



SHIPMATES

Ship Repair to Maintain Transport which is Environmentally Sustainable

As an activity, ship repair and conversion has more of the characteristics of a service industry than manufacturing. Relative to shipbuilding, it is high volume, rapid turnaround and highly unpredictable. This project is important in its structure because it is driven by the industry identifying its problems and requirements, and involves the academic community to help devise solutions.

The Shipmates project aims to ensure that the European ship repair and conversion sector improves its market share.

Background

There are 400 repair yards in Europe, mostly SMEs, working on more than a purely local level. This was established in a database development exercise as part of the Fourth Framework Programme's SYRIOS project.

The EU ship repair industry sector maintains around 40 000 ocean-going ships (around 45% of the world's total) which trade in EU waters. Of these, 50% are docked annually (the typical interval between dockings is 30 months, but some types, for example ferries, are docked annually). The industry employs over 40 000 people directly. In addition, the consistent use of sub-contractors results in a further 40 000 jobs. The EU also has a significant marine supply chain, providing the equipment and spare parts for the ships, and an additional 40 000 jobs at least can be attributed to the companies in this supply chain.

Objectives

The main objective of the project is to certify that the EU repair and conversion industry is able to improve its share of the world market and to improve the life-cycle quality of the EU fleet, reduce pollution and improve energy efficiency.

It is estimated that the development of new methods of work will allow the stakeholders to reduce manufacturing costs by 30-40% and work lead-times by 25% in the areas covered by the project. Furthermore, research activities will develop new tools, potentially leading to an increase of productivity by 5% and a repair cost reduction by 3-6%. In all cases it is expected that material costs can be reduced by 10%.

The operational goal is to produce a framework and prototype tools to assist stakeholders in the ship repair and conversion industry in achieving the main objective of the project.

The SHIPMATES project aims to promote breakthrough research and technological developments to achieve improved product quality and performance based on cost-effective and environmentally friendly production systems on a life-cycle basis. Research will seek to reduce manufacturing costs and production lead times.

An additional goal is the increase by 25% of clean maintenance, dismantling and recycling of vessels as provided by the partners.

The consortium will achieve the operational goal through the development of new methods to work in a safer, more environmentally friendly and competitive manner. This will be coupled with the delivery of the research and development results to the industry and stakeholders in a way that assists and encourages them to take practical advantage of what has been developed.

Description of work

The work packages in this proposal are intended to provide a clear understanding of best practice in the sector, and to map and simulate the range of repair and conversion yard activities, with the exception of the painting and coating range of activities, covered in the separate but related SHIP-RECOAT proposal. Then, three work packages will run simultaneously: seeking to improve the steel cutting and joining processes relevant to repair yards; improving the processes of repair and replacement of cabling and pipe work; and establishing a controlled process for converting/retrofitting ships to make their operation more environmentally friendly. The work in these three work packages will be used in a further package devoted to devising ways in which ship breaking can be carried out in Europe in a safe, environmentally friendly and economically efficient way. The project, led as it is by the AWES (European Shipbuilders and Shiprepairers Association) Group on ship repair, is emphasising the accessibility to industry of the results of the research work to be done. The AWES Group itself will take prime responsibility in the project for dissemination of project results.

Results

This project is designed to provide the ship repair sector with the tools to improve and strengthen its competitiveness within the global and regional markets. This will maximise the ability of the sector to carry out necessary repairs, refits and upgrades to ships in EU seas. The improvement in the quality of the fleet, which is the final intended outcome, has to be achieved as economically as possible. The SHIPMATES project is progressing as scheduled and the development of the described technologies, together with the comprehensive gap analysis, will help European shipyards to maintain a technological advantage over its competitors.-



Acronym: SHIPMATES

Name of proposal: Ship Repair to Maintain Transport which is Environmentally Sustainable

Contract number: TST3-CT-2004-506606

Instrument: STP

Total cost: 3,446,500 €

EU contribution: 2,150,000 €

Call: FP6-2002-Transport 1

Starting date: 01.06.2004

Ending date: 31.05.2007

Duration: 36 months

Sector: Waterborne

Objective: Advanced Design and Production Techniques

Research domain: Strategies and processes for clean maintenance, dismantling
and recycling of vehicles and vessels (Including post-Prestige package)

Website: <http://www.ssa-shipmates.co.uk>

Coordinator: Mr Sinha Ashutosh
Shipbuilders & Shiprepairers Association
Marine House, Medlake Place
UK TW20 8BF Egham

E-mail: ashutosh@ssa.org.uk

Tel: +44 (0)1915 678965

Partners: A&P Tyne Ltd
BIURO INZYNIERSKIE Eur Ing JERZY BERNATOWICZ
CETENA S.p.A - Centro per gli Studi di Tecnica Navale
FINCANTIERI - Cantieri Navali Italiani S.p.A.
Estaleiros Navais de Viana do Castelo, S.A.
Lisnave Estaleiros Navais SA
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University of Patras
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SPREEX

Spill Response Experience

SPILL RESPONSE EXPERIENCE (or SPREEX) is a Coordinated Action based on the existing experience of the response to oil spills in Europe. It is focused on the identification of research needs through the development of state of the art for issues identified by more than 25 organisations.

Background

On 13 November 2002, the Bahamian-flag tanker Prestige ran into trouble during a storm 34 km off Cape Finisterre and began to leak its cargo of 77 000 tonnes of oil. After drifting for six days along the coast, the tanker broke in half about 225 kilometres offshore, having spilled about 11 000 tonnes of oil. Several hundred kilometres of coastline were coated in oil sludge by the disaster, especially Galicia but also Asturias, Cantabria and the Basque country in Spain, as well as several departments in western France.

As a result of the accident, a post-Prestige package was agreed upon and, following a few meetings held in 2003, the SPREEX project was set up.

Objectives

The objectives of SPREEX are as follows:

- a. Identify research needs in different work programmes, and generate synergies for building new projects and partnerships between authorities and regulators, end users, universities and researchers.
- b. Develop recommendations based on an analysis of four themes:
- c. European oil-spill response management for quick response action
- d. Optimisation of resources for oil-spill response
- e. Integration and real-time updating of oil-spill information
- f. Environment effects and total costs of response approach.

Description of work

The work has been divided into seven work packages (WP).

WP0: Project management and administration

WP1: European oil-spill response management for quick response action

WP2: Optimisation of resources for oil-spill response

WP3: Integration and real-time updating of oil-spill information

WP4: Environment effects and total costs of response approach.

WP5: Recommendations for European research

WP6: Dissemination activities: newsletter, website, running two workshops.

Results

For Work Packages 1-4, state-of-the-art reports will be written, and gaps identification and prioritising will be carried out.

The other expected results are:

WP1:

- a) Spill response information and communication tools; protocols; information flow; relevant information; record and reporting; communication procedures



- b) Spill response crisis management and command
- c) Places of refuge in crisis situations
- d) OSR crisis management training, and use of simulators; legal aspects of waste management.

WP2:

- a) Vessels optimisation
- b) Equipment optimisation
- c) Robotics optimisation
- d) Spill-control equipment onboard tankers
- e) Propulsion aspects related to ships operating in seas contaminated with oil spillage
- f) Dispersants for oil response.

WP3:

- a) Real-time oil-spill detection and tracking based on airborne and satellite remote sensing technologies
- b) Real-time metrological data transfer (currents, winds, temperature, etc.)
- c) Real-time tracking of vessels and oil-spill equipment
- d) Real-time oil-spill modelling (trajectories, weathering properties, etc.)
- e) Real-time computer-aided decision support tools and alert/emergency call systems.

WP4:

- a) Methodologies for the integrated assessment of environmental and socio-economic impact
- b) Knowledge and current research on biodegradation of oil spills and bioremediation technologies
- c) Clean-up and regeneration methodologies of affected areas
- d) Places of refuge, risk and acceptance criteria plus socio-economic impact
- e) Completeness of liability legislation.

Keywords: Oil, spill



Puertos del Estado

SPREEX kick-off meeting in September 2006. Members of the project consortium.

Acronym: SPREEX
Name of proposal: Spill Response Experience
Contract number: TCA4-CT-2005-012409
Instrument: CA
Total cost: 900,000 €
EU contribution: 900,000 €
Call: FP6-2003-Transport 3
Starting date: 01.07.2005
Ending date: 30.06.2007
Duration: 24 months
Sector: Waterborne
Objective: Advanced Design and Production Techniques
Research domain: Strategies and processes for clean maintenance, dismantling and recycling of vehicles and vessels (Including post-Prestige package)
Website: <http://www.spreex.net>
Coordinator: Mr Gesé Aperte Xavier

Puertos del Estado
 Avda. del Partenón, 10
 Campo de las Naciones
 ES 28071 Madrid

E-mail: jgese@puertos.es
Tel: +34 (0)91 524 5529
Fax: +34 (0)91 524 5503

Partners: Centre de Documentation, de Recherche et d'Expérimentations sur les pollutions accidentelles des eaux FR
 HIDTMA, S.L. ES
 DHI - Water and Environment DK
 SSPA Sweden AB SE
 Consultores Investigación Tecnológica S.L. ES
 Kockums Engineering AB SE
 AURENSIS ES
 Consultrans s.a. ES
 Centro Tecnológico Del Mar, Fundación Cetmar ES
 Norsk Marinteknisk Forskningsinstitutt NO
 CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS ES
 Gateway Strategic Consultancy Services, SL ES
 Instituto Marítimo Español, S.A. ES
 ASOCIACION NACIONAL DE AGENTES MARPOL ES
 STC b.v. - Maritime Simulation Rotterdam b.v. NL
 Heriot-Watt University UK
 Mancomunidad da Área Intermunicipal de Vigo ES
 SINTEF - Stiftelsen for industriell og teknisk forskning ved Norges Tekniske Høgskole NO
 Sociedad de Salvamento y Seguridad Marítima - Centro de Seguridad Marítima Integral Jovellanos ES
 True Heading AB SE
 Instituto Nacional de Técnica Aeroespacial ES
 Centro de Estudios y Experimentación de Obras Públicas – CEDEX ES



SUPERPROP

Superior Lifetime Operation Economy of Ship Propellers

As a response to the continuous increases of fuel prices and the hydrodynamic penalties of ageing ships belonging to the project ship owners, Pescanova and Ocean, SUPERPROP will develop an easy-to-use updating strategic-costs assessment tool, indicated for fishing and tug vessels already in operation. This tool will address a range of hydrodynamic ageing causes.

Background

Many old fleets are currently operating without having updated the propulsion designs to new working conditions. Propulsion efficiency decays as time elapses inducing a rise in fuel consumption, contaminant gas pollution, engine maintenance costs and vibrations while the ship's capabilities decrease. Fishing and tugboat fleets are the largest fleets of boats operating all over the world; from the smaller boats sailing near the coast to large trawler vessels, there is a wide range of fishing vessels crossing the seas. The average operating lifetime for these kinds of vessels can be estimated at around 25 years. Since they are used to work in two different conditions (fishing and sailing to and from port and searching for fish), the design of the propulsion is conditioned by these different working conditions. With time, propulsion becomes less and less efficient. Using an appropriate economic knowledge of the actual situation of such fleets it is possible to estimate the feasible cost reduction in fuel consumption and maintenance, as well as gas emissions and vibration phenomena. Economic tools together with engineering tools will be developed for the systematic updating of the propulsive (propeller and stern area) system to the new optimum working point in order to reach the main aim of the proposal. A standard methodology for this updating procedure will be the main outcome of the project.

Objectives

The project is focused on developing maintenances strategies, in regards to ship hydrodynamics, and assess their costs in order to update the propulsion system of the targeted fleets (fishing vessels and tugboats) to their new working conditions after years of operation. Improvements in fuel consumption rates and reductions in maintenance costs are expected.

The other SUPERPROP objectives are:

- to increase the knowledge about the state of the art in old ships' propulsion and their ageing process
- to use the knowledge in correlation methods to extrapolate results obtained from model testing to full-scale
- to apply CFD codes to predict propeller behaviour, to collate computational and model testing results, and to estimate the prediction accuracy of both methods
- to study the economic profitability of old fishing and tugboat fleets and the savings that could be reached in fuel consumption, maintenance costs and contaminant gases emission by optimising the maintenance strategy from the hydrodynamic point of view.

Description of work

First, a review of fishing and tugboat technology and operation economy of the owners' fleet will be performed. Information from the real situation of old ships' working conditions (economic and technical) will be collected. The new ship design condition is not valid from a redesign point. Hence, flow around the selected vessels, reproducing the full-scale measurement conditions will be simulated in order to have an

improved estimation of the propulsive coefficients for the updating activities to be performed.

The designs will be done by different partners and optimum solutions will be taken into account for model testing. A generalisation of the obtained results will be done in order to use them for ship owners in other cases. Model testing activities will be carried out in the different facilities of the consortium. The aim of these activities is to assess more accurately the performance of new designs and redesigns before full-scale manufacturing. Full-scale trials aimed at getting real-scale data from the study cases will be performed. Once the modifications have been put into practice, another series of trials will be carried out in order to check the improvement of the performance.

Analysis activities will be done by studying the decrease with time of the propulsion efficiency in the test cases and the eventual rising after the updating activities. The manufacture of new designs or the modification of old ones will follow in time. Activities related to updating criteria, generalisation of results, as well as presenting the technical results of the project in an easy-to-use form, are the last tasks to be accomplished.

Results

The main output of the project will be a techno-economical model, which will permit the devising of maintenance strategies for tug and fishing vessels already in operation, taking into account a range of ageing effects. An indirect result will be a reduction of fuel consumption, which is associated with fewer costs and less gas emissions. The results that will be obtained from SUPERPROP focus on sustainable development. Most of the high-power thermal engines are working in ships, so the aim of improving the efficiency in this field is clearly an important factor to be considered in the contribution to air pollution.

The improved knowledge of the decreasing performance over time of a vessel's operating life will help in the first stages of this project. Therefore, SUPERPROP contributes to the 'Advanced design and production techniques' objective. This will mean a benefit for European shipping within the shipbuilding, supplying industry, consultancy and fishing industry sectors. Concentration on advanced propulsion design, which relies on technology development, will enable the industries to stay competitive.

Keywords: Ship hydrodynamics, ship economy, ship propulsion, techno economic model, ageing processes, tug vessels, fishing vessels



Pescanova S.A.

Fishing vessel Illa, a SUPERPROP test case



Ocean S.r.L.

Tug vessel Val, a SUPERPROP test case



Acronym: SUPERPROP
Name of proposal: Superior Lifetime Operation Economy of Ship Propellers
Contract number: TST4-CT-2005-516219
Instrument: STP
Total cost: 1,931,153 €
EU contribution: 999,841 €
Call: FP6-2003-Transport 3
Starting date: 01.05.2005
Ending date: 30.04.2008
Duration: 36 months
Sector: Waterborne
Objective: Advanced Design and Production Techniques
Research domain: Strategies and processes for clean maintenance, dismantling
and recycling of vehicles and vessels (Including post-Prestige package)
Website: <http://canal.etsin.upm.es/superprop/>
Coordinator: Prof. Pérez-Rojas Luis
Universidad Politécnica de Madrid
ETSI Navales, Avda Arco de la Victoria s/n
ES 28040 Madrid
E-mail: antonio.souto@upm.es
Tel: +34 (0)91 336 71 56
Fax: +34 (0)91 544 21 49
Partners: VTT Technical Research Centre of Finland
Istituto Nazionale per Studi ed Esperienze di Architettura Navale
SISTEMAR, S.A.
Norwegian Marine Technology Research Institute
Ocean S.r.L.
Pescanova S.A.
CONSTRUCCIONES NAVALES PAULINO FREIRE S.A
FUNDICIONES PORTUGUESAS LIMITADA

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ShipDismantl

Cost-Effective and Environmentally Sound Dismantling of Obsolete Vessels

This research project addresses the ship-recycling problem by developing innovative dismantling and recycling procedures, developing a decision support system (DSS) for the ship-breaking industry and by validating the proposed tools and methodologies through a real case study.

Background

With its last expansion, the European Union now has the largest fleet in the world. Therefore the problem of ship recycling in the EU is important, particularly after the adoption of new regulations that ban the sailing of single hull tankers which do not conform to the new MARPOL convention. This new situation covers worldwide shipping and there is the prospect of these regulations being extended to bulk carriers. This means many ship owners will be obliged to withdraw their ships gradually and replace them with new double-hulled ones. It is therefore evident that the demand for ship recycling is expected to rise in the near future. Despite its importance, the vast volume of ship-dismantling activities is performed in a rather unacceptable manner. The whole procedure is rather bottom based, far from being optimal, environmentally friendly and labour considerate. Workers are unaware of the hazards to which they are likely to be exposed. A number of fatal accidents have occurred in the past as a result of explosions, fires and heavy metal plates falling from the upper parts of the ships. Moreover the local environment is heavily polluted. From the above, one can easily conclude that the practices currently followed are far from optimal with a severe impact on both the environment and the workers; the related processes are also ineffective and inefficient.

Objectives

The specific objectives of the project are:

- to develop generic guidelines for innovative ship-dismantling and recycling operations consisting of the optimal design of a prototype ship-dismantling site, the optimisation of ship-breaking facilities and dismantling processes with respect to environmental, cost and energy issues, as well as to issues concerning occupational hazards (related to workers' safety and health).
- to amend, according to the above generic guidelines, already operational ship-breaking yards, which are currently active in dismantling. The final designs will be optimised through the use of dynamic simulation software tools.
- to develop a decision support system (DSS) for the ship-breaking industry, which will take into consideration the existing facilities and dismantling methodologies of the given ship breaker, the type, history and the particular characteristics of the ship and the third parties' reports (including the inventory of hazardous material on board).
- to support the decision of acceptance (or not) of a given obsolete vessel for dismantling at a given site, based on the comparison of the available against the required infrastructure.
- to validate the proposed IS tools and methodologies through real case studies.



Description of work

The project is divided into seven work packages (WP).

WP1 concerns project management and coordination issues.

WP2 is devoted to a thorough investigation into the identification and assessment of all the parameters involved in dismantling, such as strategies, methodologies and procedures, hazardous materials, health and safety problems, cost and energy parameters, and new technologies which may be introduced to the ship-breaking industry and contribute to environmental, health and safety issues.

WP3 concerns research towards the production of guidelines for the establishment of environmental, waste treatment, and occupational safety and health management plans.

WP4 deals with the development of innovative dismantling strategies and procedures. More specifically, a generic approach to the optimal design of a prototype-dismantling site is developed in the first part of the work package, which covers layout and processing issues. The proposed design is performed in a collaborative way, through experimentation by dynamic simulation.

WP5 is devoted to the development of a fully operational decision support system for ship-breaking processes (DSS-SBP).

WP6 will first deal with the amendment of the existing infrastructure of a full and a partial dismantling site, according to the output provided by WP4.

Finally, WP7 includes activities towards the proper and effective exploitation and dissemination of the scientific results and technology transfer.

Results

Some important project deliverables are:

1. Processes for safe removal of hazardous substances and their secure disposal
2. Environmental, occupational safety and health management plans
3. Generic guidelines for optimal ship-breaking facilities
4. DSS-SBP analysis
5. Optimal design and re-organisation of active dismantling sites dealing with full and partial dismantling
6. Implementation of the containment system for the full dismantling site
7. Real case application, assessment for full dismantling
8. Results analysis of both improved sites and DSS.

The results of the project are expected to have a significant impact if adopted by ship-breaking yards. The environmental pollution will be decreased and labour safety will improve. Moreover on a policy-making level, the project's results will stress the importance of the 'green passport' concept, or at least the existence of an inventory of hazardous materials on the ship to be dismantled. The DSS tool that is going to be developed is expected to assist ship-breaking yards to the acceptance or not of candidate ships to be broken in order to ensure a more sound and environmentally friendly dismantling procedure.

Acronym:	ShipDismantl
Name of proposal:	Cost-Effective and Environmentally Sound Dismantling of Obsolete Vessels
Contract number:	TST4-CT-2005-012561
Instrument:	STP
Total cost:	2,619,188 €
EU contribution:	1,570,000 €
Call:	FP6-2003-Transport 3
Starting date:	01.02.2005
Ending date:	31.01.2009
Duration:	48 months
Sector:	Waterborne
Objective:	Advanced Design and Production Techniques
Research domain:	Strategies and processes for clean maintenance, dismantling and recycling of vehicles and vessels (Including post-Prestige package)
Website:	http://www.shipdismantl-project.org/home
Coordinator:	Mr Pirinis Athanasios Naftosol SA Chrisostomou Smirnis 68 GR 18540 Pireaus
E-mail:	info@naftosol.gr
Tel:	+30 (0)210 4122183
Fax:	+30 (0)210 4114965
Partners:	Leyal Turizm Insaat Mobilya Sanayi ve Ticaret Ltd. Sti. TR University of Strathclyde UK MEDIMETAL SA SE University of Patras GR Kingston Computer Consultancy Limited UK Indian Institute of Technology, Bombay IN



WIDEM

Wheelset Integrated Design and Effective Maintenance

The economic efficiency and competitiveness of the rail transportation mode depends on the safety, availability and maintenance of its individual highly loaded structure components, such as railway wheelsets.

Background

The idea of starting this project was stimulated by the application of the new European design standards.

As the verification of full-scale fatigue limits of wheels and axles becomes mandatory, testing methods and interpretation methods of the results were either not defined or not generally consistent throughout European laboratories.

The technical information that can be found in the new European standards comes from the previous UIC norms: for example, in the case of axles, it is based on the so-called A1N steel grade, which was extensively tested in the 1970s by SNCF laboratories.

Over the past years, these norms were proven to be safe when using this kind of steel grade.

In the last 20 years, many new vehicles were put into service achieving higher and higher speeds, and vehicle weight reduction became necessary for the majority of European train manufacturers.

In Italy, during the 1980s, the former Fiat Ferroviaria, together with Lucchini, started to use an alloy steel grade (30NiCrMoV12) for the new axle of the first Italian tilting train.

In this case, design methods based on the manufacturer's internal experience were used to handle this material and the applied design was proven to be safe by years of service.

The new European standards enable the use of materials different from E1N, but not much of the recently gained experience, and knowledge in using new materials and in designing new advanced vehicles, were considered when writing these norms.

For the reasons mentioned above, it becomes difficult for today's designers to define more precise load spectra and material characteristics, which can be accepted by an authority responsible for approving the qualification of a new component.

Objectives

Combining inputs from reliable service measurement of wheel-rail forces carried out by means of an innovatively instrumented wheelset and an extensive assessment of actual material properties, an endurance strength design concept will be developed and validated through a comprehensive testing programme on full-scale wheelset prototypes. A flexible numerical tool is also proposed as an upgrading of existing knowledge.

Additionally, the project will develop and evaluate alternative NOT (non-destructive testing) techniques that allow a greatly increased detection probability and a size estimation of cracks to set up a schedule for NOT periodic inspection. The research work will lead to the definition of wheelset design procedures and maintenance methods to be implemented into existing standards for a quick and easy optimisation of the process.

Description of work

- The WIDEM project has developed an innovative measuring wheelset using up-to-date wireless data processing and transmission technology. A dynamic calibration is being carried out by using a unique roller rig on which a running condition near to reality can be performed.
- Test campaign measuring loads on two different kind of vehicles – the high-speed tilting train (the Czech Pendolino from Alstom) and the 30 axle-tonne freight vehicles from MTAB travelling across Sweden.
- Definition of a rigorous methodology to test the fatigue resistance of full-scale axles and wheels.
- Research on fretting fatigue phenomena, which takes place under axle seats, by taking into account seats and section transition geometry, press fit pressure and axle/hub slip.
- Creation and validation of an innovative methodology to design and validate wheelsets. This methodology is based on load spectra and S-N curve for the material in the full-scale condition.
- A new wheelset maintenance strategy based on more accurately defined inspection periods by taking into account the actual probability of NDT equipment to detect defects and cracks of defined dimensions, and full-scale crack propagation tests performed on axles.

Results

- At this stage a new real-time measurement methodology of wheel-rail contact forces based on the acquisition of axle deformations having a bandwidth of about 70Hz has been developed.

The development of a standard procedure for processing load (or stress) measurements will allow the computation of a wheelset design mission profile.

- The innovatively instrumented wheelset developed in WP1 has been mounted on a Czech Pendolino vehicle and will be used to determine the load spectra. Specific measurements will be made by running on switches and turnouts.
- The possibility of combining full-scale experimental fatigue tests resulting from a current testing campaign together with a FEM model representing the actual longitudinal stresses and micro-slips between hub and seat can enable the definition of design criteria against fretting fatigue.

This work is presently under progress for A1N, A4T and 30NiCrMoV12 steel grades.

- Full scale tests are being carried out on the Lucchini test rigs to find the fatigue limit at 10^7 cycles for different diameter ratios with the aim of validating the above described fretting fatigue model and of defining the 'D/d border'. Below this value, cracks will appear on the axle seat; above this value, cracks will appear on the body fillet. Such a value will increase with the fatigue resistance of the steel grade so that it will be appropriate to define the optimal D/d for each kind of material.
- Different inspection methods are being applied on both fatigue tested axles and real in-service cracked axles to find the probability of inspection related to crack or defect dimension.
- Inspection intervals: significant work has been completed in deriving crack growth rate parameters under both plane and rotating bending conditions.

Keywords: Railway, wheelset, loads, design, materials, NDT



Acronym: WIDEM
Name of proposal: Wheelset Integrated Design and Effective Maintenance
Contract number: TST4-CT-2005-516196
Instrument: STP
Total cost: 3,766,500 €
EU contribution: 1,949,900 €
Call: FP6-2003-Transport 3
Starting date: 01.01.2005
Ending date: 31.12.2007
Duration: 36 months
Sector: Rail
Objective: Advanced Design and Production Techniques
Research domain: Strategies and processes for clean maintenance, dismantling
and recycling of vehicles and vessels (Including post-Prestige package)
Website: <http://www.widem.org>
Coordinator: Dr Cervello Steven
Lucchini Sidermeccanica SpA
Via Oberdan 1/2
IT 25128 BRESCIA
E-mail: s.cervello@lucchini.it
Tel: +39 035 963483
Fax: +39 035 963483
Partners: Union of European Railway Industries
ALSTOM Ferroviaria
Dynamics, Structures & Systems International
Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
Microsystems SRL
Malmtrafik i Kiruna AB
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Czech Railways - Railway Research Institute

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ARCHES

Assessment and Rehabilitation of Central European Highway Structures

The overall goal of the proposed project is to develop ways of raising the standard of highway structures in the new Member States and Central and Eastern European Countries to the level necessary for their full economic integration into the EU and for the future development of the Union.

Background

Since 1 May 2004, the European Union road network, and accordingly the stock of highway structures, has increased significantly. Ten new Member States have brought nearly 924 500 kilometres of roads into the European network. These countries have huge numbers of highway structures, which, mainly due to their history, do not constitute a solid and trouble-free infrastructure. Structures have been affected by a lack of maintenance, regular overloading and even by the use of poor quality materials for construction. In the near future, the same structures have to face increasing volume and weight of traffic and will therefore have to be reliably assessed and, if necessary, improved or replaced. All these processes will take time and have to be realised in a sustainable way for the economy, for society and for the environment. No doubt the majority of European road infrastructures have reached an age where improvement costs (several billion euros annually) constitute a major part of infrastructure spending. This is hindering the development of the network by absorbing much-needed funds. This project will develop new construction concepts for conservation (assessment, improvement and preventative maintenance) of highway structures.

Objectives

The overall goal of the project is to reduce the gap in the standard of highway infrastructure between Central and Eastern European Countries (CEEC) – particularly new Member States – and the rest of the EU. This key problem will be addressed by a combined approach:

- developing more appropriate tools and procedures to avoid unnecessary interventions (repairs/replacements) in structures and prevent the development of corrosion by simpler and less expensive techniques
- implement faster, more cost-effective and longer lasting repair or strengthening techniques of sub-standard and unsafe bridges
- aggressive dissemination of results and general best practice to the key stakeholders.
- Another important objective of this project is to help society and politicians to understand the need for sustainable maintenance of their road networks, together with their engineering infrastructure, and to help managers of infrastructure to spend their resources in a more optimal way.

Description of work

To achieve its scientific and technological objectives, this project focuses on structural assessment and monitoring strategies to prevent deterioration and optimum improvement of highway structures by complementary techniques. It is organised in four technical work packages (WP), numbered 2-5, with the following conceptual approach:

WP2: optimise the use of existing infrastructure through better safety assessment and monitoring procedures which will avoid interventions, i.e. avoid unnecessarily replacing or improving structures that are in fact perfectly safe.



WP3: monitor and prevent corrosion of existing reinforcement and develop innovative new reinforcement materials that are highly resistant to corrosion.

WP4: strengthen the infrastructure of bridges by means of bonded reinforcements

WP5: harden highway structures with ultra high performance fibre-reinforced concretes applied in severely exposed zones to dramatically increase their durability.

Results

There are currently great disparities in the transport infrastructure between the new Member States and Central and Eastern European Countries on the one side and the EU-15 on the other. A key part of addressing the economic imbalances within the enlarged Union consists of bringing the transport infrastructure in the new Member States up to a level that will improve durability of existing highway structures and accommodate higher traffic loads and densities without jeopardising their structural safety. Although replacement of the most severely deteriorated structures will still be necessary, ARCHES will provide the means to get more from existing bridges. The project will develop more efficient assessment techniques, new strategies to prevent/monitor the influence of overload, and new and improved repair techniques. As a result, the new Member States and Central and Eastern European Countries will obtain tools to spend their limited maintenance resources in a more optimal way. Better assessment and less disruptive repair techniques will prevent excessive and unnecessary repair or demolition of bridges. This will:

- reduce energy consumption for cement production
- reduce production of demolition waste
- reduce traffic delays and, consequently, fuel consumption
- reduce other adverse impacts on the environment (noise, air pollution).
- In a practical sense, the end users will obtain several guidelines on damage assessment and the repair of structures.

Keywords: Transport, highway structures, bridge assessment, cathodic protection, ultra high performance concrete



Acronym:	ARCHES
Name of proposal:	Assessment and Rehabilitation of Central European Highway Structures
Contract number:	TST5-CT-2006-031272
Instrument:	STP
Total cost:	2,942,413 €
EU contribution:	1,799,930 €
Call:	FP6-2005-Transport 4
Starting date:	01.09.2006
Ending date:	31.08.2009
Duration:	36 months
Sector:	Road
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Website:	http://www.ibdim.edu.pl
Coordinator:	Mr Tomasz Wierzbicki Instytut Badawczy Dróg i Mostów, Road and Bridge Research Institute Jagiellonska 80 PL 03-301 Warsaw
E-mail:	twierzbicki@ibdim.edu.pl
Tel:	+48 (0)22 675 49 83
Fax:	+48 (0)22 811 30 97
Partners:	Zavod za gradbenistvo Slovenije Slovenian National Building and Civil Engineering Institute SI Centrum dopravního výzkumu CZ Universitat Politècnica de Catalunya ES Ecole Polytechnique Fédérale de Lausanne CH University College Dublin IE Forum of European National Highway Research Laboratories BE LBV Uitvoering b.v. NL Autostrade per l'Italia S.p.A. IT Faculty of Civil Engineering, University Zagreb HR Salonit Anhovo, Building materials, Joint Stock Co. SI



AVATARS

Advanced Virtual Agents for Testing the Accessibility of Rail Stations

AVATARS will develop a range of innovative technologies to simulate passenger movements. The tools will enable a population of structures with large groups of realistic, interacting agents in a series of realistic scenarios. To achieve this, AVATARS will develop three major software components. The evaluation of these tools will be carried out under a series of case studies, developed throughout the project.

Background

Current rail transport infrastructure design is led by aesthetics and prescriptive regulations. Better terminal design would increase passenger throughput and reduce overcrowding but it is very difficult to design for performance without accurate simulation tools. Existing tools are available but none specifically for general circulation movements.

AVATARS falls under the Objective "Advanced Design and Production Techniques". Within the overall objectives of area 2, the project addresses the need to "reduce manufacturing costs by 30-40% and production lead times by 25%" by the development of a tool to provide 'right first time' manufacturing of multimodal transport infrastructure. Specifically, AVATARS addresses research domain 2.7 by providing "design technologies to improve vehicle interfaces with transport infrastructure and other vehicles/vessels from the same and different transport modes". This is accomplished through the development of simulation tools to optimise the comfort and flow of passengers within the transport interchange environment. These tools will be developed to consider not just the terminal but also the area immediately outside the terminal, covering interchanges to other modes of transport. Linking with the overall aims of the objective, AVATARS will assist in developing new construction concepts for transport infrastructure, specifically improvements in safety, comfort and efficiency. Lastly, the project will examine issues to provide design techniques used in vehicle infrastructure creation aimed at developing safe and comfortable products with reduced operational cost.

Objectives

The principal objective of AVATARS is to develop a simulation tool to provide designers with a useful performance measure for train station designs which in turn will be able to improve their design based on this feedback. The improvement of a terminal design can be measured in four ways:

1. Improvement in the station's ability to function in unusual or emergency situations
2. Improvement in flow rates around the station
3. The ability of the station management to organise the movement of passengers so as to provide easy means of access while exposing them to the facilities available
4. Reduction in the number of negative emotions experienced by passengers.

These measures will allow for a further level of functionality to be built into an otherwise well-designed rail terminal. In order to achieve the above objectives, a number of quantifiable sub-objectives must be completed:

- AVATARS will develop a scenario generator capable of creating a population of 500 unique agents.
- AVATARS Agents will be capable of interacting in realistic groups of up to 20 individuals.
- The agents will be capable of handling up to five consecutive objectives in one session, including both pre-set objectives and dynamic objectives emerging from the simulation.

Description of work

The AVATARS tool will innovate in a number of distinct areas:

- Circulation-specific simulation tools covering new approaches to information dissemination and group communication
- Unique agent behaviours linked to internal emotional states
- Innovative scenario generation facilities for rapid prototype evaluation
- Intelligent software to assist users in identifying the root causes of terminal performance issues.

The AVATARS consortium will be developing innovative technologies and, consequently, intends to protect its developments through the use of patents. The desire to patent work means that some of the deliverables for the project will be disseminated sparingly until the information contained in them is protected.

Results

Below is a list of the deliverables that will be produced by the end of the project:

- Report on data requirements and collection design
- Report on agent interaction requirements and specification
- Report on support tools requirements and specification
- Report on case studies data collection
- Report on exodus case analysis
- Report on case studies definition
- Agent interaction prototypes
- Scenario generator prototype
- Advisory module prototype
- Report on testing procedures and quality assessment criteria
- Report on test results and stage 2 recommendations
- Final agent interaction prototypes
- Final scenario generator prototype
- Final advisory module prototype
- Functionality report and further development plan
- Final integrated prototype
- Final evaluation report.

Keywords: Intermodal transport, agent architecture, ship design, terminal design



Acronym: AVATARS
Name of proposal: Advanced Virtual Agents for Testing the Accessibility of Rail Stations
Contract number: TST4-CT-2005-012462
Instrument: STP
Total cost: 1,133,323 €
EU contribution: 700,000 €
Call: FP6-2003-Transport 3
Starting date: 01.04.2005
Ending date: 30.09.2007
Duration: 30 months
Sector: Rail
Objective: Advanced Design and Production Techniques
Research domain: Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Website: <http://www.bmtproject.net/avatars/>
Coordinator: Mrs Gyngell Jenny
BMT Transport Solutions GmbH
Karpfangerstrasse 14
DE 20459 Hamburg
E-mail: jennyg@bmtmail.com
Tel: +49 (0)40 364780
Fax: +49 (0)40 364799
Partners: University of Salford
Buro Happold Polska Sp.s.o.o
University of Greenwich
Autoritat del Transport Metropolità
Ferrocarrils de la Generalitat de Catalunya

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CERTAIN

Central European Research in Road Infrastructure

CERTAIN is a CA that aims to facilitate integration of the new Member States and other Central European countries into the established research and development community of the EU. The project will provide the clustering environment for EC research projects on road infrastructure.

Background

In line with the European Research Area (ERA), there are two key pillars of the Lisbon Strategy that foster structured, optimised and integrated R&D efforts in the area of European road research. These are the two European technology platforms:

- European Road Transport Research Advisory Council (ERTRAC), which gathers all relevant stakeholders of the road transport sector, and
- European Construction Technology Platform (ECTP), which includes specific elements on transport and road infrastructure issues.

Partners from the new Member States, and even more so from the other Central and Eastern European countries (CEEC), have contributed very little to these activities. The main reasons were lack of experience in European co-operative research, financial constraints (difficulties in obtaining national contributions) and poor comprehension of English by the users of the results, which prevented the main results of the European research projects being properly implemented.

This has been happening despite road transport being the primary means of mobility for all European people and goods, including the new Member States and the CEEC. It is crucial for the economic and social development of the entire continent that the road network is in good condition throughout Europe. CERTAIN will assist in overcoming these difficulties and pave the way for more efficient incorporation of the new Member States and CEEC partners into the European research activities.

Objectives

The main objectives of the CERTAIN Coordination Action are:

1. To provide a platform for coordinated work and efficient dissemination of results of the two STREP proposals on road infrastructure, dedicated to the new Member States: SPENS (Sustainable Pavements for new Member States) on pavements and ARCHES (Assessment and Rehabilitation of Central European Highway Structures) on highway structures.
2. To establish and reinforce links with stakeholder in the new Member States and CEEC by organising dedicated workshops and providing the key project deliverables in national languages.
3. To set the route for more efficient incorporation of new Member States and Central and Eastern European countries partners in future European research by organising training courses for the research project managers from these countries.

Description of work

The following tools will be applied to achieve these objectives:

1. Formation of the CERTAIN cluster in order to:
 - establish and maintain efficient links between the new Member States' projects and other relevant projects from the area of road infrastructure (Heavyroute, INTRO, NR2C, SILENCE, FORMAT, SAMARIS), and
 - register the end-users from the new Member States and CEEC, and organise their activities.

2. One of the major reasons that the results of European research have limited effect in the new Member States and CEEC countries is the limited proficiency in English at the level of the end-users. This will be addressed through:
 - development of a multi-lingual web-based platform, to provide links with the end-users, and the means for consistent and efficient promotion of the results
 - organisation of regional workshops in national languages. The participation of end-users from the new Member States and CEEC at international conferences is far too low to allow for the efficient dissemination of European research results.
 - Translation of the key projects' documents (executive summary reports) will bring the results closer to the end users and will facilitate their faster transition into practice.
3. Organisation of project management training will recruit potential coordinators for major European research projects. At present, obtaining qualified people from the new Member States and CEEC for these positions in the area of road infrastructure is a serious challenge.

Results

The expected CERTAIN deliverables are:

1. Project brochure, website and posters.
2. Multi-lingual web platform for the clustered projects, in order to bring their results closer to the end-users.
3. Establishment and maintenance of the database of end-users from the new Member States and CEEC, in order to collect and maintain information about experts from these countries in the area of road infrastructure.
4. Organisation of five national workshops in the languages of the organising countries.
5. Organisation of training programmes for managers of the research projects, to qualify people for the management of the future European research projects.
6. Translation of the key reports (executive summaries) of the clustered new Member States projects in up to five different languages of the new Member States and CEEC to be easily understood by the broadest end-users' society.
7. Joint dissemination materials for clustered projects to facilitate spreading the results of the clustered projects at different conferences and workshops.
8. Presentation of cluster activities at the main European transport research events, such as the European Research Arenas in Gothenburg in 2006 and Ljubljana in 2008.

Keywords: Road transport technology, road engineering, construction technology, new Member States, infrastructure



Alen Znidaric

The main topic of CERTAIN is road infrastructure

Acronym:	CERTAIN	
Name of proposal:	Central European Research in Road Infrastructure	
Contract number:	TCA5-CT-2006-031457	
Instrument:	CA	
Total cost:	750,000 €	
EU contribution:	750,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.06.2006	
Ending date:	31.05.2010	
Duration:	48 months	
Sector:	Road	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures	
Website:	http://certain.fehrl.org/	
Coordinator:	Mr Znidaric Aleš Zavod za gradbeništvo Slovenije Dimiceva 12 SI 1000 Ljubljana	
E-mail:	ales.znidaric@zag.si	
Tel:	+386 (0)1 2804 207	
Fax:	+386 (0)1 2804 484	
Partners:	Instytut Badawczy Dróg i Mostów, Road and Bridge Research Institute	PL
	Centrum dopravního výzkumu	CZ
	Forum of European National Highway Research Laboratories	BE



EcoLanes

Economical and Sustainable Pavement Infrastructure for Surface Transport

Infrastructure for surface transport will be developed using slip forming techniques based on existing asphalt laying equipment and steel fibre reinforced concrete. The new construction concept will reduce construction costs, time and energy consumption, minimise maintenance and make use of waste materials.

Background

A massive and targeted investment is currently required for the rehabilitation and extension of the European surface transport infrastructure, to provide a system able to respond to the needs of the enlarged European Union (EU), for the benefit of the single market and economic and socio-economic integration. The attainment of these objectives can be facilitated if the construction and maintenance costs, as well as the production lead-times, of the surface infrastructure are minimised.

The main element of surface transport infrastructure is the pavement, which can be either asphalt or concrete. With increasing oil prices the future of asphalt pavements on deep foundations is less certain, due to cost as well as to political and environmental concerns, whereas concrete pavements appear to be more cost-effective than asphalt pavements, as they can reduce the foundation layers and decrease or eliminate the asphalt topping.

However, to provide a truly sustainable solution for concrete pavements, it is necessary to reduce the energy consumption during the production of concrete pavement. The main energy component of concrete pavements (from extraction of raw material through to the placement of the pavement) is the energy used for the manufacture of cement and steel reinforcement. The use of recycled materials appears to be a promising solution for reducing the energy consumption.

Objectives

EcoLanes' main objectives are to develop, test and validate steel fibre reinforced concrete (SFRC) pavements that will contribute towards the strategic objectives of the thematic priority area of Sustainable Surface Transport. EcoLanes aims to reduce construction costs in the range of 10-20%, reduce construction time by 15% and energy consumption by up to 40%.

EcoLanes also aims to address EU societal and policy objectives, such as to improve the environmental impact with regard to emissions and noise, and improve the safety of the surface transport infrastructure.

New EU Member States and Candidate Countries have probably the greatest need and potential for new surface infrastructure and, hence, EcoLanes will also target the environments of a new Member State (Cyprus) and two Candidate Countries (Romania and Turkey).

Description of work

EcoLanes aims to integrate simplicity and innovation to ensure the timely and cost-effective implementation of its findings into the construction and maintenance of surface transport infrastructure. Three key research areas will be addressed to reach the EcoLanes objectives.

1. Tyre recycling: Techniques and equipment will be developed for post-processing steel fibres extracted from tyres, to arrive at fibres suitable for incorporation in concrete.
2. Concrete engineering: Development of steel fibre reinforced concrete (SFRC) mixes suitable for slip forming and roller compaction, which have reduced energy requirements and use recycled materials. Both industrial fibre reinforcement and fibres from recycled tyres will be used, as well as low energy cements, pulverised-fly-ash and recycled aggregates.
3. Transport engineering: The concept of the long lasting, rigid road pavement (LLRRP), made of low energy concrete reinforced with steel fibres, will be developed and technically validated on a circular accelerated testing facility. Numerical analyses and parametric studies will be carried out to develop design models for LLRRPs.

Results

One of the expected results of EcoLanes is the development of fibre reinforcement obtained from waste tyres. This will have a positive effect on the European tyre recycling industry, which currently does not have a sustainable solution for the utilisation of the steel cord extracted from tyres.

Techniques and equipment will also be developed for mixing steel fibres into wet and dry concrete mixes. These will minimise the need for using conventional steel rebars and will therefore have a positive impact on the construction costs of concrete pavements.

The development of design models for LLRRP will effectively facilitate the utilisation of this new concept.

Furthermore, demonstration roads will be constructed in four European countries to validate the results of EcoLanes.

Keywords: Tyre recycling, steel fibre reinforced concrete, concrete pavements, roller compacted concrete, LLRRP



Acronym: EcoLanes

Name of proposal: Economical and Sustainable Pavement Infrastructure for Surface Transport

Contract number: TST5-CT-2006-031530

Instrument: STP

Total cost: 2,477,223 €

EU contribution: 1,700,000 €

Call: FP6-2005-Transport 4

Starting date: 01.10.2006

Ending date: 30.09.2009

Duration: 36 months

Sector: Road

Objective: Advanced Design and Production Techniques

Research domain: Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures

Website: <http://ecolanes.shef.ac.uk/index.htm>

Coordinator: Prof. Pilakoutas Kypros
The University of Sheffield
Firth Court, Western Bank
UK S10 2TN Sheffield

E-mail: k.pilakoutas@sheffield.ac.uk

Tel: +44 (0)114 2225065

Fax: +44 (0)114 2225700

Partners: Akdeniz University
Technical University 'Gheorghe Asachi' Iasi
European Tyre Recycling Association
Aggregate Industries UK Ltd
Antalya Greater Municipality
Compania Nationala di Drumuri Nationale din Romania, prin DRDP Iasi
Adriatica Riciclaggio e Ambiente s.r.l.
Ministry of Communications and Works – Cyprus, Public Works Department

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HP FUTURE-Bridge

High-Performance (Cost Competitive, Long Life and Low Maintenance) Composite Bridges for Rapid Infrastructure Renewal

The overall objective of the project is the development of a high-performance and cost-effective construction concept for bridges based on the application of fibre-reinforced polymers (FRP) for rapid infrastructure renewal in the new Member States (NMS) and beyond.

Background

Over the last 50 years, the EU's transport networks infrastructure expenditure related to its GDP has declined by almost 50%. This has resulted in an aged infrastructure, much of which has been built with the technologies and systems developed in the late 19th or early 20th centuries. The consequences are clearly visible through social and economical impacts: traffic delays, congestion, deficient bridges and structures, deteriorating roads and motorways.

To achieve economical, environmental and social objectives, the infrastructure renewal must be done in a rapid, cost-effective, high-quality and sustainable way by reducing production lead-time, manufacturing and maintenance costs, and the environmental impact by lowering energy consumption, waste production and recyclability, and at the same time by enhancing new business models and specialised jobs. The bridges are important elements in these networks, in strategic and logistical terms as well as in economical terms. To avoid the bridges becoming bottlenecks during the upgrading of these infrastructures, cost-effective, quick and sustainable construction concepts and technologies are needed.

Objectives

The overall objective of the project is the development of a new high-performance and cost-effective construction concept for bridges based on the application of fibre-reinforced polymers (FRP) for rapid renewal, providing a longer lasting repair for these infrastructures in the new Member States.

The essential technical elements of the new concept are:

- deck and beams of hybrid FRP (carbon-glass/thermoset-thermoplastic) composites and pillars of hybrid FRP concrete. The deck concept by itself will be a solution for the renovation of existing deteriorated infrastructures
- multi-objective material optimisation for the intended design
- Multivariable optimisation criteria that essentially attempt to compromise design objectives
- performance-based simultaneous engineering and manufacturing
- on-site industrialisation
- flexible design and manufacturing for the one-off, small series and mass customisation
- development of mobile manufacturing lines
- new hybrid material combinations for improved fire and high-temperature resistance and recyclability.

Cost effectiveness will be reached by optimising material and design, reducing manufacturing costs and lead-times. High performance will be achieved by performance-based design and manufacturing, and new materials. Energy efficiency will be improved and environmental impact reduced in the whole life cycle of the bridge by the reduction of energy consumption in the on-site manufacturing process and transport of materials, and by improving recyclability through new thermoplastic resins.

Description of work

The HP FUTURE-Bridge project involves research to be carried out to be able to achieve our main objective: competing against bridges made of conventional material through the use of advanced composite materials.

First of all, and in order to be competitive, a life cycle cost model has to be done that will evaluate the sustainability of fibre-reinforced polymer bridge decks. This study, however, will seek to create an even more inclusive analysis by expanding the definition of costs to include social costs, particularly those that are usually ignored in cost analysis studies.

The requirements for new Member States (and others), with their specific cultural, social and environmental idiosyncrasies, will be taken into account to guarantee the viability of this technical solution. In order to achieve this purpose, aspects such as sustainability and life cycle costs will be managed.

The new concept has to be developed, dealing with the overall aspects (components and innovation necessities) of this idea in composite bridges. In order to compare the new concept solution versus the traditional one (concrete and steel), some critical and independent parameters will be used, and to find the best solution, multi-criteria decision-making (MCDM) tools will be used. The HP FUTURE-Bridge concept goes together with the development of a performance-based design, which deals with design methodology, modelling, dynamic behaviours and design versus manufacturing interactions, and a performance-based manufacturing, defining a new manufacturing methodology in order to be effective in reducing manufacturing costs and production lead-times. As well as design and manufacturing, advanced materials have to be developed and optimised to find a cost-competitive design. We will also do research to provide suitable solutions to fire problems through suitable fire-protective coatings.

Results

The extensive research programme will be finally assessed through the construction of pilot bridge solutions. These will demonstrate HP FUTURE-Bridge to be a high-performance and cost-competitive solution for infrastructure renewal and new bridge constructions, and this will allow us to expand the idea and create a real business opportunity for HP FUTURE-Bridge through a competitive concept that will face the challenges of the future. Two pilot bridges solutions, one in Slovenia and one in Spain, will be constructed and monitored in order to assess the feasibility and potential in the market of the HP FUTURE-Bridge project and the HP FUTURE-Bridge solution.

Keywords: Bridge, composites, FRP, renewal, construction



Acciona's previous experience - the first carbon-fibre bridge constructed in Spain

Acronym:	HP FUTURE-Bridge
Name of proposal:	High-Performance (Cost Competitive, Long Life and Low Maintenance) Composite Bridges for Rapid Infrastructure Renewal
Contract number:	TST5-CT-2006-031522
Instrument:	STP
Total cost:	2,939,975 €
EU contribution:	1,499,495 €
Call:	FP6-2005-Transport 4
Starting date:	01.10.2006
Ending date:	30.09.2009
Duration:	36 months
Sector:	Road
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Coordinator:	Mr Mieres Royo Juan Manuel ACCIONA S.A. Avenida de Europa 18, Parque Empresarial La Moraleja ES 28108 Alcobendas (Madrid)
E-mail:	jmieres@necso.es
Tel:	+34 (0)91 6633160
Fax:	+34 (0)91 6633188
Partners:	Fundación LBEIN ES MOSTOSTAL WARSZAWA, S.A. PL Municipality of Kamnik, Slovenia SI Van Wees NL Saint Gobain Vetrotex International FR Joint Research Centre - University of Ljubljana, Faculty of Civil and Geodetic Engineering SI Huntsman Advanced Materials BE Mikrosam MK



INNOTRACK

Innovative Track Systems

INNOTRACK will perform research on four key topics: track support structure, switches and crossings, rails, and logistics for track maintenance and renewal. It will also provide an innovative methodology for Life Cycle Cost calculation and Reliability Availability Maintainability Safety (RAMS) assessment to be used by all infrastructure managers across Europe.

Background

Infrastructure accounts for about 70% of railway systems' total costs. Rail infrastructure managers spend millions of euros each year on maintaining network infrastructures throughout Europe while the supply industry is investing hundreds of millions in research and development on rail technologies to deliver cost-effective products for rail infrastructure. Any reduction of production and maintenance costs would, therefore, have a significant impact on the overall cost of the provision of rail infrastructure for operators. However, a reduction in the production cost itself at the site of the supply industry has to go hand in hand with a reduction in maintenance and renewal costs for infrastructure managers (IMs). There is a strong need to bring together those responsible for the delivery of railway transportation with those responsible for providing products, services and technologies to this industry, in order to reduce life-cycle costs (LCC), improve reliability, availability, maintainability and safety (RAMS) of infrastructure, while still increasing the service life of infrastructure and overall performance of the rail system. This is the first time when all stakeholders concerned (IMs, industry, associations, academia, etc.) have committed the resources for joint collaborative research aimed at delivering the innovative solutions to achieve the targeted reduction in LCC in the long term.

Objectives

The EC's White Paper on Sustainable Transport calls for rail operators to double passenger traffic and triple freight traffic by 2020. The rolling stock industry are responding to the new challenges by continuing to increase speed, acceleration, axle loads, traction power, etc., all of which place greater demands on the track, causing more damage and higher maintenance costs.

The INNOTRACK project is a joint response of the major stakeholders in the rail sector for the development of cost-effective high-performance track infrastructure, aiming at providing innovative solutions towards significant reductions in both investment and maintenance of infrastructure costs. To achieve these objectives, investment alone is not sufficient; significant innovation supported by research is essential. INNOTRACK's main objective is to reduce the LCC, while improving the RAMS characteristics of a conventional line with a mixed traffic duty. INNOTRACK will provide railway infrastructure managers with crucial information, innovative solutions and technologies to facilitate the understanding and implementation of leading-edge track system technologies, which can effectively contribute to LCC reduction. Manufacturing industry will also benefit through the implementation of appropriate changes to specifications and standards to reduce production costs and time to market, and improve profitability.

Description of work

INNOTRACK will analyse root causes (e.g. failure rates, failure causes) of the current excessive cost of track maintenance and renewal. The analyses will benchmark the problems, the major cost drivers and remedy measures at individual networks and it will then harmonise those which are common across Europe. These will be tackled in four subprojects, dealing with the four major concerns:

- track support structure
- switches and crossings
- rails
- logistics for track maintenance and renewal.

After drawing together a common European specification regarding RAMS and LCCs, INNOTRACK will ensure that the project results from the separate areas are integrated into an overall, coherent package of measures that will achieve the targeted reduction in LCCs.

The INNOTRACK project will also provide the following, which are all internationally accepted:

- LCC methodology (fundamental for an economic assessment of technical solutions for European problems)
- RAMS technology (a recognised management and engineering discipline to guarantee the specified functionality of a product over its complete lifecycle)
- A European cost matrix including national costs due to national standards – relevant for international comparisons of LCCs and for an economic assessment of technical innovation
- LCC models for track components with different levels of detail – relevant for LCC analysis and economic optimisation.

Results

The major deliverables of INNOTRACK are:

- a database of representative vehicle types, track segments and the identification of characteristics of generic vehicles and tracks for modelling, innovative design, LCC calculation and RAMS assessment
- definition of track and wheel irregularities which lead to degradation and failure
- determination of root causes of problem conditions and priorities for innovation
- database of models and a list of potential model gaps
- 'portancemeter' for measuring track-structure stiffness on existing tracks
- validation methodology and criteria for evaluation of sub-grade enhancements and superstructure innovations
- design and manufacture of BBEST slab track components
- rail degradation algorithms
- guidelines on the selection of rail grades
- 'minimum action' rules for selected defect types
- rail inspection technologies
- rail grinding strategies, and new and optimised approaches for Europe
- logistic needs and constraints for track construction, maintenance and renewal
- validation procedure for track construction sites, maintenance and renewal activities
- boundary conditions and requirements for LCC and RAMS analysis of railway infrastructure
- modular LCC/RAMS models
- dissemination plan – network of industries and infrastructure managers
- establishment of training platform – coherent training programmes
- technical review and standardisation platform – proposals for standards.

Keywords: Infrastructure, track, track support structure, switches and crossings, rails, maintenance and renewal, logistics, LCC, RAMS, infrastructure managers, industry



Acronym: INNOTRACK
Name of proposal: Innovative Track Systems
Contract number: TIP5-CT-2006-031415
Instrument: IP
Total cost: 18,593,337 €
EU contribution: 10,000,000 €
Call: FP6-2005-Transport 4
Duration: 36 months
Sector: Rail
Objective: Advanced Design and Production Techniques
Research domain: Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Website: <http://www.innotrack.eu>
Coordinator: Dr Korpanec Imrich
 Union Internationale des Chemins de fer
 16, rue Jean Rey
 FR 75015 PARIS
E-mail: korpanec@uic.asso.fr
Tel: +33 (0)1 44 49 20 92
Fax: +33 (0)1 44 49 20 99
Partners: Association of the European Railway Industries
 European Federation of Railway Track Work Contractors
 Carillion Construction Ltd
 voestalpine Schienen GmbH
 Banverket
 Administrador de Infraestructuras Ferroviarias
 ALSTOM Transport SA
 Balfour Beatty Rail Projects Limited
 České dráhy akciová společnost
 Chalmers University of Technology
 Laboratoire Central des Ponts et Chaussées
 Goldschmidt Thermit GmbH
 Network Rail Infrastructure Limited
 ÖSTERREICHISCHE BUNDESBAHNEN – Infrastruktur Bau AG
 Réseau Ferré de France
 VAE GmbH
 VOSSLOH COGIFER
 DB Netz AG
 SPENO INTERNATIONAL SA
 Rail Safety & Standards Board
 Delft University of Technology (Technische Universiteit Delft)
 PRORAIL B.V.
 Rail Research UK
 Czech Technical University in Prague
 Corus UK Ltd, trading as Corus Rail
 Société Nationale des Chemins de Fer Français
 Damill AB
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 Polyfelt Deutschland GmbH
 University of Newcastle
 ConTraffic GmbH
 ARTTIC SA
 University of Southampton
 Manchester Metropolitan University
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ITARI

Integrated Tyre and Road Interaction

Road traffic is steadily increasing. The objective here is to provide tools to investigate new road surfaces, which will lower noise emission, lower fuel consumption and meet safety requirements. It will demonstrate the implementation of virtually prototyped road surfaces.

Background

Road traffic with its conventional heat-engine vehicles, whose energy efficiency is far from optimal, is one of the main sources of urban pollution from greenhouse gases, and it also contributes to the European Union's excessive energy consumption. With the increasing efficiency of engines, secondary effects such as rolling resistance will play a dominant role when aiming for further reductions in fuel consumption.

Noise pollution from road traffic is another major environmental problem. A major component of road traffic noise is tyre/road noise. To achieve the proposed reduction targets it is necessary to reduce tyre/road noise.

Safety is the crucial demand on road surfaces, so the design of new, low-noise textures or textures with low rolling resistance must not risk the grip potential (especially under wet conditions). Currently more than 40 000 people are killed on EU roads every year. The strategic objective is to cut this number by 50% within the next eight years and 75% by 2025. The aim here is to design highly sophisticated road surfaces to provide an optimum grip. However high-grip surfaces considered alone may not necessarily be saving fuel or absorbing noise.

Models are needed to assist in the design of road surfaces and to predict their essential properties.

Objectives

The main scientific and technical objectives of ITARI will consist of three main categories: design tools, measurement methods and a demonstration of production techniques.

The objective for the set of design tools is to allow for virtual design of road surfaces and their essential properties. This will include tools for designing:

- low noise surfaces based on a hybrid simulation model for tyre/road noise
- a prediction tool for rolling resistance as a function of surface properties
- a prediction tool for wet grip.

Measurement tools will be provided for the description of surface properties, especially concerning:

- absorption characteristics of road surfaces
- flow resistance of surfaces
- mechanical impedance of road surfaces.

While the development of models and tools takes place mainly during the first two years, year 3 is specifically dedicated to the review and assessment of the project results. The main activities at this point are demonstrating and validating the results by:

- suggesting optimised innovative road surfaces with an improved overall performance, based on the models developed for the prediction of noise, rolling resistance and wet grip.
- building such virtually designed surfaces by applying new and innovative road surface technology
- validating the results by measurements.

Description of work

The main key for the design of surfaces is understanding the interaction between tyre and road surface, this interaction being responsible for contact forces acting between the two. The contact forces are, at the same time, a starting point for the prediction of noise generation, rolling resistance and wet grip.

The main part of the work is based on the tyre/road noise model developed in the European project RATIN. Models have been developed to predict noise and rolling resistance, which also support the development of prediction tools for wet grip performance.

Despite the complexity of the models, it is essential that the tools can be applied in engineering applications. Therefore one or several surfaces are selected for a paving experiment. These experiments will be made on the full scale paving test site of RWTH Aachen. The demonstration allows for creating desired texture features without the restrictions incurred by the usual material selection or manufacturing process.

In order to verify tools and models, theoretical results are compared with measured performance of the manufactured road surface.

Results

Several parameters determine the environmental friendliness of road transport. A major parameter is the road texture influencing noise generation, rolling resistance and safety.

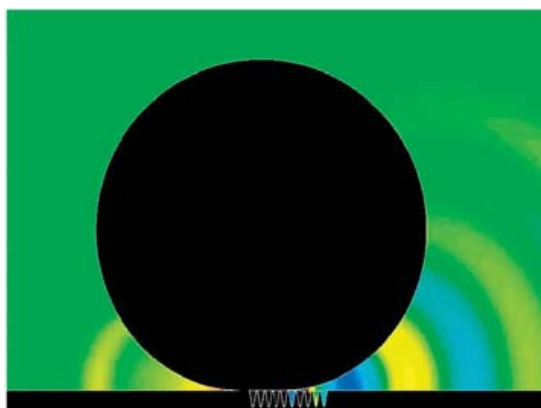
The project will help to find optimal tyre/road combinations, which minimise the total energy loss due to the rolling resistance and will lead to a reduction of the fuel consumption and thereby the emission of greenhouse gasses.

Highly sophisticated road surfaces designed to provide an optimum of grip will help to achieve improved safety.

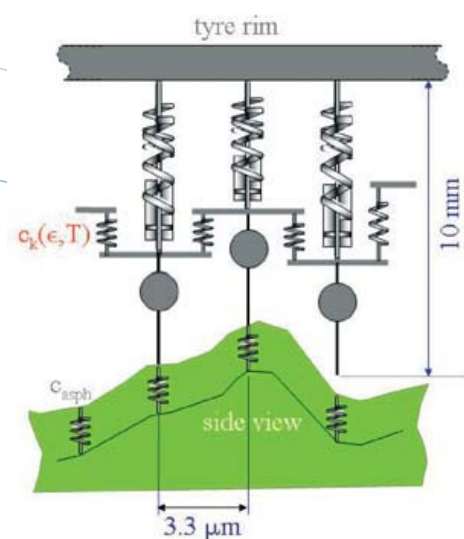
The reduction of road traffic noise (i.e. mainly tyre/road noise) needs high priority. Previous studies show that the noise reduction potential is expected to be 6 dB for passenger car tyres on dense road surfaces (referenced to stone mastic asphalt 0/8 or 0/11). Combining these low noise textures with sound absorbing and/or flexible constructions should give a reduction of at least 4 or 5 more decibels – independently from the tyres and the speed.

In addition to this, ITARI will demonstrate the implementation of virtually prototyped road surfaces in the production process. This is an essential step to create acceptance for innovative surfaces by decision-makers, infrastructure planners or road manufacturers. It will also demonstrate an alternative to expensive trial and error full-scale experiments as applied today in the development of new road surfaces.

Keywords: tyre/road noise, rolling resistance, wet grip, tyre/road interaction, manufacturing



Noise created by compression of air in the contact between tyre and road



Friction model for the determination of grip

Acronym: ITARI
Name of proposal: Integrated Tyre and Road Interaction
Contract number: TST3-CT-2003-506437
Instrument: STP
Total cost: 2,115,787 €
EU contribution: 1,700,000 €
Call: FP6-2002-Transport 1
Starting date: 01.02.2004
Ending date: 31.01.2007
Duration: 36 months
Sector: Road
Objective: Advanced Design and Production Techniques
Research domain: Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Coordinator: Prof. Kropp Wolfgang
 Chalmers University of Technology
 Sven Hultins Gata 8a
 SE 41296 Gothenburg
E-mail: wolfgang.kropp@chalmers.se
Tel: +46 (0)317722204
Fax: +46 (0)317722212
Partners: Müller-BBM GmbH
 Rheinisch-Westfälische Technische Hochschule Aachen
 University of Southampton
 Centre Scientifique et Technique du Bâtiment
 Kungliga Tekniska Högskolan
 Bundesanstalt für Strassenwesen

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NR2C

New Road Construction Concept

What will the European road system look like in 2040? How can innovation deliver solutions to the challenges of the future? These are the two questions which NR2C aims to answer. NR2C provides a long-term vision of road infrastructure, based on new concepts, and develops specific innovations to support this vision in three areas: urban, interurban and bridges.

Background

European civil infrastructure systems represent huge public investments and they are expected to provide service for very long periods of time. This means that future developments in the transport of goods and people must be assessed and planned well in advance. Looking ahead to the future and considering the probable developments in society requires a search for proper solutions.

Furthermore, the enlargement of the European Union has heightened the acute need for a sustainable integrated European surface transport network. Even if there are different starting points for deciding on the future, between Eastern and Central Europe on the one hand and Western Europe on the other, the future for the various regions of Europe will not differ. Freedom of travel and communication, as well as freedom of exchanging information and technology will contribute to the creation of a similar basic level of needs and demands all over Europe. The national and regional cultures, the economic situation and the political leanings of the authorities will determine the priority and speed of implementing trends and developments, but the main differences will become equalised in the year 2040. All the countries are or will be confronted by a shortage of clean environment, energy and space, with an increasing demand for mobility.

Objectives

NR2C is a quest for conceptual and technical answers to the mobility and transport demands of the future. It aims to generate future-oriented initiatives for accessibility problems and issues related to road infrastructure. It will develop long-term perspectives, concrete pilot studies and research recommendations, linking long-term visions and ideas to short-term actions.

The vision can be considered as a focal point for policy-makers and engineers in taking the right decisions concerning use, design, construction and maintenance of infrastructure.

Innovations developed in each of the three areas – urban, interurban and bridges – are in accordance with concepts identified in the vision (reliable, smart and safe, green, and human).

In urban areas, the development of design models for multi-modal platforms and the development of eco-infrastructure which mitigates road traffic pollution answer to the human and green objectives.

In interurban areas, two studies aim at reducing consumption of rare resources and supporting the recycling of material or using waste. Another one limits the disturbance to the road users by improving the maintenance process.

With bridges, the needs are for durability, a facility to build and a move towards using light and prefabricated structures made with new materials.

Description of work

Based on large surveys carried out on road stakeholders, NR2C will identify safe and environmentally friendly infrastructure construction and maintenance concepts. Innovative concepts will be ranked and the most promising developed for further studies, aimed at establishing feasibility and clarifying unsolved problems.

NR2C is divided into work packages (WP): WP0 – vision, WP1 – urban and suburban infrastructure, WP2 – interurban infrastructure, WP3 – bridges. Special care will be taken with dissemination and clustering in WP4.

NR2C will be carried out in three phases:

Phase 1 – survey and analysis: this phase is designed to clearly identify future user needs and expectations. It consists of enquiries, surveys, focus workshops and brainstorming sessions to build the vision. In parallel, state-of-the-art reports on innovations in urban and interurban areas and concerning bridges are provided.

Phase 2 – assessment and selection: during this phase, innovations, feasibility studies and preliminary models are carefully assessed and the most promising ones selected for further development.

Phase 3 – testing and recommendations: innovations selected in Phase 2 will undergo detailed design, laboratory or pilot tests, which will lead to specific recommendations.

This work will culminate with the mid-term workshop and the final seminar.

Results

NR2C will provide 24 deliverables.

NR2C Vision is based on four key concepts – reliable, green, smart and safe, and human – converted to ideas for solutions and future research areas.

In urban areas, the two innovations studied are:

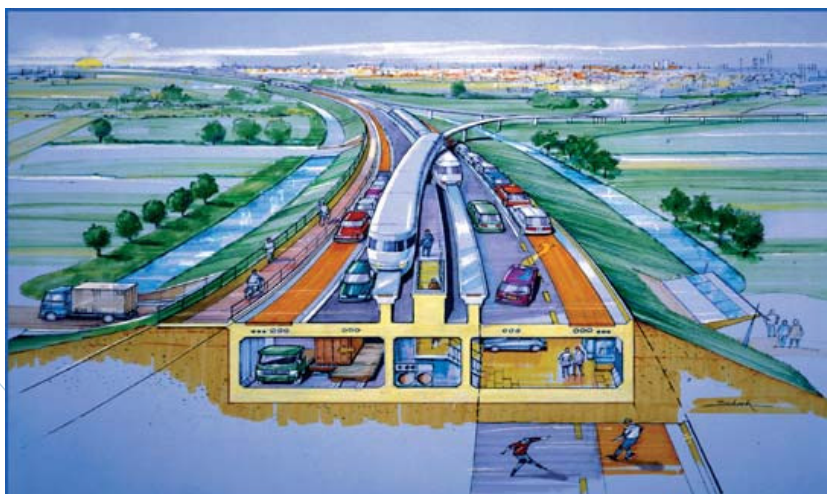
- development of design models that can be used as a tool to assess urban projects
- eco-technic infrastructure, which combines the most innovative technologies to mitigate road nuisance: noise, vibration, air and water pollution. The most original work is relevant to air pollution with the development of a prototype able to abate pollution rates.

In interurban areas, four innovations are studied:

- high-performance underlayers with low-cost materials and high percentages of re-uses: layers with a different ratio of reclaimed asphalt are submitted to durability and fatigue tests
- crack-free semi-rigid pavement: the aim is to demonstrate the feasibility
- optimisation of maintenance process: based on rating trees by analysing the influence of bad climatic conditions, the aim is to provide effective solutions
- roadway perception using infrared technology: it demonstrates how infrared characteristics of a road environment scene can be used to improve a driver's vision under bad conditions

In the bridge section, elements of slab will be designed with new materials, which can be used alone for small bridges or be supported by structural elements for greater spans.

Keywords: Road, concept, future, vision, urban, interurban, bridges



Road of the future: Eco-infrastructure - Traffic road nuisance mitigation (noise, vibration, air and water pollution)



Acronym: NR2C

Name of proposal: New Road Construction Concept

Contract number: TST3-CT-2003-505831

Instrument: STP

Total cost: 4,773,992 €

EU contribution: 2,000,000 €

Call: FP6-2002-Transport 1

Starting date: 01.12.2003

Ending date: 30.11.2007

Duration: 48 months

Sector: Road

Objective: Advanced Design and Production Techniques

Research domain: Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures

Website: <http://www.fehrl.org/nr2c>

Coordinator: Mrs Mahut Brigitte
Laboratoire Central des Ponts et Chaussées
58 Bd Lefebvre
FR 75015 Paris

E-mail: mahut@lcpc.fr

Tel: +33 (0)1 40 43 54 32

Fax: +33 (0)140 43 65 20

Partners: Dienst Weg- en Waterbouwkunde, Ministerie van Verkeer en Waterstaat, NL
Directoraat Generaal Rijkswaterstaat
Ecole polytechnique fédérale de Lausanne CH
Forum of European National Highway Research Laboratories WW
Belgian Road Research Centre BE
AUTOSTRADE CONCESSIONI E COSTRUZIONI AUTOSTRADE S.p.A. IT
Greisch Ingenierie BE
EUROVIA FR
Jean Muller International FR

SAFE-RAIL

Development of an Innovative Ground-Penetrating Radar System for Fast and Efficient Monitoring of Rail-Track Substructure Conditions

The continuous assessment of substructure conditions is a key need for rail-track maintenance activities. The SAFE-RAIL project tackles technological gaps that limit state-of-the-art systems by developing an innovative radar for fast and accurate monitoring of rail track substructure conditions.

Background

The improvement of the European Transport Network is a key action for today's sustainable development, and the revitalisation of railways is a priority that was envisaged in 2001 in the European Commission's White Paper European Transport Policy for 2010: time to decide. In this context, the improvement of the capacity and safety of the railway infrastructure is strategic at both national and trans-national levels.

The accurate, fast and continuous assessment of rail-track surface and subsurface conditions has been recognised as a primary requirement of railway owners and users for minimising slowing traffic and optimising network capacity and safety.

Today, ground-penetrating radar (GPR) is the most promising technology for non-destructive subsurface investigation and buried object detection. Railway companies use GPR systems mounted on trains, lightweight carts or carried by hand in order to identify fouled ballast and trapped water on railroads.

However, the effectiveness of radar methods is now strongly limited by

1. difficulties in estimating the ground dielectric properties with standard GPR antennas,
2. inaccurate positioning of the collected data for systems on fast moving platforms,
3. lack of onboard automatic data interpretation tools and anomaly detection capabilities,
4. lack of an integrated IT approach in long-term monitoring of large (trans-national) railway infrastructures.

Objectives

The SAFE-RAIL project was designed and proposed for developing efficient technological tools for continuous assessment of hidden and hard-to-monitor substructure conditions in a fast and accurate way. These tools will allow increasing risk-management and accident-prevention capabilities while optimising the planning of construction, reconstruction and maintenance operations along the rail network with minimum degradation of rail network capacity.

Though radar technology is used today for underground analyses at rail-tracks in conjunction with well-established methods for surface inspection, a consistent technology gap is still present, preventing the full exploitation of the radar's potentials on high-speed automatic rail diagnostic and monitoring systems, as well as during railroad construction works.

The SAFE-RAIL system is based on a completely new concept of rail-track substructure monitoring radar and on innovative data interpretation and analysis tools, based on expert systems and neural networks providing field information in a user-friendly way. This will allow full integration of the SAFERAIL subsurface monitoring system on high-speed diagnostic trains for:

1. real-time subsurface assessment and delivery of 'diagnostic' information to the onboard operator, and
2. storage of the collected information for long-term multi-temporal analyses.

Description of work

Based on an evolutionary approach specifically intended to overcome the identified limitation of conventional radar instrumentation, the SAFE-RAIL project has developed an innovative rail-track substructure condition monitoring system, consisting of:

- the new fast substructure radar (FSAR), based on innovative antennas, which allow precise estimation of layers' and buried objects' dielectric properties while maximising penetration depth under any terrain conditions, the accurate estimation of wave velocity in the sub-ground, an effective clutter cancellation, and high-speed platform operations
- the high-performance radar control unit (HPRCU), that allows real-time control of multiple channels and recording of raw collected data supporting train speeds higher than 300 km/h
- an innovative rail-track positioning unit (RTPU), allowing fast and accurate measurement of the platform position and radar triggering
- an innovative onboard processor (OBP), based on expert systems and neural network algorithms for real-time raw GPR data interpretation and user-friendly presentation
- a networked data interpretation and processing software (N-DIPS) supporting long-term monitoring of rail substructure conditions through the networking of different sensors operating along multiple segments of the railway infrastructure.

Results

D'Appolonia is coordinating an expert team of scientists, technologists and geophysicists from different European industrial companies, service providers and research institutes.

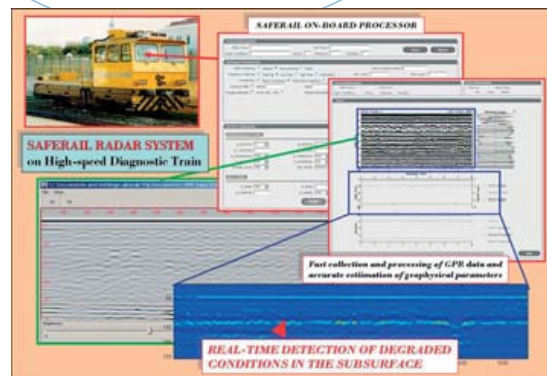
Promising results have been obtained with the first SAFERAIL prototype, which has been recently exercised on rail-track test sites. Integration on the MER MEC test-train is in progress, and the 2007 campaign of acquisitions on the European Rail Network will provide the final assessment of the SAFERAIL capabilities and performance.

The successful completion of the SAFE-RAIL project will lead to:

- a. demonstrating the capabilities of quickly and accurately referenced detection and classification of rail-track condition deterioration in the rail-track ballast, sub-ballast and sub-grade
- b. providing a prototypic processor for user-friendly onboard diagnostic data interpretation and early warning against the probability of critical failures of the rail network.

The full exploitation of the SAFE-RAIL scientific and technological results will lead, in the mid-term, to the provision of improved performance diagnostic systems and platforms, including powerful radar-based subsurface assessment capabilities. These will allow more efficient, cost-effective, faster and safer construction and re-construction of railroads, as well as optimised planning of railway network maintenance strategies.

Keywords: Ground-penetrating radar, ballast, diagnostic train



The SAFERAIL on-board processing system

Acronym:	SAFE-RAIL
Name of proposal:	Development of an Innovative Ground-Penetrating Radar System for Fast and Efficient Monitoring of Rail-Track Substructure Conditions
Contract number:	TST3-CT-2003-506218
Instrument:	STP
Total cost:	4,274,905 €
EU contribution:	2,599,458 €
Call:	FP6-2002-Transport 1
Starting date:	01.02.2004
Ending date:	31.01.2008
Duration:	48 months
Sector:	Rail
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Website:	http://www.saferail-project.eu
Coordinator:	Mr Sorge Stefano D'Appolonia S.p.A. Via San Nazaro, 19 IT 16145 Genoa
E-mail:	stefano.sorge@dappolonia.it
Tel:	+39 06 51990631
Fax:	+39 06 51990670
Partners:	Department of Electronics - University of Pavia Malaa Geoscience AB Federal Institute for Materials Research and Testing Building Research Establishment Ltd Structural Testing Services Ltd G Impuls Praha spol s.r.o. MER MEC S.p.A.

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SCOUT

Sustainable Construction of Underground Transport Infrastructures

The SCOUT project develops a new environmentally friendly concept of 'cut-and-cover' tunnels, based on a holistic approach that combines the generalisation of the observational method, optimisation of design, breakthrough construction equipment and new applications of composite materials.

Background

The development of the Trans-European Transport Network requires the construction of many new railways, highways and waterborne connections. In urban centres, burying transport infrastructures underground is the best option to avoid congestion, noise impact at the surface and, in many projects, is the only possible choice to build intermodal connections linking underground stations and airports, parking lots, pedestrian access, etc.

For such underground infrastructure, the cut-and-cover method is a cost-effective alternative to tunnels, and the best option when the tunnel is relatively shallow (maximum depth < 20 m) and the surface is free from buildings. The method is very safe, does not create subsidence, and the phasing of works allows surface traffic to be restored at a relatively early stage, when the cover slab is completed. It has a huge number of references over the world for the construction of underground roads, subways, railway lines and stations.

Cut-and-cover tunnels are therefore a vital tool for the construction of transport infrastructures which are needed for the development of the TEN-T Network. But this method is now confronted with a new set of requirements: the urgent need for safer and more cost effective techniques, and a reduction of environmental impact from the construction (use of natural resources, noise, disruption of traffic, etc).

Objectives

The main objective of the project is to develop a new concept for sustainable construction of 'cut-and-cover' tunnels that optimises the safety and life-cycle cost of the construction, and eliminates or drastically reduces most nuisances to urban environment, which are classically associated with construction projects: noise, dust and large construction equipment causing long traffic disruption at the surface. The project concentrates on the construction of tunnel walls and, using a holistic approach, addresses the three complementary domains of construction materials, design and construction process.

The first target is to develop new composite materials, namely fibre-reinforced concrete optimised for the construction of tunnel walls. The second target is to optimise the design of the structure, firstly by using these new materials and secondly by a systematic implementation of the observational method. The third target is to develop a new and breakthrough concept of construction equipment – modular, suitable for most European soil profiles – with the capacity to install this tunnel structure with minimum environmental impact. A complementary study addresses the subject of recycling excavated materials.

The final objective is to validate the concept by the construction of a prototype of limited depth (8 metres) to be tested in real conditions.

Description of work

1. New methods for design

Starting from the analysis of a selection of reference cases, the project will develop the following:

- new methods to optimise the engineering of cut-and-cover projects, using the concept of a 'double-skin' structure and aiming at reducing the cost of construction materials by 15%

- a methodology and relevant documentation to apply the observational method to cut-and-cover tunnels on a wide scale, with the objective of eliminating the extra delays and increased costs classically related to soil heterogeneity.

2. A breakthrough construction method

A radically new concept for the construction of tunnel walls will be developed, where the drilling process is continuous and horizontal, with the objectives of minimal environmental impact and maximum workers' safety. Modular architecture of the equipment will allow the adaptation of a large variety of tunnel projects in a number of different European soil types. The environmental advantages will be minimal noise and dust, and no drilling through mud. The concrete structure will be cast in situ and equivalent in quality to that of superstructures.

3. New composite materials, material recycling

The project will investigate how fibre-reinforced concrete materials can be used in both temporary and permanent structure members to optimise structural design. New materials are being developed and will be tested at full scale.

The recycling of excavated soil is being analysed (soil conditions, plant equipment, quality control requirements, costs), so as to identify the current blockages and to establish a roadmap towards the implementation of soil waste recycling.

Results

The results of the project will be:

- New practical tools for the deployment and integration of the observational method in the construction process as requested by the EUROCODE, with the objective of providing full control of construction safety, costs and delays.
- New design tools for the optimisation of structural design, with the objective of 15% savings on cost of construction materials and minimal environmental impact.
- New breakthrough construction equipment suitable for cut-and-cover sites of all sizes, characterised by:
 - innovative equipment of modular architecture providing a high level of flexibility to cope with a variety of infrastructure configurations and soil profiles
 - new type of drilling bit, specially designed for this equipment
 - a prototype of limited depth (8 metres), validated in real conditions
 - new fibre concrete composite materials for cut-and-cover tunnels, validated by full-size structural tests
 - a roadmap towards material recycling in cut-and-cover tunnels.

Keywords: Transport, infrastructure, construction, tunnel, cut-and-cover, geotechnique, fibre concrete, composite, observational method



General view of a cut and cover project in Toulouse, France



Acronym:	SCOUT
Name of proposal:	Sustainable Construction of Underground Transport Infrastructures
Contract number:	TST4-CT-2005-516290
Instrument:	STP
Total cost:	3,599,250 €
EU contribution:	1,998,000 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2005
Ending date:	31.12.2007
Duration:	36 months
Sector:	Multi
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures
Website:	http://www.soletanche-bachy.com/scout
Coordinator:	Mr Hamelin Jean-Pierre Soletanche Bachy France 6 Rue Watford FR 92000 NANTERRE
E-mail:	jp.hamelin@soletanche-bachy.com
Tel:	+33 (0)1 47 76 57 50
Fax:	+33 (0)1 49 06 97 34
Partners:	IBDiM - Instytut Badawczy Dróg i Mostów, Road and Bridge Research Institute PL Ove Arup & Partners Ltd UK AB Sandvik Tamrock Tools SE ECCON - Engineering Computer Consulting GmbH AT S.C. ZIPACON RO AITEMIN - Asociación para la Investigación y Desarrollo Industrial de los Recursos Naturales ES Riga Technical University LV ARMINES - Association pour la Recherche et le Développement des Méthodes et Processus Industriels FR

SPENS

Sustainable Pavements for EU New Member States

The aim of the project is to develop appropriate tools and procedures for the rapid rehabilitation of road pavements using materials that would:

- behave satisfactorily in a typical climate
- have an acceptable environmental impact
- be easy to incorporate within existing technologies
- be cost-effective and easy to maintain.

Background

The standard of road infrastructure differs throughout the European Union Member States. In general, the means of transportation are of a lower standard in the new Member States, but the present volume of heavy road transport requires a sustainable road infrastructure immediately.

There is a constant need for new resistant pavement materials that should comply with EU regulations. Due to the priority of motorway construction, the standard of maintenance of other roads has been lowered, resulting in an increased need for effective road maintenance and improvement over the years to come. The materials and technologies now used in the new Member States differ from those adopted in common practice in the EU-15.

SPENS will focus on developing procedures for producing and implementing improved materials for road construction, taking into account the local tradition, the availability of materials and construction techniques, as well as the specifics of roads that have already been constructed.

The research work will concentrate on the assessment of existing road conditions and maintenance planning, on pavement renewal and the upgrading of roads, and on the environmental impacts of roads.

Objectives

The overall objective of the SPENS project is to generate knowledge to enable a more rapid rise in the standard of the road infrastructure, by developing appropriate tools and procedures for the long-lasting and more cost-effective improvement of roads.

Efficient and economic rehabilitation of the existing road network can be attained if reliable and scientifically based information is available on both present pavement conditions and current actions about pavements. A new systematic decision-making methodology about pavement rehabilitation and upgrading will contribute to sustainable surface transport.

The proper use of new techniques, such as the reinforcing of pavements, can bring economical and ecological benefits. Guidelines will indicate the best practice on how to use these methods and materials.

The development of new techniques, which allow for the incorporation of recycled waste materials of different origins into building materials for roads, will contribute to savings in natural raw material resources.

An uneven and rough road surface gives rise to higher fuel consumption, exhaust emissions, costs for vehicle wear and road traffic noise. The research will contribute towards the implementation of pavement types with high durability. Instructions for the selection of pavement types with low noise emissions can reduce the cost for noise abatement measures, which are a growing cost factor in the construction of new roads.

Description of work

The research work will be organised into four technical work packages, and will address the specific problems of the new Member States.

Since financial resources for road maintenance and rehabilitation are very limited, sophisticated pavement management systems can provide results upon which long-term optimum decisions can be made. The research of one work package will focus on techniques for gathering the proper input parameters and the development of a systematic methodology analysis of the deterioration caused by traffic.

The research work outlined in the work package 'Improvement of pavement structures' will show the potential of new techniques for the improvement of new and existing flexible road pavements. For example, the efficiency of different kinds of reinforcement for road widening and rehabilitation will be established, and a practical model for the optimisation of an asphalt mixture design will be tested. Within this work package the benefits and limits of waste and by-product materials, including recycled materials, for road construction will be studied.

Evaluation of materials and pavement layers appropriate for road upgrading will be analysed in a separate work package, which will be focused on modified bitumen as asphalt binders, high modulus asphalt mixtures, and their actual field performance. Laboratory work will be concerned with a number of mixtures, the most promising of which will be tested in the field, taking into account the specific climate and traffic loads.

The work package 'Assessment of the impact of roads on the environment' will focus on the characterisation of different types of road pavements with regard to environmental features and traffic noise emission, taking into account the typical compositions and pavements used in the new Member States.

The research work will gain from clustering with other on-going research projects, but will be oriented towards implementation, and will focus on the issues which are the most important for end-users such as road administrations and contractors.

Results

Sustainable road infrastructure improves mobility, has an important economic effect and also improves quality of life.

The project aims to develop new construction concepts for sustainable and cost-effective road surfaces through the use of materials and technologies commonly available in the new Member States, paying special attention to environmental impacts.

SPENS will produce publicly available practical guidelines for the topics addressed within the research. An extensive effort will be made to ensure the wide and rapid dissemination of outcomes to the key stakeholders and for the exploitation of the results, especially in the new Member States. A project brochure and a website, as well as a multi-lingual web platform within the CERTAIN coordination action, will be prepared in order to bring the results closer to end-users.

Keywords: Pavements, pavement materials, road assessment, environmental impact of roads, road upgrading methods, waste materials



Example of an under-designed pavement



Recording of surface and road parameters

Acronym:	SPENS	
Name of proposal:	Sustainable Pavements for EU New Member States	
Contract number:	TST5-CT-2006-031467	
Instrument:	STP	
Total cost:	2,471,150 €	
EU contribution:	1,299,443 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.09.2006	
Ending date:	31.08.2009	
Duration:	36 months	
Sector:	Road	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures	
Website:	http://www.spens.fehrl.org	
Coordinator:	Ms Ravnika Turk Mojca Zavod za gradbeništvo Slovenije Dimiceva 12 SI 1000 Ljubljana	
E-mail:	mojca.turk@zag.si	
Tel:	+386 (0)1 2804 393	
Fax:	+386 (0)1 2804 264	
Partners:	Közlekedéstudományi Intézet	HU
	Statens väg- och transportforskningsinstitut	SE
	Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.m.b.H.	AT
	Centrum dopravního výzkumu	CZ
	Instytut Badawczy Dróg i Mostów, Road and Bridge Research Institute	PL
	Žilinská univerzita v Žiline	SK
	Forum of European National Highway Research Laboratories	BE
	DDC svetovanje inženiring, Družba za svetovanje in inženiring, d.o.o.	SI
	Ferriere Nord S.p.A.	IT



Sustainable Bridges

Assessment for future traffic demands and longer lives

In order to double (or even treble) the transportation by rail over the next 20 years, the load capacity and the mean residual service life of railway bridges needs to be increased. the project determines methods by which this could be achieved.

Background

There is a great demand for European railway bridges to carry increased loads and allow higher speeds increasing infrastructure capacity for passenger and freight traffic. In many cases these demands can be met through proper structural assessment, determination of the true behaviour of the structure, strengthening of certain sections or by monitoring critical properties. Research has shown that there is a great potential for a big step forward in all these areas. Using a probabilistic approach for loads and resistance is one example of a new generation of methods that can be developed and applied.

Codes for bridge design has been developed gradually and have been designed to consider all the uncertainties that are present in the construction phase of a structure. These codes are also often used for the evaluation of existing bridges. However, far better information on material and structural properties is available for an existing structure than for one not yet built. Nevertheless the same factors of safety are often applied to existing structures as to the ones being constructed. Many bridges can be allowed to carry greater loads and faster trains if better codes and methods for assessment are used.

The project will save about €1 000 million (2% of the capital value of the bridges) by allowing increased loads and extending residual service life.

Objectives

The project objectives are:

- to increase the transport capacity of existing bridges by allowing axle loads of up to 33 tons for freight traffic with moderate speeds or for speeds of up to 350 km/hour for passenger traffic with low axle loads
- to increase the residual service lives of existing bridges by up to 25%
- to enhance management, strengthening and repair systems.

The objectives are achieved by different measures, for example:

- developing new methods for structural assessment of existing bridges in order to obtain better approximations of the real structural capacity
- giving guidance and using background material for a new code and guidelines for structural assessment
- determining models for the progressive development of reinforcement corrosion
- developing a scanning application and a combination of echo methods for condition assessment
- developing, implementing and testing monitoring systems based on optical fibres, micro-electro-mechanical-systems (MEMS), a local area communication infrastructure and smart data processing tools
- preparing guidelines for monitoring
- developing easy-to-handle systems and a guideline for quality assurance of repair and strengthening
- applying the developed methods on demonstration bridges
- disseminating the new results by publications, a website, training courses/workshops, seminars and a conference.

Description of work

Much research has been carried out in relation to this field of research but there is a need for integration, innovative development and testing in order to establish procedures for the safe and effective management and upgrading of railway bridges.

The work is carried out in nine work packages (WP):

WP1: Map existing bridge types to find critical points

WP2: Internal review and guidance. Investigate present and future loads and load distributions. Check demands for traffic interoperability between countries

WP3: Develop new methods for inspection and condition assessment

WP4: Develop improved methods to determine the capacity of structures

WP5: Develop monitoring methods based on new IT

WP6: Develop new repair and strengthening methods using e.g. carbon fibres

WP7-8: Demonstrate the new methods by field testing and monitoring on bridges

WP9: Training bridge owners, consultants and contractors in the use of these new methods.

The project is carried out by a consortium of bridge owners, consultants, contractors and research institutes from all over Europe. Jan Olofsson, Skanska, Sweden, is Manager and Prof. Lennart Elfgren, Luleå University of Technology, Sweden, is Scientific Leader. They are assisted by a team of work package leaders and report to an executive board appointed by a general assembly consisting of all members of the consortium.

Results

More than 40 deliverables are planned; most of them are already available in preliminary versions.

- A group of railway owners has mapped the existing stock of over 220 000 railway bridges. Over 35% of the bridges are more than 100 years old, while only 11% are less than 10 years old. Small span bridges dominate, with 62% of the bridges spanning less than 10 metres, while only 5% have spans larger than 40 metres.
- Measurement methods available for quantifying the present situation have been collected in a toolbox making information accessible to bridge engineers. Proposals for use in new condition assessment systems and connections to a unified damage classification scheme are made.
- Monitoring techniques (sensors, data communication and data processing) are being developed.
- A guide for assessment of loads, capacity and resistance has been drawn up.
- Repair and strengthening methods are developed.
- The developed methods are tested on five existing bridges. One of them has been loaded to failure after being strengthened with near-surface mounted carbon fibre reinforced polymer bars.
- Training courses are planned.
- A conference on Sustainable Bridges is planned for October 2007 in Wrocław, Poland.
- A website has been set up at www.sustainablebridges.net

The project, in the summer of 2006, is more than half way through and the overall progress is very good.

Keywords: Assessment methods, strengthening of structures, monitoring of loads and deformations, residual service life



Lennart Elfgren

Test to failure of a reinforced concrete bridge in order to evaluate strengthening and assessment methods



Acronym: Sustainable Bridges
Name of proposal: Assessment for future traffic demands and longer lives
Contract number: TIP3-CT-2003-001653
Instrument: IP
Total cost: 10,231,460 €
EU contribution: 6,887,965 €
Call: FP6-2002-Transport 1
Starting date: 01.12.2003
Ending date: 30.11.2007
Duration: 48 months
Sector: Rail
Objective: Advanced Design and Production Techniques
Research domain: Design and manufacture of new construction concepts for road,

Website: <http://www.sustainablebridges.net>

Coordinator: Olofsson Jan
 Skanska Sverige AB, Skanska Teknik
 Råsundavägen 2
 SE 16983 Solna

E-mail: jan.olofsson@skanska.se

Tel: +46 (0)31 7711319

Fax: +46 (0)31 7711927

Partners: Network Rail
 Banverket
 Federal Institute for Materials Research and Testing
 COWI A/S
 Swiss Federal Institute for Materials Testing and Research
 Luleå University of Technology
 Laboratoire Central des Ponts et Chaussées
 North Finnish Building Cluster/Consulting KORTES Ltd,
 Consulting Engineers Sormunen & Uuttu Ltd
 Wrocław University of Technology
 City University, London
 University of Salford
 Swedish Geotechnical Institute
 Sto Scandinavia AB
 DesignTech Sweden AB
 Swedish Road Administration
 Deutsche Bahn AG
 Universität Stuttgart (University of Stuttgart) Institut für Werkstoffe
 im Bauwesen (Institute of Construction Materials)
 Rheinisch-Westfälische Technische Hochschule Aachen (RWTH)
 Norut Teknologi AS
 Swiss Federal Institute of Technology, Lausanne
 Chalmers University of Technology
 University of Oulu, Research Unit of Construction Technology
 Finnish Rail Administration
 Finnish Road Administration
 Société Nationale des Chemins de Fer Français
 Universidade do Minho
 Universitat Politècnica de Catalunya
 PKP Polish Railway Lines
 Vladimir Cervenka - Consulting
 Royal Institute of Technology
 Lund Institute of Technology

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TURNOUTS

New Concepts for Turnouts in Urban Rail Transit Infrastructures

The word 'turnout' describes the junction in trackwork where lines diverge or converge. Although a turnout consists of several components, this project focuses on the most expensive component: the frog. The frog is the section of the turnout that enables the wheel that is running on one rail to literally cross over another rail. The project considers the following types of frogs: cast manganese, welded, moveable nose, flange bearing and deep groove. The TURNOUTS project focuses on the design and manufacture of new turnout concepts for rail infrastructure. Project partners include the main European turnout manufacturers as well as research and engineering organisations, one contractor and three end users.

Background

There is a significant difference between railway operations and urban transport (tram, metro) operations. The main one is speed. The speed varies from 100 km/h for a freight train to 160 km/h for medium-distance trains to 350 km/h for high-speed trains. In comparison, the maximum speeds of a tram and metro are far lower at respectively 50 and 100 km/h. Railway axle loads range from 18 tonnes for passenger coaches to 22.5 tonnes for freight and locomotives, whereas axle loads for tram and metro range from 8 to 14 tonnes. Railways usually face fewer geographical and thus environmental concerns, as they run separately, typically at a greater distance from residences. Metros and trams face significant space constraints as they operate in an urban environment. Metro tracks are in a tunnel and turnouts cause great concerns, especially in terms of noise and vibration. Trams operating on the streets, often close to residences, cause similar problems. In addition, trams operating on the street require special (girder) rails and thus special turnouts. All these elements show that, even though the basic concepts are the same, turnouts developed for railways cannot be simply implemented in urban transport.

Objectives

The objective of this project is to improve the vehicle-track interaction of turnout systems as used in urban rail transit, and therefore improve their efficiency, enhance their safety levels, reduce their maintenance costs, increase their life expectancy and restrain the emitted noise.

Description of work

The TURNOUTS project starts with the modelling of actual turnouts to provide the benchmarks against which the improvements will be measured. Design changes will be implemented in the models to predict their behaviour. The turnouts will then be manufactured and installed for validation purposes and measurements will be performed to confirm the predictions from the models. The end result will be a series of turnouts with improved characteristics. The project is divided into several work packages (WP):

WP1: Six different existing turnout systems representing the conventional turnouts used today will be measured and modelled. The models will be optimised to reflect the actual measurement results. Improvements and changes will be made to these turnouts. The models are then used to optimise the proposed changes.

WP2: A large number of potential measures to reduce impact forces will be defined. Conceptual design studies will be made for some of these designs.

WP3: Seven test sites will be selected within the networks of the participating operators and the most optimal design for each particular location will be developed.

WP4: The most optimal designs will include the use of new materials, new manufacturing techniques and new installation techniques. The selected designs will be manufactured and tested in the lab.

WP5: After installation, the performance of the designs will be tested and compared against the calculated results.

WP6: The results of the new designs will be used to develop conclusions about the benefits of various designs.

Results

The project focuses on design and manufacture of new construction concepts of special trackwork for rail infrastructure that are low maintenance, high quality, safer, risk mitigating and produce lower noise. Complete turnouts will be considered in the research project (frog and switch area) with the exclusion of the control systems. At the start of the project, two different modelling procedures for impact force calculation during vehicle running in turnouts will be compared for their performance and validated. A first comparison will be made comparing measurement and modelling results on a reference turnout. Further refinement will be made by updating modelling results by means of measurement results on six different turnout systems, which are representative for the conventional turnouts used today in urban rail transport networks (WP1). Also at the start of the project, a large number of potential design measures for reducing impact forces will be defined. A conceptual design study of these design measures will be made (WP2). In the second phase of the project, seven test sites will be selected (three end users) and for each test site the most optimal new turnout design will be developed (iterative procedure in terms of refining selected turnout or in terms of selection a new turnout design) (WP3). The newly developed turnout systems will be manufactured (WP4), tested in the lab and installed on site. This will include the use of new materials, new manufacturing techniques and new installation techniques. Their performance will be measured and compared against the calculated results (WP5). At the end of the project, conclusions will be drawn in WP6. The consortium includes the main European turnout manufacturers, research and engineering partners, a contractor and three end users.

Keywords: Turnouts, impact forces, life expectancy, maintenance, noise, vibrations



Acronym:	TURNOUTS	
Name of proposal:	New Concepts for Turnouts in Urban Rail Transit Infrastructures	
Contract number:	TST3-CT-2003-505592	
Instrument:	STP	
Total cost:	3,950,916 €	
EU contribution:	2,169,560 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.11.2003	
Ending date:	31.10.2006	
Duration:	36 months	
Sector:	Rail	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures	
Coordinator:	Dr Vanhonacker Patrick Dynamics, Structures & Systems International Jules Vandenbemptlaan 71 BE 3001 Heverlee	
E-mail:	patrick.vanhonacker@d2sint.com	
Tel:	+32 (0)16 238988	
Fax:	+32 (0)16 238910	
Partners:	Bari Fonderie Meridionali	IT
	Cogifer	FR
	Vlaamse Vervoersmaatschappij De Lijn	BE
	Frateur de Pourcq	BE
	Jez Sistemas Ferroviarios	ES
	National Technical University of Athens	GR
	Politecnico di Milano	IT
	Régie Autonome des Transports Parisiens	FR
	Société des Transports Intercommunaux de Bruxelles	BE
	Université Catholique de Louvain	BE



URBAN TRACK

Urban Rail Infrastructure

The URBAN TRACK integrated research project was set up to address the '2020 ERRAC' vision: low life-cycle cost (LCC), high performance, modular, safe, low noise and vibration rail infrastructure systems that fit into a harmonised European market.

Background

New urban rail systems (LRT, tram, metro) face destructive opposition to the installation of new tracks from residents living nearby. This often-organised resistance delays the necessary authorisations. Their arguments are about noise and vibration disturbance during construction and exploitation, reduced revenues for businesses during construction, and general quality of life concerns over things such as safety, reduced property values and neighbourhood attractiveness. Besides these human factors, there are also a number of technical issues that increase the project cost and thus require improvement. The cost of classical urban track construction is very high, especially for embedded tram tracks, which include the complete renovation of the roadbed and, in some cases, also the sewer system. Track renewal methods are cumbersome, time consuming and often need complete closure of a section. There is almost no standardisation within the same network. On a broader scale, there is no uniformity of functional requirements between networks, making it hard to transfer rolling stock from one network to another. Urban networks often also face internal challenges. Investment costs and maintenance costs are generally covered by two different authorities that may have opposing interests, and prevent LCC-based decisions. This is further exacerbated by the fact that no generally accepted method exists to assess the total life-cycle cost of urban track systems.

Objectives

This four-year research project aims at developing, testing and validating a series of innovative products that can be categorised in three classes:

- innovative new products and solutions: prefabricated track modules, green tram tracks, embedded metro tracks, alternative low-cost tracks for floating slab in tunnels and on gradients
- innovative new methods: innovative track installation methods, automated track installation, fast renewal and refurbishment methods, cost/benefit analysis method for infrastructure works, preventive and predictive maintenance methods, techniques for reducing wear in curves and turnouts
- harmonised reference documents: standard for rail transit track inspection and maintenance, LCC calculation method, functional performance specifications.

The products will be integrated into a family of solutions within the function of the track type (metro, tram shared, tram segregated) and in function of the network's specific needs. Validation will be carried out in ten networks (each validating another type of infrastructure or solution). The evaluation will be based on criteria such as operational availability and cost.

Description of work

The project aims at developing families of innovative products, methods and standards in order to achieve greater harmonisation and safe, environmentally friendly urban track solutions at a low cost. The building blocks will be integrated using the developed tools into a family of solutions within the function of the track categories concerned (metro, tram-shared, tram-segregated) and within the function of the specific needs of the network concerned (small curves, high axle loads, etc.).

Subproject (SP) 1 revolves around the following new products/solutions: prefabricated track modules, green LRT/tram tracks, embedded metro tracks, alternative low cost tracks for floating slab in tunnels and on gradients, maintenance-free interface between rail and street pavement for embedded tracks.

SP2 will cover the following new methodologies for track maintenance, renewal and refurbishment: innovative track installation methods, automated track installation, fast renewal and refurbishment methods of existing tracks (LRT/tram), cost/benefit analysis method for urban rail infra works (LRT/tram), preventive and predictive maintenance for metro tracks, techniques for reducing wear in curves and turnouts (LRT/tram).

SP3 will design and implement these solutions at selected test sites.

SP4 will develop a LCC model and an associated software tool. It will also look at the socio-economic cost of track construction for nearby residents and shops.

SP5 will develop harmonised standards for rail transit track inspection and maintenance, as well as harmonised functional performance specifications. It should be noted that the network operators/infrastructure managers are the drivers of this project.

Results

The entire project deals with two topics: reducing costs and harmonising specifications. This project is aimed at reducing the life cycle costs by 25% by reducing the material cost by 20%, the overall installation cost by 30% and by increasing the service life by 50%. The results will be new innovative track products, systems and construction methods, as well as new innovative track maintenance methods, supported by a comprehensive LCC model and its accompanying software. These innovative construction methods are developed in conjunction with a harmonised standard for 'rail transit track inspection and maintenance' and harmonised functional performance specifications. These harmonised documents will promote the standardisation of track systems. Besides these cost savings, the improved quality of the track construction methods will result in reduced fatigue damage and longer service life; two factors that benefit safety. The new track systems will benefit the environment through better aesthetics, controlled noise and vibrations.

Keywords: Track, installation, maintenance, LCC, performance specifications, maintenance specifications



Acronym:	URBAN TRACK	
Name of proposal:	Urban Rail Infrastructure	
Contract number:	TIP5-CT-2006-031312	
Instrument:	IP	
Total cost:	18,590,478 €	
EU contribution:	9,998,351 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.09.2006	
Ending date:	31.08.2010	
Duration:	48 months	
Sector:	Rail	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacture of new construction concepts for road, rail and inter-modal infrastructures	
Coordinator:	Mr Van Leuven André Dynamics, Structures & Systems International Jules Vandenbemptlaan 71 BE 3001 Heverlee	
E-mail:	andre.vanleuven@d2sint.com	
Tel:	+32 (0)16 238988	
Fax:	+32 (0)16 238910	
Partners:	Société des Transports Intercommunaux de Bruxelles	BE
	ALSTOM Transport SA	FR
	Bremen Strassenbahn AG	DE
	Composite Damping Materials	BE
	Die Ingenieurswerkstatt	DE
	Institut für Agrar- und Stadtökologische Projekte an der Humboldt	DE
	Tecnologia e Investigacion Ferriaria	ES
	Institut national de Recherche sur les Transports et leurs Securite	FR
	Institut National des Sciences Appliquées de Lyon	FR
	Dirreccion General de Transportes, COPT, Junta de Andalucia	ES
	Alfa Products & Technologies	BE
	Autre Porte Technique Global	PH
	Politecnico di Milano	IT
	Régie Autonome des Transports Parisiens	FR
	Companhia do Metro de Sao Paolo	BR
	Studiengesellschaft für Unterirdische Verkehrsanlagen	DE
	Stellenbosch University	ZA
	Transport for London	UK
	Ferrocarril Metropolitana de Barcelona	ES
	Trends Engenharia e Tecnologia	BR
	Transport Technology Consult Karlsruhe	DE
	Université Catholique de Louvain	BE
	Universiteit Hasselt	BE
	International Association of Public Transport	BE
	Union of European Railway Industries	BE
	Verkehrsbetriebe Karlsruhe	DE
	Fritsch Chiari & Partner	AT

CATIEMON

Catenary Interface Monitoring Coherent sensing technology for electrical railway infrastructure and rolling stock for interoperable cross boundary transportation

In a deregulated EU rail market, the monitoring of the vehicle and infrastructure interface is mandatory for an enhanced availability of operation, which reduces costs. Condition monitoring becomes crucial when a rolling stock is crossing boundaries between independent infrastructure grids.

CATIEMON is investigating methods to determine damaged pantographs and overhead line equipment. Effective in-service monitoring of these components ensures that preventive action to be taken before more serious damage occurs.

Background

The SMITS EU Fifth Framework Programme project built the foundation for the CATIEMON project. The principles for condition monitoring were investigated and are now further developed and applied within this project in the Sixth Framework Programme.

SMITS was considering solely the use of techniques involving the pantograph to detect overhead line condition. CATIEMON considers this aspect further and also examines the use of an infrastructure device to assess pantograph condition.

By investigation damage to these components, effective responsibility can be attributed to the rolling stock or infrastructure owner in relation to the condition of their equipment. The method could also be used to determine access charges and to restrict the use of locos with damaged pantographs running on a network.

Objectives

The objective of this project is to minimise the damages on the overhead contact line (OCL) and the current collector (pantograph). Both rail infrastructure managers and rolling stock operators will obtain greater transparency on the condition of the other party's devices.

Description of work

To enable the train to detect damages on the overhead contact line, the pantograph will be equipped with sensors. The rail infrastructure manager will have an inspection gate at the entrance of his track and will be able to stop trains with faulty pantographs. Non-critical wear on the devices could define reduced or increased fees.

Results

The information needed for interoperability will become available. Through the results of this project the EU railway market can grow.

Keywords: CATIEMON catenary interface monitoring



Overhead Contact Line OCL



Current Collector CC

Acronym:	CATIEMON
Name of proposal:	Catenary Interface Monitoring Coherent sensing technology for electrical railway infrastructure and rolling stock for interoperable cross boundary transportation
Contract number:	TST4-CT-2005-012105
Instrument:	STP
Total cost:	5,722,563 €
EU contribution:	3,199,982 €
Call:	FP6-2003-Transport 3
Starting date:	01.04.2005
Ending date:	30.09.2008
Duration:	42 months
Sector:	Rail
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Website:	http://www.catiemon.info
Coordinator:	Dr Henning Uwe Siemens Aktiengesellschaft Transportation Systems Group Werner-von-Siemens-Str. 67 DE 91052 Erlangen
E-mail:	uwe.dr.henning@siemens.com
Tel:	+49 (0)91 31 7 27789
Fax:	+49 (0)91 31 828 27789
Partners:	BLS Lötschbergbahn AG Morganite Electrical Carbon Limited Furrer+Frey AG Cybernetix SA Arbeitsgemeinschaft paneuropäischer Korridor X Ges. b.R. (StrNo. 013/3981 Ref.01 FA) Eurailscout B.V. Institut fuer Physikalische Hochtechnologie e.V. Jena Commissariat à l'Énergie Atomique

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Europac

European Optimised Pantograph-Catenary Interface

Europac brings together major European railway stakeholders in a research project on vehicle/infrastructure interaction through pantograph-catenary contact. The project aims to enhance interoperability between pantograph and catenary (overhead line equipment), decreasing the number of incidents related to this system and reducing maintenance costs by switching from corrective to preventive maintenance. Specifically Europac is developing a comprehensive system composed of joint software for interoperability and both trackside and onboard monitoring systems.

Background

Two vehicle/infrastructure mechanical interfaces are present in the railways. The first is wheel/rail contact, which has been a topic of research for many years, concerning safety and comfort, from the modelling and experimental points of view. The second is pantograph-catenary contact, where much less research has been performed.

However, this interface is of crucial importance, since it is more critical to interoperability issues, contrary to wheel/rail contact. Moreover, it constitutes a limitation to increasing train speed due to the wave propagations in the very flexible catenary. Finally, defects in the catenary often lead to the rupture of the contact wire, consequently stopping train services. Consolidated statistics from DB, SNCF and Trenitalia show an average number of 915 incidents per year leading to 308 days of delay, generating tremendous costs to society in general and railway stakeholders in particular.

Objectives

The Europac objectives are:

- to bring together European manufacturers, operators, infrastructure managers and academia involved in railway activities to build up a common research project that will significantly contribute to reinforcing interoperability and standardisation throughout the European rail community
- to develop a joint numerical software to model the dynamic behaviour of the pantograph-catenary system in three-dimensions, designed to be capable of simulating all present and future infrastructure and rolling stock configurations
- to assess existing, and specify new, technical specifications for interoperability
- to study and model the impact of deteriorated conditions on the pantograph-catenary system's behaviour including crosswinds and extreme temperature situations, material defects and wear
- to develop a prototype of a trackside monitoring station aimed at detecting, identifying and assessing, in real-time, defects in a pantograph coming into a network
- to develop a prototype of an onboard monitoring system designed to detect, identify and assess defects in a catenary in real-time.

Description of work

Interoperability covers two main issues: ensuring interoperability of the equipment during the development phase and monitoring interoperability during operation. Maintenance can also be improved through simulating deteriorated conditions and monitoring systems. To address these two aspects, Europac will produce two types of tools: software and monitoring systems.

Two work packages are dedicated to the development of the Europac joint software. The first is focused on the design of joint nominal software aimed at being capable of representing all current and future pantographs and catenaries. The second is designed to complete the software with modules representing the effects of deteriorated conditions: extreme climatic conditions, defect and wear effects.

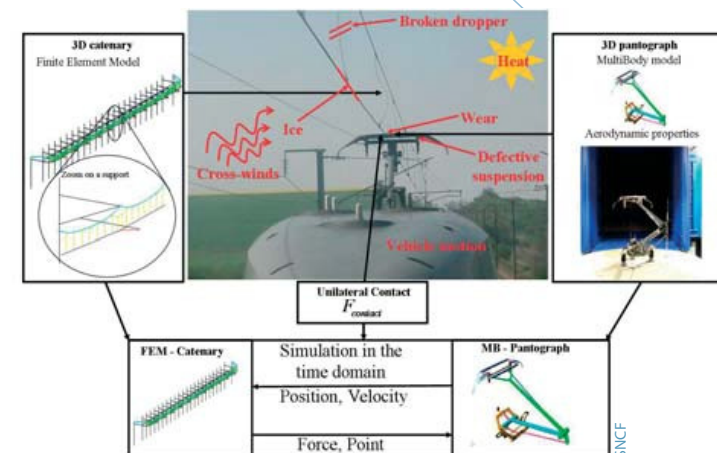
Operational interoperability and maintenance are ensured by the monitoring systems developed within two other work packages. For this purpose, these work packages will develop a new generation of monitoring systems combining expert systems and machine efficiency. Moreover, these monitoring systems will take advantage of the defect signatures provided by the software, not only to detect the defect effects but also to identify their origin and assess their seriousness. Inversely, the software will be validated and refined if necessary using results measured by the monitoring systems.

Results

Europac will achieve the following results:

- A core 3D pantograph-catenary software, based on the latest multibody dynamics and finite-element methodologies developed in a modular manner. This software will have all the features necessary to analyse any model of pantograph or catenary, and also take into account mechanical parameters (tension, contact wire sections) and effects of singular points (curves, switches, changes in the catenary height).
- Modelling crosswind, extreme temperature, wear and defect effects and integrating the routines developed in the project into the core model.
- Interoperability assessment of different existing and underdeveloped pantograph-catenary systems. The software will contribute to this result by providing railway stakeholders with a commonly accepted tool and by reducing costly tests, using simulation during the development phases.
- Evaluation of partners' compatibility criteria to define joint interoperability criteria or equivalence between compatibility criteria, using both simulation and test results.
- A trackside monitoring station aimed at detecting, identifying and assessing, in real-time, defects in a pantograph, to allowing infrastructure managers to make the right decision at the right time as well as optimising rolling stock maintenance.
- An onboard monitoring system to detect and specify, in real-time, defects in the catenary to allow infrastructure managers to optimise their maintenance.
- Databases containing a) parameters necessary to model pantographs and catenaries used by the partners, b) defect and wear signatures, to be used by the monitoring systems, and c) outputs from on-site tests of the systems, to be used to validate simulation results.

Keywords: Pantograph, catenary, interoperability, maintenance



Architecture of EUROPACAS, the Europac software

Acronym:	Europac	
Name of proposal:	European Optimised Pantograph-Catenary Interface	
Contract number:	TST4-CT-2005-012440	
Instrument:	STP	
Total cost:	4,922,245 €	
EU contribution:	2,599,997 €	
Call:	FP6-2003-Transport 3	
Starting date:	01.01.2005	
Ending date:	31.12.2007	
Duration:	36 months	
Sector:	Rail	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces	
Website:	http://www.uic.asso.fr/europac	
Coordinator:	Mr Cl��on Louis-Marie SNCF 45 rue de Londres FR 75009 Paris	
E-mail:	louis-marie.cleon@snCF.fr	
Tel:	+33 (0)1 53 42 92 55	
Fax:	+33 (0)1 53 42 92 54	
Partners:	Alstom Transport	FR
	ARTTIC	FR
	Banverket	SE
	Cesk�� dr��hy akciov�� spolecnost	CZ
	Deutsche Bahn	DE
	Faiveley Transport	FR
	Instituto Superior T��cnico Lisboa	PT
	Mer Mec S.p.A.	IT
	Politecnico di Milano	IT
	R��seau Ferr�� de France	FR
	Rete Ferroviaria Italiana S.p.A.	IT
	Trenitalia S.p.A.	IT
	Union Internationale des Chemins de Fer	FR
	Kungliga Tekniska H��gskolan	SE

INFRACLEAR

Rail Infrastructure Clearance Management

The aim of INFRACLEAR is to allow optimum use of the infrastructures 'track clearance' by means of an innovative approach for track gauging using operational monitoring technology and thus contributing towards increasing the capacity and safety of the infrastructure.

Background

In the UK, Laser Rail is in the process of delivering a track clearance measuring system to Network Rail. The national gauging project (NGP) aims to upgrade the measuring platform by using modern 'off-the-shelf' equipment like a high-speed rotating laser.

In Germany, the consortium, made up of Metronom Automation, FTI Engineering Network and Fraunhofer Institute Physical Measurement Techniques, has developed a high-speed train-borne measuring system, THELIX, which aims to deliver clearance profiles at cyberspeed.

In France, this train is to be operated by Deutsche Bahn. OBSERVEUR (the last generation of PHOTOPROFIL 1 and 2) is at the acceptance phase from SNCF for operating inspections of civil engineering at between 5 and 120 Km/h.

In Italy, FS is currently developing a new measuring vehicle from MERMEC, which aims to deliver clearance measurements.

Objectives

The current technologies used for infrastructure gauging purposes are very simple:

- the most common checking system is made of a piece of wood, shaped like a train, which is expected to run through the tunnels, and the gauging process consists of checking the breakage of that piece of wood after it has travelled over several kilometres of track: it is only a go/no-go process, with very poor measurement or location capability
- a more recent system is composed of a rotating laser scanner, mounted either on a lorry or a road-railer, and run at just a few kilometres per hour. These systems may provide digital processing of the clearance, but the track must be closed before starting a measuring run
- some other countries, like France, are operating a measuring wagon, travelling in the range of 5-10 km/h. Such a low running speed has the same drawback as manual inspection systems: the track has to be closed during the measurement run.

The objective of the present research work is to make it possible to run on the track to be inspected at a commercial running speed. This process would allow the clearance to be checked without stopping the commercial trains. The expected gain is very advantageous from a commercial and financial point of view of the global management of the infrastructure.

Description of work

The INFRACLEAR clearance sensor under development is based on laser sheet triangulation profiling techniques. It integrates the following technologies:

- a laser sheet projector, with a fan angle close to 270° perpendicular to the axis of the track. The laser power is an 18 W continuous wave solid-state laser, with specific spreading optics

- one set of high-speed and high-resolution cameras, installed separately from the laser, pan for clearance measurement
- geometric stability of this arrangement is ensured by the implementation of a global rigid metallic frame supporting all the cabinets, including the lasers or sensors
- a running track reference, based on the inertial principle, is provided by additional cabinets, including lasers, cameras and inertial sensor, which is attached under the main frame and looking closely towards the rail
- the whole sensor frame, with all the sensor cabinets and the computers will be installed in a 'comfortable' container, well protected against the outside environment
- the measuring container has to be mounted on a classical freight wagon, and fixed on it with the usual locks. This solution makes it possible to put the measuring container on any wagon, so it can be run on a specific track gauge.

This system will be composed of three sub-systems namely:

- a measurement device, including a train-borne sensor and the measuring car
- a processing device associated with an expert system to provide conditional maintenance programmes
- a simulation tool making it possible to determine clear and safe 'European routes' for a given train gauge over borders.

Results

The performance of the inspection device is summarised below:

- an inspection should be carried out at least once a year on the entire railway network (inspection of single tracks is expected to be performed in a single operation)
- the targeted measuring speed objective during inspection is 120 to 140 km/h
- the accuracy of the system must allow for detection of obstacles with a minimum thickness of 20 mm, i.e. 0.5 ms passing time in front of the sensor when the train is running at 140 km/h
- the dimension and space requirements of the device will be designed so that they are accepted on the different networks.

The potential market impact foreseen is based on the following forecasted costs:

- Operation rate (with no operator): €5 000 per day
- Stand-by rate: €500 per day
- Modulate/demodulate rate: lump sum to be defined from time to time.



Acronym: INFRACLEAR
Name of proposal: Rail Infrastructure Clearance Management
Contract number: TST3-CT-2003-505784
Instrument: STP
Total cost: 5,252,000 €
EU contribution: 2,600,030 €
Call: FP6-2002-Transport 1
Starting date: 01.02.2004
Ending date: 31.01.2008
Duration: 48 months
Sector: Rail
Objective: Advanced Design and Production Techniques
Research domain: Design and manufacturing technologies to improve vehicle/vessel interfaces
Website: <http://infraclear.org/>
Coordinator: Mrs Semerano Antonella
CYBERNETIX SA
306, rue Albert Einstein
FR 13382 Marseille
E-mail: antonella.semerano@cybernetix.fr
Tel: +33 (0)6 91 21 77 00
Fax: +33 (0)4 91 21 77 01
Partners: EURAILSCOUT B.V.
Cideon Engineering Bautzen GmbH
DMA s.r.l.
Laser Rail Ltd
Arbeitsgemeinschaft paneuropaischer Korridor X Ges.n.BR

NL
DE
IT
UK
AT

INTERGAUGE

Interoperability, Security and Safety of Goods Movement with 1435 and 1520 (1524) mm Track Gauge Railways: New Technology in Freight Transport including Hazardous Products

The aim of the project is to develop and validate a new rail transport technology on the basis of adjustable wheelsets, enabling the interoperable, safe and secure traffic between railways with different gauge width. This new transport technology allows limiting the time required for a train to move through a border crossing with a gauge-changing station and minimise the environmental hazards. It is a new alternative in the supply of energy resources. INTERGAUGE consists of three subsystems: operation technology and track layout of switching station, innovative solution SUW 2000 II and the construction of a track gauge switching station with enhanced durability to take loads of 225 kN.

Background

Technologies currently applied in international railway freight transport through border crossings, where track gauge changes from 1435 mm to 1520 mm, require time- and work-consuming reloading procedures and very expensive reloading appliances. The new INTERGAUGE technology using cars with adjustable wheel sets is considerably safer and more efficient than the currently used methods, especially for the transport of dangerous materials – gas and petroleum – which are easily damaged while reloading, and of goods that are hazardous to the environment. There is now a need for a transportation method for such goods, which was expressed at international meetings with railway companies. The project involves research on technological advances and integration with regard to the interoperability of freight transport. It increases the possibility for the railways to take over the transport of some dangerous freight, which is currently shipped by road.

Objectives

The aim of the project is to develop freight movement technologies to enable the interoperability of transport between railways with different gauge widths.

The following tasks should be realised during the project:

- elaboration of theoretical track layouts and switching station operational technology
- development of a prototype construction of a tank car equipped with adjustable wheel sets
- construction of a track gauge changing station and the equipment used to operate it.

Description of work

One of the objectives of the project is to develop a bogie tank car with gauge-adjustable wheel sets and its implementation for transporting petroleum. This car and bogie should adapt for higher speed and higher axle-loads, allowing a greater load capacity of the whole car. The construction of a bogie with gauge-

adjustable wheel sets should be adapted to 225 kN axle load and $v = 120$ kph. The development of a new car superstructure is also aimed at reaching a better tare weight factor. Owing to the implementation of new materials, the factor for the tank car should not exceed 0.25-0.27 with a technical availability factor of 0.92-0.95. The most up-to-date analytical methods as well as fatigue tests have been used.

A track gauge switching station with enhanced durability equipped with devices to automate operation and monitor the switching process will be constructed.

Results

As a result of the project, the following prototypes will be developed:

- the construction of a new tank bogie car with a gauge-adjustable wheel sets for 225 kN axle load and speeds of 120 kph, comply with the common leaflet UIC 430-4/OSShD/516 O+R and UIC and RIV regulations
- the construction of the track gauge switching station with enhanced durability and equipped with devices to automate the switching and monitor the switching process.

Acronym:	INTERGAUGE
Name of proposal:	Interoperability, Security and Safety of Goods Movement with 1435 and 1520 (1524) mm Track Gauge Railways: New Technology in Freight Transport including Hazardous Products
Contract number:	TST4-CT-2005-516205
Instrument:	STP
Total cost:	1,845,300 €
EU contribution:	698,000 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2006
Ending date:	31.12.2007
Duration:	24 months
Sector:	Rail
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Coordinator:	Prof. Chudzikiewicz Andrzej Warsaw University of Technology Plac Politechniki 1 PL 00-661 Warsaw
E-mail:	Dziekan@it.pw.edu.pl
Tel:	+48 (0)22 621 56 87
Fax:	+48 (0)22 621 56 87
Partners:	Kiev University of Transport Economy and Technologies UA Railway Scientific and Technical Centre PL State Scientific Research Centre of Railway Transport of Ukraine UA University of Zlina, Faculty of Mechanical Engineering SK POZNANSKIE ZAKLADY NAPRAWCZE TABORU KOLEJOWEGO S.A. PL Open Joint Stock Company 'Azovmash' UA JP - TRANSPLAN OY FI KolTram Sp. z o.o PL TENS Sp. z o.o PL PKP POLSKIE LINIE KOLEJOWE S.A. PL

ISLE

Integrated communicating solid-state light engine for use in automotive forward lighting and information exchange between vehicles and infrastructure

This proposal aims to develop an innovative manufacturing technology to produce a new generation of headlamps for vehicles, which will be the basis for a future car-to-car or car-to-infrastructure communication system. To achieve this, a new production process needs to be developed, combining LED chips into a packaging which already forms the beam, with minimised losses. This proposal aims at simplifying the production process of headlamps by:

- reducing the number of production steps
- reducing the number of components (electric bulb, reflector and housing) to just one injection-moulded component
- reducing the production time and thus reducing the manufacturing costs.

Background

The state of the art in lighting is an electric bulb. But these bulbs cannot be modulated, so they are of no use for communication. White LEDs are in existence today and could serve for both purposes. A standard incandescent bulb achieves 20 lumens per watt (lm/W) while automotive xenon lamp technology provides 90 lm/W. Solid-state technology currently achieves up to 40 lm/W in laboratory quantities and about 20 lm/W in series production. New records are established every three months. The theoretical limit of 200 lm/W means the solid-state source achieves greater efficiency than the best existing light source. More efficient lighting systems would mean an enhanced brightness on the road while reducing fossil fuel emissions through lower power consumption.

Objectives

The main objective is to define the ability of an LED system to provide communication modes for other vehicles or traffic safety devices – measured by the new ability to communicate during different driving conditions. This will be achieved by:

- validating the chip-on-board LED array with a primary optic moulded over the LED array, measured by an automotive qualification schedule
- researching the best methods for converting multiple blue chip array into white chip array, measured by meeting colour temperature and rendering requirements
- defining the best colour temperature and rendering for automotive driving
- creating the most efficient optical system while understanding system trade-offs, measured by optical simulations and photometric measurements



- defining the best method to electrically drive an LED system and integrate electronics in a vehicle format with respect to the modulation of the LED-array for communication
- developing over-moulding technology for chip-on-board modules to produce a complete lamp within one injection-moulding shot
- creating a system integration for the ISLE project in an automotive environment, measured by cost studies and automotive qualification schedule.

Description of work

In the first phase, the consortium concentrated on finding convertible concepts, which meet both the individual excellence of each partner and the overall project goal. The central elements were:

- the LED architecture with respect to the requirements of the beam pattern forming optical elements
- finding a suitable possibility to perform communication without any losses in light
- definition of the required components
- efforts in making LED headlamps legal.

The work was organised and the interfaces defined, the best suitable concepts were selected and implemented accordingly. From the first results optimisation loops have begun.

Results

Results achieved so far:

- first samples of white LED have been manufactured performing with a correlated colour temperature below 4 500°K
- the communication concept has been implemented and its feasibility was approved in the laboratory
- the integrated optical concept, which is based on the coupling between refractive and reflective optical components, was turned into a first sample for a high beam module and the low beam is on the way
- a novel concept of laminating high-reflective coating on plastic optics was developed to substitute Al-coating
- an electronic driver circuit on a lower scale integration with all the necessary functionality was developed
- a liquid cooling system for the thermal management inside the headlamp was developed.

Expected end results

At the end, the consortium will present a fully functional headlamp device using LED as a light source, performing a high and low beam. The out coming light will be able to be modulated in order to communicate information to the infrastructure. The device will provide outline dimensions in accordance with the space generally available in today's cars. It will be capable of being mounted on a test rack in front of a vehicle.

It is expected that the additional knowledge built up during the project will enable each partner to have further commercial benefits or, in case of public bodies, reputation and contacts with industry.

Keywords: LED headlamp, light modulation, communication, automotive, liquid cooling system, highly reflective coating, reflective and refractive optical components

Acronym:	ISLE
Name of proposal:	Integrated communicating solid-state light engine for use in automotive forward lighting and information exchange between vehicles and infrastructure
Contract number:	TST3-CT-2003-506316
Instrument:	STP
Total cost:	5,418,240 €
EU contribution:	2,900,000 €
Call:	FP6-2002-Transport 1
Starting date:	01.10.2003
Ending date:	30.09.2006
Duration:	36 months
Sector:	Road
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Coordinator:	Mr Eike Krochmann Schefenacker Vision Systems GmbH Alfred-Schefenacker-Str. 1 DE 71409 Schwaikheim
E-mail:	eike.krochmann@schefenacker.com
Tel:	+49 (0)7195 581 1575
Fax:	+49 (0)7195 581 3 1575
Partners:	Global Light Industries GmbH DE OEC AG DE Technische Universität Berlin DE STMicroelectronics IT LED Products Europe S.L. ES Philips Electronics B.V. NL University College Cork - National University of Ireland, Cork IE IGS HIGH TECH B.V. NL IFP-Sicomp SE University of Veszprém HU Universidad Politécnica de Madrid ES Regloplas AG CH Chamberlain Plastics Ltd UK Universidad Politécnica de Madrid ES LITEC-LLL GmbH DE

NG2SHIPI/F

New-generation Natural Gas Ship Interfaces

The goal of this project is to improve the effectiveness of LNG transportation from exporting countries to receiving ones through improving the interfaces between liquefied natural gas (LNG) ships and their dedicated loading and unloading terminal infrastructures. These interfaces include loading arms to load/unload the liquid gas, onboard pipes to transfer LNG from tanks to shore, specific submerged pumps and an electrical system to operate it, and highly insulated tanks on LNG carriers.

Background

The project will contribute to a more competitive LNG supply chain, and strengthen the technological leadership of European shipyards, which today are facing fierce Asian competition. The project could also result in a €3 million p.a. cargo pump industry in Europe, thus creating an alternative supply source to US and Far East suppliers. It opens the door to a potential €1 million p.a. retrofit market for European LNG carrier repair shipyards and equipment suppliers, and to international freshwater trading. It paves the way for setting innovation, and affordable, competitive and more environmentally friendly design and operating standards for LNG carriers and terminals.

Objectives

This NG2SHIPI/F project features the following operational targets:

- develop and demonstrate an LNG cargo pump enabling a 20% reduction in its operating time
- develop more efficient LNG cargo transfer lines, demonstrating an 80% improvement in their thermal performances, with improved insulation systems
- develop a new concept of insulation for the LNG cargo tanks, demonstrating a 20-40% reduction in boil-off-related CO₂ emissions during harbour manoeuvres
- demonstrate the feasibility of using diesel-electric LNG carriers as co-generation units providing power and hot water to regasification terminals.

The main operational benefits expected from this project are:

- for shipyards and LNG carrier operations: a manufacturing cost reduction of more than €2 million per ship, and a yearly operational cost reduction of up to €5 million
- for terminals: a 20% increased capacity; reduced boil-off emissions during ship manoeuvres and transfer operations; the creation of a new role for freshwater providers to LNG exporting countries; access to a competitive co-generation source, and exploitation of the regasification cooling power.

Description of work synopsis

The work has been split into the following work packages (WP):

WP1: Coordination.

WP2: Cargo pump: trade-off and conceptual studies, electrical motor technology assessment, electrical architecture optimisation, pump preliminary design, forerunner building for further tests in WP6.

WP3: Transfer lines insulation: improvement of foam insulation formulation at cryogenic temperature, foam insulation creep behaviour at cryogenic temperature, insulation of transfer line components, loading arms insulation studies, optimisation of piping mechanical brackets.

WP4: Tank insulation: feasibility and performance tests performed on foam insulation, thermal analysis, feasibility of retrofit on an existing carrier.

WP5: Co-generation I/F: power generation interface definition.

WP6: Cargo pump demo: test-bench modification and acceptance, demonstrator manufacturing, assembly and acceptance, demo tests performance, test-bench reconditioning.

WP7: Transfer lines insulation demo: equipment insulation demonstration tests, loading arm insulation demonstration tests.

WP8: Tank insulation demo: thermal model on existing LNG carrier, test on the existing LNG carrier.

WP9: Knowledge management and dissemination plan.

Results

A cargo pump scale 1 prototype has been designed and mounted, and has fulfilled a series of tests to assess its hydraulic performances. After this successful first part, the second phase consisted of specific tests on the new electrical motor, which showed very good results in terms of efficiency and motor behaviour.

The design of a powerful variable speed system for this type of pump has been studied in depth with the use of dedicated models. Loading arms insulation studies have shown improvements by using double wall and vacuum insulated pipes, a solution that has been manufactured and tested with positive results.

The power interface study concluded that there is a high potential gain from using a power interface.

Acronym:	NG2SHIPI/F
Name of proposal:	New-generation Natural Gas Ship Interfaces
Contract number:	TST3-CT-2003-506154
Instrument:	STP
Total cost:	5,242,000 €
EU contribution:	1,800,000 €
Call:	FP6-2002-Transport 1
Starting date:	01.11.2003
Ending date:	31.10.2006
Duration:	36 months
Sector:	Waterborne
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Coordinator:	Mr Viallon Emmanuel Snecma Moteurs Forêt de Vernon FR 27208 Vernon
E-mail:	emmanuel.viallon@snecma.fr
Tel:	+33 (0)2 32 21 88 48
Fax:	+33 (0)2 32 21 75 40
Partners:	Alstom Power Conversion SA FMC Energy Systems LOGSTOR Instytut Elektrotechniki Oddział Wrocław MIKROMA SPOLKA AKCYJNA
	FR FR DK PL PL



RAILCOM

Electromagnetic Compatibility between Rolling Stock and Rail-infrastructure encouraging European Interoperability

The RAILCOM project is focusing on electromagnetic compatibility (EMC) solutions in relation to railway interoperability. It aims at the harmonisation of interference limits for train detection and the characterisation of the railway electromagnetic environment for communication systems.

Background

Although RAILCOM research will be focusing on practical problems regarding the vehicle/infrastructure interface on the TEN-T railway network, it will use the results and information collected during previous EC co-funded research projects in the specific field of rail EMC carried out in the Fourth and Fifth Framework Programmes. In comparison with all these projects, RAILCOM is aiming at achieving harmonisation of interference limits necessary for a sustainable improvement of production techniques for electrical installations of railway vehicles.

One important part of this work will also be to fill the gap that exists between the expertise available in other transport areas (aeronautics, automotive) and the knowledge and best practise applied to rail systems.

One major distinctive difference between railways and other transport/industrial systems is that the whole power involved in railways has the potential for EMC disturbance and the extension of the system favours the propagation of disturbances in the environment. Moreover, the interaction between the disturbance sources and the system can amplify the interference, as a function of the specific operating conditions.

Objectives

The objectives of the project are:

- to harmonise the interference limits for train detection systems on the TEN-T railway network
- to characterise the railway electromagnetic (EM) environment for communication systems, with correlation between EM emission and operating conditions of the system.

Train detection systems

According to EN 50238, the railway infrastructure managers shall define the interference limits to be met by the trains.

The scope of the work covers the lower end of the frequency scale, from DC to a maximum of 100 kHz. This corresponds to the frequency range of 99% of all train detection systems currently in use, i.e. track circuits, axle counter sensors and loops.

The project will provide a toolbox of fully validated methods for the characterisation of train detection systems, and for the assessment of compatibility between rolling stock and train detection systems.

Communication systems

The objective is to achieve a comprehensive characterisation of the electromagnetic environment of the railway system, according to the significant operating conditions of the system itself, including sources of interference (vehicles, substations, lines, auxiliary equipment) in order to determine the susceptibility levels of the communication systems to electromagnetic interference, to guarantee the safety of the messages and the transmission of the information in a delay that, for example, respects the ERTMS and Euroradio requirements.

Important input to standards like EN50121-2, EN50121-4 and EN50159-1 is envisaged as a part of the dissemination activity through the partners participating in the respective working groups.

Description of work

The research activity, including modelling and measurements, will be focused on train detection and communication systems. Harmonised calculation methods will be identified and validated through appropriate test campaigns. Strong efforts will be made to favour harmonisation of interference limits and methods to determine the limits of train detection systems, overcoming the barriers imposed by national regulations and practice. The EM of the railway systems will be related to their operating conditions, in order to facilitate the forecasting of electromagnetic emissions based on the systems' characteristics and to assess interference with the communication systems.

Compatibility between vehicles and train detection systems

The main objective of this work is to provide a set of fully validated characteristics and technically sound testing methods and approaches to achieve and demonstrate electromagnetic compatibility between vehicles and track circuits for future interoperable lines.

The specification, models and methods shall aim to become generally accepted and recommended tools for the design and acceptance processes defined in the relevant European Standards and TSIs.

High frequency interference of the whole railway (especially of communication systems between trains and infrastructure)

This work aims to improve the capacity of the whole railway, especially that of communication systems and the safety of the message transmissions between train and infrastructure using new telecommunication technologies. The work will consist of developing experimental and numerical characterisation methods to determine EMC specifications, to protect the safety of the message transmissions and improve the capacity of the communication systems by taking into account rail interoperability.

Results

The results of the project are expected to comprise of:

- harmonised methods defining interference limits for train detection systems on the TEN-T lines
- relationships between the EM fields in the railway environment and the operating conditions of the system with particular reference to communication systems.

The benefits of the project will include:

- significant technical/scientific innovation in the modelling/calculation techniques
- contribution to the improved global approach to railway systems through the improvement of interoperability between various railway infrastructure components
- important economical impact on the demonstration of vehicle compliance
- improved competitiveness of the European railway industry
- improvement of compliance within the environmental constraints.

Keywords: Electromagnetic compatibility, railway interoperability, train detection, radio communication, interferences



Movares Nederland BV



Movares Nederland BV



Acronym: RAILCOM

Name of proposal: Electromagnetic Compatibility between Rolling Stock and Rail-infrastructure encouraging European Interoperability

Contract number: TST4-CT-2005-516369

Instrument: STP

Total cost: 3,699,108 €

EU contribution: 2,450,403 €

Call: FP6-2003-Transport 3

Starting date: 01.12.2005

Ending date: 30.11.2008

Duration: 36 months

Sector: Rail

Objective: Advanced Design and Production Techniques

Research domain: Design and manufacturing technologies to improve vehicle/vessel interfaces

Website: <http://www.railcom.org>

Coordinator: Mr Gert-Jan van Alphen
Movares Nederland B.V. (old name until 30.4.2006 - Holland Railconsult B.V.)
Daalseplein 101
PO Box 2855
NL 3500 GW Utrecht

E-mail: bogdan.godziejewski@movares.nl

Tel: +31 (0)30 265 38 95

Fax: +31 (0)30 265 42 21

Partners: ALSTOM Transport SA
ANSALDOBREDA S.p.A.
Bombardier Transportation Sweden AB
VUZ - Railway Research Institute
Deutsche Bahn AG
Technische Universitaet Kaiserslautern
INRETS - Institut National de Recherche sur les Transports et leurs Securite
NITEL - Consorzio Nazionale Interuniversitario per I Trasporti e la Logistica
Siemens AG
SNCF Société Nationale des Chemins de Fer Français
Union Internationale des Chemins de Fer
Union of European Railway Industries

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SPURT

Seamless Public Urban Rail Transport

Rail mass transit vehicles, which are defined as trams, light rail and metros, very often do not behave as expected when running on existing rail infrastructure, although the vehicles may well be fully compatible with the specifications of the buying authorities and they may well have passed the acceptance tests. Many operators have different types of vehicles on their infrastructure and most operators also have different types of track systems in their network. They want the current and future vehicles to perform well on their complete existing and future network. This is one of the reasons why most vehicles today are built to local specifications.

Background

In rail traffic, existing and planned standards dealing with the design of single, highly loaded structure components are not based on the latest knowledge and do not offer a reliable guarantee against damage. Compared to other transportation systems, a lack of basic knowledge generally exists in railway design. Such knowledge and experience are decisive prerequisites for a reliable design and the specification of safe structures for long-term usage.

Ensuring the competitiveness of the rail-bound vehicle industry requires innovative solutions and methods to reduce system costs, shorten development times and increase safety and transport capacity. Rail infrastructure is very important in this regard.

Lifetime and endurance strength are mainly determined by the following parameters:

- operational loading combined with special event-loading (wheel-flats)
- existing design of the complete trackbed system and its components
- influence of materials
- environmental conditions
- quality assurance monitoring and maintenance schemes.

The interaction between vehicle and infrastructure results in complex stresses and damage mechanisms:

- material fatigue under highly dynamic loads
- damage to rails by rolling contact due to abrasion, wear and tear, plastic deformation in the surface zone
- derailment
- trackbed settlements.

Such damage may lead to considerable danger and a reduction in safety, as well as to a loss of comfort and a decreased driving performance. It will at least lead to an impairment of availability and an increase in maintenance expenditure. The SPURT project will lead to infrastructures, which are in an acceptable condition for ensuring seamless transportation. The infrastructure will no longer be the bottleneck for optimal operation. The vehicle speed should be as high as possible (though this is, in general, not an issue for the vehicle but depends on the condition of the infrastructure).



Objectives

It is mandatory to first solve some major track-related problems before being able to increase the technical harmonisation for vehicles and hence the potential of these vehicles to be used in other cities. The advantages will be enormous: higher residual value of vehicles, higher scope for vehicle leasing, higher vehicle production series and hence reduction of manufacturing cost and production lead times.

The major track-related problems which are to be identified and solved are:

- the reduction of the track degradation in time for ensuring a minimum track quality level
- the avoidance of derailment for ensuring safety at all times
- the improvement of the wheel/rail interface for reducing maintenance
- the minimisation of noise and in particular structure-borne noise and vibrations.

The study (problem identification and solution) of the above track-related problems is the scope of this research project. Solutions will be sought which are effective for existing and future vehicle types, albeit that some vehicle (wheel set) adaptations might be recommended or required.

Description of work

Data will be collected about the tram lines in different European cities (i.e. the types of rail, types and numbers of curves/crossings, the current quality of the rail including any history of damaging growth, date of laying) and data about the vehicles running on these tracks (i.e. type and number of vehicles, profiles and wheel quality).

A comprehensive technical knowledge will be gained on flange-climb derailment mechanisms through experimental data and numerical results. Numerical data will be collected concerning the response of tramcars to degraded track conditions. This methodology can show which of the infrastructure requirements (maximum acceptable irregularity levels) are compatible with vehicle safety and operating conditions.

Data will be collected concerning the correlation between service loads and damaging growth on rails and wheels.

Results

The outcomes of this project will be prediction methods and design tools for quieter urban city transport. It is not foreseen to have these aspects patented. The aim is to optimise study tools for the reduction of noise and vibration when applied to the development of new or renewed urban tracks. This strengthens the position in the European and international markets, and via a spread of technology and solution helps European cities to develop action plans to reduce city traffic noise as requested by EU Directive 2002/49/EC.

Acronym:	SPURT	
Name of proposal:	Seamless Public Urban Rail Transport	
Contract number:	TST3-CT-2003-506401	
Instrument:	STP	
Total cost:	2,558,160 €	
EU contribution:	1,399,113 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.12.2003	
Ending date:	30.11.2006	
Duration:	36 months	
Sector:	Rail	
Objective:	Advanced Design and Production Techniques	
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces	
Website:	http://www.lbf.fhg.de/SPURT	
Coordinator:	Mr Kieninger Michael Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. Hansastraße 27c DE 80686 München	
E-mail:	michael.kieninegr@lbf.fraunhofer.de	
Tel:	+49 (0)6151705267	
Fax:	+49 (0)6151705214	
Partners:	Technical University of Darmstadt	DE
	LUCCHINI SIDERMECCANICA SpA	IT
	Politecnico di Milano	IT
	Dynamics, Structures & Systems International	BE
	ANSALDOBREDA S.p.A.	IT
	SPIE RAIL	FR
	Société des Transports Intercommunaux de Bruxelles	BE
	Politechnika Slaska (Silesian University of Technology)	PL



UNIACCESS

Design of Universal Accessibility Systems for Public Transport

This project wants to promote the networking and coordination of R&D activities in the field of universal design of accessibility systems for public transport with a comprehensive group of stakeholders who have a view to achieving equality of access to public transport in the EU.

Background

Our society has committed itself to providing all citizens with equal opportunity. This means that, inasmuch as possible, people with different degrees of mobility (the young, the elderly, people with disabilities, people carrying infants or shopping, pregnant women, etc.) should be granted the same comfort, speed and capacity when using public transport. The only way to guarantee this is to ensure that the whole of the public transport system (railway, buses, taxis and its supporting infrastructure) in the EU becomes universally accessible.

In addition, universal design is not only a way of solving a problem; it is also an opportunity to increase the quality, usability and safety of public transport as well as the competitiveness of the industry.

Experience has shown that accessibility design is a multidisciplinary problem that demands a highly coordinated approach. End-users must validate new designs; they must also communicate their needs and assessment of the current situation. Designers and manufacturers must find cost-effective viable solutions and that what works in the laboratory must also work in reality. Authorities must legislate and regulate taking all of this into account to achieve maximum effectiveness.

Objectives

The aim of this project is to break with the traditional ways of dealing with these issues, which mitigate the problem but do not fully solve it.

- a. To collect useful state-of-the-art knowledge for designing universal accessibility systems for public transport in a way that allows this knowledge to be used and shared by all stakeholders in accessibility to public transport with a view to favouring synergies and better quality.
- b. To produce a roadmap of future R&D in universal accessibility to public transport based on:
 1. the current situation of accessibility to transport
 2. our vision of future accessibility to transport based on the universal design philosophy
 3. the emerging R&D concepts in this field
 4. the technology gaps that separate our current situation from the intended one.
- c. To invent new R&D project proposals that allow us to bridge the existing technology gaps, such as for example
 1. to come up with promising ideas that allow us to make access easier and more comfortable for all
 2. to reduce time waste during access.
 3. to achieve an efficient use of available space
 4. to obtain concepts that can be applied to different train, bus and car types with as few modifications as possible
 5. to maximise reliability to keep the devices always working properly
 6. to achieve a safe system.

- d. To define an improved collaborative innovation process in accessibility to transport that takes advantages of all the stakeholders involved in the field: end-users, operators, authorities, designers and manufacturers.
- e. To spread knowledge of universal design among educational institutions, end-users, operators, designers and manufacturers with a view to facilitating the adoption of the new concepts.

Description of work

The work has been divided into five work packages (WP).

WP1: this ensures that the consortium works efficiently and that information is available to all partners.

WP2 is concerned with the review of the state of the art. More than gaining new knowledge, the goal here is to establish a basis on which new ideas can be generated and new designs developed.

WP3 will identify concepts for new accessibility devices that can be used by people with or without mobility problems.

WP4 will define a new improved collaborative innovation process which breaks the communication barriers that prevent us nowadays from taking full advantage of the contributions of all stakeholders to improve accessibility to transport.

WP5 covers the dissemination of the results of the project to all the EU agents who can facilitate the adoption of universal accessibility systems to public transport: end-users, authorities, operators, manufacturers and designers, educators and the public in general.

Results

Deliverables:

- 1.1 Periodic progress report and cost statements
- 1.2 Minutes of project and steering committee meetings
- 1.3 Report on IPR and confidentiality management
- 1.4 Report on website and other supporting infrastructure
- 1.5 Final report
- 2.1 Report on end-user requirements
- 2.2 Report on the current situation and constraints of means of transport and infrastructures (the operators' view)
- 2.3 Report on design and manufacturing
- 2.4 Report on legislation and standardisation
- 2.5 Report on accessibility to public transport in different countries
- 2.6 Report on crosscutting studies and other studies
- 3.1 Report on emerging concepts
- 3.2 Roadmap of future R&D
- 4.1 Current practices in the innovation process in the field of accessibility to public transport
- 4.2 Report on improved collaborative innovation process
- 4.3 Report on new project proposal definition
- 5.1 Newsletters
- 5.2 Report on workshops and conferences
- 5.3 Guides and training for operators, end-users, designers and manufacturers
- 5.4 Report on society awareness activities

Potential market impact:

When speaking of accessibility, this project considers requirements for the disabled and their satisfaction would result in a society-wide increase in the quality of transport all over Europe. If we can design solutions for these people, we will be creating extremely easy and user-friendly products and services for all citizens.

Moreover, with better levels of accessibility we would be facilitating transport interoperability, reducing embarkation/disembarkation time, speeding up the flow of information, etc.



STS Siemens

Example of universal design



CRF Italy

Good example of universal design in a car

Acronym:	UNIACCESS
Name of proposal:	Design of Universal Accessibility Systems for Public Transport
Contract number:	TCA4-CT-2005-012504
Instrument:	CA
Total cost:	1,300,000 €
EU contribution:	1,300,000 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2005
Ending date:	31.12.2006
Duration:	24 months
Sector:	Multi
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Website:	http://www.uniaccessproject.org
Coordinator:	Mr Ajuria Jose Luis Grupo Interés Accesibilidad Transporte Avda. Los Huetos, 79 ES 01010 Vitoria-Gasteiz
E-mail:	jlajuria@euve.org
Tel:	+34 (0)945 21 46 46
Fax:	+34 (0)945 21 46 47
Partners:	European Network on Independent Living IE AGE, European Older People's Platform BE SINTEF - Stiftelsen for industriell og teknisk forskning ved Norges Tekniske Høgskole NO C.R.F. Società Consortile per Azioni IT CONFEDERACION COORDINADORA ESTATAL DE MINUSVALIDOS FISICOS DE ESPAÑA ES Siemens SGP Verkehrstechnik AU POLIS - Promotion of Operational Links with Integrated Services, association internationale BE Regie Autonome des Transports Parisiens FR

VISIONS

Vehicular Information System Interface for Open Network Services

The objective of the project is to enable information exchange between onboard truck information systems and external information systems, through standard and open information interfaces.

Background

The VISIONS project aims at implementing the following scenario. A truck, at the moment in which it enters a road infrastructure (e.g. a tunnel, a container terminal or a highway, etc.), exchanges data and documents with the information system of that infrastructure to inform it about the status of the vehicle and the cargo via a wireless network. Based on such data, the infrastructure can decide on whether to allow or deny access to the infrastructure in real-time, and also on how to assist the truck in case of accident, thus maximising efficiency and safety.

The enabling component for this scenario is an interface, called VISIONS interface, that integrates

- a. the controller area network (CAN-BUS) of the truck to extract the vehicle status parameters,
- b. a set of sensors installed in the trailer and interconnected via short-range wireless links to extract the cargo status,
- c. the infrastructure information systems interconnected via wireless local area network to exchange data, and
- d. a number of remote office information systems (transport company, administrations, etc.) to send appropriate information (e.g. fuel consumption, position, etc.) regardless of the brand of trucks, trailers, etc. The VISIONS interface is the focus of the VISIONS project.

Objectives

The objectives of the VISIONS project are

- to define an open (not proprietary) interface for the data and document exchange between the trucks and the ground information systems through different kinds of wireless networks (Wi-Fi, GPRS, UMTS, etc.)
- to set up a demonstration system implementing the VISIONS interface capable of showing the feasibility and effectiveness of this interface, in a pair of mission-critical applications
- to undertake a set of political actions, such as encouraging the European Commission to support this interface with appropriate recommendations (e.g. the Euro-x standards for environmental pollution), submitting to a standardisation committee (e.g., IETF, ISO, etc.) and aggregating the consensus of end-users about the appropriateness of the interface.

Description of work

Analysis of the state-of-the-art technology: The main contribution to this analysis is the awareness that the information and the communication technologies available today are suitable for supporting the VISIONS system functionalities. In particular:

1. Identification of data and documents to be exchanged through the VISIONS system: The core contribution of this analysis is the awareness that there exists a set of information items, that, properly transferred (i.e. at the appropriate time and location) from the vehicle to other information systems and

vice-versa, would increase the safety, the efficiency and the quality of the processes managed by end-user partners, i.e. tunnel administrations, transport companies, container terminals, etc.

2. Definition of the VISIONS architecture: The result of this activity is the definition of the VISIONS system architecture. The most innovative features of the architecture are:
 - the dynamic registry of available services: when the truck enters a VISIONS-enabled area, the onboard system registers to the infrastructure ground station and automatically exposes its services to the management station
 - the profiles of service security: the system grants access to different sets of services provided by the vehicle information system, according to the privileges of the requesting entities
 - the export of services to third parties: the services provided by the vehicle information system are made available to other actors through a business community mechanism based on a service oriented architecture
 - the seamless integration of the communication channel: the services provided by the vehicle information system can be supported by different types of wireless infrastructure (i.e. Wi-Fi, GPRS, UMTS), which are dynamically selected and transparent to the service users.
3. Implementation of the onboard linux based computer, on low-power dedicated hardware developed specifically for the VISIONS system.

- vice-versa, would increase the safety, the efficiency and the quality of the processes managed by end-user partners, i.e. tunnel administrations, transport companies, container terminals, etc.
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 3. Implementation of the onboard linux based computer, on low-power dedicated hardware developed specifically for the VISIONS system.

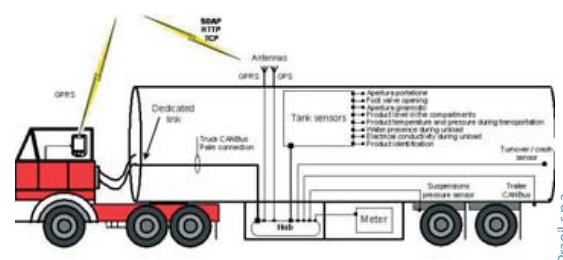
Results

The results of the project include:

- analysis of the state-of-the-art technology with experiments for local and long-distance data transfer
- analysis of the truck-related processes of container terminal, transport companies and tunnel administration
- specifications and design of the VISIONS system
- implementation of the VISIONS onboard system for local information exchange in the Mont Blanc tunnel:
 1. hardware prototype for data collection and long-distance communication
 2. Pilot 1: a truck sends more than 30 pieces of control data to the Mont Blanc tunnel information system every two seconds for 1km while driving inside the tunnel at 70km/h
 3. Pilot 2: several trucks send information on containers carrying dangerous goods to a transport company information system
 4. Pilot 3: several oil tankers send information on the status of the cargo to different platforms continuously.



Hardware onboard system specifically developed for VISIONS pilots



The architecture of the VISIONS system pilot on tankers

Acronym:	VISIONS
Name of proposal:	Vehicular Information System Interface for Open Network Services
Contract number:	TST3-CT-2003-506476
Instrument:	STP
Total cost:	2,639,146 €
EU contribution:	1,399,713 €
Call:	FP6-2002-Transport 1
Starting date:	01.01.2004
Ending date:	31.12.2005
Duration:	24 months
Sector:	Road
Objective:	Advanced Design and Production Techniques
Research domain:	Design and manufacturing technologies to improve vehicle/vessel interfaces
Website:	http://visions.dei.unipd.it
Coordinator:	Prof. Maresca Massimo Department of Information Engineering Via Gradenigo, 6/B IT 35131 Padova
E-mail:	mm@dei.unipd.it
Tel:	+39 0498277946
Fax:	+39 0498277699
Partners:	Wintec S.p.A. IT Telindus Group NV BE Delft University of Technology NL IRIS, Informatica Innovazione Ricerca Sviluppo srl IT Padova Container Service srl IT MAN Aktiengesellschaft DE Kanton Uri CH Tunnel du Mont Blanc (GEIE-TMB) FR Hoyer Group CH

Re-balancing and Integrating Different Transport Modes



EUDDplus

European Driver's Desk Advanced Concept Implementation - Contribution to Foster Interoperability

The project EUDDplus aims at the development, in-field testing and validation of the interoperable, harmonised and modularised train driver's desk (console). The main objective is to minimise the configuration and layout varieties for different kinds of rolling stock.

Background

The international state of the art regarding train driver desks is characterised by many different national and operator-specific solutions which impede the interoperability of the rail system in Europe. This situation affects the seamless rail traffic across Europe and reduces the efficiency of international rail operations, as well as the competitiveness of the whole rail system with respect to other means of transport. The great variety of train driver desk layouts, applying different operational philosophies, not only concerns the railway undertakings but also the suppliers, who have to develop dedicated driver desk solutions for each of their customers and therefore could not profit from 'economies of scale'. Besides the missing harmonisation, the layout of today's driver desk often provides poor ergonomic conditions.

The project EUDDplus represents the first phase of a 3-phase multi system approach. It is the logical and direct successor of the former Fifth Framework Programme (FP5) project European Driver's Desk (EUDD) and the ongoing FP6 project, Modular Train (MODTRAIN). EUDDplus provides the logical and necessary link between the achievements of MODTRAIN, taking advantage of EUDD outcomes and the exploitation of the advanced driver desk layout with all its operational (functional performance), ergonomic and economic advantages to enable them to be applied on a larger scale all over Europe.

Objectives

EUDDplus project aims at the development of an innovative vehicle concept for both passenger and freight trains, characterised by interoperability and inter-connectivity, for cross-operation between different transport networks.

EUDDplus is designed as a multi-system stepwise approach involving modular and integral phases. Due its more ambitious complexity, the locomotive application has been chosen for first field-testing under real operational conditions with a pre-competitive R&D approach.

The project EUDDplus consists of the following major steps:

- derive a specification that is compliant with Operational Requirement Specifications/Functional Related Specifications/Systems Related Specifications/Functional Interface Specifications, there will be development and vehicle integration of the new desk, including software development
- in-field tests in cross-border operations (including the necessary certification), involving drivers from several operating companies, to justify the expected advantages
- recommendations for broad-scale exploitation and to facilitate future certification procedures, i.e. for those countries that the vehicle platform was not designed for.

Description of work

Despite the progress which has been achieved by EUDD and MODTRAIN, further work is needed to achieve the full range of potential benefits in terms of ergonomics, economics, harmonisation and modularisation. The EUDDplus project is dedicated to:

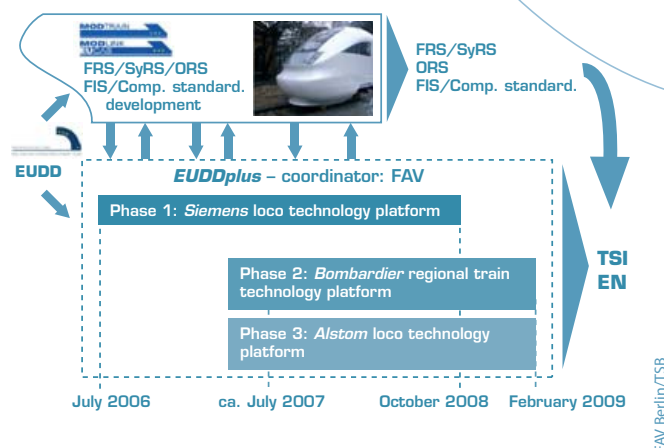
- specify the locomotive version of the European driver desk based on the MODTRAIN operational requirement specifications (ORS), compliant functional/system-related specifications (FRS/SyRS) and functional interface specifications (FIS) considering the results of the previous EUDD project
- develop innovative control items, such as the mono master controller (combined traction/electro dynamic braking)
- build and integrate the desk in a modern multi-system locomotive, prepare and perform in-field tests with regular services in cross-border operation with drivers from different EU Member States
- evaluate the in-field tests and determine the economic and ergonomic benefits of the EUDD application compared with the state of the art
- facilitate further standardisation procedures by involving responsible bodies, such as CEN/CENELEC, UIC and IEC from the beginning and provide draft product and assessment standard proposals.

Results

The expected results of the EUDDplus project are the following:

- to achieve a reduction of the life cycle costs (LCC) of the system driver desk by at least 15% compared with the reference case (given by the test locomotive with conventional desk)
- to achieve field test certification for cross-border operation from Austria to other networks
- to justify the ergonomic advantages of the EUDD desk layout during in-field operation in day-to-day conditions
- to prove the technical and operational feasibility of the EUDD concept implementation, e.g. the shift of functions from hardware to software with enhanced flexibility, improved ergonomics and reduced costs to reduce hardware controls by 30% without any loss of operational performance, to validate the new arrangement of traction/braking operation with newly developed master controller, modularisation of remaining hardware controls according to functional and logical groupings, standardisation of component interfaces enabling interchangeability and application of drive-by-wire control concept.
- to facilitate the future series homologation procedure of the EUDDplus desk layout for all European networks by involving the ERA and the national authorities for the entire project duration via a user platform.

Keywords: Railways, standardisation



EUDDplus multi-system approach involving modular and integrated phases



EUDD functional demonstrator during virtual reality tests in May 2003

Acronym:	EUDDplus	
Name of proposal:	European Driver's Desk Advanced Concept Implementation - Contribution to Foster Interoperability	
Contract number:	TST5-CT-2006-031555	
Instrument:	STP	
Total cost:	2,845,460 €	
EU contribution:	1,799,198 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.07.2006	
Ending date:	31.10.2008	
Duration:	28 months	
Sector:	Rail	
Objective:	Re-balancing and Integrating Different Transport Modes	
Research domain:	Development of vehicle and vessel concepts, characterised by interoperability and inter-connectivity	
Website:	http://www.fav.de	
Coordinator:	Mr Steinicke Wolfgang H. Forschungs- und Anwendungsverbund Verkehrssystemtechnik Berlin /TSB Am Borsigturm 48 DE 13507 Berlin	
E-mail:	wsteinicke@fav.de	
Tel:	+49 (0)30 4303 3540	
Fax:	+49 (0)30 4303 3550	
Partners:	Siemens Aktiengesellschaft	DE
	Bombardier Transportation GmbH	DE
	ÖBB – Traktion GmbH	AT
	Hungarian State Railways Ltd	HU
	Ceské dráhy akciová společnost	CZ
	via donau – Österreichische Wasserstraßen-Gesellschaft mbH	AT
	IAS Institut für Arbeits- und Sozialhygiene Stiftung	DE
	Technische Universität Wien / Vienna University of Technology	AT
	Fundació Politècnica de Catalunya-Universitat Politècnica de Catalunya	ES
	Union Internationale des Chemins de Fer	FR
	Union of European Railway Industries	BE
	Deuta Werke GmbH	DE
	ŠKODA TRANSPORTATION s.r.o.	CZ
	ALSTOM Transport S.A.	FR
	EAO Lumitas GmbH	DE
	W. Gessmann GmbH	DE



MODBRAKE

Innovative Modular Brake Concepts for the Integrated European High-speed Railway System

MODBRAKE, focusing on the brake systems, aims at contributing to the practical implementation of interoperability of railway systems across Europe. The objective of the project is to reduce the complexity, and therefore the costs, of brake systems by incorporating them in modular form.

Background

The MODBRAKE project aspires to make a significant contribution to the achievement of the ERRAC Strategic Rail Research Agenda (SRRRA) published in 2002.

In the framework of the two railway packages, the High Speed and Conventional Rail Directives are being implemented through the publication of technical specifications for interoperability and validated via new and improved voluntary standards. The practical implementation of interoperability requirements however requires a joint approach by the railway stakeholders to ensure that the standardisation process across Europe will become more efficient. Brake-related issues of interoperability and standardisation will be thoroughly addressed within the MODBRAKE project.

The difficulty in developing and describing universal brake requirement specifications is a major handicap to the opening up of the Interoperable European Rail Network – a key element of EU single market policy.

The braking system is one of the most critical and complex sub-systems of rail vehicles, particularly as far as safety requirements at train-level are concerned. The brake system may be 5% of the value of the train but of far greater importance and complexity than most other items of similar value. In fact, up to 40% of the efforts in generating interoperability specifications for rolling stock and control command and signalling systems are related to braking performance and how it could best be achieved.

Objectives

During the implementation of the MODTRAIN project, it became clear that this Integrated Project could not address brake-related issues beyond the brake-relevant interfaces in a sufficiently appropriate manner, and that there was a strong case for a separate project dedicated to braking performance, brake modules and their interfaces to TCMS and the other sub-systems of rolling stock.

It is critical to carry out research on braking performance and brake module interfaces, which will enable a comprehensive approach to be applied to modular high-speed trains and universal locomotives.

To reduce this complexity, and therefore the costs of brake systems, the project proposes to develop a modular brake system. The related system specifications will be determined, evaluated and tested to develop a modular brake concept. The standardised modules will be interchangeable in terms of functions and interfaces, but they may still be specific to each manufacturer so as to guarantee future technological progress.

The MODTRAIN consortium therefore proposed to start a MODBRAKE project, which focuses on the braking system starting from the interfaces defined in MODTRAIN. The field of application for MODBRAKE will be the same as for MODTRAIN: TSI high-speed trains and universal locomotives (locos, train sets and EMUs) capable of speeds greater than 190 km/h.

Description of work

A four-phase approach will be adopted to achieve MODBRAKE's scientific and technical objectives.

In the first phase, the work within MODBRAKE will be concentrated on understanding the existing standards and regulations for brake systems on one hand, and the interface results and the functional, system and safety requirements coming from the MODTRAIN project on the other.

In the second phase, the project will focus on:

- detailed determination and definition of standards for the functional requirement specifications and system requirement specifications for the identified modules (top down approach – harmonisation on system-level)
- starting from existing specifications, MODBRAKE will elaborate complete standard proposals for a range of interchangeable components.

In the third phase, the modules, derived from the harmonised rolling stock architecture on the relevant level, will be evaluated through life-cycle cost analysis. For this analysis, a software tool, already developed in MODTRAIN, will be enhanced so as to be suitable for brake specific data on life-cycle costs.

As a result of this evaluation, two of the identified brake system modules will be developed, tested and evaluated in the fourth phase of the project. An appropriate amount of interchangeable modules will be identified, selected and specified within the macro-modules.

Results

The outcomes of the MODBRAKE project will be:

- the specification of the brake system modules (according to all relevant levels of the rolling stock architecture) and the delivery of tested prototypes
- a design for the development of the modules and their interfaces
- the specification of validation/assessment and maintenance processes (especially inspection/test criteria for safety or reliability)
- the development/improvement of a tool to evaluate the life-cycle cost of brake modules
- direct proposals to standardisation bodies concerning the standardisation of future brake requirements and of standards that need to be updated
- prototype modules integrated within mock-ups.

Impacts foreseen:

- the brake suppliers will have clear and stable requirements for each module. The current costs to conceive, design, develop and validate new systems for every contract will be reduced in future
- the decision to standardise the brake system at the level of functional modules, and not at the level of components, will still allow the brake suppliers to continue their R&D efforts for future innovation in the technological content of the modules
- market competition will be increased: clear and stable-over-time specifications will facilitate market entry of new suppliers
- car builders and maintenance providers will have the opportunity to choose from a standard catalogue of interchangeable modules.

Keywords: Railways, brake, modular, modules, interfaces



Acronym:	MODBRAKE
Name of proposal:	Innovative Modular Brake Concepts for the Integrated European High-speed Railway System
Contract number:	TST5-CT-2006-031498
Instrument:	STP
Total cost:	4,937,690 €
EU contribution:	2,700,000 €
Call:	FP6-2005-Transport 4
Starting date:	01.06.2006
Ending date:	30.11.2008
Duration:	30 months
Sector:	Rail
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Development of vehicle and vessel concepts, characterised by interoperability and inter-connectivity
Coordinator:	Mr Loraillère Antoine Association of European Railway Industries 221 Avenue Louise BE 1050 Brussels
E-mail:	antoine.loraillere@unife.org
Tel:	+32 (0)2 643 70 87
Fax:	+32 (0)2 626 12 61
Partners:	Faiveley Transport Italy Knorr-Bremse Systeme für Schienenfahrzeuge GmbH Union Internationale des Chemins de Fer - UIC Société Nationale des Chemins de Fer Français - SNCF Trenitalia S.p.A. Deutsche Bahn AG ALSTOM Transport SA Siemens AG Transportation Systems ANSALDOBREDA S.p.A. Bombardier Transportation (Holdings) Germany GmbH Technical University of Berlin Politecnico di Torino Instytut Pojazdów Szynowych - TABOR ALMA Consulting Group S.A.S.

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MODTRAIN

Innovative Modular Vehicle Concepts for an Integrated European Railway System

MODTRAIN is defining the necessary functional, electrical and mechanical interfaces and validation procedures to deliver the range of interchangeable modules, which will form the basis for the next generation of intercity trains and universal locomotives.

Background

In September 2001, the Commission published its White Paper, «European Transport Policy for 2010: time to decide», in which, for the first time, the Commission is placing the needs of the users at the heart of its transport strategy by proposing over 60 measures to refocus Europe's transport policy onto the needs of its citizens. The first of these measures is designed to shift the balance between modes of transport by 2010 by revitalising the railways.

The European Commission wants to ensure that the development of transport in Europe goes hand in hand with an efficient, high-quality and safe service for people. For railways, the goal for 2010 is to maintain the modal share of rail transport at the same level as that in 1998. Rail transport is thus expected to grow significantly as the total transport demand in 2010 is expected to be 40% higher than in 1998.

In its White Paper, the Commission also announced its intention to table a set of new proposals to improve access to the railway network for freight transport and to amend existing directives on the interoperability of conventional rail systems and high-speed rail systems, as well as a proposal to create a European Railway Safety and Interoperability Agency.

To meet these objectives, affordable and attractive interoperable rolling stock must become the norm for use on European networks.

Objectives

To avoid the risk of each new train being the subject to independent interpretations of the requirements and built from unproven prototype sub-assemblies, interoperable constituents must be defined, validated and promoted at European industry level. This is why the main European railway system manufacturers, sub-system suppliers, railway operators and professional associations have decided to combine their efforts with highly skilled research centres to reach this objective.

The MODTRAIN Integrated Project will define and prove the necessary functional, electrical and mechanical interfaces, and validation procedures necessary to deliver the range of interchangeable modules that will make the next generation of intercity trains and universal locomotives possible.

The principal elements to be defined in MODTRAIN using end-users' requirements and validation (via the MODUSER platform) are:

- the running gear (MODBOGIE)
- the train control architecture (MODCONTROL)
- the onboard power systems (MODPOWER)
- the man-to-machine and train-to-train interfaces (MODLINK).

Description of work

The industry is detailing, in continuous collaboration with the operators, the necessary functional and physical interfaces, requirements and validation procedures as a reference to deliver the range of interchangeable

modules that will make the next generation of intercity trains and universal locomotives possible. The operators then assess, amend and approve these specifications. At the end of the project, open standards will be achieved for the most appropriate train components and their interfaces.

Therefore, the three main steps representing the main thread on which the implementation plan is based are:

- detailing a generic functional requirements specification (FRS) and system requirements specification (SyRS): this is the precondition for further technical and scientific work regarding the principal elements running gear, the train control and monitoring system, the onboard power system, the man-to-machine and train-to-train interfaces
- standardisation of functions and interfaces: this will not stop at the level of the four principal elements (subprojects). It also encompasses the definition of interfaces of smaller units and components (spare parts)
- the interfaces of the modules and components: these will be described in terms of open standards (to operators, industry and maintenance service providers).

Results

The main outputs of the MODTRAIN project are related to standardisation:

- operational requirements specification (ORS) from the operators group which provide the operational requirements, specifically for high-speed trains and locomotives, with the aim of maximising the degree of standardisation possible without losing operational performance
- the train architecture and the functional requirement specifications which will be used for companies' future projects
- standardised functional interface specification between the main subsystems of the train
- standardisation of certain components such as the water pump, HVAC nozzles of the driver's cab or the vertical damper for the secondary suspension. These documents will be written in English to ease the adoption of the English standard for the future
- a proposed driver desk (console) (EUCAB) compliant with the EUDD requirements is being developed and functional tests will be performed using SNCF simulator equipment
- EUPAX car mock-up to specify an interoperable door system, access for disabled passengers, passenger and crew information interfaces, safety alarm and emergency information systems.

Keywords: Modular, railway, standardisation, interoperability



EUCAB: mock-up of the driver's cabin developed by MODTRAIN

Acronym:	MODTRAIN	
Name of proposal:	Innovative Modular Vehicle Concepts for an Integrated European Railway System	
Contract number:	TIP3-CT-2003-506652	
Instrument:	IP	
Total cost:	30,385,048 €	
EU contribution:	16,900,000 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.02.2004	
Ending date:	31.01.2008	
Duration:	48 months	
Sector:	Rail	
Objective:	Re-balancing and Integrating Different Transport Modes	
Research domain:	Development of vehicle and vessel concepts, characterised by interoperability and inter-connectivity	
Website:	http://www.modtrain.com/	
Coordinator:	Mr Lorailère Antoine Association of European Railway Industries 221 Avenue Louise BE 1050 Brussels	
E-mail:	antoine.lorailere@unife.org	
Tel:	+32 (0)2 643 70 87	
Fax:	+32 (0)2 626 12 61	
Partners:	ALSTOM Transport SA	FR
	ANSALDOBREDA S.p.A.	IT
	Bombardier Transportation (Holdings) Germany GmbH	DE
	Siemens AG Transportation Systems	DE
	Union Internationale des Chemins de Fer - UIC	FR
	Forschungs- und ANwendungsverbund Verkehrssystemtechnik Berlin - FAV	DE
	ABB Schweiz AG	CH
	FAR Systems spa	IT
	D'Appolonia S.p.A.	IT
	FRENSISTEMI srl	IT
	KMT tekniikka Oy	FI
	Knorr-Bremse Systeme für Schienenfahrzeuge GmbH	DE
	Dynamics, Structures & Systems International	BE
	LUCCHINI SIDERMECCANICA SpA	IT
	Politecnico di Milano	IT
	Universita degli Studi di Firenze	IT
	Technischer Überwachungs-Verein Nord e.V.	DE
	Fraunhofer Institut fuer Werkstoffmechanik	DE
	Deuta Werke GmbH	DE
	Newcastle University - Centre for Railway Research - NewRail	UK
	Technical University of Berlin	DE
	Institut für Arbeits-und Sozialhygiene Siftung	DE
	Vienna University of Technology, Institute E330	AT
	Universitat Politecnica de Catalunya Fundacio Politecnica de Catalunya	ES
	Railway Industry Association	UK
	Fédération des Industries Ferroviaires	FR
	Verband der Bahnindustrie in Deutschland e.V. (Association of Railroad Industry in Germany)	DE
	Anie Federation	IT
	European Research Consortium for Informatics and Mathematics	FR
	Instituto Superior Técnico	PT
	Division IFE Doorsystem Knorr Bremse GmbH	AT
	Lumikko Oy	FI
	Deutsche Bahn AG	DE
	Trenitalia S.p.A.	IT
	Société Nationale des Chemins de Fer Français - SNCF	FR
	ALMA Consulting Group S.A.S	FR



CREATING

Concepts to reduce environmental impact and attain optimal transport performance by inland navigation

CREATING will improve competitive transportation in inland waterway systems by introducing new logistical and vessel concepts with optimised performance on hydrodynamics, fuel economy and environmental impact, thus improving safety and efficiency.

Background

One of the measures proposed in the White Paper, European transport policy for 2010: a time to decide is promoting waterborne transport. Inland navigation is stated as a “key component of intermodality, which must provide a means of coping with the growing congestion of road and rail transport and of tackling air pollution”. At present, it has been underused, even though there is a huge potential for inland waterborne transport, with a dense network of rivers and canals linking to the basins of the rivers which flow into the Atlantic and the North Sea, and linked to the Danube basin and Black Sea.

CREATING aims to reinforce the position of inland navigation, targeting RTD on integration and consistent validation of innovative intermodal vessel concepts and systems, to attain optimal sustainable transport performance, with the objective to:

- reduce the congestion problems in European transport and cope with the predicted growth of transport
- strengthen the competitiveness of the inland navigation link in logistic transport chains, by integrating relevant research domains to create new intermodal logistic concepts and link up all players in the logistics chain
- optimise innovative, safe and sustainable inland navigation concepts, focussing on significant reduction of emissions, optimal efficiency, and safety for vessels and the environment.

Objectives

The scientific and technological objectives of the project are to determine or develop:

1. Logistic chains in the transport markets which can be made ‘more maritime’ in new intermodal concepts. Sustainable transport performance indicators will be developed to facilitate the selection of feasible transport for modal shift. This has to result in logistical requirements for innovative vessel concepts and technical challenges for efficiency (cargo handling), safety and emissions;
2. Conceptual designs of innovative vessel concepts optimising performance in terms of logistics, economy, efficiency, environmental impact and safety;
3. A methodology to analyse and validate the overall performance of future logistic chains to determine a scientific assessment of performances in the ‘as is’ and ‘to be’ situation of the elaborated concepts;
4. Methods and solutions to minimise emissions by:
 - Reducing hull resistance and improving propulsion efficiency in order to reduce fuel consumption;
 - Researching alternative fuel (treatment) and fuel cell applications;
 - Reducing NO_x and soot particles by researching fuel pre-treatments, combustion technology and exhaust gas treatments;

5. Methods and solutions to optimise safety in vessel concepts including improved construction, navigation, manoeuvring and the harmonisation of accident registration in Europe.

Description of work

Work package (WP) 2: To improve the position of inland navigation (IWWT) in the transport chain, it is important to have a good insight into the continental cargo flows. The feasibility of shifting cargo to inland navigation will be based on criteria developed in this project. The functional requirements for the new ships will be specified.

WP3: The requirements will lead to the design of the ships, also taking into account the input gained from other WPs.

WP 5: The ship design will be based on optimal hydrodynamics. A toolbox will be made to assist in the design of the hull form and propulsion system.

WP6: Ships can be made much cleaner by applying clean fuel and retrofitting techniques. We will concentrate on reducing the exhaust of NO_x, fine soot particles and sulphur, and fuel cell technology.

WP8 and 9 will determine whether further improvements are possible to reduce the probability of collision and the effects of an accident.

WP4 will define the performance of the ships in monetary and environmental terms, compared to other modalities.

WP7: Interesting developments in terms of the application of retrofitting techniques, energy management, modern propulsion systems, fuel cell technology, safe construction methods and ships with optimised performance will be demonstrated here.

WP10 will report and disseminate the integrated results to stakeholders, including possible impacts on regulations.

Results

The following reports will result from CREATING:

WP2: Logistic requirements for the inland navigation part of the transport chain, taking into account the overall efficiency/feasibility of the transport chain and the functional design requirements with respect to inland ships, including all cargo handling aspects.

WP3: The concept design of at least four inland ships based on the requirements discovered in WP2.

WP4: The effect of CREATING ships on the performance of inland navigation.

WP5 Indicating the possible improvements in terms of exhausts and the exploitation of inland ships.

WP6: The performance of the engines and their physical limits in terms of efficiency and exhaust. Due attention will be paid to retrofit techniques, fuel management, and a decrease in the exhausts of NO_x and fine soot.

WP7: Demonstrator report, including the explanation of the principles, the measured effects on exhaust, and calculation methods enabling all ship-owners to decide on whether it is worthwhile to invest in the new developments.

WP8 reports on the calculation of risks and registration of accidents and the definition of the safety contours for a number of relevant situations.

WP9: An overall report on all measures which can be taken by the ship to reduce the probability of accidents, as well as the effects thereof.

WP10: A final report that integrates all the results obtained with an indication of possible impacts on rules and regulations.

Keywords: Inland navigation, logistics, ship building, environment, hydrodynamics, safety



Acronym:	CREATING
Name of proposal:	Concepts to reduce environmental impact and attain optimal transport performance by inland navigation
Contract number:	TST3-CT-2004-506542
Instrument:	STP
Total cost:	4,454,378 €
EU contribution:	2,649,996 €
Call:	FP6-2002-Transport 1
Starting date:	01.06.2004
Ending date:	31.05.2007
Duration:	36 months
Sector:	Waterborne
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Development of new inter-modal vehicle/vessel concepts
Website:	http://www.creating.nu
Coordinator:	Mr A.N. Roos Stichting Projecten Binnenvaart Vasteland 12e NL 3001 KC Rotterdam
E-mail:	cbrb@binnenvaart.nl
Tel:	+31 (0)10 4115900
Fax:	+31 (0)10 4129091
Partners:	Centraal Bureau voor de Rijn - en Binnenvaart Vopak Barging Europe European Federation of Inland Ports B.V. Scheepswerf Damen Bergum Scheepswerf Hoebee Vereniging Nederlandse Scheepsbouw Industrie AVIV CTO Imtech Marine & Offshore B.V. IPA Automation Engineering Bureau Veritas Lloyd's Register of Shipping IVR Université de Liège Maritime Research Institute Netherlands DST - Europaeisches Entwicklungszentrum fuer Binnen- und Kuestenschiffahrt Delft University of Technology Budapest University of Technology and Economics Danube Project Centre ECN EFIP Netherlands Organisation for Applied Scientific Research (TNO)

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ISTU

Integrated Standard Transport Unit for Self-guided Freight Container Transportation Systems on Rail

The ISTU STREP project investigates, develops and demonstrates a cost-effective integrated propulsion unit and individual self-driven, two-container, cost-improved rail platform wagons for freight container transport between ports and cargo distribution centres. The new motor concept, integrating all the major propulsion features, is a key technology suited for the designed harbour vehicle called ISTU.

Background

There has been an increase in the transport of shipped containers from modern harbour infrastructures, which have eco-efficient, clean and fast logistic systems, to discharge ships that send the cargo urgently to interim logistic centres where it can then be selected for final destination. More and more automatic guided vehicles (AGVs) are under consideration as an analysis in the last ten years has shown their effectiveness and cost advantages. Today only a few ports have been equipped with AGVs; most still work with a manual-driven operation.

Such systems are expensive and the pollution aspects with diesel-driven vehicles are high, increasing the energy cost further for operators. Since the signing of the Kyoto Protocol, these diesel engines operating around the clock in harbours that are mostly located in the centre of cities are seen in a bad light due to their polluting features.

This project considers an alternative technology for such AGVs to overcome some of these major problems within a future generation. ISTU concentrates on the design and specification of a two-container wagon for terminal applications based on a speed of up to 50 km/h with a diesel-electric power supply unit to provide an autonomous integrated electrical propulsion system. The chosen technology can be extended to all major future eco-efficient systems.

Objectives

The target is the design, marketing and validation of such container platforms, satisfying a practical driving cycle of two-container wagons within terminal applications including their requested security and application aspects. A major objective is to integrate all the main propulsion components such as motor, power converter, cooling and embedded controllers in one drive. With this propulsion rated at 30 kVA, we expect to create the basic drive component for the container platform with improved characteristics of a reduced cost (by 30%), an efficiency increase of 2% and a system availability of up to 98%, validated by a laboratory set-up.

As a technical goal, the ISTU vehicle is designed for terminal application based on a standard speed of 12 km/h and a maximum speed of up to 50 km/h. The ISTU project optimises and designs the complete vehicle system, i.e. all electro-mechanical components, including a diesel-electric power supply unit to provide an autonomous integrated electrical propulsion system.

The full vehicle integration is part of the project while the engineering work will concentrate on the documentation and the specification of all needed components, including the power supply in the form of a cost effective diesel/generation set. The product will be evaluated as per its cost targets where we have set strong objectives for market acceptance.

The market approach and the application is a final objective of the project, including security aspects for such systems in their environment and the dissemination in the market of the chosen technology.

Description of work

The project analysed the needs and application scenarios in harbours with related logistic centres. Using basic assumptions, the targets for the drive requirements were set and the according engineering process started. To avoid critical interference from the different involved partners and their tasks, we coupled the drive with the wheels of the platform via a cardan shaft although not a standard in today's rail technology. Via this approach we could proceed to simultaneous engineering while the cost targets were reached. The design of the vehicle and the propulsion could be done individually.

A first prototype of the Integrated Propulsion Motor Unit called 'IPMOT' confirmed the technical features and revealed some improvement possibilities with regard to the overloading characteristics of such a motor. In a redesigned and completed product, we integrated these features by smaller changes in the winding layout. In parallel, the full vehicle was designed with a proper diesel-electric power supply unit and all components integrated in the vehicle structure.

As an extension from this technology, a road driven vehicle was additionally analysed.

Results

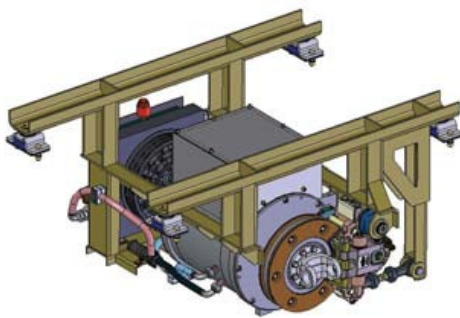
To cope with the objectives, we have chosen a simple switched reluctance 30 kW motor as a base propulsion component. This motor has been dimensioned and the layout done for all the requested components of this integration process. Furthermore, a brake system has been added on the shaft of the motor.

Within a redesign we have considerably increased the overload capabilities so as to allow the integrated motor to be the main component within future hybrid drives. This drive has been analysed for road operation which is an alternative market request. The engineering for a rail vehicle is actually validated on a test belt although the simulated results are demonstrating the targeted values already.

Dissemination has been done at several conferences and will also be carried out in the World Cargo News. The technology has been presented to different ports and will be demonstrated next at a fair. A follow-up intends to intensify the work on a suitable logistical control to arrive at an unmanned automatic piloted transport system for eco-efficient electrical power supply system.

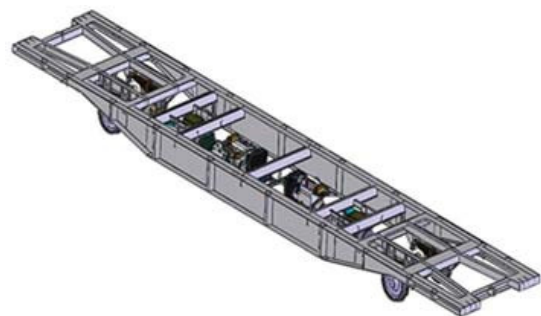
Extending this system to dense industrial areas where such systems are expected to reduce road traffic, pollution and noise is a possibility. ISTU is an official Trade Mark.

Keywords: Automatic guided vehicle, integrated propulsion, eco-efficiency



Integrated Propulsion Motor Unit 'IPMOT'

ITAPS GmbH



ISTU vehicle rail platform

ITAPS GmbH

Acronym:	ISTU
Name of proposal:	Integrated Standard Transport Unit for Self-guided Freight Container Transportation Systems on Rail
Contract number:	TST3-CT-2003-506243
Instrument:	STP
Total cost:	1,456,219 €
EU contribution:	896,000 €
Call:	FP6-2002-Transport 1
Starting date:	01.11.2003
Ending date:	30.06.2006
Duration:	32 months
Sector:	Multi
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Development of new inter-modal vehicle/vessel concepts
Website:	http://www.istu.info
Coordinator:	Dr Bendien Johan Charles Innovative Trade and Product Strategies GmbH Im Bettenklingen 6 DE 69488 Birkenau
E-mail:	itaps@t-online.de
Tel:	+49 (0)6201 393895
Fax:	+49 (0)6201 393896
Partners:	Aachen University of Technology Politecnico di Torino APS energia Sp. z o.o. Skoda Trakcny Motory s.r.o. Instytut Pojazdów Szynowych „TABOR”
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LOGBASED

Logistics-based Ship Design

LOGBASED develops methods/tools to provide designers, shipbuilders and ship operators with better guidance to develop effective ship designs for business opportunities relating to intermodal transportation solutions. Four ship designs will be developed on this basis and measured for their competitiveness.

Background

Waterborne transport has historically transported goods from quay to quay without focusing much on the intermodal aspects. This situation is changing: focus is shifting towards door-to-door transport and ship operators are increasingly adapting to this new mode of working. It is anticipated that waterborne transport services must continually improve their service levels but at the same time improve competitiveness by reducing cost levels of operations every year. The customers require the goods to be transported 'all the way' and have certain demands regarding time, price, flexibility, reliability and frequency. These logistics requirements are considered by transport customers when buying services. Short-sea shipping has great potential to be the main part of competitive intermodal transport solutions, provided co-operation with other transport modes can be fulfilled, as shipping, more than other transport modes, is able to fulfil tomorrow's (sustainable) demands regarding costs, safety, environment and quality.

In order to exploit this potential, new knowledge, solutions and approaches on managing and transporting intermodal cargo flows must be developed. To be successful, a total service must be delivered to the customer in the form of door-to-door transport, as well as administrative and financial services related to the transport operation. Seldom is vessel performance (speed, costs, regularity, flexibility, safety, etc.) within the intermodal supply chain assessed and benchmarked, as vessel design is, in many cases, currently conducted as a sub-optimal and decoupled task in a technical department/shipyard isolated from the business development and logistics department.

Objectives

The LOGBASED approach will change the current situation in business development as described above, and make transport system and ship design development an integral part. It is argued that only through this approach can the most effective solutions be identified and developed.

The main aim is to develop RoRo vessels and enable the motorways of the sea to become more competitive towards their road/rail equivalents. To accomplish this aim, LOGBASED has developed methods and tools based upon a systems theory, which provide decision-making support to the development team and/or decision-makers. The method and tools are developed based on the following objectives:

- identifying the principal requirements and variables influencing the development of a viable intermodal transport business
- capturing the principal ship design and shipbuilding variables, as well as their inter-relationships
- mapping the commercial and technical aspects in a logistics-based design methodology and developing a supporting software tool to facilitate its application
- applying the developed method and tools for selected business cases (intermodal transport systems) in order to verify the approach through the design of more efficient RoRo vessels.

Description of work

The systems management approach adopted in LOGBASED is used to develop a common platform, in the form of a decision-making support system, to develop dynamic intermodal transport solutions and their pertinent ship designs.

The approach is novel and functions as a key means to transfer logistics information into a readily usable format for end users (ship owners and designers). It is argued that this approach leads to the design of better ships – serving the cargo owner and ship operators better than solutions of the past. LOGBASED focuses upon developing more efficient RoRo vessels as an integral part of dynamic intermodal transport chains based on the utilisation of the methodology. However, the approach and method are generic by nature and can be applied to most ship and cargo types.

The project is aiming for improvements of up to 30% for various transport system performance parameters for the resulting ship designs. The method identifies the requirements/expectations, which should be targeted for the particular case/transport system in question, and focuses upon developing a ship design matching these requirements/expectations. Such requirements/expectations may be technically related (resistance, stability, etc.); commercially related (costs, reliability, frequency, etc.); strategically related (market position, growth, etc.); and/or related to health, safety and environmental issues.

Results

LOGBASED has developed a logistics-based ship design methodology for nine different modules dealing with: business concept definition, performance expectations, competitive position, risk assessment, transport system and design solution development, decision-making support, ship functions, ship systems and performance evaluation. This methodology can support a business development process more effectively and can drive out uncertainty more robustly in related design decisions to be made. Decision-making support is provided to the users through the methodology.

The final products from the project are four ship designs serving as integral parts of dynamic intermodal transport chains. These designs will be measured for their performance against stakeholders' expectations/requirements and towards other/existing systems or designs.

The preliminary experience using the LOGBASED methodology in designing ships is that it provides a structured and systemic approach in order to develop concept/basic/preliminary ship designs for the operation in intermodal transport systems.

Supporting tools are being developed and utilised within the different modules of the method in order to make it more efficient and less error-prone.

Keywords: Logistics, ship design, transport system, design methodology, systems theory



Wilson Star operated by Wilson EuroCarriers. This ship and route are used as a benchmark for the transport system and ship design being developed in one of the cases.



Tor Magnolia operated by DFDS Tor Line. This ship is used as a benchmark for the ship design being developed in one of the cases.



Acronym: LOGBASED
Name of proposal: Logistics-based Ship Design
Contract number: TST3-CT-2003-001708
Instrument: STP
Total cost: 3,028,592 €
EU contribution: 1,784,651 €
Call: FP6-2002-Transport 1
Starting date: 01.03.2004
Ending date: 28.02.2007
Duration: 36 months
Sector: Multi
Objective: Re-balancing and Integrating Different Transport Modes
Research domain: Development of new inter-modal vehicle/vessel concepts
Website: <http://www.logbased.no>
Coordinator: Dr Oestvik Ivan
Grieg Logistics
C. Sundtsigt 17/19
NO 5804 Bergen
E-mail: i.ostvik@grieg.no
Tel: +47 (0)55 57 66 57
Fax: +47 (0)85 02 84 82
Partners: Flensburger Schiffbau Gesellschaft mbH & Co. KG
Navantia
Wilson Eurocarriers AS
DFDS Tor Line
FRETI - Sociedade de Formação e Gestão de Navios, Lda
Formação Desenvolvimento e Investigação, SA
University of Strathclyde
National Technical University of Athens-Ship Design Laboratory
Nautical Enterprise Centre Ltd
Det Norske Veritas AS
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CAESAR

Coordination Action for the European Strategic Agenda of Research on Intermodalism and Logistics

Intermodal transport will supply more capacity, but this can only be achieved with a coordinated innovation agenda and various activities. Thus, it is necessary to bring together people with decision-making capabilities to influence the planning of research and technology programmes, hence the European Intermodal Research Advisory Council (EIRAC).

Background

Freight transport in Europe has been growing more rapidly over the last ten years than the EU-15's GDP, and even more than the mobility of people. One cause is the opening up of the transport market, which has occurred over the same period. The major drawbacks are represented by congestion, which is growing on the main European transport system, and the harmful effects on the environment and public health.

Moreover, the challenges of the enlargement compel new choices to be made to promote transport policy with more balanced, smarter and greener mobility systems.

A radical shift in the mentality and behaviour of actors in transport is needed. Intermodal aspects must be brought in at all phases of transport policy and planning, based on cost-effective, implemental research and technological development.

Efficient logistics and transport operations require reliable and secure flows of goods and traffic throughout both the transport and logistics chains. While in the past, infrastructure investment programmes were developed from a single mode approach, global logistics operations today favour the integration of modes and impose new priorities in the decision-making process. The logistic shifts towards global sourcing and centralised inventories demand larger geographical coverage and smoother international transport without any counterproductive delays in the networks.

Objectives

CAESAR aims at fostering the creation of a new and common vision of intermodal research in Europe, by achieving the following objectives:

- to establish research and development requirements in conjunction with business scenarios
- to improve the implementation of intermodal research results by the relevant industry
- to focus research programmes and their implementation (at EU and national levels) around a joint strategy.

To achieve these objectives, CAESAR will focus attention on real industry needs, the relevant business scenario, and then it will identify and focus on five main areas for innovation. At the proposal stage, a preliminary analysis has shown that the most important are:

- logistics
- interoperability between the systems
- security
- socio-economics
- education and training.



Description of work

The work plan of CAESAR is organised into four main work packages (WP), coordinated by a proper project management work package. Each WP is organised into different tasks, aiming at fulfilling the different achievements expected by the Coordinated Action.

The Coordinated Action is planned to last 24 months. Each single work package is paced by different milestones to guarantee the work completion of each activity and task, and to synchronise the progress among the different WPs.

The CAESAR work packages are:

WP1: Project management

WP2: Establishment of the European Intermodal Research Advisory Council

WP3: Setting the strategic research agenda

WP4: Implementation strategy

WP5: Communication and dissemination strategy

Work Packages 1, 3 and 5 will last the whole of the CAESAR project, accompanying the coordination action along its path and development. WP2, lasting until month 12, is to set up the Plenary and sign the Terms of Reference (first 4 months), and to establish the reference Group of National Representatives (until month 12). The implementation strategy (WP4) to develop the content of the strategic research agenda will last from month 4 until the end of the CA.

Results

The establishment of EIRAC – European Intermodal Research Advisory Council – is the main objective of this initiative, with the aim of bringing together the stakeholders of the intermodal sector. The EIRAC will be established at the end of month 4 of the CA, and it will prepare, in accordance with the scheme provided in the description of WP3, the Strategic Research Agenda of Intermodal Transport. CAESAR will continue operating to ensure the existence of EIRAC after the completion of the project.

Although the details would be specified in the Terms of Reference (see section 1.1.5.2), which are to be signed at the establishment of the European Intermodal Research Advisory Council, it is expected that the EIRAC will be composed of the following entities:

- the Plenary, industry driven,
- the Support Group, industry driven,
- the Mirror Group, representatives of the EU Member States and Switzerland,
- the Secretariat.

The CAESAR consortium will provide the Secretariat services to the EIRAC.

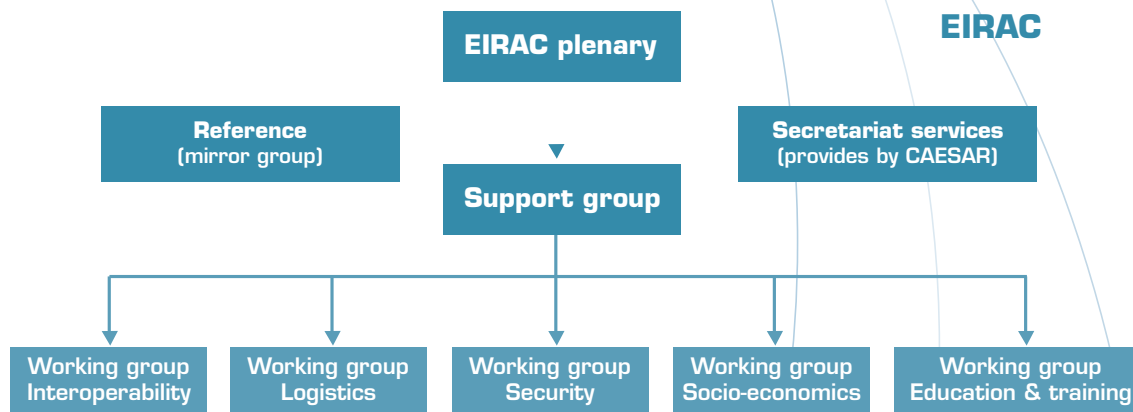
The Terms of Reference rule the operation and decision-making process of the advisory council. They will include the scope, the mission, the process of processing and maintaining the strategic research agenda.

The Strategic Intermodal Research Agenda 2020 (SIRA) is the list of needs for future research and a compendium of the research strategy developed in conjunction with a business scenario. The contents of the strategic research agenda will be determined by key industrial figures, i.e. the EIRAC members. It will be based on prioritised areas of innovation targeted to specific industrial and business objectives set by the stakeholders.

The implementation plan is meant for change, to feed the work programmes of future EC Framework Programmes, and equivalent initiatives of the Member States and private investments.

All information on EIRAC will be made available: www.EIRAC.net

Keywords: Transport economics, transport technology, Research and Innovation Development Policy, intermodality



EIRAC organisation chart

Acronym:	CAESAR
Name of proposal:	Coordination Action for the European Strategic Agenda of Research on Intermodalism and Logistics
Contract number:	TCA4-CT-2005-012457
Instrument:	CA
Total cost:	799,920 €
EU contribution:	799,920 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2005
Ending date:	31.12.2006
Duration:	24 months
Sector:	Multi
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Development of logistics systems and concepts (Loading/unloading, containers, space optimisation in terminals)
Website:	http://www.eirac.net
Coordinator:	Dr Recagno Valerio Consorzio per la Ricerca e lo Sviluppo di Tecnologie per il Trasporto Innovativo - Consorzio TRAIN Centro di Ricerche ENEA della Trisaia SS 106 KM 419+500 IT 75026 Rotondella (MT)
E-mail:	valerio.recagno@dappolonia.it
Tel:	+39 010 3628148
Fax:	+39 010 3621078
Partners:	The Alliance of Maritime Regional Interests in Europe BE Connekt NL METTLE GROUPE FR European Intermodal Association BE



CHINOS

Container Handling in Intermodal Nodes - Optimal and Secure!

Transport operators currently face several challenges, which are driven by commercial, legal/security and technical factors. CHINOS will support operators to exploit these challenges in the best possible way by employing innovative IT technology solutions such as radio frequency identification (RFID) technology. This combination of commercial and security issues in one approach makes CHINOS quite unique.

Background

Operators of container terminals (seaports, inland ports, freight villages, rail/road intermodal terminals) and transport are currently facing several challenges that not only put additional burden on them but also offer potentials for process optimisation at the same time. There are several drivers for this project: commercial (how to cope with continuous rising cargo volumes to be handled), legal/security (how to deal with new security rules and regulations for fighting against terrorism, and the change of responsibilities in the chain), and technology (how best to integrate technologies such as RFID transponders for container identification and electronic seals, combining the benefits of classical bolt seals with RFID capabilities). All these drivers form a complex area that the CHINOS project wants to support.

Objectives

CHINOS will support operators in exploiting the current challenges on commercial, legal/security and technical levels in the best possible way by employing innovative IT technology solutions. Processes can be optimised and accelerated tremendously by using automatic identification and condition checks with contact-free reading possibilities (container RFID tags, electronic seals, optical checks) without requiring human intervention. CHINOS terminal operators are able to optimise their storage space and to enhance the integration of transport modes along intermodal logistics chains by re-designing the procedures at their interfaces. Since the full benefit from new technologies can only be exploited if the total integration of (re-engineered) business processes and IT systems will be achieved, CHINOS will put a special focus on this integration work and carry out demonstrations at several European locations.

As RFID technology has not been used in container transport so far, transport users and authorities are not fully aware of the potentials offered for logistic and security purposes with regard to process automation, reduction of processing errors, increase of reliability, enhancement of status monitoring along the chain, fulfilment of security requirements, etc. CHINOS will help identify and open up the potentials of this new technology.

Description of work

The main objective of CHINOS is to optimise container handling in intermodal nodes by using innovative IT technology. The most challenging applications are the identification of cargo and equipment, and the detection of their status from both the economic and the security aspect. It is important to exploit the potentials of the RFID technology to the best possible extent for intermodal container logistics and security. Special emphasis will be laid on process integration and how the new technologies can be best embedded into existing (or re-engineered) business processes and IT systems along the chain in order to enhance the efficiency, information and service quality, security, speed of operation, and use of storage space on vehicles and in yards. CHINOS will concentrate on containers; however, the results can be transferred to other cargo units like swap bodies or semi-trailers.

CHINOS will research a methodology for the integration of container identification information using RFID technology, container security-related information (electronic seals), and optical container condition information (high-resolution images) in intermodal transport nodes thus supporting the business processes within the nodes and the total transport chains. An integrated prototype system for automatic container identification based on RFID-technology and optical damage documentation will be developed. It will be installed at European intermodal container handling nodes and operated under real-life conditions in order to validate the functionality, scalability and portability to other end-user scenarios. Furthermore, supporting the chain perspective, hinterland transport is included in the project by involving inland terminal operators, freight village operators and railway operators.

Results

The results of the CHINOS project will improve both efficiency and security of container handling throughout the entire transport chain, taking into consideration the specific user requirements and needs of all stakeholders ranging from shipping companies, forwarders, freight owners and port operators to insurance companies and government agencies. By fostering the deployment of electronic seals, CHINOS will contribute to international efforts in the fight against terrorism and will support activities like the American Customs-Trade Partnership against Terrorism (C-TPAT) and the expected corresponding European initiatives.

CHINOS results will be ready-for-the-market IT tools (Automatic Container Identification Unit, Damage Documentation System, Communication Controller(s), Chain Event Manager) as well as technical and organisational recommendations on how to exploit these new technologies efficiently so as to be prepared for the actual and upcoming challenges.

Keywords: Intermodal, container, security, RFID, C-TPAT, electronic seal, container tag



North Sea Terminal Bremerhaven (NTB)



Acronym: CHINOS

Name of proposal: Container Handling in Intermodal Nodes - Optimal and Secure!

Contract number: TST5-CT-2006-031418

Instrument: STP

Total cost: 2,573,652 €

EU contribution: 1,499,985 €

Call: FP6-2005-Transport 4

Starting date: 01.10.2006

Ending date: 31.03.2009

Duration: 30 months

Sector: Multi

Objective: Re-balancing and Integrating Different Transport Modes

Research domain: Development of logistics systems and concepts
(Loading/unloading, containers, space optimisation in terminals)

Coordinator: Dr Gendner Nils
Institut für Seeverkehrswirtschaft und Logistik
Universitätsallee GW I Block A
DE 28359 Bremen

E-mail: gendner@isl.org

Tel: +49 (0)421 2209653

Fax: +49 (0)421 2209655

Partners: North Sea Terminal Bremerhaven GmbH & Co.
GAC Shipping SA
Thessaloniki Port Authority SA
Tricon Consulting GmbH & Co. KG
Datenbank Bremische Haefen AG
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FastRCargo

Fast Transhipment Equipment and Novel Methods for Rail Cargo in Europe

The project FastRCargo aims at developing the fastest transhipment system with the potential of a significant impact on rail innovations for 2010 and beyond. The system tranships standardised intermodal transport units between standardised rail wagons and trucks below active power lines.

Background

Fast and adequate rail transhipment of standardised intermodal transport units (sITU) remains one of the highest ranked challenges of rail research. A cost-efficient solution for this topic is key for further enhancements towards sustainable competitiveness of intermodality against mono-modal road transport.

Objectives

The project FastRCargo aims at developing a new transhipment system for fast loading and unloading of standardised intermodal transport units (sITU, consisting of ISO containers and swap bodies) between rail and road vehicles, and terminal or support vehicle structures. Interoperability and inter-connectivity between rail and road transport for cross-operation is perfectly supported by the fact that road standardised production means will be seamlessly integrated into rail operation without any modification, without excessive operating time and for reasonable friction costs. Intermodal liner networks will become reality with the system proposed.

The main objectives are:

- to develop an automatic transhipment system, consisting of a set of equipment featuring a high degree of flexibility, scalability, dependability and ease of integration
- to develop effective rail transport and service concepts, contributing to a sustainable alternative to road haulage
- to develop further components needed in order to complement the equipment to a versatile intermodal node as part of a broader logistic and transport system
- to verify the sustainability of the new rail transport service concepts, the complementary systems and the new transhipment equipment within a commercially oriented user group.

Description of work

FastRCargo is divided into nine work packages.

WP0: The project management activity covers all the work necessary to provide direction and administrative support to the project.

WP1: This activity aims to support the development-related work packages in setting guidelines for design, realisation and evaluation.

WP2: This aims to research rail-specific aspects for integrating the new fast transhipment system into valid rail services of the future.

WP3: The main objective is to build the required system components according to the modularity concept and integration framework developed in WP1.

WP4: The loading/unloading process in the context of FastRCargo has to be considered as a highly safety-critical process. This work package aims at developing a set of reliable integrated packages for sensing.



WP5: The two main objectives of this work package include (1) development of an appropriate software model and coherent software architecture for control purposes, and (2) to define appropriate use scenarios and 'guidelines' for the operational phase.

WP6: It aims to integrate the hardware and software sub-systems developed in other work packages into one system.

WP7: This work package mainly builds the demonstrator and evaluates its further potential.

WP8: Dissemination of project information will start early in the project to ensure broad awareness.

Results

By focusing on innovation and novelty for intermodality and interoperability, the project contributes to an increase of image, public acceptance and share of mind for rail transport and its actors. This will lead to a higher media presence and societal acceptance of transport and rail transport in particular. The project supports policy-makers with sustainable supplement for intermodal transport in its present form and thus a valid alternative, which is:

- in support of existing intermodal networks and their developments
- in support of local, regional and industry-specific long-term environmental objectives
- in support of high yield investments.

Potential impact:

With the use of technologies developed within the project, novel transport methods will become a strategic option, especially for new entries and innovative operators. When applying new paradigms for rail operation as well, various new alternatives for rail transport production methods become feasible for realisation and reinforcing competitiveness of intermodal rail cargo vs. truck transport. For example:

- shifting the balance between modes of transport
- removal of bottlenecks
- fast execution of the loading operation and by the fact that trains can be manipulated while waiting on bypass tracks with active electrical power lines.

Acronym:	FastRCargo	
Name of proposal:	Fast Transshipment Equipment and Novel Methods for Rail Cargo in Europe	
Contract number:	TST5-CT-2006-031554	
Instrument:	STP	
Total cost:	3,635,820 €	
EU contribution:	1,950,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.10.2006	
Ending date:	31.03.2009	
Duration:	30 months	
Sector:	Multi	
Objective:	Re-balancing and Integrating Different Transport Modes	
Research domain:	Development of logistics systems and concepts (Loading/unloading, containers, space optimisation in terminals)	
Coordinator:	Mr Unseld Hans G. CargoTechnologies GmbH Lerchenfelder Strasse 44/V Strozzigasse 5/7 AT 1080 Vienna	
E-mail:	unseld@cargotechnologies.com	
Tel:	+43 (0)1 403 0371 10	
Fax:	+43 (0)1 402 2604	
Partners:	Dautel GmbH	DE
	ESG Elektroniksystem- und Logistik-GmbH	DE
	Österreichische Bundesbahnen - Infrastruktur Bau AG	AT
	Austrian Research Centre Seibersdorf Research GmbH	AT
	Chalmers Tekniska Högskola Aktiebolag	SE
	Copenhagen Business School	DK
	rail4chem Eisenbahnverkehrsgesellschaft mbH	DE
	Autoterminal S.A.	ES
	CTD Container-Transport-Dienst GmbH	DE



SECURCRANE

Design of an Innovative System for the Drive and Control of Port Cranes for Safe Remote Operation

This project focuses on port cranes to increase their performance and safety and human operator working conditions, thus eliminating the gap between theoretical and real productivity (lifts/hour) of cranes. The core problem of crane productivity is the loss of efficiency from the human operator due to the stressful working conditions inside the crane cabin. SECURCRANE will develop a remote crane control, and an innovative anti-sway device, providing the operator with all information physically 'sensed and seen' in his position onboard so that a 3D television image supplies the driver at a remote site with the same information/functions as he had from the crane cabin seat.

Background

In the manufacturing field of port cranes, manufacturers usually neglect research and innovation due to highly detailed bids from buyers and severe price competition. Current anti-sway devices are mainly based on several physical/electrical principles (combining sensors/actuators to rebalance sway and damp oscillations). Their performance rates and cost/benefit ratios are not satisfactory, and many crane operators admit to working with the anti-sway switched off. The absence of efficient and cost effective anti-sway systems have prevented the introduction of remote crane control.

The project covers the social aspects of innovation, involving crane drivers from the start and focusing on their re-qualification of their job position after the remote crane cabin has been adopted.

Objectives

SECURCRANE addresses two specific problems, distinct but highly interconnected, which affect the crane operator's behaviour:

1. the stressful working conditions of crane operators caused by both physical stress (shocks, vibrations, accelerations due to cabin position suspended to trolley and cabin-constrained movement along crane boom), and psychological stress (sway of spreader/container and time needed to engage corner casting holes with spreader twistlocks or into the 'cones', which considerably frustrate drivers and increase average handling time per movement)
2. the potential damages caused to intermodal units (and/or goods inside them), relevant causes of expensive legal actions and, often, financial disbursements (insurance costs or direct refunding to clients).

Description of work

The project's two objectives are reached by realising, installing and testing the remote control (RCM), anti-sway (ASM) and cargo monitoring (CMM) module prototypes on a port crane in Le Havre. Furthermore, SECURCRANE will build a consensus within the crane drivers' community by inviting them to trials where they will get hands-on experience of the innovation in practice. The RCM originates from past expertise developed in defence field applications, which is now transferred into this civil application subject to different constraints, environment and needs. The imagery system is innovative too, based on a patented system promising to overcome negative aspects of past 3D imagery systems. The ASM originates from successful past experience in other science domains (mostly cognitive sciences and artificial intelligence

devices design), hardware simplicity, fast response to external inputs, positive past applications of the same expertise, and reduced hardware costs promise efficiency coupled with very interesting cost/benefit ratios. The CMM raises commercial attractiveness of SECURCRANE system by reducing insurance costs and providing added-value services to terminal operators. The CMM acquires many container images performing functions like container identification (to avoid misoperations), extraction of geometric features (early detection of damages to avoid refunding clients for damages made outside terminal premises), and other functions. CMM adopts technologies able to limit optic/geometric distortion and environmental/light adverse condition, while keeping hardware costs low.

Excluding management, the project is organised in five work packages (WP).

WP 1: User's needs: these will be ascertained through interviews, questionnaires and advice of key field experts/end users), then 'translated' into proper functional requirements to draw up the SECURCRANE system architecture.

WP 2: Design, development and tests: the design and development of the modules runs separately because their applications are logically 'installed' in different allocations on crane controls.

WP 3: Integration, testing and validation: modules are integrated and tested to verify the functionalities and performances of each module as well as the global system. Final results will be validated.

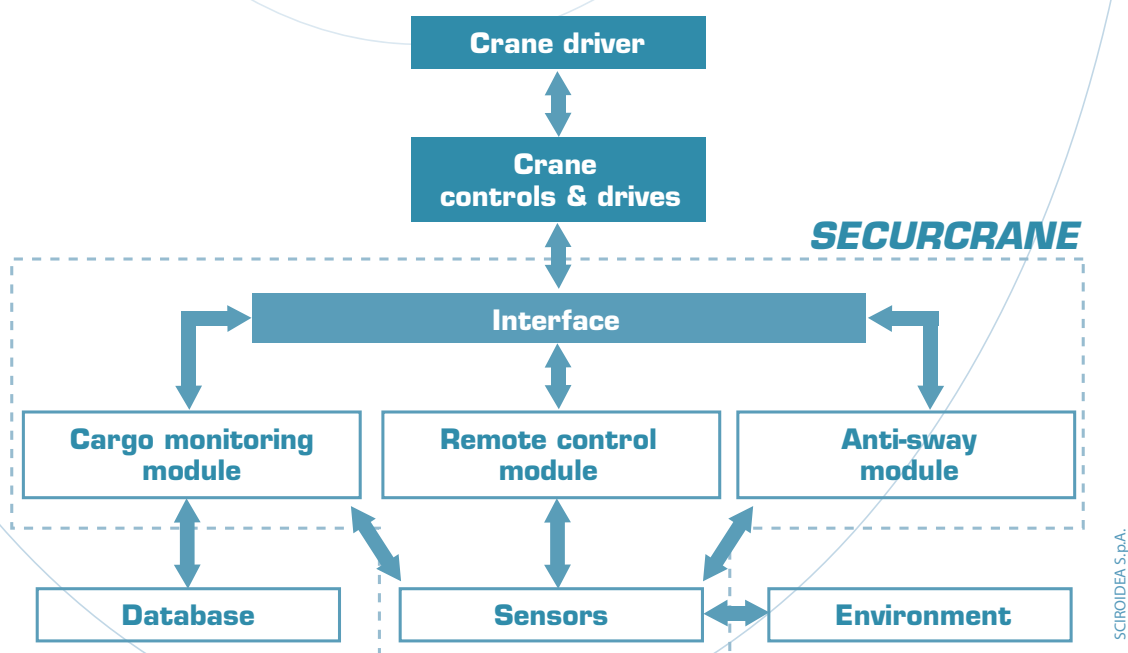
WP 4: Evaluation and assessment: identification of impacts on the introduction of SECURCRANE's technologies and associated organisational concepts, and the 'road map' for implementation.

WP 5: Dissemination and workshops: major instruments are SECURCRANE Interest Operators' Club (SIOC), distribution of brochures, update of project website and validation workshops.

Results

The major expected result is that the first prototype of the SECURCRANE system installed on a port crane in Le Havre will practically eliminate the effects of the sway when the driver puts the control joystick to idle. The remote control of the crane will be achieved via CCTV 3D images and the retrieval of additional information on handled containers will complete the functions. SECURCRANE will allow terminal operators to capitalise on their crane drivers' skill with limited investments. If this research challenge is won, the first positive applications will not only involve the port cranes field where safer working conditions and more efficient drivers' performances may be reached, but the civil construction industry may also benefit from these achievements.

Keywords: Remote control cabin, anti-sway-system, multispectrum imaging, image processing, image feature, image recognition and identification, man-machine interface



SECURCRANE modules and interactions



Acronym: SECURCRANE

Name of proposal: Design of an Innovative System for the Drive and Control of Port Cranes for Safe Remote Operation

Contract number: TST5-CT-2006-031548

Instrument: STP

Total cost: 4,246,000 €

EU contribution: 2,200,000 €

Call: FP6-2005-Transport 4

Starting date: 01.05.2006

Ending date: 30.04.2009

Duration: 36 months

Sector: Multi

Objective: Re-balancing and Integrating Different Transport Modes

Research domain: Development of logistics systems and concepts
(Loading/unloading, containers, space optimisation in terminals)

Website: <http://www.securcrane.info>

Coordinator: Dr Derito Andrea
SCIROIDIA S.p.A.
Via Fieschi 25-6A
IT 16121 Genova

E-mail: a.derito@sciroidea.com

Tel: +39 010 29 12 741

Fax: +39 010 29 12 740

Partners: ECA S.A.
TL & Associés
ENEA - Italian National Agency for New Technologies Energy and the Environment
INTECSA-INARSA S.A.
Port Autonome du Havre
BERTOLOTTI S.p.A.

FR
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TRIMOTRANS

Development of new intermodal loading units and dedicated adaptors for the trimodal transport of bulk materials in Europe

This project targets the development of new intermodal loading units (container plus adapter) including devices such as the ISO bulk container, roll-off container, capable adaptors and mobile fixtures suitable for the trimodal transport of bulk and packaged goods on road, railway and inland waterways.

Background

Road transportation is facing rapidly increasing congestion. On the contrary, the available capacity on railways and inland waterways are being underutilised. A redistribution of the carriage of goods is urgently needed. Up until now the most important obstacles have been the incompatible interfaces between the various carriers and the diversity of loading devices being used in the EU.

In this context, the lack of harmonisation and standardisation of loading units is a great barrier against utilising the development potential of the intermodality.

By applying new loading units, the logistic chain can be set up without changing the loading unit within the complete door-to-door transport process. Trans-shipping does not require crane technology anymore so the costs will be reduced substantially. In compliance with the ISO container dimensions, the new characteristics of the loading units will lead to a harmonisation of the handling.

The development, design and testing of the new intermodal loading units and their later introduction into the market will strongly contribute to the policy objectives of the European transport.

New developments and a growing complexity in trans-shipping technologies, which are aimed at cost reduction, do not allow for the universal use of the existing ISO and roll-off containers in the transport chains of combined traffic systems anymore.

Objectives

The main objective of the project is the development of new technical solutions for intermodal loading units including containers, dedicated adaptors and mobile internal fixtures in order to shift the main transportation route for goods from the road onto rail and inland waterways in a sustainable way.

By the development and integration of tailored adaptors for the necessary lifting and shifting operations, the loading units will lead to an optimum for intermodal transportability and compatibility to existing systems, i.e. hook-lifting or spreader technology and/or the horizontal trans-shipping via devices such as MOBILER, ACTS, etc.

The technical activities will be focused on the development and design of large ISO containers and ISO compatible roll-off containers with the dimensions of 2 550 x 2 900 x 7 450 mm. These dimensions comply with the recommended directive of the European Commission for intermodal loading units.

Within the project, technical solutions for the transport of selected gases and liquids are also developed.

Furthermore, it is intended to equip the containers with optional exchangeable fixtures and movable walls in such a way that they can accommodate bulk goods as well as packaged goods.

Considering these requirements and specifications, two types of loading units will be designed and tested within the project in agreement with the recommendations of the EC.



Description of work

The following technical solutions will be developed and designed:

- intermodal loading units for the formation of a multi handling process at intermodal transport conditions with the necessary characteristics of the interoperability for the trimodal traffic carriers
- appropriate modular adaptor systems for the efficient adaptation of the loading units to the main intermodal transportation and loading demands for bulk and packaged goods
- container modules for gases and liquids
- adaptor systems for the transport on trimodal traffic carriers
- fixing modules for the receptacle connection with the trimodal adapter system.

The design of the new loading unit prototypes will include the following sub-tasks:

- ISO-compatible bulk material/package goods container
- ISO-compatible roll-off container
- frame systems and the required mobile built-in equipment
- adaptation of the frame systems to the types of goods, norms and other legal regulations (e.g. EN, ISO, UIC, UIT, TSI and GOST) and to the means of transportation.

In addition, suitable measuring and testing techniques have to be developed and constructed:

- discharging tests for selected groups of bulk goods and municipal waste
- examination of the goods (or loading units) with respect to the design of the inner walls and the transfer equipment system will be executed.

Results

1. The logistic chain can be set up without changing the loading unit throughout the complete door-to-door transport process.
2. The trans-shipping procedures are possible with different handling technologies and the costs will be reduced substantially.
3. The uniformity of the special internal features, such as the position and design of fittings as well as the compliance with the container dimensions, will contribute to the harmonisation of the loading units.
4. In the field of municipal waste, the specific roll-off container will be adapted to allow the application of spreader technology as well as stacking. The application spectrum of these containers will be extended considerably as they can be handled with classical SPREADER as well as HOOK-LIFT technology.
5. New, significantly changing requirements of today's logistics are emerging. The ISO container for mineral bulk goods will probably be used as a self-discharging unit when carried on a railway wagon. This ISO container can be handled with SPREADER, MOBILER, ACTS and HOOK-LIFT technology.

New loading units and the installation of efficient transport chains may avoid unnecessary changes at transport facilities. Transport, handling and trans-shipping can be reduced by the goods being transported directly to the consumer without any interim storage.

Keywords: Transport, container, trimodal transport, ISO container, roll-off container, transport chain, trans-shipping, adapter, HOOK-LIFT technology

Acronym:	TRIMOTRANS
Name of proposal:	Development of new intermodal loading units and dedicated adaptors for the trimodal transport of bulk materials in Europe
Contract number:	TST4-CT-2005-516271
Instrument:	STP
Total cost:	1,720,339 €
EU contribution:	1,307,752 €
Call:	FP6-2003-Transport 3
Starting date:	01.10.2005
Ending date:	30.06.2008
Duration:	33 months
Sector:	Multi
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Development of logistics systems and concepts (Loading/unloading, containers, space optimisation in terminals)
Website:	http://www.zaft.htw-dresden.de
Coordinator:	Prof. Schuszter Mathias Zentrum für Angewandte Forschung und Technologie e.V. Friedrich-List-Platz 1 DE 01069 Dresden
E-mail:	mathias.schuszter@zaft.htw-dresden.de
Tel:	+49 (0)351 462 3244
Fax:	+49 (0)351 462 2159
Partners:	Budapest University of Technology and Economics HU Loxodon Machining Ltd HU Werner & Weber GmbH AT Kluge GmbH DE Broder AG CH Cesko-Saske Pristavy s.r.o. (Tschechisch-Sächsische Häfen GmbH) CZ G. Transport '96 Forwarding Ltd HU Moscow State University of Railway Engineering RU CIDEON Engineering GmbH DE



CAPOEIRA

Coordination Action of Ports for integration Of Efficient Innovations and development of adequate Research, development and innovation Activities

CAPOEIRA will concentrate on maximizing the opportunities for successful research, development and innovation (RDI) in the field of freight transport activities in ports. These issues will be addressed as three separate topics: seaport interface, land-port interface, and port information and communication. Recommendations for future RDI projects for European ports will be developed through workshops by bringing together the main stakeholders from European ports: port associations, technology platforms, research projects and advisory councils.

Background

Port activity has rapidly grown over the last 20 years. This is valid for main ports and smaller ones. They all play increasingly a key role in the further distribution of goods in Europe. This causes huge problems for EU transport flows in general and in particular creates expensive problems of congestion in ports, endangering their competitiveness and attractiveness.

Before 2015, maritime traffic will have doubled again.

To cope with this traffic growth and increasingly severe constraints, notably of environmental and spatial development nature, technological and organisational innovations are required in the ports.

Such innovation, and the implementation of its results, requires huge financial and human resource investments.

Past research, development and innovation (RDI) has not always led to sufficiently tangible results and commercial and competitive solutions in EU ports. Many (trans)port RDI projects funded by the EU or the Member States have not gone beyond the design table, notwithstanding the excellent technological or scientific approach. Less than 10% of the projects of the Fourth and Fifth Framework Programmes have allowed real business development and commercial results. A reason of concern; a reason to learn from past experiences and answer the question how one can minimize the risk that RDI projects will not lead market implementation and commercial success.

It is expected that the results of this project will be of relevance for the activities of all transport related Technology Platforms, ACARE, ERRAC, ERTRAC and Waterborne, as well as EIRAC when implementing their Strategic Research Agenda's.

Objectives

CAPOEIRA aims at developing recommendations with concerned actors regarding future (and current) research, development and innovation projects in ports with the objective to minimise the risk of associated public or private investments. It will also:

- concentrate on the transport of goods in ports (i.e. transshipment, information and communication, handling, storage, terrestrial and maritime modes' accesses)

- produce guidelines for current and future research, development and innovation projects in ports, presenting key success factors and a method allowing to assess the opportunity of RDI projects by linking them with indicators showing their technical feasibility (interoperability), social (impact on employment and working conditions, qualification) and societal acceptability, cost-effectiveness and efficiency
- define common research topics based on needs (for solutions, products) in the field of transport at ports in the short, medium and long term (until 2020)
- produce recommendations related to the implementation of RDI projects in ports (investments, transition period management, communication, training), to contribute towards improving the capacity of management of innovation by port actors and promote a culture of change in ports.

Description of work

With the help of a scientific board, this work will be carried out in direct interaction with the main relevant actors concerned by innovation in the field of transport of goods in ports, from both the business and the research communities, respectively gathered under two dedicated bodies:

- A business group: high-level representatives from European ports, professional organisations of the port community
- A research group: high-level industrialists, researchers and research programmers from European technology platforms and advisory councils, and professional research organisations.

CAPOEIRA will identify the necessary conditions for research to pass the commercialisation threshold, through the analysis of the reasons of failures and successes of past RDI projects.

Three workshops will be organised with the business group (bringing its solutions and products, experiences and visions for the future), and the research group (providing its competencies, facilities and RDI infrastructures).

A dedicated internet platform will be set up at the start so as to communicate proactively and continuously on CAPOEIRA developments in order to ensure two-way communication: www.capoeiraproject.eu

Results

All the work will lead to a final conference and to a book, destined for business and research communities, written in a common language and collecting all the main project results:

- The method of evaluation of innovation projects under the form of a 'project opportunity assessment grid' aggregating indicators defined so as to minimise the risks of investments in innovations (validated by port actors, technology platforms and advisory councils) and to guarantee that research will pass the commercialisation threshold
- The articles from a scientific board composed of relevant experts
- The assessment of past projects, current and future needs of ports/products to be developed and common research topics to be addressed
- The guidelines (key success factors for innovation, for implementation) for ports, research groups (technology platforms, organisations, industries, etc.) and EC research programmes.



Acronym:	CAPOEIRA
Name of proposal:	Coordination Action of Ports for integration Of Efficient Innovations and development of adequate Research, development and innovation Activities
Contract number:	TCA5-CT-2006-031557
Instrument:	CA
Total cost:	499,500 €
EU contribution:	499,500 €
Call:	FP6-2005-Transport 4
Starting date:	01.05.2006
Ending date:	30.04.2008
Duration:	24 months
Sector:	Multi
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Technologies to ensure effective, clean and safe operations of vehicles/vessels in terminals
Website:	http://www.capoeiraproject.eu.com
Coordinator:	Mr Cabrera Afonso Juan Manuel INTECSA-INARSA S.A. Avda. San Juan de la Peña, 160 ES 50015 Zaragoza
E-mail:	jcabrera@za.intecs-a-inarsa.es
Tel:	+34 (0)976 73 15 17
Fax:	+34 (0)976 73 19 87
Partners:	TL & Associés British Maritime Technology Ltd

FR
UK

EFFORTS

Effective Operation in poRTS

The European economy depends highly on the efficient operations of ports. Most of European trade passes through ports and this will continue to do so: a doubling of transport volumes is expected in the next 15 years.

Ports, therefore, are under a tremendous pressure to increase their capacities and efficiency while at the same time environmental and spatial development considerations imply constraints.

EFFORTS is structured around ports with the aim to address three key issues, navigation, environment, organisation and infrastructure, with a vision to develop and integrate innovations so that the final added value is much more than the sum of individual improvements.

Background

According to Commissioner Borg, over 90% of Europe's trade with the rest of the world is shipped through its ports. This is also the case for almost half of the intra-European trade. Seaports handle a total of 3.5 billion tonnes of cargo per year. Approximately 350 000 people in Europe work in over 1 000 ports or in directly related services, which together generate about € 20 billion. At the same time, the container sector is facing an increasing threat of terminal congestions and thus container terminals are the potential bottlenecks within the transport chain. Besides the logistics problems, which will arise from container terminal congestion, European ports in general need to strengthen competitiveness by improving their availability and cost-benefit ratio of services to all types of vessels, passengers and commodities. Regarding the environment, over the last years European ports have been consolidating a strong involvement in environmental protection and friendliness in ports. Also, the EU environmental regulation framework that relates to ports, directly or indirectly, is impressive. Yet, much remains to be done. European ports already follow an innovative and proactive approach; however, appropriately structured research assistance will have a lever function resulting in much higher benefits than costs.

Objectives

EFFORTS has been built through co-operation with ports to determine deficiencies or ideas for improvement. The overall objectives of EFFORTS are to achieve more effective, safe and environmentally friendly operations in European ports. After analysing the current state of the art and requirements, concrete research objectives have been worked out and translated into the work plan of EFFORTS. The vision is rather simple: to combine selected key developments intelligently so that the overall benefit is much more than the sum of individual improvements. The terms of reference are challenging but feasible within the project duration and will result in clearly measurable products and processes.

To achieve the applicability of results on a European level, the approach aims at modular, evolutionary and interoperable solutions. It shall also enable usability on each level of individual technological development of a port. Hub ports have needs distinct from small feeder ports thus transferability methodologies will be invented.

However, searching for new solutions always includes the risk of not achieving all the specified objectives. The project approach therefore allows for alternatives to avoid dead ends. EFFORTS is structured around ports and port services resulting in a holistic approach.



Description of work

The work content covers the sub-project areas Navigation, Environment, and Organisation and Infrastructure, which will be brought into a coherent context through the project Integration activity. Integration in EFFORTS is not restricted to technology and business processes but takes into account crucial social economic aspects, such as personnel qualification, business awareness, social responsibility and job satisfaction. The work packages for the three sub-projects will use a proven methodology, commencing from state of the art, and then defining specifications to develop suitable solutions to be evaluated through demonstrations, and the assessment results providing inputs for further enhancements. Common issues like Education and Training, Dissemination, and Implementation and Exploitation will be tackled by horizontal work packages so as to ensure a standardised approach and foster the transfer of results to a generic level. Validation and verification will be dealt with horizontally as part of the Integration Work Package, which also controls demonstrations. The first eight months are declared as the verification phase in which the state of the art and ports' needs will be detailed and work package descriptions refined. It will be concluded with a review by the Commission deciding which of the work packages will be conducted during the next phases of the project.

Results

Priority is given to tangible results with short introduction phases and high applicability:

Navigation in Ports, to allow for safe and efficient approach and berthing. Based on highly accurate digital chart data (Harbour ECDIS) operations of vessels and tugs will allow improved use of space and monitoring of operations and increased automation of processes. Prognostic management of feeder vessels will improve planning of port resources.

Ports and Environment, to integrate ships into the land-based systems to handle wastes and pollutants. Shore-based reception facilities need to be operated in a network from ships provisions to waste. EFFORTS will look to accelerate European solutions regarding dredging and for a harmonised port neighbourhood by minimizing annoyances from all kind of emissions.

Port Organisation and Infrastructure, to provide a comprehensive picture of port processes. Tools and methodologies for improved port operations and infrastructure will also be developed, including a risk assessment framework and investigations into artificial offshore ports.

Solutions will be developed to reduce costs and environmental impacts, and increase safety and flexibility of European ports. EFFORTS will thereby improve their competitiveness, supporting the modal shift from road to sea and better balancing the effectiveness between European ports and ports of other continents.

Keywords: Maritime safety, maritime engineering, safety technology, navigation, environment, risk assessment, port management

Acronym:	EFFORTS
Name of proposal:	EFFective Operation in poRTS
Contract number:	TIP5-CT-2006-031486
Instrument:	IP
Total cost:	15,186,879 €
EU contribution:	8,000,000 €
Call:	FP6-2005-Transport 4
Duration:	36 months
Sector:	Waterborne
Objective:	Re-balancing and Integrating Different Transport Modes
Research domain:	Technologies to ensure effective, clean and safe operations of vehicles/vessels in terminals
Website:	http://www.efforts-project.org
Coordinator:	Mr Recagno Valerio D'Appolonia S.p.A. Via San Nazaro 19 IT 16145 Genoa
E-mail:	valerio.recagno@dappolonia.it
Tel:	+39 010 3628148
Fax:	+39 010 3621078
Partners:	Technische Universitaet Hamburg-Harburg DE
	Aristotle University of Thessaloniki GR
	British Maritime Technology Ltd UK
	Centrum Techniki Okrętowej S.A. - Ship Design and Research Centre S.A. PL
	DORIS Engineering S.A. FR
	FORCE Technology DK
	Instituto de Soldadura e Qualidade PT
	European Commission - Joint Research Centre IT
	Norwegian Marine Technology Research Institute NO
	Nielsen + partner Unternehmensberater GmbH DE
	National Technical University of Athens GR
	'Ovidus' University of Constanta - Center for Advanced Engineering Sciences RO
	Transeuropean Consultants for transports, development and Information Technology S.A. GR
	National Company maritime ports Administration Constanta SA RO
	PORT AUTHORITY GIJON ES
	SAM Electronics GmbH DE
	TL & Associés FR
	Thessaloniki Port Authority S.A. GR
	via donau - Österreichische Wasserstraßen-Gesellschaft mbH AT
	VTT Technical Research Centre of Finland FI
	Fundación de la Comunidad Valenciana para Investigación, Promoción y Estudios Comerciales de Valenciaport ES
	Kongsberg Seatex AS NO
	Imperial College of Science, Technology and Medicine UK
	Ingeniería de Sistemas para la Defensa de España, S.A. ES
	Instituto Superior Técnico PT
	Technische Univeriteit Delft NL
	Medcenter Container Terminal S.p.A. IT
	Environmental Protection Engineering S.A. GR
	Marima Tech A/S DK
	Hamburg Port Authority DE
	PEMAR RD FR
	Port Autonome du HAVRE FR
	UNICAEN FR
	Port Autonome de Marseille FR
	Dublin Port Company IE
	Administração do Porto de Lisboa/Lisbon Port Authority PT
	SIREHNA GA
	SODENA SA FR
	TuTech Innovation GmbH DE
	Centre d'Etudes Techniques Maritimes et Fluviales FR
	Consultrans s.a. ES
	International Consulting Environment Services FR

Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion



DSS-DC

Decision-support System for Ships in Degraded Condition

DSS-DC develops decision-support tools for handling crisis situations onboard cruise ships, oil tankers and other ships. The situations covered are problems in propulsion systems, hull damage and intentional grounding – including in adverse weather conditions. Co-operation tools for use onboard and between ship and shore will also be developed.

Background

Shipping has had a continuously improving safety record over the last decades. However, accidents will still happen and with ever bigger passenger and cargo ships, the consequences of not handling the accident optimally may become very serious. New cruise liners carry almost 4 000 passengers to areas where it may not be very safe to launch lifeboats. The Prestige accident shows what can happen if an oil tanker spills its cargo. Thus it is of outmost importance to be able to keep the ship floating as long as is necessary and if this proves not to be feasible, it will be necessary to analyse the consequences of alternative actions, such as intentional grounding. This has also been recognised by the IMO (International Maritime Organisation) through its passenger ship safety programme and by the EU through various directives to increase the safety of shipping.

Objectives

The following are the main technical and scientific objectives of DSS-DC:

1. Develop a model for interaction and co-operation between onboard and onshore decision-makers in an emergency.
2. Perform an analysis of onboard alarms and propose how alarm handling can be integrated in the overall decision-support system (e.g. through alarm priorities, risk-based alarm hierarchies, etc.).
3. Develop a computer and network architecture for implementation of the co-operative decision-support system. This shall support all DSS-DC modules as well as existing systems on ship and land.
4. Develop a prototype 'multi-function console' (MFC) that integrates the decision-makers' interface requirements (see objective 1) as well as supports the ship/shore co-operation model from objective 1.
5. Develop a decision-support (DS) module for ships with degraded manoeuvring and/or propulsion systems. Support both immediate operational requirements as well as a 'what if' type analysis. Weather effects shall be considered.
6. Develop a DS module for assessing the effects of hull damage under various operational and weather conditions. The module covers hull strength and damage propagation. It will be able to give operational advice on changes in speed, course and ballast distribution.
7. Develop a DS module for intentional grounding and for advice after an accident. It shall be able to give predictions on hull damage and pollution (from cargo and bunkers) in case of grounding (being afloat afterwards) and stranding (being stuck). Weather effects shall be considered.
8. Develop a DS module for immediate assessment of current status and trends in the propulsion system's technical condition. The module will make use of a hierarchical system of technical condition indices (TCIs) that will make it possible to assess functional consequences of component degradation as well as trace the consequences back to the component(s) causing the degradation.

9. Develop weather and sea routing functionality that can interact with the degraded manoeuvring DS module to provide overall ship routing in all conditions. There will also be interfaces to the hull damage module to allow the inclusion of weather conditions and forecasts.

Description of work

Computer science: DSS-DC will be widely distributed in a multi-tier system and via the Internet domain. Of particular importance is online collaboration between ship and shore over low capacity satellite data links.

Simulation and analysis of ship responses: This is used to implement the degraded manoeuvrability module. The module will be able to detect certain errors in the manoeuvring and propulsion systems to simulate future behaviour, for example when operating in adverse weather in restricted waters.

Effects of hull damage and sea loads: The system will use a set of pre-calculated datasets from existing numerical methods combined with interpolation mechanisms to estimate stresses in a damaged hull in various conditions.

Hull penetration and cargo outflow after grounding: A similar approach to that in the previous paragraph will be taken. Advanced numerical methods will be used to calculate data tables that can be used to estimate effects of various grounding scenarios.

Key performance indicators (KPI): As technical condition indices (TCI), these will be developed for the technical condition of propulsion machinery. It will be used to give an at-a-glance assessment of current conditions and operational margins. The system will also be extended to 'life support' systems such as fresh and black water plants.

Results

DSS-DC will demonstrate the use of an integrated decision-support system onboard a shuttle tanker and a cruise ship. The system will integrate the functions discussed above as well as support onshore organisations in the decision-making process.

Deliverables are partly the developed modules and partly the corresponding documentation. Various public papers will also be included as part of the project deliverables.

Keywords: Ship safety, hull strength, ship stability, decision-support systems, ship manoeuvring



Passenger-ship - the bridge



Passenger-ship engine-room

Acronym: DSS-DC
Name of proposal: Decision-support System for Ships in Degraded Condition
Contract number: TST3-CT-2003-506354
Instrument: STP
Total cost: 4,220,140 €
EU contribution: 2,350,000 €
Call: FP6-2002-Transport 1
Starting date: 01.01.2004
Ending date: 31.12.2006
Duration: 36 months
Sector: Waterborne
Objective: Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain: Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring
Website: <http://www.marintek.no>
Coordinator: Mr Rødseth Ørnulf Jan
 Norwegian Maritime Technology Research Institute
 PO Box 4125 Valentinlyst
 Otto Nielsens vei 10
 NO 7450 Trondheim
E-mail: ornulf.jan.rodseth@marintek.sintef.no
Tel: +47 (0)7359 5257
Fax: +47 (0)7359 5776
Partners: British Maritime Technology Ltd UK
 Technische Universität Berlin DE
 Norwegian University of Science and Technology NO
 Carnival plc UK
 TeeKay Norway AS NO
 Martec s.p.a. IT
 Kongsberg Maritime AS NO
 Siemens AG DE
 Lodic AS NO



FLAGSHIP

European Framework for Safe, Efficient and Environmentally Friendly Ship Operations

FLAGSHIP will improve the safety of European maritime transport and make it more environmentally friendly and competitive. The emphasis of the project is on onboard systems and procedures, onshore ship management systems, the impact of new technology on present ship-, owner- and operator organisations, effective and efficient communication interfaces, and the impact of standards and regulations.

Background

The shipping industry has, over the last few years, acquired high exposure. Some has been positive, but unfortunately much of the attention has been focused on accidents and environmental damage. Shipping needs to further improve the way it operates in terms of pollution control, redundancy and foolproof mechanisms and procedures. The layout of the ship and components must increasingly address the human-machine interface, ensuring that crews can cope in the most extreme conditions, under increasing time pressures and congestion.

Globalisation and the accompanying increase in world trade lead to increasing congestion. Also, the increase in international terrorism has put more attention on the movement of dangerous persons and materials. Hence ships are being monitored and controlled more and more, and the crews need to send a steadily increasing number of reports and data to various shore authorities. Measures to reduce the administrative burden and free resources to do more operative work are urgently needed. This includes automatic reporting systems as well as decision support for compliance with new rules and regulations.

Developments, particularly within the areas of information technology and communication, make an increasingly stronger impact on shipping. The strategic exploitation of information technology concerns not only the ship and the communication between ship and shore but also requirements of knowledge integration to an extent hitherto unseen.

Objectives

What all the requirements presented above have in common is the need for knowledge; knowledge about the state of the hull and the machinery onboard, about the position of the ship and events onboard, about rules and regulations, about the status of cargo and about the status of the overall shipping organisation.

The rapid development of satellite communication and the Internet have provided the means by which data can be gathered instantaneously and in large amounts. However, data is not knowledge; it is only the prerequisite for knowledge. Knowledge results from analysing the data and processing it intelligently so that it can be acted upon either in an automatic fashion or by humans who are either acting in isolation or in an integrated (though possibly geographically fragmented) group.

The vision of FLAGSHIP is to create the mechanism by which the expertise of all the required actors can be brought together in real time, independent of their location, and given to the right people, in the right format, at the right time and incorporating the highest level of knowledge, so that they can better manage all the questions which confront a ship operator: issues relating to the ship itself and its equipment (e.g. hull monitoring, equipment diagnostics and maintenance planning), its day-to-day operation (e.g. navigation, cargo and rule compliance) as well as emergencies and other exceptional situations (collision, fire, etc.).

Description of work

The RTD activities are organised into four work packages (WP). Other work packages will demonstrate the results on three different vessel categories and carry out training of users.

WP A. Technical operations and technical management: the focus of this work package is on the ship and the ship's equipment. Emphasis is on early detection of problems, efficient diagnosis and timely repair; also on long-term efficiency and savings by optimised monitoring and maintenance.

WP B. Nautical operation and support: improved day-to-day ship operation on the ship and in the shore office is a priority. Emphasis is on the improvement of safety and efficiency in light of more complex tasks and changes in crew responsibilities and composition.

WP C. Emergency management: improved emergency management tools both onboard and ashore. Prognosis and consequence assessment for alternative actions, as well as onboard and onshore simulator systems to prepare for a given action.

WP D. Support actions: this will cover ICT infrastructure; health and safety, organisation and processes; incentives and controls.

Results

Some of the expected deliverables include:

Monitoring systems for real-time assessment of hulls will extend the life of the existing fleet of tankers and bulk carriers by up to five years.

Monitoring tools for fuel efficiency indicators shall assist ship owners to improve energy efficiency by up to 10%.

The decision-support frame will reduce the time for a user's decision by a factor of 2 compared to present bridge installations.

A factor 2 improvement will also show up in support systems for nautical operations, and particularly in increased awareness of the navigation scenario, increased safety from nautical decisions and in the increased speed of nautical decisions.

Alarm filtering will reduce bridge alarms in a given scenario (breakdown in auxiliary systems) by 80% and in the general operational scenario by 20%.

Support systems for rule compliance will improve the speed of text look-up by at least a factor 2 while also improving the quality of the search.

Scheduling and repositioning of empties will distribute the load more evenly throughout the journey, cutting the average waiting time by about 26% and therefore reducing queues and speeding up the containership's operations.

A prognosis and assessment tool for emergency management will demonstrate improvements of between two and ten times in prognosis generation speeds and result reliability in fire and smoke propagation, hull damage and flooding.

Keywords: Safety, efficiency, ship-shore coordination, onboard data and decision integration



Acronym:	FLAGSHIP
Name of proposal:	European Framework for Safe, Efficient and Environmentally Friendly Ship Operations
Contract number:	TIP5-CT-2006-031406
Instrument:	IP
Total cost:	19,006,003 €
EU contribution:	10,215,000 €
Call:	FP6-2005-Transport 4
Duration:	48 months
Sector:	Waterborne
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain:	Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring
Coordinator:	Mr de Meester Theodoor Herman European Community Shipowners' Associations (a.s.b.l.) 67 rue Ducale BE 1000 Brussels deMeester@ecsa.be
E-mail:	deMeester@ecsa.be
Tel:	+32 (0)2 511 39 40
Fax:	+32 (0)2 511 80 92
Partners:	Teekay Shipping Corporation NO Minoan Lines GR V.Ships UK Carnival Corporation & plc UK Danaos Shipping Co. Ltd GR Kursiu Linija Ltd. LT Norwegian Shipowners' Association NO Consorzio Armatori per la Ricerca S.r.l (Italian Shipowners' Research Consortium) IT PERSEVERANZA SPA DI NAVIGAZIONE IT CCS ES Niederelbe Schiffahrtsgesellschaft mbH & Co. KG DE Koninklijke Vereniging van Nederlandse Reders NL PORTLINE - Transportes Marítimos Internacionais, S.A. PT Altair Special Maritime Enterprise GR Superfast Ferries S.A. GR Rolls-Royce plc UK Wärtsilä Finland Oy FI KONGSBERG MARITIME AS NO SAM Electronics GmbH DE Autronica Fire and Security AS NO Lyngsø Marine A/S DK Shipbuilders and Shiprepairers Association UK Lodic AS NO European Marine Equipment Council BE Germanischer Lloyd AG DE RINA SPA IT Bureau Veritas FR Port Authority of Valencia ES Trans-Base Soler, S.L. ES Spanish Depot Service, S.A. ES Meyer Werft GmbH DE Aker Yards S.A. FI Community of European Shipyards Associations BE TEMIS S.A. FR Regs4ships Ltd UK MJC2 Limited UK SEMA2 s.r.l. IT Ingeniería de Sistemas para la Defensa de España, S.A. ES SIREHNA FR British Maritime Technology Ltd UK MARINTEK NO University of Strathclyde UK Norwegian University of Science and Technology NO National Technical University of Athens GR Cardiff University UK Instituto Superior Técnico PT WEGEMT- A European Association of Universities in Marine Technology and Related Sciences UK

INMARE

Technologies and Methodologies for Safe, Environmentally Friendly and Efficient Shipping Operations of the Future

The Coordination Action, InMare, involves partners operating in the maritime sector. The main objective was to translate the maritime operators' real needs on input for feasible and effective future studies and/or research projects by identifying the most promising scientific and technical developments in order to make European shipping ready to face the future competitive challenges.

Background

The CA was based on the assumption that there will be even more increased focus on sea borne transport because of its environmentally attractiveness and efficiency, compared to road transport. The risk of massive oil-spill or the risk of casualties represents, however, a threat to sustainable development. New approaches to improve reliability and safety of European maritime activities are therefore required, together with intelligent systems to support onboard decisions, particularly under emergency situations. Emphasis should also be put on telematic and communication tools to integrate ship and shore resources better. The improvement of casualty prevention will be important to secure the highest possible level of safety at sea in order to minimise risks. With a tool like a dedicated CA, and through trans-national co-operation of directly or indirectly involved parties, the level of knowledge will be raised to set the priorities for technology and methodology developments required to realise the aims of industry. The CA may also give a foothold for the expansion of technology-based industry, specialising in ship instrumentation, telecommunications, design and construction of marine systems, tools related to quality assurance, etc. in the marine and other sectors. Such improved systems and tools may in turn be adopted by the industry to design and construct safer and more cost-effective ships and marine structures in the future.

Objectives

InMare has the intention to create the basis for further enhancing European short sea shipping by improving freight service capacity and reliability and passenger well-being on the one side, and by minimising the risk of life losses, damages to the environment and accidents on the other, thus maintaining the operational quality of ships during their operating life.

In particular, the project aims at coordinating activities within five areas, identified as important topics:

- enhanced efficiencies on board and ashore
- human resources
- communication and decision-support system (DSS)
- regulatory matters
- environmental sustainable ship operations.

The basic idea of the InMare CA was, therefore, to integrate expertise and experience with a substantial contribution from European shipowners' representatives. It can be recognised as an important tool for stimulating a common research strategy in support of European operators' efforts in their attempt to maintain the European shipping industry at the forefront of competitiveness.



Description of work

The CA was divided into seven work packages with one partner appointed as work package leader. The work packages were:

- Specification of end-user needs
- Establishment of working groups
- Working group activities
- Arrangement and execution of assessment workshops
- Harmonise and summarise results of all working groups
- Dissemination actions
- Project management and administration.

According to the five topics of InMare, five working groups were formed, mainly composed of shipowners, system makers and ship operators.

The allocation of the partners to the working groups was defined according to their competencies and preferences.

The obtained results of the working groups (and of the CA) are illustrated in deliverables which report, for each of five topics, the following:

1. State of the art
2. Identification of R&D needs
3. Overview of existing systems/solutions as well as proposals for new ones (where applicable)
4. Support of EU policies towards upcoming IMO (International Maritime Organisation) regulations through specific R&D actions.

Each working group worked in order to produce contributions for these deliverables, as expected, in the project.

During the project, meetings and various events were organised with direct participation of all project partners, which also included external experts and the Commission's representative.

The project and its results are available on the InMare website (<http://www.inmare-fp6.com>).

Results

During InMare, 14 deliverables were issued.

Deliverable 1 was a detailed report on the concrete R&D needs expressed by the shipping world on the topics of interest for the project.

The purpose of Deliverable 2 was to provide the composition of the five working groups of the InMare CA.

Deliverable 3 was intended as an overview on recent research and studies on the selected topics.

Deliverable 4 focused on the ultimate technologies, systems, solutions and methodologies already available in the market on the topics of interest. The reports provided an updated list of overviews on existing systems with short critical evaluation for the major items, and possible industrial development for new solutions/proposals.

Deliverable 5 was the summary of the R&D priorities and rankings produced by InMare giving a wide sample of EU shipping representatives and ship operators.

Deliverable 6 was focused on the evaluation of the future planned IMO issues, considered as important or critical from the view of the operators and for which R&D studies had been proposed and considered.

Deliverable 8 was a management report on the mid-term convention which contains the most important issues discussed and the inputs which emerged for the re-calibration of the CA.

In order to have a more efficient project management control, the Deliverables 7, 9, 10 and 14 provided the partners with the overall project status and a consolidated overview of the budgetary situation.

Deliverable 13 was a public document on the project results.

Acronym:	INMARE	
Name of proposal:	Technologies and Methodologies for Safe, Environmentally Friendly and Efficient Shipping Operations of the Future	
Contract number:	TCA3-CT-2003-506427	
Instrument:	CA	
Total cost:	893,300 €	
EU contribution:	750,000 €	
Call:	FP6-2003-Transport 3	
Starting date:	01.04.2004	
Ending date:	31.03.2006	
Duration:	24 months	
Sector:	Waterborne	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring	
Website:	http://www.inmare-fp6.com	
Coordinator:	Ing. Balzano Giuseppe Consorzio Armatori per la Ricerca S.r.l.(Italian Shipowners Research Consortium) Via De Guevara,17 IT 80059 Torre del Greco (Naples)	
E-mail:	consar@consar.net	
Tel:	+39 0818492629	
Fax:	+39 0818826194	
Partners:	Norwegian Shipowners' Association	NO
	British Maritime Technology Limited	UK
	Marine Technology Centre	NO
	Technische Universitat Berlin	DE
	Carnival Corporate Maritime Affairs	UK
	TEEKAY Norway AS.	NO
	SAM Electronics GmbH	DE
	Satellite Observing Systems	UK
	DANAOS MANAGEMENT CONSULTANTS LTD.	GR
	Deiulemar Compagnia di Navigazione S.p.A.	IT
	Services for Maritime Management SEMA2	IT
	University of Strathclyde (SSRC)	UK
	Confederazione Italiana Armatori	IT
	CNR-Istituto di Studi sui Sistemi Intelligenti per l'Automazione	IT
	Det Norske Veritas AS	NO
	Polish Shipowners' Association	PL
	FINCANTIERI - Cantieri Navali Italiani S.p.A.	IT
	ASSOCIACAO DE ARMADORES DA MARINHA DE COMERCIO	PT
	European Community of Shipowners Association	BE



POP&C

Pollution Prevention and Control-safe Transportation of Hazardous Goods by Tankers

The consequences of tanker accidents are often catastrophic, as can be vividly attested by the recent disasters of the Erika and Prestige, raising the issue of oil spills to the highest priority for the EU community. The POP&C project aims to address this issue head on by focusing on prevention and mitigation in ship design and operation for existing and new vessels.

Background

Stricter international regulation enacted in the early 1990s and advances made in design and safe operation of tankers saw a significant improvement in the tanker industry safety record. According to The International Tanker Owners Pollution Federation, oil pollution from tankers for the period 1997-2003 was only 25% of the pollution for the period 1990-1996. The total number of reported tanker incidents with pollution for the period 1997-2003 was only 37% of the figure for the period 1990-1996, while at the same time the total oil trade had increased by 15%. Two particular accidents, though, detracted from the tanker industry's good record. The cause and effect of the Erika (1999) and Prestige (2002) incidents, with their heavy oil cargoes causing extensive pollution on European shores, have had major political, social and economic implications.

Single hull tankers are gradually being phased out, according to the International Maritime Organisation's global regime, but last year Europe went beyond international regulations and implemented a unilateral accelerated phase-out, which has since led to the international phase-out being accelerated too. The control system for tankers has also been tightened up at the same time as the industry itself has taken initiatives to ensure that the structural integrity of tankers is maintained to good standards throughout the life of the ships.

This STREP proposal addresses the scientific, technological and wider societal and policy objectives of the Sustainable Surface Transport thematic priority, and particularly by increasing the safety of waterborne transport, through integrating technologies for driving, piloting and manoeuvring assistance to improve safety and maximise the effective capacity of the infrastructure, including the secure transportation of hazardous goods (Research Domain 4.11). The consortium comprises prime protagonists in the area of maritime safety in Europe and is organised to provide all the complimentary capabilities (the partners represent all industry sectors) that are necessary to satisfy the project objectives.

Objectives

The specific objectives include:

- developing a risk-based methodology to measure the oil spill potential of tankers
- developing a risk-based passive pollution prevention methodology (design and operational lines of defence)
- developing a risk-based, active, post-accident pollution mitigation and control framework.

The POP&C project proposes to deliver a framework and suitable tools for a methodological assessment of risk to be undertaken to provide a rational basis for making decisions pertaining to the design, operation and regulation of oil tankers. Such support can be used to make more informed decisions, which will in turn contribute to reducing the likelihood and severity of future oil spills.

Description of work

The objectives will be achieved by identifying and ranking critical hazards such as collision and grounding, fire and explosion and structural failure (WP2), leading to estimates of probability of capsizing/sinking from loss of stability or structural failure (WP3, WP4), which combined with estimates of consequences within a risk-based framework will provide a pollution risk (WP5).

Risk reduction through preventative measures (WP6) and post-accident mitigation and control measures such as decision support tools, human-machine interface and safe refuge (WP7) will also be developed.

Deliverables include pollution risk methodology and assessment tools, decision-support tools for pollution prevention and crisis management, and design and operational guidelines for containment of pollution risk.

Results

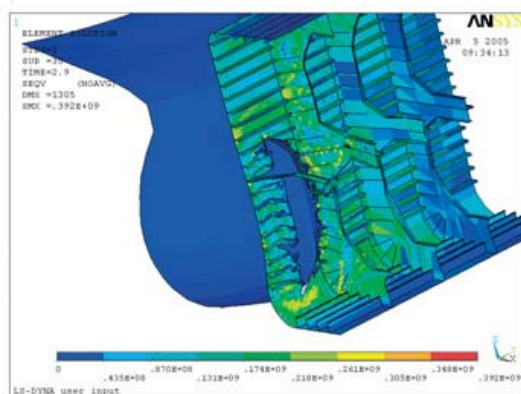
There are currently no exploitable results to publicise.

A number of publications can be obtained through the project website: <http://www.pop-c.org>

Keywords: Pollution prevention, environmental risk assessment, maritime safety, tanker design and operation

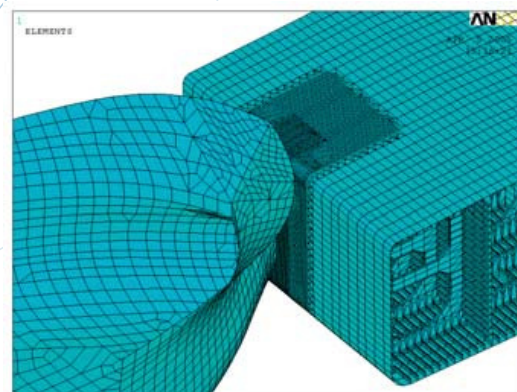


MT Prestige accident



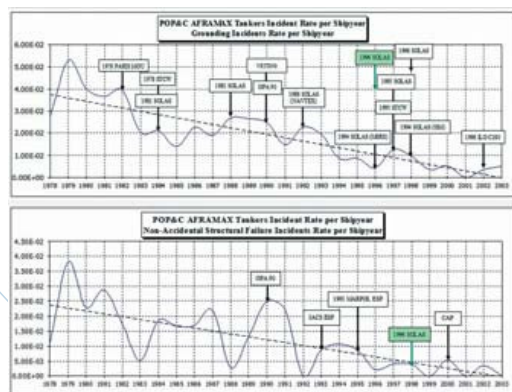
POP&C

the stress distribution on deformed configuration; after 30th calculation steps



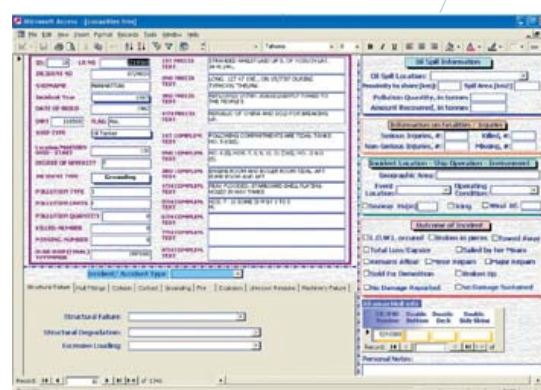
POP&C

the mesh showing collision damage extent for a scenario



POP&C

The influence of regulations on the safety record of the AFRAMAX tankers



POP&C

MS Access base POP&C tanker accident data-base



Acronym:	POP&C
Name of proposal:	Pollution Prevention and Control-safe Transportation of Hazardous Goods by Tankers
Contract number:	TST3-CT-2004-506193
Instrument:	STP
Total cost:	2,204,873 €
EU contribution:	1,549,953 €
Call:	FP6-2002-Transport 1
Starting date:	01.01.2004
Ending date:	31.12.2006
Duration:	36 months
Sector:	Waterborne
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain:	Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring
Website:	http://www.pop-c.org
Coordinator:	Dr Aksu Seref INTERTANKO 100 Montrose Street UK G4 0LZ Glasgow
E-mail:	admin@pop-c.org
Tel:	+44 (0)141 5484832
Fax:	+44 (0)141 5484784
Partners:	University of Strathclyde Bureau Veritas SIREHNA Center of Maritime Technologies e.V. National Technical University of Athens-Ship Design Laboratory Stocnia Gdynia S.A. Maritime Simulation Rotterdam b.v. Lloyds's Register NAVANTIA SSPA Sweden AB Istanbul Technical University Herbert Software Solutions - Europe Ltd Souter Shipping Ltd University of Newcastle upon Tyne IMO (International Maritime Organisation)

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SAFECRAFTS

Safe Abandoning of Ships - Improvement of Current Lifesaving Appliances Systems

The project is aiming to realise innovative and proven evacuation craft concepts to increase passenger safety substantially during an emergency at sea. It addresses the assessment procedures and generates novel concepts in order to increase the reliability of ship rescue.

Background

A tendency to develop passenger vessels carrying more than 5 000 passengers can be foreseen. A major calamity, such as flooding or fire, would have catastrophic consequences and special focus should be given to the means of rescue. Little scientific evidence is available on the effectiveness of ship evacuation craft in realistic conditions. No technical evidence seems to be available on the performance of the rescue system, i.e. hardware and procedures/management. Analysing the rescue process as a whole and considering non-conventional measures might increase the effectiveness of safety investments and save space aboard ship. Moreover, the success rate will improve dramatically. Model-scale and full-scale tests of novel rescue system concepts under extreme weather conditions will be required and a full-scale test prototype will be developed in order to obtain evacuation success rates.

Passenger transportation by sea or inland is important for many European citizens, living an average distance away from waterways of about 50 km.

Europe is the market leader when it comes to capital investment in passenger ships and ferries throughout the world. By taking the lead in improving human safety and by providing standards for all lifesaving appliances in Europe, we can strengthen our position and maintain our influence on the market.

Objectives

The objective is to provide an improvement in safety for the evacuation system in terms of passenger/crew survivability by conceptual improvements of current lifesaving appliances (LSA).

This project is concentrating on the rescue process by both quantifying the performance of ship evacuation craft and improving the concept of reaching the rescue vessel in a safe and reliable manner. The challenge is to exploit a first principles approach (regarding hydromechanics, mechanics and human behaviour) in the design of rescue systems for passengers, addressing both the hardware and the procedures.

The project takes the two major aspects into consideration:

a. Passenger performance

Performance of passengers under an evacuation can be characterised by parameters which can quantify passenger abilities. Examples are the ability to climb/descend or the ability to survive violent motions during a lifeboat launch.

Psychological aspects related to passenger behaviour are considered in a pragmatic fashion.

b. Hardware performance

The evacuation hardware can also be characterised by physical parameters, but now with respect to what is required from passengers in order to successfully use the hardware, e.g. height of the steps to be taken for boarding a lifeboat, including the effect of motions.

Description of work

The project focuses on researching current evacuation craft, and the development of new concepts and assessment and testing of their life-saving performance. The complete rescue process will be investigated from abandoning the ship until leaving the survival craft on a safe refuge area.

The following steps will be taken:

1. Identify appropriate parameters to assess the performance of evacuation systems in a quantitative fashion
2. Identify and modify calculation tools to predict evacuation hardware performance in terms of physical circumstances to which passengers will be subjected, as well as mechanical reliability
3. Acquire well-documented and reproducible test data on physical performance which can be expected from passengers
4. Acquire well-documented and reproducible test data on characteristics of existing evacuation hardware
5. Use data from tests on existing hardware to modify and tune the calculation tools
6. Generate new evacuation concepts
7. Predict the characteristics of these concepts with relation to physical circumstances to which passengers will be subjected when using these new systems, as well as mechanical reliability
8. Build a demonstrator of the most promising concept and put it to the test.

Results

The following results will be achieved:

1. A method to assess overall reliability and effectiveness of rescue systems for passenger vessels, integrating available methodology from earlier studies on specific subjects of the rescue process
2. Potential improvements for existing systems and their expected effectiveness, supported by theoretical and experimental assessment
3. Innovative ship evacuation concepts including their expected effectiveness, supported by theoretical and experimental assessment
4. An application of an equivalent design clause under the SOLAS (International Convention for the Safety of Life at Sea) provision for the innovative LSA concept.

The aim is to prove attained safety levels acceptable to the EC. Stated safety levels must be supported by sound scientific evidence. In this respect, physical model tests and full-scale tests will play a decisive role.

Keywords: Ship, passenger, evacuation, craft, lifeboat, raft, rescue, LSA, SOLAS



Boarding of rescue platform from a raft

Acronym:	SAFECRAFTS	
Name of proposal:	Safe Abandoning of Ships - Improvement of Current Lifesaving Appliances Systems	
Contract number:	TST3-CT-2004-506402	
Instrument:	STP	
Total cost:	5,076,560 €	
EU contribution:	2,849,980 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.02.2004	
Ending date:	31.10.2007	
Duration:	45 months	
Sector:	Waterborne	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring	
Website:	http://www.safecrafts.org	
Coordinator:	Mr de Vries Leo TNO - Netherlands Organisation for Applied Scientific Research Van Mourik Broekmanweg 6 NL 2628 XE Delft	
E-mail:	Leo.devries@tno.nl	
Tel:	+31 (0)15 276 3373	
Fax:	+31 (0)15 276 3021	
Partners:	British Maritime Technology Ltd	UK
	Ship Design and Research Centre	PL
	Maritime Research Institute Netherlands	NL
	SIREHNA	FR
	Ustica Lines Spa	IT
	Lisnave Estaleiros Navais SA	PT
	Fr. Fassmer GmbH & Co. KG	DE
	Viking Life-Saving Equipment A/S	DK
	Bureau Veritas	FR
	RINAVE - Registro Internacional Naval	PT
	BALance Technology Consulting GmbH	DE
	Gdansk University of Technology	PL
	Instituto Superior Técnico	PT
	University of Strathclyde, The Ship Stability Research Centre	UK
	Holland America Line	NL
	Flensburger Schiffbau-Gesellschaft	DE
	Carnival	UK



SAFEICE

Increasing the Safety of Icebound Shipping

SAFEICE aims to create a scientific basis for ice class rules (ship-hull strength) and for placing requirements on ice classes. The project will be carried out with the participation of universities, maritime authorities and European, Canadian and Japanese marine research institutes. The partners represent the vertical chain from basic research into implementing the ice rules and enforcing safety at sea.

Background

The ice cover present on many northern sea areas poses many difficulties for shipping. The sea ice creates a much higher resistance to motion than that encountered in open water. Thus the ships navigating in ice must have a much higher performance level (propulsion power, manoeuvrability) than ships navigating only in open water. Ice also causes high loads on the ship hull and machinery – much higher than those encountered in open water. The ultimate result of the ice load may be a rupture of the ship's hull leading to an environmental accident or, at worst, a total loss. The winter of 2003 in the Baltic was more severe than a long-term average winter – and definitely more severe than the previous ten winters – and many ship damages and minor accidents occurred, for example the collision of two ships, due to ice. Propellers and rudders were damaged and several cases of severe damage on ships' hulls occurred – some of these resulted in the hulls being ruptured. The present project is concerned with the ice loads and safety of ships in ice, but also in the terms of how a better performance in ice can reduce the risks.

The design of ice-strengthened tonnage is controlled by ice rules. For the Baltic and more generally for sea areas where only first year ice exists, the Finnish-Swedish ice class rules are applied widely. Most classification societies have also adopted these as their Baltic ice class rules.

Objectives

The basis for the required ice class is not clearly defined. This leads to confusion and a potential hazard for the safety of shipping, as experience from the Baltic shows when non-ice-strengthened vessels were allowed to enter the eastern Gulf of Finland through heavy ice.

The randomness of ice loads means that some way to treat the design question must be developed (as stated above). The irregularity of ice loads also has an implication on the design point.

The project aims can be summarised as:

- decreasing the environmental and material risks of shipping in ice-covered waters by creating a unified basis for winter navigation system for first-year ice conditions including the methods to get the required ice class
- developing semi-empirical methods based on measurements and advanced theoretical models to determine the ice loads on ship hulls and relate these to the operational scenarios and ice conditions
- developing ship-ice interaction models and stochastic methods to assess the design loads on the ship's hull.

The outcome is a description of load level versus ice and operational parameters.

- creating a framework to develop design codes and regulations for a plastic design basis for icebound ships.

Description of work

The first step in the SAFEICE project is to bring together earlier ice load measurement results. Analysis of these results will give an idea of the design for the ice-load level of different ships in different sea areas. The measured data will be arranged into a common database. The database will be designed so that different measurements are comparable with each other and that results from different ships can be combined. The analysis of different data sets gives a picture of data gaps that each measurement contains and those that need to be covered with additional measurements in certain sea areas or in certain ice conditions in the future. With an increased knowledge of the ice loading process it is possible to conduct better-arranged measurements and more realistic ice-load models. The data and load prediction tools can be used for validation of theoretical ice-load calculation models. Based on the analysis and database it is possible to develop theoretical and statistical models from ice-load calculations. These results can be then used when load responses are calculated. As a result, the risk level of ice damage can be estimated. The acceptable risk level is then defined by society and can be implemented into ship design, for example, via ice class rules.

Results

The extensive compiled database of ice loads and ice damages worldwide enable reliable verification of the developed ice load calculation models and can also be used in the future for similar purposes. This is the first time in the history of ice research that the expensive full-scale data from EU-countries (Finland, Sweden, Germany), Japan and Canada have been combined into a common resource.

Conducted model scale tests of ice navigation and related ice loads enable comparison of the loads on a conventional size and large ice-strengthened tanker and give valuable data for the development of future ice class rules for the Baltic Sea, especially to determine proper ice load levels for the large tankers navigating more frequently to Russian ports within the Gulf of Finland

Based on the data from full scale and model testing, analysis of the ice damages on the hull and extensive theoretical modelling of ice-induced load a synthesis has been developed for a good design basis for ice-strengthened ships navigating in the Baltic Sea. This will form the starting point for the development of the new ice rules for Baltic Sea, this work will be initiated by Finnish and Swedish Maritime Administrations in early 2007.

The systematic analysis of the risks related to the ships navigating in ice enable guidelines development for safe ice operation practises including both icebreaker and assisted ice strengthened ships operation principles. This can be use e.g. to educate future officers onboard ships navigating in ice in the Baltic Sea.

The wide Safeice collaboration between almost all nations operating ships in ice works toward a common understanding of these conditions and perhaps an eventual vision for a unified international ice classification standard.

Keywords: Safety, ice load, winter navigation



Firstaship

A second ship in compressive ice in the Baltic Sea



Acronym: SAFEICE
Name of proposal: Increasing the Safety of Icebound Shipping
Contract number: TST3-CT-2003-506247
Instrument: STP
Total cost: 2,175,226 €
EU contribution: 1,050,000 €
Call: FP6-2003-Transport 3
Starting date: 01.09.2004
Ending date: 31.08.2007
Duration: 36 months
Sector: Waterborne
Objective: Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain: Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring
Website: <http://www.tkk.fi/Units/Ship/Research/SafeIce/Public/>
Coordinator: Prof. Kujala Pentti
Helsinki University of Technology/Ship Laboratory
Tietotie 1
FI 02015 TKK Espoo
E-mail: pentti.kujala@tkk.fi
Tel: +358 (0)94513484
Fax: +358 (0)94514173
Partners: Chalmers University of Technology
Finnish Maritime Administration
Germanischer Lloyd AG
Hamburgische Schiffbau-Versuchsanstalt GmbH
National Maritime Research Institute
National Research Council Canada
Swedish Maritime Administration
Tallinn Technical University
Arctic and Antarctic Research Institute

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SAFETOW

Strategic Aid for Escort Tugs at Work

SAFETOW will provide masters of disabled vessels and masters of salvage and escort tugs with support tools, which will enable them to take decisions in real time with the best available information regarding the consequence of their actions.

Background

Between January 1992 and March 1999, a total of 593 merchant ships were lost. If SAFETOW had been available there is quite a good probability that, in many of these cases, the accidents would have been avoided. For instance, in the Amoco Cadiz accident, if action had been taken early enough to control the drift this would have prevented the grounding of the ship and the spilling of 227 000 tons of crude oil, with a cost of about €282 million. If SAFETOW is able to prevent even one such disaster in the future it will have paid back many times over the investment being proposed. From the point of view of commercial exploitation, we are forecasting a turnover of around €20 million over the first three years following the end of the project, of which we would expect well over €10 million to be profit. The consortium includes a ship owner association (CONSAR), a port authority (Gijon), one of the world's major salvors (SMIT Salvage), a supplier of shipboard navigational systems (STN ATLAS Marine Electronics), a salvage association and supplier of manoeuvring simulators (BMT), a classification society (Bureau Veritas) and an academic institution (the Universities of Glasgow and Strathclyde).

Objectives

The overall objective of this project is to:

- a. provide masters of vessels with tools to help them control their vessels if they become disabled and
- b. provide masters of salvage and escort tugs with tools which will enable them to take decisions in real time with the best available information regarding the consequence of their actions.

The project encompasses an experimental programme which collects manoeuvring data, including collaborative manoeuvring with more than one tug. This data will be analysed and used as a basis of validation for the simulation software. The software will then be integrated with the vessels' bridge systems to provide real-time help and decision support, training capability and monitoring.

Description of work

SAFETOW builds on innovative technologies to develop easily parameterisable modular solutions for

- a manoeuvring aid
- a towing aid
- a lines monitor.

The manoeuvring aid is aimed at tankers and will advise the disabled ship on the likely results of any manoeuvre (or lack of). Even when a ship is disabled there are a few actions available to it which will have an effect on the way it is drifting. It is, however, essential to forecast accurately the consequences of any such action so as to be sure of taking the appropriate decision. The manoeuvring model will be able to predict the drift mode accurately and it will also make suggestions about the most advisable course of action.

The towing aid is aimed at escort and salvage tugs. It will have a full model of the tug plus configurable and easily parameterisable models of the towed vessel and other involved tugs. This will allow the manoeuvring model of the whole tug plus the disabled tanker system to be put together in real time out of pre-existing models and a few basic parameters.



The lines monitor will assist the tug crews in determining whether the towing equipment is being stressed, which is usually a sign of problems in the towing configuration.

The accuracy of all these models will depend to a great extent on the quality of the data. An experimental programme will be run to collect high quality.

Results

The experimental programme has been run and the system components have been created and tested as stand-alone products. The work of the final year will cover the full validation of the integrated system.

Keywords: Salvage, safety

Acronym:	SAFETOW	
Name of proposal:	Strategic Aid for Escort Tugs at Work	
Contract number:	TST3-CT-2003-506317	
Instrument:	STP	
Total cost:	2,237,813 €	
EU contribution:	1,250,000 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.03.2004	
Ending date:	28.02.2007	
Duration:	36 months	
Sector:	Waterborne	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Integrating assistance and decision support tools to facilitate driving, piloting and manoeuvring	
Website:	http://www.bmtproject.net/safetow/	
Coordinator:	Mrs Gyngell Jenny British Maritime Technology Ltd Goodrich House, 1 Waldegrave Road UK TW11 8LZ Teddington	
E-mail:	jennyg@bmtech.co.uk	
Tel:	+44 (0)20 8943 5544	
Fax:	+44 (0)20 8977 9304	
Partners:	SMIT Salvage BV	NL
	AUTORIDAD PORTUARIA DE GIJON	ES
	STN ATLAS Marine Electronics GmbH	DE
	Bureau Veritas	FR
	University of Strathclyde	UK
	Consorzio Armatori per la Ricerca S.r.l (Italian Shipowners Research Consortium)	IT

ADOPT

Advanced Decision-support System for Ship Design, Operation and Training

The ADOPT project will focus on optimising safety by the development of a system that senses the environment of a real situation, predicts the ship's motion accordingly and, based on this data, calculates the actual risk of operating the ship in any given situation.

Background

Modern ship types are developing rapidly. Consequently, the experience gained by a crew on a certain ship does not necessarily apply to another vessel, even to vessels of the same ship type. Situations have been reported where vessels have entered dangerous situations without any warning.

With today's modern ship types, the captain and his crew can be faced with 'new' phenomena like parametric excitation and pure loss of stability. Generally, guidance on how to identify such problems and resonance is not available or appropriate, mainly due to the highly non-linear roll motion and lack of development (i.e. the means to use the theoretical knowledge for practical application). Also phenomena like slamming and excessive vertical accelerations at the bow are not simple to detect on large modern ships.

Recent data proves that commercial losses and loss of life can potentially be reduced by introducing this kind of decision support system. Losses pertinent to the motion of ships in heavy seas recorded from April 2005 until March 2006 are 43 lives and an estimated € 100 million. (Source: www.janmaat.de)

Objectives

Creating a risk-based system that will assist the captain in deciding safe and efficient ship handling with respect to the motions of an intact ship in severe seas, based on the risks arising from:

- the identified hazards and their formulation of limit states
- the actual sensed environmental situation
- the ship's condition
- the ship's behaviour
- the expected sea state on all possible courses
- the prediction of ship motions on all these courses caused by the prevailing conditions, etc.

Description of work

- Development of a toolbox for sensing the environment, prediction of ship response, and support for decision-making and selection of appropriate risk control options;
- Development of interfaces for the interaction of the developed toolbox with existing systems;
- The integration of the predicted ship response with on-board monitoring devices and enabling these combined systems to predict the ship's response accurately;
- Presenting relevant information on predicted sea-keeping behaviour and risk control options to the captain in real-time;

- Development of interfaces for operational use, use in design and approval, and use in training;
- Development of a user display, which is actually able to communicate the relevant parameters and their real meaning to the crew, especially in extreme conditions;
- Interfacing with available systems on the bridge (GPS, radar, ECDIS, etc.);
- Validation of the usability of the system in (simulated) extreme conditions in a full mission simulator to evaluate and improve usability;
- Validation of the developed DSS using full-scale measurements.

Results

After its first year, the ADOPT project achieved a clear understanding of the tasks at hand. This was done by performing a hazard identification session on the motions of intact ships without a digital satellite system (DSS), identifying the most critical scenarios being subject to a DSS. Another session was performed on ships having a DSS onboard, identifying the potential hazards resulting from a DSS.

The findings from these sessions were further structured and, together with additional information, put into a stakeholder requirement specification. This document forms a solid basis for future developments.

The work on decision criteria clearly indicates that economic interests of an owner and an operator are expected to put more stringent limitations on ship operations than safety concerns.

All disciplines involved in the development of the ADOPT DSS, which are oceanographics, numerical simulation of the motions of intact ships, description of permanent and varying ship data, and man-machine-interface, reviewed the state of the art and put these in the context of ADOPT. Focus was put on sources of uncertainties in the respective data. This provides ADOPT with a solid basis for its work in the next reporting period, where the respective details will be covered.

The full-scale measurement campaign, which ran over the winter season, provided the consortium with valuable data on ship motions of state-of-the-art Ro-Ro vessel in a relevant environment.



<http://tv-antenna.com/heavy-seas/3/>

Heavy seas seen from the bridge

Acronym:	ADOPT	
Name of proposal:	Advanced Decision-support System for Ship Design, Operation and Training	
Contract number:	TST4-CT-2005-516359	
Instrument:	STP	
Total cost:	2,950,470 €	
EU contribution:	1,899,999 €	
Call:	FP6-2003-Transport 3	
Starting date:	01.04.2005	
Ending date:	31.03.2008	
Duration:	36 months	
Sector:	Waterborne	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing technologies to acquire and predict information on infrastructure conditions and parameters	
Website:	http://adopt.rtdproject.net	
Coordinator:	Tellkamp Jan Flensburger Schiffbau-Gesellschaft mbH & Co. KG Batteriestr. 52 DE 24939 Flensburg	
E-mail:	jt@fsg-ship.de	
Tel:	+49 (0)461 4940 502	
Fax:	+49 (0)461 4940 217	
Partners:	Det Norske Veritas AS	NO
	GKSS Forschungszentrum Geesthacht GmbH	DE
	OceanWaveS GmbH	DE
	FORCE Technology	DK
	Technical University of Denmark	DK
	DFDS A/S	DK
	Technische Universität Hamburg-Harburg represented by TUHH-Technologie GmbH	DE
	National Technical University of Athens	GR
	SAM Electronics GmbH	DE
	Uniresearch	NL



INTRO

Intelligent Roads

The INTRO project aims to address the problems of road safety and capacity by combining sensing technologies and local databases with real-time networking technologies. This will improve both road safety and capacity by providing rapid feedback on emerging problems to maintenance authorities and road users.

Background

Over 42 000 road users are killed in European Union countries annually and around 3.5 million are injured. This accounts for annual costs of over €160 billion, not counting the pain and suffering of victims and their relatives.

Recent studies in one EU Member State show that, since 1980, crash safety improvements have reduced casualties by 15%, drink/driving measures by 11% and road safety engineering improvements by 6.5%. There is clearly considerable untapped potential for a much greater reduction in casualties through adding intelligence to road infrastructure.

Even without safety improvements, European countries are experiencing ever-increasing maintenance costs to keep the road network in a good and safe condition. The reasons for this are increased traffic volume combined with accelerated damage to pavements due to increased gross weights and evolution of load configurations of heavy goods vehicles. With the demand for increased freight transport increasing substantially, this situation will get worse instead of better unless new approaches can be found to increase the capacity and improve the maintenance through added intelligence to existing roads rather than building new roads.

In these circumstances, the target set by the EC of a 50% reduction in road deaths by 2010 is ambitious and a major challenge for the road research community, as well as the road authorities and operators.

An innovative integration of existing sensor and communication technologies with road infrastructure is one way of reaching the twin goals of increased safety and increased capacity. For a relatively small cost, significant 'added value' can be obtained from existing infrastructure, achieving a cost-effective solution to the problem.

Objectives

The INTRO project will focus on the following main objectives:

- applying and combining existing and new sensor technologies in a holistic way in order to increase capacity and safety significantly, as well as improving the well-being of road users
- make combined use of real-time network technologies, road databases and sensor technologies in order to create timely and localised information of the infrastructure, improving both road safety and capacity
- aggregate and visualise information in order to optimise the road user's needs as well those of the road operator and road authorities.

A challenging and promising fact is that a large amount of sensor/data input is already available: road surface databases, in situ sensors in road pavements and bridges (WIM, strain gauges, optical-fibre technologies, etc) as well as an increased number of in-vehicle sensors developed by the car industry.

Description of work

Three technical strands of research will be conducted:

- Surface safety monitoring:
 - integration and testing of real-time warning systems at network level to achieve a significant decrease in the number of accidents due to 'surprise effects' from sudden local changes in weather resulting in low friction and hence skidding
 - increasing drivers' attention to low road friction by only a few percent may result in significantly higher reduction of accident rates due to its non-linear relationship

- Europe's most advanced driving simulator will be used to optimise driver responses to new types of information.
- Traffic and safety monitoring:
 - combination of different sensor data will enable the estimations of entirely new real-time safety parameters and performance indicators to be used in traffic monitoring and early warning systems.
- Intelligent pavement and intelligent vehicles:
 - innovative use and a combination of new and existing sensor technologies in pavements, bridges and vehicles in order to prevent accidents, enhance traffic flows and significantly extend the lifetimes of existing infrastructure
 - a prolonged lifetime of high capacity roads could thus be obtained using novel methods for early warning detection of deterioration and damage to road surfaces.

Results

Deliverables:

- Consolidated state of the art focused on the scope of INTRO and focused needs across Europe
- Report on scenarios, structure and potential short-term trends
- Report on implementation strategies
- Model for estimating expectable stopping distances
- Report on the simulator study, including evaluation of impact on safety and drivers
- Data model for road safety-related data
- Report on technical implementation and users' feedback
- Demonstration of methods for the measurement of condition using probe vehicles
- Report on the assessment of methods to identify pavement conditions using current and novel in situ sensors
- Report on the use of combined probe vehicle and in situ measurements. Proposals for best practice implementation
- Traffic indicator needs: single source and data fusion estimation models
- Integration of weather effects for traffic indicators forecasting
- Safety indicators needs: simulation-based and field-based models
- Creation of a website
- Report on the launch workshop held in June 2005
- Report: A Vision of Intelligent Roads
- Final summary report
- Project quality assurance plan
- Project mid-term report
- Project final report

Exploitable product(s) or measure(s):

- guidelines and recommendations for ITS deployment use in future standards
- implemented data model combining static and dynamic skid warnings
- new use of in situ sensors and probe cars
- new methods for data fusion and travel time estimations

Sectors:

- road authorities
- ITS service providers
- traffic management

Keywords: Sensors, in situ, pavement, data fusion, ad hoc networks, friction estimation, intelligent infrastructure



INTRO aims to provide driver and road operator of accurate, real-time information of road safety and traffic conditions, using traffic data as well as pavement and vehicle sensors. The figure illustrates a possible warning system for sudden onset of slippery road sections due to adverse weather condition.

Acronym:	INTRO
Name of proposal:	Intelligent Roads
Contract number:	TST4-CT-2005-012344
Instrument:	STP
Total cost:	3,496,456 €
EU contribution:	1,999,020 €
Call:	FP6-2003-Transport 3
Starting date:	01.03.2005
Ending date:	29.02.2008
Duration:	36 months
Sector:	Road
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain:	Developing technologies to acquire and predict information on infrastructure conditions and parameters
Website:	http://intro.fehrl.org
Coordinator:	Dr Walivaara Bengt Swedish Road and Transport Research Institute Olaus Magnus väg 35 SE 581 95 Linköping
E-mail:	bengt.walivaara@vti.se
Tel:	+46 (0)13 204208
Fax:	+46 (0)13 141436
Partners:	I.S.I.S Ingénierie des Systèmes d'Information et de Sécurité S.A. FR Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.m.b.H. AT TRL Limited UK Laboratoire des voies de circulation; Ecole polytechnique fédérale de Lausanne CH Forum of European National Highway Research laboratories BE Rigobert Opitz Consulting & Engineering DE TSS-Transport Simulation Systems S.L. ES Institut national de Recherche sur les Transports et leurs Securite FR PRISMA solutions EDV-Dienstleistungen GmbH AT

MISS

Monitor Integrated Safety System

MISS aims to develop an innovative platform to dynamically sense and predict natural and infrastructure conditions. This project wants to increase the safety of both citizens and operators by enabling a just-in-time intelligent computation of an open dynamic road surveillance network.

Background

The MISS project aims at fulfilling an objective of the Sustainable Surface Transport Priority – “Objective 4: Increasing road, rail and waterborne safety and avoiding traffic congestion”. More specifically it focuses on the Road Safety Strategies issue. Currently, more than 40 000 people are killed every year on EU roads and under 1 000 in other modes of transport. The short-term strategic objective of the Community is to halve the number of fatalities by 2010. The medium-term objective for MISS is to cut the number of persons killed or severely injured by around 50% by 2010. To be effective, road safety policy and the supporting research must target the human, the vehicle and the infrastructure environment. In addition, the interaction between these elements must be considered, as well as the acceptability and cost-effectiveness of the proposed measures in a wider socio-economic context. Research should devise the economic mechanisms necessary to reward the introduction of advanced technologies with a view to their overall safety benefits, instead of the defensive approach taken today to avert possible liability risks.

Objectives

The main objective of the MISS project is building a Unified Operative Centre (UOC), aimed at improving vehicle safety and mobility. This Unified Operative Centre has to support and integrate the activities of different structures at provincial level. It will manage the road monitoring activity of these organisations: the urban police, the civil protection and the road services. We estimate that each entity will improve its efficiency, starting from these operational points:

- defining some guidelines to coordinate the institutional working activities
- integrating the communication and effort among the operators and vehicles of the three entities.

By building on these points within the UOC we will:

- tie together the three entities, improving their administrative and operational processes
- guarantee efficiency and effectiveness when managing events
- satisfy the optimisation needs of resources on the ground and inside the operative centre
- extend the road safety among citizens and throughout the area.

The UOC will support the operational, planning and policy decisions to extend road knowledge, using information technology tools to store and extract all the information needed. It will also support the prevention and forewarnings of the events, analysing all the basic aspects.



Description of work

The MISS project is being developed along two main parallel but co-related lines:

- establishing and demonstrating an innovative and co-operative platform aimed at controlling road infrastructures and transport operations
- setting the basis for effective demonstration and exploitation.

Work Package (WP) 2 will fully identify the user requirements and the potential service scenario provided by test users with the support of UNIUD, CERTH, AUTH, CTL and CRF.

WP3 and WP4 are cascaded work packages aiming at establishing the system infrastructure design and develop the components and the services needed to improve the efficiency of transport operations.

In WP5, the user feedback, gained from collecting extensive data, will be mastered by the coordinator (PROBO). Meanwhile the validation outcome will be gathered and analysed by the other two public partners (SAAR and BVG together with BLIC), so that value and strength are added to the efficiency of our adopted solution.

In WP6, industrial exploitation will play a role in selecting the market and the appropriate distribution channels. The legal framework will play a fundamental role for the exploitation stages later on.

WP7 will include participating in public events, taking input from the results of WP5 and WP6. For details, please refer to the dissemination plan. It will be mainly managed by SRM, COI and CTL.

Results

The Monitor Integrated Safety System (MISS) is an integrated platform of sensing, communication, and algorithmic designs that can collect, process and disseminate information on roadway hazards. Specifically, the MISS platform will consist of:

1. Innovative onboard vehicle-based detection kit (MSCU).
2. Existing communication technologies (via a GPRS or TETRA network) to transmit the detected information to a UOC; the same network will be used by the vehicles to receive information.
3. A geo-reference database to store this information as raw data on a geo-coded network.
4. Advanced algorithms to fuse the detected real-time data gathered by several organisations with static infrastructure and historical traffic and control information, In addition, dynamic route planning algorithms will be developed specifically for emergency vehicles (police, fire department, emergency medical services, hazardous materials response, towing services, etc.) to and/or from the scene of an incident.
5. Intelligent communication schemes to allow targeted information dissemination to clerical staff and drivers, based on their location and projected route (they will be informed if they are likely to use the problematic area), thus avoiding problems with information overloading.

Acronym:	MISS	
Name of proposal:	Monitor Integrated Safety System	
Contract number:	TST4-CT-2004-516235	
Instrument:	STP	
Total cost:	2,989,046 €	
EU contribution:	1,499,977 €	
Call:	FP6-2003-Transport 3	
Starting date:	01.01.2005	
Ending date:	31.12.2006	
Duration:	24 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing technologies to acquire and predict information on infrastructure conditions and parameters	
Website:	http://www.missproject.net	
Coordinator:	Dr Luminasi Pietro Province of Bologna Via Malvasia, 4 IT 40131 Bologna	
E-mail:	pietro.luminasi@nts.provincia.bologna.it	
Tel:	+39 0516598231	
Fax:	+39 0516598693	
Partners:	M-SYSTEMS Flash Disk Pioneers	IL
	REGULUS	IT
	Centre for Research and Technology Hellas/Hellenic Institute of Transport	GR
	SINTRA S.p.A	IT
	C.R.F. Società Consortile per Azioni	IT
	University of Udine	IT
	Landeshauptstadt saarbruecken IKS	DE
	Aristotle University of Thessaloniki	GR
	BVG - Berliner Verkehrsbetriebe	DE
	stowarzyszenie Miasta w Internecie	PL
	SRM - Reti e Mobilità SpA	IT
	KM & AZ Cyprus Transport Logistics Ltd	CY



REACT

Realising Enhanced Safety and Efficiency in European Road Transport

The REACT project represents a breakthrough towards the long-term vision of significantly reducing traffic deaths and improving the transport infrastructure's efficiency. REACT will sense natural and infrastructure conditions within and near each equipped vehicle. By using mobile vehicle sensors, REACT will ultimately cover all roads, and not just interurban routes where existing traffic management systems tend to be located.

Background

Transport by road is considered the most dangerous and costly of all modes of transport, in terms of human lives. Approximately 49 000 people die every year on the roads of European Union countries.

Moreover, the different growth speed of European cars and trucks compared to road infrastructure development (nearly always insufficient and inadequate), and the increasing need for passenger and freight mobility, result in a complex traffic congestion problem, more pronounced in high population areas. The efficiency decrease produced by road transportation congestion represents 11 billion hours of delay for European Union motorists.

Today, some urban and interurban areas have traffic management and advice systems that collect data from stationary sensors, analyse them, and post notices about road conditions ahead with recommended speed limits on display signs located at various points along specific routes. However, many other urban and interurban areas do not have such traffic management systems, and they are virtually non-existent on rural routes. With rural road crashes accounting for more than 60% of all road fatalities in OECD (Organisation for Economic Co-operation and Development) countries, the need for a system that can cover rural roads is compelling if a significant reduction in traffic deaths is to be achievable.

Objectives

REACT will equip vehicles with sensors to give information on natural and infrastructure conditions. 'Natural' refers to weather and atmospheric conditions affecting travel, and can include the natural condition of the driver. 'Infrastructure' conditions refer to vehicle speed, road congestion, road surface condition, etc. The goal is to monitor natural and infrastructure condition variables that are believed or statistically proven to influence safety and efficiency. By using mobile rather than stationary sensors, the information can be collected for all relevant routes, subject to the capacity of the communications system – and not just those where the stationary sensors happen to be located. Also, while the stationary sensors now measure traffic conditions, REACT's mobile sensors would include important natural and infrastructure conditions that are clearly quite influential on safety: visibility, road friction, traffic flow and vehicle speed. Over time, other natural conditions such as temperature and precipitation, and other driver measures, such as unusual steering wheel movements, could be added.

The analysis of the traffic conditions and safety risks of different routes can only be done in a central server that collects and analyses data coming from a large number of geographically distributed vehicles.

Description of work

REACT has key advantages over current systems:

- it has mobile rather than stationary sensors, which cover all routes where vehicles travel
- it measures relevant natural as well as infrastructure conditions
- it gives customised, model-based recommendations transmitted to individual vehicles.

Where a regional traffic management system is operating, REACT will be coordinated with the regional system and come under its control. On rural roads and other routes where a regional traffic management system is not present, REACT's central server will control messages sent to individual vehicles.

Improvements will address a number of indicators, the most important of which will be related to traffic safety and efficiency. With regard to safety, it is well known that the number of accidents cannot deliver statistically significant results if demonstrations are planned to run for a few months only. This difficulty will be circumvented via the intended development of risk indicators and models that may be fed with real traffic data. The risk indicators measure the likelihood of an incident occurrence and they may therefore be used as a quantitative measure of success, even without actual accident occurrence. Targeted measurable improvements with regard to risk indicators will be defined during the project's lifetime, after the development and validation of such indicators.

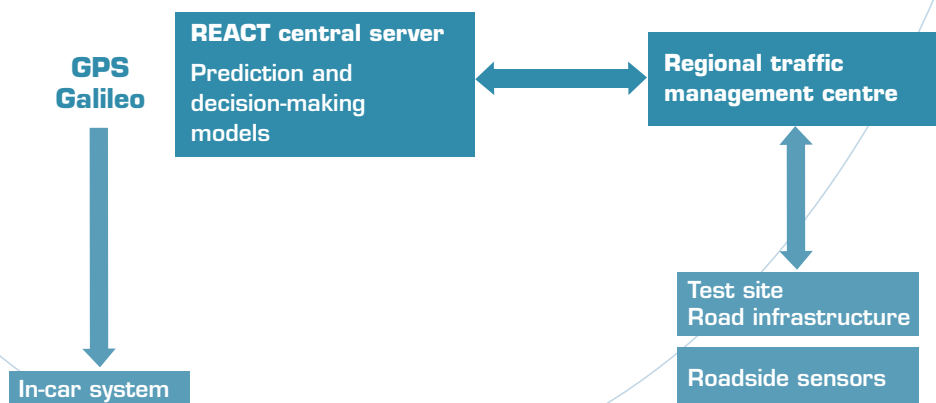
Results

By acting on the key elements of the safety and efficiency architecture, REACT will be suitably positioned to respond to the ambitious European Commission objectives:

- **Vehicle:** REACT will improve vehicle safety through the development, installation and integration of advanced devices in the vehicle such as visibility sensors, road friction sensors, traffic sensors and speed information.
- **Driver:** REACT will act on driver behaviour by displaying secure and personalised human machine interface (HMI) alerts concerning safety (risk of black ice, speed warnings, etc) and efficiency (route and traffic condition messages).
- **Infrastructures:** REACT's central server will merge infrastructure sensor information to monitor and enhance road safety and congestion information to be delivered to drivers when available.
- **Public Administration:** it is the basic pillar to impulse the system (by regulation, funding, bring interests together, etc.).

The REACT project has the potential of reducing traffic fatalities, increasing road transport efficiency, and contributing to greater standardisation and harmonisation throughout Europe with:

- **economic and societal impact:** reducing traffic fatalities, improving transportation efficiency, etc.
- **technological impact:** integrating mobile sensors with a central analytic and decision-making system, and utilising effective communications.





Acronym:	REACT
Name of proposal:	Realising Enhanced Safety and Efficiency in European Road Transport
Contract number:	TST4-CT-2005-516233
Instrument:	STP
Total cost:	3,675,513 €
EU contribution:	1,999,955 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2005
Ending date:	31.12.2006
Duration:	24 months
Sector:	Road
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain:	Developing technologies to acquire and predict information on infrastructure conditions and parameters
Website:	http://www.react-project.org
Coordinator:	Dr Gabay Chanan Motorola Israel Ltd. 3 Kremenetski St IL 67899 Tel Aviv
E-mail:	chgabay@motorola.com
Tel:	+972 (0)35684988
Fax:	+972 (0)35659915
Partners:	ARTTIC Israel - Halevi Dweck & Co TRANSVER GmbH Technical University of Munich - Chair of Traffic Engineering INRIA - Institut National de Recherche en Informatique et en Automatique Association pour la Recherche et le Développement des Méthodes et Processus Industriels Netherlands Organisation for Applied Scientific Research (TNO) DMR Consulting (Estrategia y Tecnologías de la Información), S.L Intempora S.A. Autobahndirektion Südbayern

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APROSYS

Advanced Protection Systems

The general objective of APROSYS is the development and introduction of critical technologies that will improve passive safety for all European road users in all relevant accident types and severities.

Background

The European Union is the largest car producing area in the world and has the largest car market. Research and technological development (R&TD) is essential for improving the impact motor vehicles have on our society and safety is one of the key issues in this respect. In the European Union, there are more than 40 000 reported deaths and 1.3 millions casualties as a result of road traffic accidents each year. The annual costs to the European Society due to these accidents are more than € 160 billion, which is twice the entire budget of the European Union. Significant growth in the demand for transport of people and goods is foreseen for the next decade: compared to 1998, experts predict that there will be an increase in passenger kilometres of 24% and in the transport of goods of 38% in the European Union by 2010.

The risk of being fatally injured varies significantly per road-user class. For car occupants, this is 0.8 fatalities per 100 million kms travelled, for pedestrians and cyclists about nine times higher (respectively 7.5 and 6.3 fatalities per 100 million kms) and for motorcyclists even 20 times higher.

More detailed accident data indicate that within the above classes of road users the following accident types are of particular importance (with the highest injury reduction potential):

- Car-to-car front and side impacts, including impacts with infrastructure (taking into account compatibility issues)
- Cars to trucks
- Pedestrians and cyclists impacted by the front of a car
- Pedestrian and cyclists impacted by trucks
- Motor cycle accidents with cars and with infrastructure.

Objectives

- Development of new injury criteria and injury tolerance values for injuries with high societal relevance, including head and lower leg injuries, and injuries to children and the elderly.
- Development of new mathematical models of the human body for both the crash and pre-crash phase accounting for arbitrary body sizes.
- Development of a new worldwide-harmonised, mechanical model of the human body or crash dummy for representation of a small female car occupant in side impact collisions (prototype).
- Development of knowledge and tools enabling the design, implementation and evaluation of intelligent safety systems, with special emphasis on new sensor and actuator technologies, and generic test methods for the evaluation of pre-crash sensing-based systems.
- Enhancement of virtual testing (numerical simulation) technology for the design and evaluation of crash protection methods with special emphasis on reliability, efficiency, representation of real world accident conditions and implementation in a regulatory environment.

- Development and validation of evaluation methods and development of advanced protection systems for injury reduction of pedestrians and bicyclists impacted by the front of passenger cars, with special emphasis on injuries to children and the elderly. Both the primary impact and the secondary impact will be studied.
- Development and validation of evaluation methods and development of advanced protection systems, including compatibility strategies for injury reduction of car occupants for the most relevant car-to-car accident types, those of front and side impacts.
- Development and validation of evaluation methods and the development of advanced protection systems for injury reduction in the most relevant type of accidents involving heavy trucks: 1) accidents involving vulnerable road users and 2) passenger cars striking the side of a truck.
- Development and validation of evaluation methods and advanced protection systems for the reduction of the number and the severity of injuries to motor cyclists (test procedure for motorcycles against road infrastructure).

Description of work

To reach the general objective, the Integrated Project (IP) partners clearly realise that not all the possible and required work can be performed within this project. Therefore the emphasis is placed on the issues with the greatest fatalities/injuries reduction potential, as well as on issues not tackled by previous, current or already planned research activities.

Four sub-projects are related to accident scenarios, e.g. cars, trucks, pedestrians and cyclists, and motorcyclists. Four other sub-projects are related to technologies, e.g. biomechanics, advanced safety systems, virtual testing and accident analysis.

Results

The benefit of the results or the research carried out in APROSYS will only become visible to a small extent before 2010. Much more will be introduced after 2010 and this is due to 1) the pre-competitive nature of the research proposed here and 2) the long lead-time which is typical for the introduction of new systems in the automotive market. Accordingly, the impact of this IP can be largely expected in the period after 2010. Forecasting the contribution of this RTD project to the casualty reduction in a period ten years ahead is a rather difficult and imprecise process. Estimates provided in the APROSYS proposal on a sub-project level, as well as data on the effect of passive safety measures realised in the past, led to the following figures: at least a reduction of 1 000 fatalities per year in the period 2010-2020 and at least a ten-times higher contribution to a reduction in other casualties. The largest effects are predicted for frontal impacts, namely a 50% fatality reduction due to new passive safety measures. This is due to, among others, to compatibility measures and the large-scale introduction of intelligent safety systems. For side impacts, a fatality reduction due to passive safety measures of 40% is predicted and for motorcycles and pedestrians, 25% and 30% respectively.

Keywords: Passive safety, side impacts, impact biomechanics, intelligent safety systems, accident analysis



Acronym:	APROSYS	
Name of proposal:	Advanced Protection Systems	
Contract number:	TIP3-CT-2004-506503	
Instrument:	IP	
Total cost:	29,791,236 €	
EU contribution:	18,000,000 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.04.2004	
Ending date:	31.03.2009	
Duration:	60 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing integrated safety systems (preventive, active and passive)	
Website:	http://www.aprosys.com	
Coordinator:	Mr. Kellendonk Gijs	
	Netherlands Organisation for Applied Research - TNO	
	Schoemakerstraat 97	
	P.O. Box 6033	
	NL 2600 JA Delft	
E-mail:	gijs.kellendonk@tno.nl	
Tel:	+31 (0)15 269 7263	
Fax:	+31 (0)15 262 4321	
Partners:	MECALOG SARL	FR
	TU-Graz	AT
	Bolton Institute of Higher Education	UK
	SKODA VYZKUM s.r.o.	CZ
	University of Birmingham	UK
	DAINESE S.p.A.	IT
	Università degli Studi di Firenze	IT
	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.	DE
	Ludwig-Maximilians-Universität München	DE
	Siemens Restraint Systems GmbH	UK
	TRL Limited	UK
	DEKRA Automobil GmbH	DE
	Institut für Kraftfahrzeugwesen Aachen	DE
	Universite Louis Pasteur Strasbourg	FR
	DaimlerChrysler AG	DE
	Toyota Motor Engineering & Manufacturing Europe	UK
	Instituto Superior Técnico	PT
	Institute of Fundamental Technological Research, Polish Academy of Sciences	PL
	Siemens AG	DE
	Faurecia Sièges d'Automobile S.A.	FR
	Warsaw University of Technology (Politechnika Warszawska)	PL
	C.R.F. Centro Ricerche FIAT	IT
	Takata-Petri AG	DE
	CIDAUT - Fundación para la Investigación y Desarrollo en Automoción	ES
	Cranfield Impact Centre Ltd	UK
	Politecnico di Torino	IT
	Volkswagen AG	DE
	FIAT AUTO Spa	IT
	Universidad Politécnica de Madrid	ES
	IDIADA Automotive Technology SA	ES
	BAST - Bundesanstalt fuer Strassenwesen	DE
	Saint-Gobain Sekurit Deutschland	DE
	Cellbond Composites Ltd	UK
	Chalmers University of Technology	SE
	Concept Technologie GmbH	DE
	Federation of European Motorcyclists' Associations	FR
	Institut national de Recherche sur les Transports et leurs Securite	FR
	ESI Software	FR
	FTSS Europe B.V.	NL
	Partnership for Dummy Technology and Biomechanics	DE
	PSA - Peugeot Citroën Automobiles	FR
	REGIENOV (Renault Recherche Innovation)	FR
	Technische Universiteit Eindhoven	NL
	Schmitz-Cargobull	DE
	Piaggio	IT
	University of West Bohemia	CZ
	NISSAN Technical Centre Europe	UK
	GdV Gesamtverband der Deutschen Versicherungswirtschaft	DE



APSN

Network of Excellence on Advanced Passive Safety

Following the mobilisation of critical R&D mass on vehicle passive safety in EU Thematic Network projects like PSN & EVPSN2, APSN is aiming at a durable integrated European vehicle passive safety research and implementation programme, and the creation of a virtual institute (VI).

Background

The growing demand for greater mobility in European society has made transportation an essential feature of modern living. However, the price paid for mobility in European society is far too high. Though the number of road accidents dropped significantly at the beginning of the 1990s, the trend has been less marked in recent years. In 2000, road accidents killed over 40 000 people in the EU and injured more than 1.7 million. The directly measurable cost of road accidents is in the order of € 45 billion.

The European Commission advocates a cost-benefit approach in the formulation of future road safety policy: there is economic justification for taking measures valued up to € 1 million in order to save one single life. The White Paper European transport policy for 2010: time to decide calls for a reduction by half in the numbers of deaths on the road in this decade. This reduction can be reached through vigorous research actions to reach socio-economic improvements, among others a European network of excellence on passive safety of vehicles and road infrastructure.

Another important objective is the strengthening of the European automotive industry competitiveness for the future. The integration of knowledge and resources to design and build cost-effective and safer vehicles will contribute to this goal.

Objectives

The aim of this Network of Excellence (NoE) is to mobilise the European scientific and business expertise in vehicle passive safety to accelerate improvements in road safety in order to reduce the annual road victims in the European Union. The specific objectives of this NoE are:

- to create a permanent organisation (virtual centre of excellence) in the field of passive safety
- to further integrate research activities at European, national and regional level
- to facilitate technology transfer in order to accelerate the dissemination of ongoing research activities
- to provide a platform for 'knowledge brokering' where users and providers are brought together for knowledge transfer
- to cluster Community funded and nationally funded projects in the field of passive safety
- to establish links with initiatives in neighbouring fields of interest like active vehicle safety, road infrastructure, railway safety and aircraft safety
- to identify 'white spots' and initiate new RTD projects in the areas of restraint systems, materials, biomechanics and computer simulation
- to provide a platform for promoting the interests of the vehicle passive safety community with policy-makers and (inter)national legislative bodies
- to accelerate the dissemination of results of passive safety research, as well as the implementation and harmonisation of new and proven passive safety measures throughout Europe.

Description of work

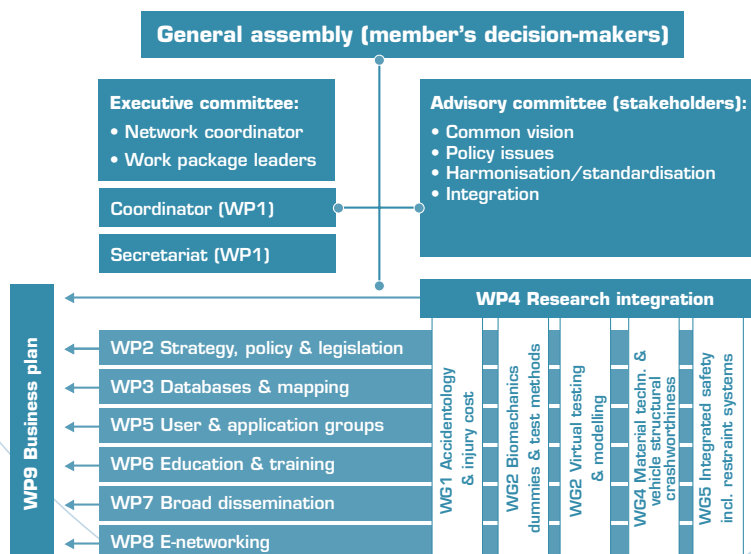
The focus of the APSN activities will be on those topics that will contribute to a progressive and durable integration. In particular:

- develop and start a coordinated programme for the sharing of facilities and setting-up common research guidelines
- analyse the financial, legal (including Intellectual Property Rights) and organisational issues regarding the set-up of an association or other type of legal entity, and formalise the collaboration
- develop and start a coordinated programme for new knowledge generation and sharing
- develop and start a clustered joint research agenda related to road (vehicles) (passive) safety in consultation and collaboration with other stakeholders in the field
- develop and start a coordinated programme for the exchange and training of researchers
- develop and demonstrate the new APSN/VI website portal, hosting the (completed) APSN databases, the encyclopaedia and other functionalities.

Results

The results of the NoE will include:

- Advanced Passive Safety Network website and portal
- shared virtual testing capabilities
- inventory of training courses and existing exchange programmes
- programme for the exchange and training of researchers/students
- clustered joint research programme
- bi-monthly electronic bulletins with information on calls, proposed consortia, kick-off meetings, state of proposals, etc.
- a durable structure to find and analyse technology trends and market needs
- a structure to publish the results (e.g. commercial workshops)
- possible establishment of the VI organisation/legal entity
- research criteria and legal/financial/organisational guidelines for sharing facilities/tools
- a permanent structure for setting-up and updating guidelines for biomechanical testing, including ethical issues.



NoE APSN Structure



Acronym: APSN
Name of proposal: Network of Excellence on Advanced Passive Safety
Contract number: TNE3-CT-2003-506257
Instrument: NoE
Total cost: 3,800,000 €
EU contribution: 3,800,000 €
Call: FP6-2002-Transport 1
Starting date: 01.04.2004
Ending date: 31.03.2008
Duration: 48 months
Sector: Road
Objective: Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain: Developing integrated safety systems (preventive, active and passive)
Website: <http://www.passivesafety.com>
Coordinator: Mr Wismans Jac
 Netherlands Organisation for Applied Research (TNO)
 Schoemakerstraat 97
 Postbus 6033
 NL 2600 JA Delft
E-mail: jac.wismans@tno.nl
Tel: + 31 (0)15 269 6685
Fax: + 31 (0)15 262 4321
Partners: Autokut
 University of Birmingham
 Bolton Institute of Higher Education
 CAD-FEM GmbH
 Cellbond Composites Ltd
 Chalmers University of Technology
 Cranfield Impact Centre Ltd
 Fundación para la Investigación y Desarrollo en Automoción (Cidaut)
 Concept Technologie GmbH
 C.R.F. Società Consortile per Azioni
 Centro Sviluppo Materiali SpA
 Czech Technical University
 DaimlerChrysler AG
 Dekla pscl
 ESI Software
 Swiss Federal Institute of Technology (ETH) and University of Zurich
 Faurecia Sièges d'Automobile S.A.
 Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
 German Insurance Institute for Traffic Engineering (GDV)
 GESAC Inc. (European Operations)
 Hebrew University of Jerusalem
 Imperial College of Science, Technology and Medicine
 IDIADA Automotive Technology
 IKA/RWTH
 Institut national de Recherche sur les Transports et leurs Securite
 Universidad Politecnica de Madrid
 Instituto Superior Técnico
 Johnson Controls ASG
 LAB PSA Renault
 LMS International N.V.
 Ludwig-Maximilians-Universität München
 MECALOG SARL
 National University of Ireland - Dublin
 University of West Bohemia
 National Technical University of Athens
 Przemyslowy Instytut Motoryzacji (Automotive Industry Institute)
 Politecnico di Milano
 SKODA VYZKUM s.r.o.
 TOFAS Türk Otomobil Fabrikasi A.S.
 TRL Limited
 Technische Universität Berlin
 Technische Universiteit Eindhoven
 TU-Graz, Institut f. Mechanik u. Getriebelehre
 Université Louis Pasteur Strasbourg
 Uniresearch BV
 Università degli Studi di Firenze
 Institute of Forestic Engineering, University of Zilina
 Loughborough University Vehicle Safety Research Centre
 Volkswagen AG
 Politechnika Warszawska (Warsaw University of Technology)
 Grupo Antolin
 Enginsoft
 FTSS
 Dalphimetal
 IDMEC

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PISa

Powered Two-wheeler Integrated Safety

The aim of this project is to develop and use new technologies to provide integrated safety systems for a range of powered two-wheelers, which will greatly improve primary safety. PISa will contribute to the general EU target of 50% reduction in road accident fatalities.

Background

Currently, almost 40 000 people are killed every year on EU roads. About 6 500 of them are drivers and passengers of powered two-wheelers (PTWs) (i.e. motorcycles and mopeds). Motorcycle or moped travel carries a risk of death per kilometre travelled that is 20 times higher than that for car travel. PTW accidents now represent a major subject for road safety in Europe. The safety of vulnerable road users, including motorcycle and moped riders, is one of the priorities of the European Community.

Developing countries have a much lower level of motorisation and the road usage pattern is significantly different from those of developed ones. The proportion of PTWs in these countries is extremely high and the traffic usage patterns are very complex. In India, for instance, PTWs account for about 80% of the domestic automotive sales. This means that these countries are exposed to a much higher level of road accident risk. Typically about 39% of the annual 336 000 road traffic deaths in South East Asia are PTW users. India's automotive policy (2002-2010) has given a major thrust to improving the road infrastructure, which is abysmally poor in comparison to the growth of traffic (7-10% per annum). While this will largely help in decongesting the roads and reducing the probability of accident occurrence, the motor vehicle rules are being continuously improved to enhance the design of vehicles for safety.

Objectives

The objective for the PISa project is to combine sensors and actuators to:

- a. avoid 50% of accidents where a collision was not inevitable
- b. reduce the impact speed, and hence reduce the injury severity by one MAIS integer for 50% of accidents where a collision was unavoidable
- c. prevent 50% of the single vehicle loss-of-control accidents.

The PISa main scientific and technical objective can be summarised by:

1. Identify the most frequent causes – precipitating factors and contributory factors – of PTW accidents and how the rider interacted with the PTW during the pre-crash phase
2. Examine rider and PTW interaction when riding along known accident sites
3. Assess and measure rider behaviour in dangerous manoeuvres identified from the accident analysis and instrumented PTW by using computer models
4. Assess and measure the PTW behaviour and response in dangerous manoeuvres, identify potential areas for improvement by use of triggered control mechanisms on, for instance, the suspension, brakes, steering



5. Identify existing technologies and assess their usability in PTWs.
6. Develop a PTW safety system that integrates sensors, warning devices, and actuators that will reduce the incidence and severity of PTW accidents
7. Assess the costs of the PTW safety system and the benefits in terms of reduction in accidents and injuries
8. Fit the prototype integrated safety system to at least two PTWs and evaluate them on a test track and road using different riders
9. Invite various dignitaries to observe the behaviour and hence the benefits of the integrated system during track and road tests.

Description of work

The PISa project will develop advanced integrated safety systems similar to those fitted to cars. It will comprise sensors to detect a potential emergency, an advanced braking and suspension system that will respond to inputs from the sensors and warning devices to assist the rider. The system will take human reactions to information, warning and support systems into account. The (pre-crash) sensors could be linked to a black box that fires an airbag or other passive safety devices when the system has decided that crash avoidance is not possible, thus creating a genuine integrated safety system.

Specific sensors and actuators integrated into an operational safety system for PTWs will be developed to allow for driver warning and assistance; improving braking and stability is innovative and beyond the current state of the art. The aim is for the system to reduce the incidence and severity of up to 50% of PTW accidents.

Results

PISa will produce 36 deliverables. Of these the most important are:

- a report summarising the accident scenarios and causations in which integrated safety systems are considered likely to make a positive contribution from the statistical accident data
- estimate of the impact of integrated safety devices on the fatalities/injuries
- integrated system – sensors (including a configuration suitable for the motorcycle state observer), logic control, warning devices, intelligent brake and suspension component for motorcycle(s)
- evaluation of collision mitigation and avoidance strategies
- prototypes of the selected safety devices and laboratory test results
- a motorcycle fitted with a second phase prototype system(s) that can be used to demonstrate the performance and benefit.

PISa will decrease the number of PTW accidents and their consequences, thus reducing the societal cost, including medical costs.

Forecasting the contribution of PISa to the casualty reduction in a period ten years ahead is a rather difficult and imprecise process. In the APSN Roadmap of future Automotive passive safety technology development, 2004, a reduction of 25% in motorcycle fatalities by 2030 due to passive safety measures alone is predicted. A higher percentage is expected for PISa based on the integrated approach, i.e. avoidance in 50% of accidents where a collision was not inevitable, reduction in impact speed and preventing 50% of the single vehicle loss-of-control accidents.

Keywords: Powered two-wheeler (PTW), integrated safety, passive safety, accidentology analysis, safety devices

Acronym:	PISa	
Name of proposal:	Powered Two-wheeler Integrated Safety	
Contract number:	TST5-CT-2006-031360	
Instrument:	STP	
Total cost:	2,943,730 €	
EU contribution:	1,850,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.06.2006	
Ending date:	30.11.2009	
Duration:	42 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing integrated safety systems (preventive, active and passive)	
Website:	http://www.pisa-project.eu	
Coordinator:	Mr Hoogvelt Boudewijn Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek Schoemakerstraat 97 Steenovenweg 1 NL 2600 JA Delft	
E-mail:	boudewijn.hoogvelt@tno.nl	
Tel:	+31 (0)15 269 6411	
Fax:	+31 (0)15 262 4321	
Partners:	Universita degli Studi di Firenze	IT
	Loughborough University	UK
	Ludwig-Maximilians-Universität München	DE
	TRL Limited	UK
	IBEO Automobile Sensor GmbH	DE
	PAIOLI MECCANICA S.P.A.	IT
	Malaguti S.p.A.	IT
	TVS Motor Company Ltd	IN
	Uniresearch BV	NL

SAFEDMI

Safe Driver Machine Interface (DMI) for ERTMS automatic train control

SAFEDMI's objective is to design and develop an ERTMS-compliant safe (at least SIL2) driver machine interface with safe wireless communication interfaces for configuration, software and firmware downloading and diagnostic purposes to respond to the increasing safety level needs in the automatic train control systems of high-speed rail lines.

Background

The railway's automatic train control (ATC) systems are based on both trackside and onboard systems. The increasing level of train traffic and the spread of high-speed rail lines are now demanding an increasing safety level in the ATC systems. In order to ensure compatibility and interoperability between the ATC systems produced in Europe, the European Rail Traffic Management System (ERTMS) programme has been set up to provide unique functional and non-functional standard requirements.

The ERTMS architecture for the onboard ATC encompasses a driver machine interface (DMI) component whose functions and ergonomic requirements are defined so as to satisfy all the CENELEC (European Committee for Electrotechnical Standardisation) related requirements.

However, such requirements do not yet include safety, despite the fact that the DMI is required to operate (as a slave) in quite critical contexts. In fact many railway operators are starting to require DMIs from their providers which satisfy the high requirement of being a safe man-machine interface (MMI), reaching at least SIL2 (safety integrity level 2) according to the CENELEC specifications.

The safety requirement has come about by the increased complexity of ATC onboard systems generated by ever-higher demanding requirements on railway line capacities, exacerbated by the requirement of avoiding possible loss of driver attention caused by the amount of information displayed.

Objectives

The objective of the SAFEDMI project is to design and develop a DMI system that distinguishes itself from other train-borne DMIs currently available on the market by being able to satisfy at least SIL2 (safety integrity level 2) according to the CENELEC specifications (with all the related implications), and to integrate safe wireless communication interfaces for configuration, software and firmware downloading and diagnostic purposes.

The proposed detailed objectives are:

- a. to design and develop a safe DMI integrated with the current onboard ERTMS systems and developed according to the ERTMS interface specifications
- b. to study and develop all the hardware and software solutions to properly address the safety and fault tolerance issues generated by the SIL 2 requirements
- c. to integrate safe wireless communication interfaces in the DMI for configuration, software and firmware downloading and diagnostic purposes
- d. to design and develop a hardware and software tool infrastructure to support automatic test execution, simulating a driver's actions.

The safety issues to be tackled by the SAFEDMI project are related to visualisation, driver input data acquisition, data communication between onboard system components, data processing and wireless communication interface.

Description of work

The work is organised into five technical work packages (WP). Two additional work packages will deal with dissemination and exploitation (WP6) and project management (WP0).

WP1 will investigate the railway scenarios that will serve as a source of requirements for the project, identifying the technical challenges, threats and resilience requirements that will be addressed by the design, evaluation and testing solutions to be developed in the project. It will also assess the risks to be considered to be SIL2 compliant according to CENELEC.

WP2 focuses on the design of hardware and software architectural constructs and fault tolerance mechanisms.

WP3 is aimed at developing safe and non-safe protocols for wireless communication.

WP4 will develop a comprehensive quantitative evaluation methodology encompassing analytical modelling, simulation and experimental techniques, aimed at assessing the dependability and resilience of applications, and a testing framework targeted at the removal of design and malicious faults. The framework will be used to evaluate the technical solutions developed in WP2 and WP3 and analyse their efficiency.

WP5 will build an experimental prototype integrating building blocks from the other work packages, together with a suitable application, to illustrate the feasibility of the technical solutions developed in SAFEDMI and analyse their efficiency using controlled experiments.

Results

SAFEDMI will deliver the following results:

1. the requirements and constraints to be considered to be compliant with SIL2
2. the SAFEDMI architecture, a preliminary hardware and software specification, the selected wireless communication technology, the communication architecture and a preliminary quantitative evaluation methodology
3. the SIL2-compliant final prototype to be evaluated and validated.

SAFEDMI will directly contribute to the CENELEC Technical Body CLC/SC 9XA 'Communication, signalling and processing systems' and in particular to the standardisation activities dealing with 'Railway applications – Communication, signalling and processing systems – European Rail Traffic Management System – Driver-Machine Interface'.

SAFEDMI will also contribute to CENELEC TC9X-WG12 'Electrical and electronic applications for railways', in the Working Group 12 (WG12) dealing with 'Communication means between safety equipment and Man Machine Interface (MMI)'.

Keywords: DMI, ERTMS, SIL2, wireless communications



Acronym: SAFEDMI
Name of proposal: Safe Driver Machine Interface (DMI) for ERTMS automatic train control
Contract number: TST5-CT-2006-031413
Instrument: STP
Total cost: 2,022,666 €
EU contribution: 1,235,000 €
Call: FP6-2005-Transport 4
Starting date: 01.09.2006
Ending date: 31.08.2008
Duration: 24 months
Sector: Rail
Objective: Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain: Developing integrated safety systems (preventive, active and passive)
Website: <http://www.ansaldo-signal.com/>
Coordinator: Mr Sabina Salvatore
Ansaldo Segnalamento Ferroviario S.p.A.
Via Paolo Mantovani 3-5
IT 16151 Genova
E-mail: sabina.salvatore@asf.ansaldo.it
Tel: +39 010 6552585
Fax: +39 010 6552706
Partners: Consiglio Nazionale delle Ricerche - Istituto di Scienza
e Tecnologie dell'Informazione
Budapest University of Technology and Economics
AZD PRAHA s.r.o.
Aalborg University

IT
HU
CZ
DK

SAFEINTERIORS

Train Interior Passive Safety for Europe

Technological advances have led to a decrease in passenger rail fatalities in Europe during the last four decades (Eurostat). With the reduction of risks stemming from active safety and structural crashworthiness, the focus is now on the remaining areas of risk to access any remaining survivability measures.

Background

This new interior passive safety framework will provide a systems approach to drastically reduce injuries and fatalities by combining and exploiting, in a cost-efficient and optimised manner, the already well-matured railway structural crashworthiness (closely linked with primary collision events) with injury biomechanics that are directly associated with secondary collisions.

There is still an ongoing major effort, to identify, formulate and implement proper solutions for safety issues in guided transportation systems. These include in general:

- collision avoidance, where the main objective is to develop active safety systems to prevent the occurrence of accidents
- accident survivability involving passive safety requirements for structural crashworthiness
- vehicle interior solutions that contribute to the reduction of severity in terms of occupant injuries.

Train crash events can be basically divided into two phases:

1. The primary collision, where the initial kinetic energy is progressively dissipated by means of plastic structural deformation. In this phase, occupant compartment integrity and acceptable vehicle acceleration levels (crash pulses) are the most important design requirements to be considered.
2. The secondary collision, where the occupant will be subject to a great variety of potentially harmful occupant/interior or occupant/occupant contacts.

Objectives

SAFEINTERIORS will appraise requirements and validation procedures and propose best practices for future standards, recommendations and regulations to improve the chances of survival in future catastrophic events. At the same time, it will explore the suitability of the proposed interior passive safety methodologies as applied in the retrofitting of existing rail vehicles, thus contributing to speeding up the introduction of improved passive safety levels in the railway sector.

The friendliness of the compartment interior is a major design issue and its treatment will complete the framework of railway passive safety. The purpose of the SAFEINTERIORS project is to provide the different railway stakeholders with a currently missing platform capable of assessing interoperability of all present and future interior rail vehicle layouts. The proposed framework will address design requirements and assess new interior solutions following advanced state-of-art interior designs, representative layouts, a range of suitable crash pulses, and new test and validation procedures suitable to the rail industry. The use of new materials will be fully exploited to improve the occupant/furniture contact characteristics and contribute towards lowering overall vehicle mass levels.



Description of work

The project is broken down into six work packages (WP).

WP1 is dedicated to the project management.

WP2 consists of defining a framework for the development of the rail vehicle interior passive safety, taking into account the advances provided by the recent projects and practices in the railway industry.

WP3 identifies key occupant postures in rail vehicles. From such postures, interior layout of rail vehicle and key types of injury of the rail vehicle occupants seen in the accident data determine trends of occupant kinematics, restraining objects and likely injuries that may be avoided by improved passive safety design.

WP4 is about defining a consistent and realistic set of functional specifications for the development of the advanced rail vehicle interior layouts.

WP5 concerns the identification of most relevant train interior layouts and components regarding potential hazards including their design, testing and concept validation, taking into account the injury assessment of accidents and any potential for improvements with respect train occupant interior safety.

WP6 is devoted to a synthesis effort and the dissemination of the project results throughout the international rail community, through the applicable regulatory and standards agencies within the Member States and at European level.

Results

1. Concept

A systematic statistical treatment of railway accidents and risk assessment including correlations of secondary collision events and corresponding levels of injury in the different body segments. New and relevant injury criteria for rail vehicle occupants based on biomechanical data obtained in more recent research work. There will be new and revised layouts.

2. Design

Establishment of guidelines for best practices in railway interior layouts. Discussing in depth trade-offs between safety requirements, ergonomics and non-safety related functionalities. A systematic approach to PRM issues will be obtained.

New design specifications for interior equipment, furniture and layouts including requirements for PRM with the aim of achieving cost-efficient, friendly interiors.

There will be new lightweight furniture designs with optimum energy absorption characteristics using new materials.

3. Test

New and advanced tests of interior layouts including new furniture and interior elements will be manufactured and physically tested to assess new designs and demonstrate their feasibility. There will be new measuring devices to reproduce the loading on the dummies and on the vehicle interior elements. Bio-fidelity of the devices will be demonstrated.

4. Validation

New test procedures and methods will be carried out, and a full validation programme involving correlation between experimental methods and computer model outputs.

Acronym:	SAFEINTERIORS	
Name of proposal:	Train Interior Passive Safety for Europe	
Contract number:	TST5-CT-2006-031260	
Instrument:	STP	
Total cost:	3,691,051 €	
EU contribution:	1,950,000 €	
Call:	FP6-2005-Transport 4	
Duration:	42 months	
Sector:	Rail	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing integrated safety systems (preventive, active and passive)	
Website:	http://www.eurailsafe.net	
Coordinator:	Dr Roberts John Bombardier Litchurch Lane UK DE24 8AD Derby	
E-mail:	john.roberts@uk.transport.bombardier.com	
Tel:	+44 (0)1332 266056	
Fax:	+44 (0)1332 251840	
Partners:	ALSTOM Transport SA	FR
	ATOC Ltd (Association of Train Operating Companies)	UK
	University of Bolton	UK
	Fundación para la Investigación y Desarrollo en Automoción - Cidault	ES
	Deutsche Bahn AG	DE
	Grupo Antolin FFI	FR
	Institut national de Recherche sur les Transports et leurs Securite - INRETS	FR
	Instituto Superior Técnico	PT
	MIRA Ltd	UK
	Rail Safety & Standards Board	UK
	Saira Alluminio S.p.a.	IT
	Siemens AG Transportation Systems	DE
	Société Nationale des Chemins de Fer Français	FR
	Union of European Railway Industries	BE
	VUKV a.s	CZ

SELCAT

Safer European Level Crossing Appraisal and Technology

SELCAT will perform a deep analysis of completed and existing European level crossing safety research focusing on appraisal, technology and safety evaluation methodology including dissemination actions like workshops, special sessions at conferences, public campaigns and a web portal.

Background

Every year, more than 330 people are killed in more than 1 200 accidents at road-rail level crossings in the European Union. Together with tunnels and specific road black spots, level crossings have been identified as being a particular weak point in road infrastructure, seriously affecting road safety. In the case of railway transport, level crossings can represent as much as 50% of all fatalities caused by railway operations. Until now, the only effective solution appears to involve upgrading level crossing safety systems, even though in more than 90% of cases the primary accident cause is inadequate or improper human behaviour rather than any technical, rail-based issue.

High safety requirements for level crossing safety systems required by European railway sector standards create a high cost base which hinders the technological upgrade of existing systems. Railway standards already include a risk-based definition of safety, according to which only the unacceptable risk must be eliminated by the technical system. Nevertheless, the lack of approved safety methodology, which would allow the industry to quantify the risk to be reduced, still leads to the need for the highest safety integrity levels for technical solutions in most European countries.

To date the fact that level crossings are a factor in only a very small proportion of the total of road accidents has limited the involvement and commitment of the road sector in developing solutions to the problem.

Objectives

SELCAT aims to contribute actively to the reduction of level crossing accidents by:

- collecting, analysing and disseminating existing research results and stimulating new knowledge exchange in the area of level crossing safety
- creating circumstances whereby European partners, in the rail and road sectors, can make a significant contribution to the reduction of accidents, injuries and fatalities at level crossings
- understanding and codifying existing and planned research
- comparing and harmonising data sources
- exploring new technologies and harnessing appraisal techniques to optimise these.

The activities of SELCAT should lead directly to the improvement and expansion of intermodal collaboration between the road and rail sectors.

Addressing safety methods, safety targets and indicators in connection with cost benefit analysis SELCAT will also harmonise with the aims of the European Railway Agency's (ERA) work programme.

The objective of SELCAT is to evaluate the safety performance of European level crossings and to make recommendations on the common safety targets for this particular subsystem of railway transport. In addition, the level crossing as a practical example will be used as a benchmarking exercise for the application of evaluation methodology and can be used as an important contribution to the adoption of Common Safety Methods advised by ERA for the year 2008.

Description of work

In order to reach the above stated scientific and technological objectives, the work plan of SELCAT intends to carry out the following coordination activities:

- Provide a knowledge base for the improvement of the level crossing safety by carrying out an analysis of results of safety-related projects from the Fifth Framework Programme (FP5) and FP6 with regard to railway and road transport
- Provide an overview of existing and planned level crossing research and improvement activities in European countries and in Japan
- Analyse incident and accident data and databases related to level crossings in Europe and Japan
- Propose a standard for reporting level crossing accidents in European countries
- Set up a common level crossing accident information system
- Examine the potential for, and practicability of, existing and new technologies to improve the safety and the performance of level crossing systems
- Investigate the applicability of available risk and cost-benefit analysis methods for the classification of technological solutions for the safer interface of rail and road traffic at level crossings
- Disseminate the results of investigated projects (FP5, FP6, national research) by the organisation of three specific workshops, the organisation of a special session on existing planned conferences and the creation of a thematic level crossing web portal.

Results

The results of SELCAT will be available in the following planned deliverables:

- D1 Report about statistics, database analysis and regulations for level crossing
- D2 Report about examination of actual and potential technologies for level crossings
- D3 Report about risk modelling techniques for level crossing risk and system safety evaluation
- D4 Report on cost benefit analysis methods for level crossings
- D5 Level crossing (LC) web portal structure
- D6 Proceedings of the workshop LC Appraisal
- D7 Proceedings of the workshop LC Technology
- D8 Proceedings of the workshop LC Methodology
- D9 Dissemination campaign for car drivers organised through media of an automobile club
- D10 Progress report
- D12 Level crossing web portal providing:
 - structured access to the FP5 and FP6 results concerning rail and road safety
 - interactive access to level crossing statistics database (population, accidents, types, etc.)
 - structured accessibility of relevant national and international documents and studies (standards, railway guidelines, etc.)
 - all public deliverables of SELCAT (documents, workshop and special session advertisement, etc.)
- D13 Recommendations for FP7 activities
- D14 Recommendations for standardisation
- D15 Final report

Keywords: Level crossing, road transport, railway transport, accident statistics



Acronym:	SELCAT
Name of proposal:	Safer European Level Crossing Appraisal and Technology
Contract number:	TCA5-CT-2006-031487
Instrument:	CA
Total cost:	860.000 €
EU contribution:	860.000 €
Call:	FP6-2005-Transport 4
Duration:	22 months
Sector:	Rail
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion
Research domain:	Developing integrated safety systems (preventive, active and passive)
Website:	http://www.levelcrossing.net
Coordinator:	Prof. Schnieder Eckehard Technische Universität Braunschweig Pockelstrasse 14 Langer Kamp 8 DE 38106 Braunschweig
E-mail:	e.schnieder@tu-bs.de
Tel:	+49 (0)531 391 3317
Fax:	+49 (0)531 391 5197
Partners:	University of Rome University of Zilina University of Birmingham Todor Kableshkov Higher School of Transport Union Internationale des Chemins de Fer ADAC e.V. Institut National de Recherche sur les Transports et leurs Securite Rail Safety & Standards Board Centrum Naukowo-Techniczne Kolejnictwa Deutsches Zentrum für Luft- und Raumfahrt e.V. Technical Research of Finland MULTITEL Network Rail Infrastructure Ltd Deutsche Bahn AG Rete Ferroviaria Italiana S.p.A. National Company Capacity Allocation Office

IT
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SIM

Safety In Motion

SIM project deals with the development of an innovative concept vehicle with new safety devices that will result in a decrease in the number of powered two-wheelers (PTW) accidents and related consequences for riders. An integrated (matrix) approach to solve safety issues for PTWs will be implemented.

Background

Over 6 000 of the 40 000 fatalities on European roads in 2001 were related to powered two-wheelers (PTWs). Compared to the overall number of victims on the roads, this figure represents 15% of this dreadful aspect of our society. The European Commission has launched the third Road Safety Action Plan with the ambitious goal of reducing the fatalities by 50% in 2010. With this goal, the SIM project will play a key role in the reduction of PTW riders' fatalities and injuries by identifying a suitable safety strategy and providing an integral safety solution. According to the matrix relationship between the three main factors or pillars for safety (motorbike, motorcyclist and infrastructure) and the different aspects related to accident dynamics, from the a priori-event to the crash event (dealing with preventive, active and passive safety), the Safety In Motion project focuses on the vehicle safety aspects. These will include the human-machine-interaction through the enhancement of vehicle stability and control (active safety), development of inflatable protections (passive safety) and innovative human-machine-interface (preventive safety). The most relevant element in SIM is the ambitious objective of developing a comprehensive safety strategy for motorcycles, structuring co-operation with existing research projects in order to cover all the different fields of application.

Objectives

The SIM project will focus on active and passive safety aspects, mainly from a PTW point-of-view. Preventive safety will also be covered, especially considering human-vehicle interaction. Focusing on vehicle peculiarities, it should be stressed that riding a PTW is a complex task because the balance conditions can only be obtained in a dynamic way and path change is more complex than for a four-wheeler (by actions involving the whole rider-plus-vehicle system). As PTW riders are one of the most vulnerable road users, the main objectives of SIM are:

- to identify a suitable safety strategy for PTWs
- to enhance preventive and active safety acting on electronic vehicle management and improving human-machine-interaction (HMI)
- to focus on integral passive safety devices.

The objective of active safety devices onboard is to substantially improve each of the elements contributing to vehicle stability and balance in all riding conditions. Even if the main aim of SIM is to avoid accidents, passive safety systems are essential to mitigate consequences in case of inevitable precipitating events. SIM will also implement and evaluate human-machine interaction systems, based on ADAS (advanced driver assistance system) technology.

Preventive, active and passive safety aspects will be integrated into the same prototype in order to develop and validate a comprehensive safety strategy for PTWs.

Description of work

The SIM project consists of six work packages (WP). WP3, 4 and 5 are focused on technological development activities.

WP1 deals with the overall coordination of the project, ensuring the management of the activities dealing with financial and technical administration.

WP2 aims to identify accident scenarios and evaluate technical solutions and potential improvements. Moreover, activities carried out in this WP will be devoted to links and collaboration with other current R&D projects focusing on PTW safety.

The main activities of WP3 are the definition of active and preventive safety, vehicle dynamic systems, electronic control of active system implementation, HMI and comfort, and active and preventive safety systems integration.

The work in WP4 is focused on the development of highly effective passive safety systems for motorcycles that will act if a crash event occurs.

In WP5, the feasibility of integrated safety concepts applied on motorcycles will be established by definition of the technical tests to be run, the technical assessment of the overall integrated system and the HMI strategies, evaluating in terms of potential reduction of accident events and potential mitigation of their consequences.

WP6 is responsible for correct and widespread dissemination of information and results generated with regard to integrated safety on motorcycles.

Results

SIM's aim is the development and implementation of a new concept vehicle that intrinsically enhances PTW safety, merging the handling of classic PTW and the stability of passenger cars, by developing and implementing active, preventive and passive safety devices. The expected results are:

- development of electronic active devices (e.g. enhanced anti-lock braking system, traction control and brake-by-wire) for powered two-wheelers
- development of a passive safety algorithm to activate passive safety devices
- adaptation of protective devices located on the rider (garment) and on the vehicle (inflatable leg protections).

A new generation of the anti-lock braking system is considered, with a better behaviour in cornering and steering, and adaptable on wet road surface conditions. Electronically controlled suspensions for the optimisation of load-shift in acceleration/braking will be implemented, together with a traction control system. A tailor-made integrated passive system for PTWs will be developed and tested with algorithms, sensors and actuators for the activation of the passive system. Protective devices on the rider and on the vehicle will be adapted. Special focus will be devoted to the innovative dashboard designed to optimise the information flow to the rider via the helmet. All the devices and systems will be integrated to generate a prototype as an integral safety solution.

Keywords: Safety, PTW, mobility, accident analysis

SIM	Active	Prevent.	Passive	Post-crash
Motorbike	Suspensions, brakes, ABS, ESP...	HMI, conspicuity, ...	Limbs protection, kinematics, algorithm,...	e-Call
Motorcyclist helmets/clothing	Training and education	HMI, comfort, strap fasten, info exchange, conspicuity...	Helmets & clothing performance ...	
Infrastructure	Maintenance, audits,...	e-Safety	Performance when a motorcyclist impacts	Maintenance, repair,...

Acronym:	SIM	
Name of proposal:	Safety In Motion	
Contract number:	TST5-CT-2006-031348	
Instrument:	STP	
Total cost:	4,036,404 €	
EU contribution:	2,199,939 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.09.2006	
Ending date:	31.08.2009	
Duration:	36 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing integrated safety systems (preventive, active and passive)	
Coordinator:	Dr Santucci Mario Donato Piaggio & C. S.p.a. Viale Rinaldo Piaggio 25 IT 56025 Pontedera	
E-mail:	mario.santucci@piaggio.com	
Tel:	+39 0587272504	
Fax:	+39 0587272827	
Partners:	CIDAUT - Fundación para la Investigación y Desarrollo en Automoción	ES
	Continental Teves AG & Co. oHG	DE
	C.R.F. Centro Ricerche FIAT	IT
	Czech Technical University in Prague, Faculty of Transportation Sciences	CZ
	DALPHI METAL ESPAÑA, S.A.	ES
	DEKRA Automobil GmbH	DE
	Prendas Deportivas NZI S.L.	ES
	Öhlins Racing AB	SE
	Savatech, Industrial Rubber Products and Tyres, d.o.o.	SI
	Department of Mechanical Nuclear and Production Engineering - University of Pisa	IT
	University of West Bohemia	CZ



2TRAIN

Training of Train Drivers in Safety Relevant Issues with Validated and Integrated Computer-based Technology

2TRAIN aims at developing standards for a safety enhancing use of computer-based training technology for European train drivers. A common simulation interface will be developed, as well as several add-on systems, tested with simulation scenarios focusing on the ability to act in hazardous situations.

Background

The European railway sector is a continually growing economic area and recent years have brought significant developments in rail technology. Responding to these tendencies, the EU is aiming at enhancing rail safety as well as improving the harmonisation and interoperability between railway systems. The establishment of safe, competitive and interoperable railways in Europe demands particular attention to the qualification of train drivers. 2TRAIN will particularly focus on the development and evaluation of computer-based training systems. At present 133 000 train drivers are employed in the EU-25. Working directly at the human-machine-interface they are specifically affected by technical developments and the increasing amount of cross-border operations. To strengthen the harmonisation, it is necessary to advance common training technology as well as common training content. Developments concerning these two aspects are the scientific and technological objectives of 2TRAIN as, until now, no broad effort concerning the common training of train drivers in Europe has existed. A complete harmonisation of training technology and training content will be unachievable. Nevertheless there is a strong need to harmonise and coordinate the education of drivers concerning general driving and operational abilities, as well as particular crisis management competencies.

Objectives

2TRAIN aims at developing European standards for the training of train driver competencies providing best-practice guidelines for an efficient, safety enhancing and cost-effective use of the latest computer-based training technologies. The starting point of 2TRAIN is benchmarking the training technology, content and models that are already in use in Europe. To reach a harmonisation of diverse training technologies and to allow a standardised driver evaluation, a common data interface will be developed and implemented into three simulator pilots. In addition, a CBT pilot will be realised. In the second step, common training simulation scenarios and CBT modules will be developed that will particularly focus on the training of crisis management competencies and abilities to act in rarely occurring hazardous situations. The trainees' actual behaviour will be compared to predefined target behaviour. The results will be stored in an assessment database that will be used as a base for the development of a virtual instructor and further add-on systems, e.g. standardised performance evaluation. The quality of 2TRAIN is ensured by a close collaboration between operational railway companies and their partners in the field of R&D, the integration of the newest computer-based training technologies, and the strong support from a user group consisting of further European stakeholders.

Description of work

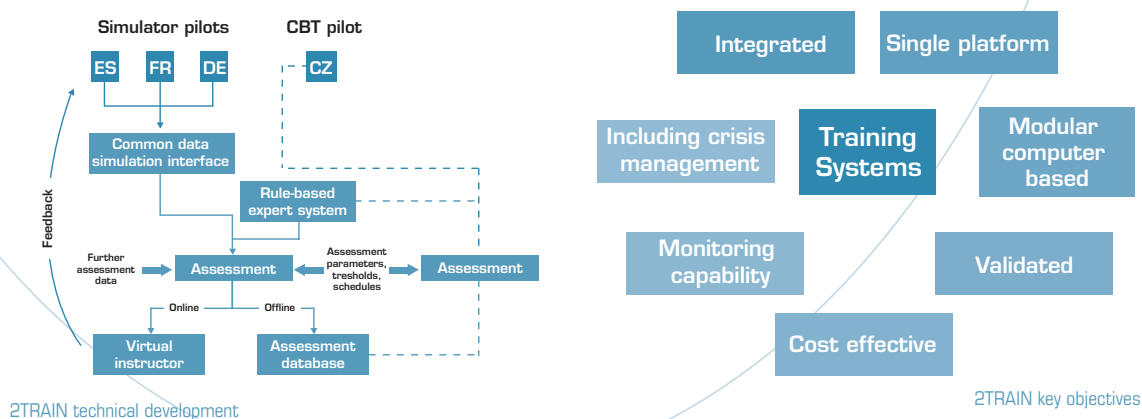
Based on benchmarking results, training technology, content and models will be specified in order to adjust the further project steps. The development and implementation of a common data simulation interface will overcome existing differences in European training technologies and allow for a standardised data recording, driver assessment and evaluation. Three simulator pilots are intended to demonstrate the

technical developments within 2TRAIN as well as their acceptance and resulting learning effects. In addition, a rule-based expert system in national variants will gather the target behaviour of the train driver in different situations. The comparison of target behaviour (expert system) and actual behaviour (simulation data) of the train driver provides the data for both a virtual instructor and an assessment database. The virtual instructor enables an online assessment to give feedback to the trainee on how to improve the driving tasks. In this way the system will also be able to provide adaptive training. In addition, the assessment data will be stored in a database. The stored data will provide the basis for training feedback as well as for recommendations concerning future training arrangements. As a core result of 2TRAIN recommendations, best-practice guidelines concerning the usage of training technology and assessment procedures for train drivers in Europe will be proposed.

Results

The first benchmarking report will include information and conclusions about strengths and weaknesses of each simulator analysed, and a comparison with the standards of training technology. A second report will include information and conclusions about the training contents and training models for each railway operator, and a comparison with the standards of drivers' training. The technical deliverables are a common simulation data interface, a rule-based expert system, a virtual instructor and a database for standardisation. In addition, simulation scenarios, computer-based training modules as well as the description of assessment parameters and thresholds will be compiled. Four pilots are intended for demonstration activities as a combination of existing training tools and enabling technology. At least one pilot should include simulation, CBT and assessment data management. The European railway companies will be provided with guidelines for an efficient, safety enhancing and cost-effective use of modern technologies for the competence training and assessment of train drivers. There will be a close informational exchange with a huge numbers of stakeholders organised in a user group. The exploitable results will be included in an exploitation and business plan, which will highlight the European dimension of the exploitation issues, and define the strategy and methods for a future deployment.

Keywords: Training, railway, technology, simulation





Acronym:	2TRAIN	
Name of proposal:	Training of Train Drivers in Safety Relevant Issues with Validated and Integrated Computer-based Technology	
Contract number:	TST5-CT-2006-031324	
Instrument:	STP	
Total cost:	3,731,742 €	
EU contribution:	2,200,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.10.2006	
Duration:	36 months	
Sector:	Rail	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing computer-based training systems	
Website:	http://www.izvw.de	
Coordinator:	Prof. Krueger Hans-Peter Center for Traffic Sciences at the University of Wuerzburg Roentgenring 11 DE 97070 Wuerzburg	
E-mail:	krueger@psychologie.uni-wuerzburg.de	
Tel:	+49 (0)931 312653	
Fax:	+49 (0)931 312616	
Partners:	Ceské Dráhy a.s. (CD)	CZ
	CORYS Training & Engineering Support Systems S.A. (Corys)	FR
	Deutsche Bahn AG, DB Training (DB)	DE
	Jan Perner Transport Institute (IJP)	DE
	Krauss-Maffei Wegmann GmbH & Co. KG (KMW)	CZ
	Krauss-Maffei Wegmann GmbH & Co. KG (KMW)	DE
	Rail Training International Ltd (RTI)	UK
	SNCF (SNCF)	FR
	Universitaet Passau (UP)	DE
	Universidad Politécnica de Madrid (UPM)	ES

TRAIN-ALL

Integrated System for driver TRaining and Assessment using Interactive education tools and New training curricula for ALL modes of road transport

TRAIN-ALL aims to develop a computer-based training system for the training and assessment of different land-based driver cohorts (motorcycle riders, novices, emergency drivers and truck drivers) that integrates multimedia software, driving simulator, virtual driving simulator and onboard vehicle sensors into a single modular platform.

Background

Over 80% of all traffic accidents can be directly attributed to the human factor so emphasis must be given to driver operator training. Traffic participants range from car and motorcycle to truck drivers and all need to be trained in a specific way. Indicatively:

- novice drivers of passenger cars have no possibility of enhancing risk awareness and need training in other higher order skills
- motorcycle drivers have no experience on using safety equipment and low experience on driving different types of motorcycles
- heavy vehicle drivers get most of their experience on the road and are often involved in specific accident types
- drivers of emergency vehicles only get a few possibilities to practise on the complexities of interaction with other traffic participants.

There is a pan-European consensus on the fact that driver training needs to expand away from its current focus on controlling the vehicle in traffic, so as to cover 'higher level' strategic factors. TRAIN-ALL will improve initial and continuous driving training in order to stimulate road users towards a more responsible behaviour. In this way the project will contribute to the European Road Safety Action Programme's goal of halving the number of road fatalities in 2010.

Objectives

The main objectives are to:

- prioritise a set of training scenarios for each driver type
- develop a common and concise ontological framework for computer-based training (CBT) tools, functionalities and scenarios
- develop a cost-efficient and valid methodology to assess simulator reliability and fidelity
- employ intelligent agent technology in order to develop CBT with Aml-based traffic participants
- develop co-operative training scheme and co-driver training (for emergency vehicle co-pilots) scenarios and tools
- develop the appropriate P2P tools to allow CBT networking and even real-time collaboration
- develop a virtual instructor module that will allow autonomous and cost-effective multi-user training by CBT
- develop and test the method of adaptive training
- develop appropriate training schemes and scenarios for CBT in the use of new driver assistance and information systems
- use an existing motorcycle simulator and adapt it accordingly



- develop cost-effective, high fidelity, low dizziness and modular driving simulator tools for passenger cars and trucks, and a virtual driving simulator for passenger cars
- develop new, improved training and assessment curricula for drivers
- evaluate the viability, usability and usefulness of the developed tools and curricula in ten pilots
- estimate the potential road safety enhancement due to the developed tools and curricula
- produce detailed exploitation and business plans for the developed tools.

Description of work

Work starts with benchmarking and classification activities on CBT tools and curricula for driver training and assessment, to lead to a common CBT and assessment model and prioritisation of training requirements.

The development encompasses building a common system architecture for distributed interoperable driving simulators (ontology-based), and a knowledge management tool to collect and process centrally the trainee performance data from different simulators, as well as a simulator validity assessment methodology.

Enabling technologies will be built, including an ambient intelligence framework, co-operative driving and group training module, an immersive simulation platform for virtual reality (VR)-based training, CBT tools connecting internet network supporting scenario sharing, a virtual instructor and debriefing module, simulation sickness aversion principles and guidelines, enhanced reality and adaptive training module.

The new modules are integrated into different simulator prototypes (motorcycle, passenger car, truck, immersive (VR) simulator and modular/integrated driving simulator).

Developed prototypes will be tested in ten pilots, leading to an impact analysis on the usefulness and value of the use of driving simulators for driver training and assessment.

An information dissemination framework, cost benefit analysis, cost effectiveness analysis and exploitation plans, application guidelines, proposals towards adequate standards, CBT-based training and assessment certification and accreditation schemes complement the work plan.

Results

Key Deliverables:

- D1.1 Benchmarking and classification of CBT tools for driver training
- D1.2 Training needs and scenario definition
- D2.1 Common system architecture for driving simulators based on interoperable federates
- D2.2 Knowledge management tool
- D2.3 Driving simulator functional validity assessment methodology
- D3.1 Ambient intelligence module
- D3.2 Co-driving, co-operative and group training modules
- D3.3 Immersive simulation platform
- D3.4 i3-based tool for networked learning and remote control of simulators
- D3.5 Virtual instructor and debriefing modules
- D3.6 Dynamic scenario management module
- D3.7 ADAS/IVICS simulation module
- D3.10 Enhanced reality module
- D3.11 Module for controlling adaptive training sequences
- D4.1 Adapted motorcycle simulator prototype
- D4.2 Adapted truck simulator prototype
- D4.3 Adapted car simulator prototype for emergency vehicle drivers
- D4.4 Adapted car simulator prototype for novice drivers
- D4.5 Adapted VR simulator prototype
- D4.6 Multi-purpose driving simulator prototype
- D5.3 Proposal for an integrated training curriculum and impact analysis
- D6.2 Demonstration pilot results consolidation
- D7.3 Cost benefit and cost effectiveness analysis
- D7.4 Exploitation and business plans

Keywords: driver training, driver assessment, driving simulator, cooperative driving



The CRF virtual reality driving simulator

Acronym:	TRAIN-ALL	
Name of proposal:	Integrated System for driver TRaining and Assessment using Interactive education tools and New training curricula for ALL modes of road transport	
Contract number:	TST5-CT-2006-031517	
Instrument:	STP	
Total cost:	3,702,408 €	
EU contribution:	2,300,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.11.2006	
Ending date:	31.10.2009	
Duration:	36 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Developing computer-based training systems	
Coordinator:	Ms Panou Maria Centre for Research and Technology - Hellas 6th km. Charilaou-Thermi Road GR 57001 Thermi	
E-mail:	mpanou@certh.gr	
Tel:	+30 (0)210 9853194	
Fax:	+30 (0)210 9853193	
Partners:	TRL Limited	UK
	Universität Stuttgart	DE
	Institute of Communication and Computer Systems	GR
	Netherlands Organisation for Applied Scientific Research (TNO)	NL
	Center for Traffic Sciences at the University of Wuerzburg	DE
	Dr. Ing. Reiner Foerst GmbH	DE
	Green Dino Virtual Realities BV	NL
	Thales Training & Simulation	FR
	Institute for Occupational Physiology at the University of Dortmund	DE
	C.R.F. Centro Ricerche FIAT	IT
	Präsidium der Bayerischen Bereitschaftspolizei	DE
	University of Basel, Department of Psychiatry, Center of Applied Technologies in Neuroscience	CH
	Statens väg- och transportforskningsinstitut	SE
	Universität Passau	DE
	Wuerzburger Institut für Verkehrswissenschaften	DE
	French National Institute for Transport and Safety Research - INRETS	FR



HeavyRoute

Intelligent Route Guidance for Heavy Vehicles

The objective of HeavyRoute is to develop an advanced route guidance system for deriving the safest and most cost-effective routes for road freight transport throughout Europe. The system will take into account road user needs, vehicle operating and environmental costs, but also maintenance costs due to the deterioration of roads and bridges.

Background

The increasing volume of freight transport, together with the increasing gross weights and the changing load configurations of heavy goods vehicles (HGVs), has led to accelerated damage to bridges and pavement fatigue, as well as creating major traffic management problems to maintain safety and reduce congestion. For truck operators, there are the combined challenges of reducing ever-increasing fuel costs, maximising efficiency and profitability whilst maintaining safety.

In 2000, the total volume of road transport in the EU-25 was 1 482 billion tonne-kilometres and this is predicted to grow to more than 3 133 billion tonne-kilometres by 2030 (DG Transport and Energy – Trends to 2030). This will have a significant influence on congestion and damage to the road infrastructure over that period. In addition, freight distribution is predicted to outpace passenger cars as the largest source of CO₂ from transport over the period. Also the fatality risks when trucks are involved in an accident are significantly higher than those compared with passenger cars and other vehicles.

Clearly the growth in the volume of trucks, coupled with the increasing size and weight of trucks on the network, will create special problems. Finding the means to reduce the costs associated with the increasing traffic volumes is therefore a major challenge for the road research community, as well as the road authorities and operators.

Objectives

The overall objectives are to improve road safety and capacity while reducing the negative impacts on the environment and the road and bridge maintenance costs (by reducing the rate of deterioration caused by heavy traffic). The route guidance system aimed for in this project will be built on available and implemented systems, and technologies such as fleet management and logistics systems, guidance/rerouting systems, traffic monitoring and management systems, dynamic map updating and various ITS solutions. The following needs, focusing on different stakeholder and user requirements, will be addressed in HeavyRoute when developing the HGV management and route guidance system:

- Different routing solutions will be developed taking into account HGV constraints of the infrastructure (bridges, tunnels, roads, environmental zones, etc.), deriving 'allowable' routes and thereafter deriving 'recommended' routes based on arguments addressing the road safety, energy, environment, infrastructure costs and tolling.
- An onboard system will support the driver during the journey with relevant local information such as speed limits and overtaking restrictions, as well as relevant changes, i.e. dynamic data on traffic flow, road and bridge conditions, etc. The system will also provide real-time driver warnings and recommended driving to maintain or improve vehicle safety, using vehicle and infrastructure data.
- Real-time data on road, load and journey will be transferred from the onboard system for road, bridge and traffic management.

Description of work

The activities in HeavyRoute will be focused on the following objectives:

System conception and user requirements:

- assessment of state of the art in fleet management and HGV guidance systems/services
- identifying stakeholder and user requirements on an advanced HGV management and route guidance system
- identifying factors that influence the 'route optimisation'
- deriving a system architecture concept.

Databases and vehicle/infrastructure interaction models:

- inventory of available static, periodic and dynamic road, bridge and traffic data in national databases
- inventory of available effect models for deriving the 'optimum' route and reducing impacts on the infrastructures.

Route guidance and driving support:

- design and development of innovative route guidance and driver-support applications for HGVs based on database contents and effect models.

Traffic simulation and effects of management strategies:

- traffic simulation and assessment of possible effects and future scenarios from traffic management solutions implemented on a European scale using route guidance solutions, particularly taking into account critical sections
- simulation of traffic flows due to different management strategies using economical incentives and legislative means.

Dissemination and clustering of results:

- effective communication of the objectives and results of the project to road authorities and fleet operators. Road authorities will need to be convinced of the benefits to them – the business case – of providing their data (or collecting new data) which will be needed for the mapping functions.
- The project will lead towards proposals for a full-scale pilot of the system functionality leading to widespread implementation.

Results

The prototypical HGV guidance applications developed in HeavyRoute, together with the simulation results, will be used to exploit technology and expertise in three directions:

- to provide an improved guidance application for the transport industry and to link these guidance approaches with fleet management, trip planning and navigation solutions. The main focus when developing the advanced heavy vehicle route guidance system is to be able to derive the fastest, safest and most efficient routes for HGV transport
- to integrate HVG routing strategies in traffic management centres and guidance service providers
- to enrich the map provision and EServer solutions by integrating HGV specific attributes in future releases.



Acronym:	HeavyRoute	
Name of proposal:	Intelligent Route Guidance for Heavy Vehicles	
Contract number:	TST5-CT-2006-031461	
Instrument:	STP	
Total cost:	3,280,803 €	
EU contribution:	1,700,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.09.2006	
Ending date:	28.02.2009	
Duration:	30 months	
Sector:	Road	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Development of a platform for the intelligent transport vehicle and infrastructure of the future	
Coordinator:	Dr Ihs Anita Swedish Road and Transport Research Institute Olaus Magnus väg 37 SE 581 95 Linköping	
E-mail:	anita.ihs@vti.se	
Tel:	+46 (0)13 204031	
Fax:	+46 (0)13 141436	
Partners:	Laboratoire Central des Ponts et Chaussées Österreichisches Forschungs-und Prüfzentrum Arsenal Ges.m.b.H FEHRL - Forum of European National Highway Research Laboratories Volvo Technology Corporation NAVTEQ B.V. PTV Planung Transport Verkehr AG ERTICO - European Road Transport Telematics Implementation Coordination Organisation	FR AT BE SE NL DE BE

INTEGRAIL

Intelligent Integration of Railway Systems

In accordance with the ERRAC objectives, the InteGRail project aims at developing an intelligent coherent information system by integrating all the main railway subsystems. The objective is to achieve a higher level of coordination and co-operation between the key railway processes.

Background

An efficient and well-integrated European railway system is the only answer to the growing demand for mobility in Europe: one which can cope with all the technical, logistical and environmental constraints, to enable sustainable growth of the enlarged Union. To keep up with such expectations, railways need to improve in terms of capacity, average speed and punctuality, safety and the optimised usage of resources.

ERRAC, the European Rail Research Advisory Council, has proposed the target of doubling rail passenger traffic and tripling rail freight traffic by the year 2020. Responding to ERRAC's challenge, the InteGRail project intends to improve railway performance by better co-operation and information exchange between the different subsystems, allowing for a global optimisation at system level.

Currently, increasingly larger amounts of information are accessible from all of the railway subsystems. A number of information systems are also available where information is stored for immediate or later usage. Unfortunately, most information is produced in proprietary formats and its circulation is limited to specific subsystems and applicative platforms. This can make difficult barriers, or even create them, for a wider flow and usage of information, as is required by new and advanced methodologies. These problems are emphasised when considering an international context, for example one of the European corridors, where the number of systems, actors and networks involved can become huge and ad hoc solutions are impossible.

Objectives

The InteGRail project aims to create a holistic, coherent information system, integrating the major railway sub-systems in order to achieve higher levels of performance of the railway system in terms of capacity, average speed and punctuality, safety and the optimised usage of resources. Building on results achieved by previous projects, InteGRail will propose new intelligent procedures and will contribute to the definition of new standards, in accord with EC directives and technical specifications for interoperability (TSI).

The project will not replace existing systems but it will be used in conjunction with them.

InteGRail will favour a higher level of interoperability of railway information systems, easier information sharing and increased global optimisation and performance.

Meeting ERRAC's goal means reducing costs and enhancing environmental sustainability, while maintaining a high level of safety, compared to other transport modes. InteGRail is crucial to meeting these challenges. The specific goals include:

- reliability improved by up to 50% for targeted systems through optimised maintenance
- 30% availability improvement and reduction in irregularities
- 10% reduction in maintenance costs
- 5% increase in punctuality
- increased capacity in line with ERRAC objectives
- information sharing within the railway community, enabling optimisation of decision-making for improved performance.

Description of work

Due to its size and complexity, the project has been divided into a number of subprojects (SP):

SP1 – Project management, integration activities and horizontal support

SP2 – System requirements, architecture and continuous assessment, identifying information that needs to be shared

SP3A – Intelligent system monitoring and control to ensure that the right information can be obtained

SP3B – Intelligent system maintenance, identifying ways of using information more effectively for maintenance optimisation

SP3C – Intelligent system management, identifying ways of combining and using information effectively for management requirements

SP3D – Advanced system communication, ensuring that information can be transmitted effectively to decision-makers

SP4 – System integration, testing and validation, demonstrating performance improvement.

By creating innovative concepts in the areas of train control and monitoring, maintenance, management and communications, the proposed project will completely re-define the basic elements required by each system. The project will assess the needs of rolling stock, infrastructure, traffic management (including the European Rail Traffic Management System, ERTMS), train operations and propose intelligent procedures to process all available additional information to its best advantage.

Results

InteGRail will deliver the specification of a standard platform and protocol in order to interface existing or new information systems, so as to enable the exchange of key information between subsystems, which are needed to improve the performance of the railway system.

InteGRail will enable the RIGHT information to be in the RIGHT place at the RIGHT time through:

1. specification of information sharing
2. development of a protocol language as standard, using ontology and quality of service-oriented telecom resources.

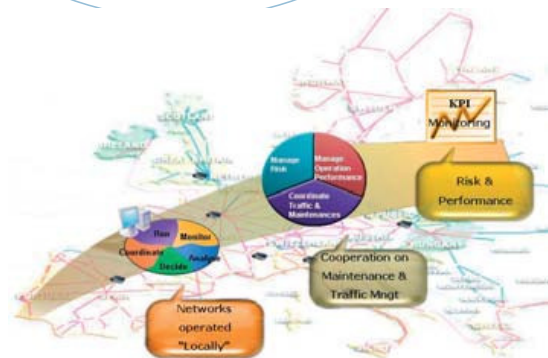
The specifications developed in the project will be proposed as candidate standards, through dissemination to and co-operation with relevant standardisation bodies, or as contributions to new or existing TSIs, in accordance with EC and other directives.

An all-pervasive, wide-band communication framework, offering a suitable digital data link between trains and ground installations, will be defined and proposed as the future reference standard in railways.

Keywords: Railways, interoperability, information, communication, maintenance, integration, monitoring, management



ERRAC Vision at 2020



InteGRail targeted results

Acronym:	INTEGRAIL	
Name of proposal:	Intelligent Integration of Railway Systems	
Contract number:	TIP4-CT-2005-012526	
Instrument:	IP	
Total cost:	20,205,470 €	
EU contribution:	10,999,650 €	
Call:	FP6-2003-Transport 3	
Starting date:	01.01.2005	
Ending date:	31.12.2008	
Duration:	48 months	
Sector:	Rail	
Objective:	Increasing Road, Rail and Waterborne Safety and Avoiding Traffic Congestion	
Research domain:	Development of a platform for the intelligent transport vehicle and infrastructure of the future	
Website:	http://www.integrail.info	
Coordinator:	Ms Melleri Minna Union of European Railway Industries 221 Avenue Louise BE 1050 Brussels	
E-mail:	minna.melleri@unife.org	
Tel:	+32 (0)2 626 12 68	
Fax:	+32 (0)2 649 27 85	
Partners:	ALSTOM Transport SA	FR
	ANSALDOBREDA S.p.A.	IT
	Siemens Aktiengesellschaft	DE
	Bombardier Transportation UK Ltd	DE
	D'Appolonia S.p.A.	IT
	Forschungs- und Anwendungsverbund Verkehrssystemtechnik / TSB	DE
	AEA Technology Rail BV	NL
	Ansaldo Trasporti - Sistemi Ferroviari S.p.A.	IT
	CONSTRUCCIONES Y AUXILIAR DE FERROCARRILES, S.A.	ES
	Nortel Networks Germany GmbH & Co. KG	DE
	Laboratori Fondazione Guglielmo Marconi S.r.l.	IT
	AtosOrigin SpA	IT
	MER MEC S.p.A.	IT
	Trenitalia S.p.A.	IT
	Rete Ferroviaria Italiana S.p.A.	IT
	Association of Train Operating Companies	UK
	České dráhy, a.s. (Czech Railways, joint stock company)	CZ
	Hungarian State Railways Ltd.	HU
	UniControls a.s.	CZ
	Strukton Railinfra BV	NL
	Deuta-Werke GmbH	DE
	Heriot-Watt University	UK
	Interuniversitair Micro-Elektronica Centrum vzw	BE
	Kuratorium OFFIS e.V.	DE
	Televic nv	BE
	Seebyte Ltd	UK
	Kontron AG	BE
	Universidad de Chile	CL
	Institut national de Recherche sur les Transports et leurs Securite	FR
	Wireless Future s.r.l	IT
	The University of Birmingham	UK
	Administrador de Infraestructuras Ferroviarias	ES
	Réseau Ferré de France	FR
	Network Rail Limited	UK
	Korridor X Bes.b.R.	AT
	ProRail B.V.	NL
	Société Nationale des Chemins de Fer Français	FR
	Union Internationale des Chemins de Fer	FR

Horizontal Activities



ACMARE (CA)

Coordination Action to Implement an Advisory Council for Maritime Transport Research in Europe

ACMARE aims at supporting the European Technology Platform WATERBORNE, to which all stakeholders in the maritime industry and waterborne transport have developed a medium to long-term vision, assess the key challenges, formulate R&D actions to meet these challenges in a strategic research agenda (SRA), set out an implementation plan, and promote the mobilisation of necessary resources.

Background

The history of civilisation and commerce cannot be separated from that of waterborne transport. The trading of goods, passenger transport, exchange of knowledge, and the development of cities, regions and even civilisations were, in past centuries, often only possible by means of waterborne transport. Today's Europe would not be one of the world's most powerful regions without the performance of waterborne transport and operations, including the related European industry, knowledge and expertise. Always with a high commercially motivated innovative pitch, almost all maritime technology developments have been made in Europe, even today in the age of globalisation. European stakeholders along the waterborne value chain are amongst the world leaders in their fields, benefiting from a tradition of developmental co-operation between, for example, operators and builders or clients and suppliers – a proven maritime cluster. The WATERBORNE TP is the initiative of all parties involved in the areas of shipping and shipbuilding, offshore industry and leisure vessels, ports and infrastructure development, and equipment manufacturers and systems suppliers to present their contribution to the development and prosperity of the European Union and its Member States.

Objectives

By supporting the activities of the ETP WATERBORNE, ACMARE is aiming to:

- establish a continuous dialogue-seeking consensus between the various stakeholders (Member States, the EU, industry, research institutes, associations) in maritime transport R&D
- highlight the future R&D needs, priorities and mechanisms, thereby stimulating the necessary investments in R&D from private, European and national sources
- accelerate the generation of knowledge, innovation, and the uptake of research and technologies to improve the competitiveness and productivity of the waterborne transport sector, especially with regard to SMEs
- contribute to social expectations regarding clean and safe waterborne transport
- support the development and networking of regional and interregional clusters in maritime transport research, and help regions identify and address the particular challenges and opportunities relevant to themselves or their collaboration (e.g. short sea shipping)
- contribute to aligning research and technology developments, and a coherent, consistent policy and regulatory framework in the EU
- facilitate the integration of the new EU Member States (of which six are maritime and two are main maritime actors) on waterborne transport matters
- encourage additional involvement of female researchers in the waterborne transport sector.

Description of work

ACMARE supports the organisation of expert meetings and work to develop the common medium to long-term vision of the waterborne industries, the WATERBORNE strategic research agenda (WSRA) establishing the R&D challenges and the WSRA IP setting up the priorities and time lines. This means:

1. Providing the necessary management and administrative support for implementing the Coordination Action. Providing the interface with the Commission and make sure the contractual obligations are completed in due time.
2. Establishing a proper documentation management system and thus creating a WATERBORNE website for the exchange of information among WATERBORNE stakeholders.
3. Providing support to the drafting of the WSRA and other necessary reports.
4. Leading the WATERBORNE Support Group, and providing an efficient and effective technical steering of planning, control and reporting.
5. Providing WATERBORNE with the technical support necessary to conduct its role as research advisory body concerning the waterborne transport sector.
6. Disseminating the WSRA IP, WSRA and the vision of the future for European maritime industry and waterborne transport research to Member States' representatives, the European Commission, research organisations, the various actors in the maritime industry and the public. Two-way dialogue will be established and supported through seminars, a workshop and a website.

Results

ACMARE, through the ETP WATERBORNE, has so far produced the following results:

- a medium to long-term vision: the Vision 2020 was launched on 8 February 2006 in Brussels
- the WATERBORNE strategic research agenda overview was launched on 4 May 2006 in Vienna
- the finalisation of the WSRA implementation plan.

These documents will be regularly updated and disseminated to the WATERBORNE stakeholders.

ACMARE will continue the mobilisation of R&D efforts for projects definition, promotion and financial engineering.

ACMARE is trying to establish good relations with the other relevant European technology platforms.

Keywords: Coordination action, European technology platform, waterborne, maritime, inland navigation, Vision 2020, strategic research agenda, implementation plan

Acronym:	ACMARE (CA)
Name of proposal:	Coordination Action to Implement an Advisory Council for Maritime Transport Research in Europe
Contract number:	TCA4-CT-2005-516339
Instrument:	CA
Total cost:	999,950 €
EU contribution:	999,950 €
Call:	FP6-2003-Transport 3
Starting date:	01.01.2005
Ending date:	31.12.2007
Duration:	36 months
Sector:	Waterborne
Objective:	Horizontal Activities
Website:	http://www.waterborne-tp.org
Coordinator:	Mr Lüken Reinhard Community of European Shipyards' Associations Rue Marie de Bourgogne 52 BE 1000 Brussels
E-mail:	cesa.research@skynet.be
Tel:	+32 (0)2 282 03 53
Fax:	+32 (0)2 230 43 32
Partners:	Force Technology (for European Co-operation in Maritime Research - ECMAR) DK European Community Shipowners' Associations BE European Marine Equipment Council BE Federation of European Private Port Operators BE European Dredging Association BE European Oil and Gas Innovation Forum BE Bureau Veritas SA FR WEGEMT - A European Association of Universities in Marine Technology and Related Sciences UK

CAREMAR

Coordinated Academic RTD and Education Supporting Innovation in Marine Industries

CAREMAR focuses on mechanisms to link European universities' expertise with the research, education and technology needs of the marine technology and related sciences sector, by providing a platform coordinating universities' expertise, and mobilising their skills and resources to support industry.

Background

The EU is investing heavily in mechanisms, particularly in research and training, to provide European marine sector industries with sufficient human and technological resources so that they can respond to the fierce competition by low-cost Far-East marine industries and meet the challenges of the 21st century. CAREMAR will help the academic sector to support the needs of industry in both the short term and the medium to long term, and to deliver solutions through mobilising the skills and resources of the entire marine technology academic community. In this respect, CAREMAR attempts to bring academia and industry together at a fundamental and strategic level rather than in a specific technological area, so that strategic planning and processes can be examined in a highly original way to ensure that outputs from academia are clearly aligned to industry needs across a broad spectrum of technology areas.

CAREMAR will foster the partnership between the EU, industry and the academic and research communities, both to meet European objectives for technology in competitiveness and societal needs, and to ensure that investment in research leads to Europe achieving global prominence in technical innovation.

Objectives

The objectives of the project are:

- To undertake a thorough examination of current RTD and RBE practices of European universities and to propose improvements to the underlying processes in consultation with industry, especially where this brings together university consortia in joint programmes or course development to satisfy industry needs
- To provide a platform for the supply of RTD that derives from and is initiated or coordinated by the university sector, which meets industry needs through research, provision of manpower and knowledge transfer
- To identify and improve communication routes between universities, research organisations and industry for improved RTD project development and undertaking
- To provide a focused approach using innovative tools for the supply of RTD, especially in the identification and management of expertise and facilities
- To demonstrate through practical means how this can be achieved and to incorporate RTD results in the educational programmes
- To disseminate the results effectively and facilitate the acceptance by European society
- To coordinate these efforts with those of proposed integrated projects (IPs), Networks of Excellence (NoE) and other Coordinated Actions (CAs) for the effective distribution of best practice
- To demonstrate the positive effect of this coordination through participating in the preparation and presentation of IPs, NoEs and CAs, and proposals within IPs, NoEs and CAs
- To demonstrate the portability of the proposed solutions to other industry sectors.

Description of work

1. The project will use standard business and management tools together with technology-orientated solutions to undertake a strategic analysis of academic research and technological development and research-based education (RTD and RBE) systems related to marine technology, and related science requirements within industry.
2. In the early stages of the project, the focus will be on the supply chain analysis, the identification of change management processes and business process re-engineering (BPR) for systemic requirements in the delivery of RTD and RBE, and the development of knowledge and communication tools. The CAREMAR CA will need to demonstrate the effectiveness of the BPR and supply chain analysis approaches by:
 - a) presenting and delivering RTD proposals that address the infrastructural and communication issues where these may be improved upon
 - b) presenting and delivering RTD proposals matching the needs of industry, which display the requirement for RTD with a university-led focus.
3. Development of key interfaces with CAs and networks led by the maritime industry. The CAREMAR CA will address the entire RTD supply chain for the maritime sector from the academic point of view.
4. It will initiate the development of RTD projects, act as an umbrella for existing RTD where appropriate, and nurture new proposals.
5. There must be a demonstration of the effectiveness of this CA's communication, tools and networking infrastructure.

Results

CAREMAR will deliver a user-focused portal and online subject-related community based on the outputs of the project. Users will be able to access a set of five databases that will provide a comprehensive information source of university-based expertise and facilities. The databases to be developed are:

- **UNIVERSITY:** contains general information about universities – overview of university courses, RTD experiences and skills.
- **RECRUIT:** contains information for companies looking to recruit personnel with particular skills. It will include a 'young researchers' area where people looking for employment in RTD in industry can advertise their capabilities.
- **FACILITY:** contains a registry of university marine RTD facilities including towing tanks, model basins, cavitation tunnels, computing facilities, laboratories, large-scale facilities, etc.
- **CONSULT:** includes a database of individual academic expertise providing details of the skills of individual staff members. There will also be a capability for confidential communication with individuals who are contained in the database. Access to an individual's published papers may be made through the database.
- **TECHNOLOGY:** contains the published outcomes of analyses on future technology trends and predicted requirements undertaken by universities through CAREMAR or as part of other external work.

Acronym:	CAREMAR
Name of proposal:	Coordinated Academic RTD and Education Supporting Innovation in Marine Industries
Contract number:	TCA4-CT-2005-516401
Instrument:	CA
Total cost:	748 000 €
EU contribution:	748 000 €
Call:	FP6-2003-Transport 3
Starting date:	01.09.2005
Ending date:	31.08.2008
Duration:	36 months
Sector:	Waterborne
Objective:	Horizontal Activities
Website:	http://caremar.org
Coordinator:	Mr Patrick Robert WEGEMT - A European Association of Universities in Marine Technology and Related Sciences 10 Upper Belgrave Street UK SW1X 8BQ London
E-mail:	Office@wegemt.org
Tel:	+44 (0)2078389149
Fax:	+44 (0)2078389147
Partners:	Helsinki University of Technology National University of Athens University of Strathclyde University of Plymouth Instituto Superior Técnico Norwegian University of Science and Technology University of Newcastle upon Tyne University of Southampton Hochschule Bremen Committee of the European Shipbuilders Associations asbl Gdansk University of Technology Institute for High Performance Computing and Information Systems Technical University Denmark

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ERTRAC

European road transport research advisory council european road transport 2020 a vision and strategic research agenda

ERTRAC is the European Technology Platform on road transport research. This action is aiming at a better alignment of European, national and private research activities for more economic efficiency, quality of results and reduced time to applying innovation. It is ERTRAC's mission to explore these opportunities and make specific recommendations for implementation. ERTRAC's inclusion of all major road transport actors makes it unique and allows a truly holistic and integrated view of road transport issues.

Background

Over € 28 billion are spent each year on R&D in Europe's road transport sector. This sector employs more than 9% of the entire EU workforce, generating a turnover that amounts to 20% of the Union's GDP. Road transport supplies the majority of mobility services demanded by Europe's citizens and businesses. It is responsible for over 75% of inland freight transport and, as such, plays a crucial role in all European industrial and commercial activities. The importance of road transport is also reflected in a number of high-level policy initiatives, aimed at strengthening the European automotive industry, for which research is a mainstay.

Today R&D activities are largely managed within individual stakeholder groups and the Member States. It is apparent that a good alignment between European and national, as well as between private and public research activities, can provide major benefits in terms of economic efficiency, quality of results and reduced time to application of innovation.

In line with the European objectives for competitiveness and sustainability, ERTRAC involves all the main stakeholders in the road transport sector and fosters structured, optimised and integrated R&D efforts across European programmes.

Objectives

The ERTRAC approach is key to addressing Europe's road transport challenges successfully and effectively, for both today and tomorrow.

ERTRAC's objectives include:

- providing a strategic vision of European road transport in 2020 and beyond, particularly with respect to R&D
- defining priorities agreed by all stakeholders
- aligning European and national research agendas and programmes
- monitoring progress and adjusting research road maps accordingly
- providing a platform for ongoing research alignment and co-operation
- making specific recommendations for large cross-stakeholder research
- identifying needs for international and global co-operation.

Description of work

The overall objective of the ERTRAC Coordination Action is to provide the management and organisational support together with administrative and technical input, which is required to facilitate ERTRAC in its assessment of European road transport research needs and the formulation of the strategic research agenda (SRA) and its implementation.

The ERTRAC documents are structured according to four main research areas supporting two fundamental aspects of the road sector. The first is the need to provide for free movement of people and the transport of goods, in line with the key objectives of the European Union, both at local and intra-regional levels. This is reflected in the sections for Mobility, Transport and Infrastructure, Safety and Security as well as Environment, Energy and Resources.

The second is the competitiveness of the European industry, addressed in the section Design and Production. The documents were developed through extensive and intense workshops and reviews throughout the sector, involving more than a hundred actors.

Results

In November 2003, the Plenary agreed the basic structure of ERTRAC, which involves all the relevant stakeholders in European road transport. In June 2004, the Vision 2020 was published as a brochure and widely circulated, and in December 2004, the strategic research agenda was published. Both are available as a download from the website. In 2005, the main tasks were the discussion and elaboration of a research framework for 2007-2015, which is based on the Vision and the SRA. The objective is the provision of useful input for planning of the Seventh Framework Programme, as well as for planning national activities. It was published in April 2006 (see the synopses for ERTRAC II).

Furthermore, an overview of national road transport research activities in Europe was initiated, covering 17 countries.

All documents are available as free downloads from the ERTRAC website: www.ertrac.org

To conclude, ERTRAC could successfully establish a European platform with the leading stakeholders in road transport research and development.

Acronym:	ERTRAC	
Name of proposal:	European road transport research advisory council european road transport 2020 a vision and strategic research agenda	
Contract number:	TCA3-CT-2003-506525	
Instrument:	CA	
Total cost:	800,000 €	
EU contribution:	800,000 €	
Call:	FP6-2002-Transport 1	
Starting date:	01.10.2003	
Ending date:	30.09.2005	
Duration:	24 months	
Sector:	Road	
Objective:	Horizontal Activities	
Website:	http://www.ertrac.org	
Coordinator:	Dr Affenzeller Josef AVL List GmbH Hans-List-Platz 1 AT 8020 Graz	
E-mail:	Josef.affenzeller@avl.com	
Tel:	+43 (0)316 787 253	
Fax:	+43 (0)316 787 657	
Partners:	Ford Forschungszentrum Aachen GmbH	DE
	Centro Ricerche FIAT Società Consortile per Azioni	IT
	European Union Road Federation	BE
	CONCAWE	BE
	Faurecia Service Group	FR
	Forum of European National Highway Research Laboratories	BE
	POLIS	BE
	Renault S.A.	FR
	Robert Bosch GmbH	DE
	Siemens VDO Automotive AG	FR
	Vodafone Pilotentwicklung GmbH	DE
	Volvo Technological Development Corp.	SE

ERTRAC II

Technology Platform for European Road Transport Research

ERTRAC II is the continuation of the Coordination Action ERTRAC (see synopses ERTRAC/506525). ERTRAC II aims at supporting the European technology platform, ERTRAC (European Road Transport Research Advisory Council). ERTRAC set up the basic structure for the technology platform and created the Vision and strategic research agenda (SRA), and ERTRAC II is focussing on updating the SRA and on its implementation.

Background

Over € 28 billion are spent each year on R&D in Europe's road transport sector. This sector employs more than 9% of the entire EU workforce, generating a turnover that amounts to 20% of the Union's GDP. Road transport supplies the majority of mobility services demanded by Europe's citizens and businesses. It is responsible for over 75% of inland freight transport and, as such, plays a crucial role in all European industrial and commercial activities. The importance of road transport is also reflected in a number of high-level policy initiatives, aimed at strengthening the European automotive industry, for which research is a mainstay.

Today R&D activities are largely managed within individual stakeholder groups and Member States. It is apparent that a good alignment between European and national, as well as between private and public research activities, can provide major benefits in terms of economic efficiency, quality of results and reduced time to application of innovation.

In line with the European objectives for competitiveness and sustainability, ERTRAC involves all the main stakeholders in the road transport sector and fosters structured, optimised and integrated R&D efforts across European programmes.

Objectives

The ERTRAC II Coordination Action will provide a platform to all relevant stakeholders for establishing a consensus on future road transport research directions, and the definition and promotion of European RTD activities such as joint technology initiatives. The objective is to provide the management and organisation, together with technical support, that is required to facilitate ERTRAC achieving its mission. In addition, the co-operation with the European Union services, Member States and other technology platforms will be ensured. Finally, the results of ERTRAC need to be extensively promoted and disseminated towards a large audience of research partners and the public.

Description of work

The coordination activities are structured in five work packages (WP):

WP1: Technology Platform Management: The main aim of this work package is the overall organisational management of the technology platform, including the secretariat.

WP2: Road Transport RTD Networking: The two main objectives of this WP are firstly to promote the coordination of European, national, regional and private R&D actions for road transport in order to increase efficiency and strengthen the European Research Area and secondly, to foster the networking with other technology platforms, as well as with the EC and national bodies in terms of SRA, RTD synergies, finance and governance.

WP3: Strategic Research Agenda: This WP deals with the update of the ERTRAC strategic research agenda, which was published for the first time in 2004. There will be a review of the structure and the content of the SRA.

WP4: SRA Implementation – Promoting Technology Initiatives: This WP is of utmost importance for ERTRAC to be in the ‘implementation phase’ of a technology platform. The SRA implementation has several objectives. The operational focus/promotion of concrete technology initiatives includes the commitment of stakeholders (industry, public authorities, financial community, etc.).

WP5: Dissemination Activities: A proper promotion and communication of the ERTRAC outcome and activities is key to the success of the technology platform.

Results

The first result of the ERTRAC Research Framework (April 2006): This is based on Vision&Challenges and the strategic research agenda which were published in 2004. The ERTRAC Research Framework highlights road transport research priorities for the timeframe 2007-2015. ERTRAC believes that this research framework is useful for the planning of the Seventh Framework Programme as well as for planning national activities. The document is available from the ERTRAC website, www.ertrac.org.

Further deliverables will be:

- Annual work programmes and status reports.
- An overview of national transport research activities across Europe.
- An update of the strategic research agenda.
- Support for Joint Road Transport Technology Initiatives.
- Elaboration of finance and governance issues of European Technology Initiatives in road transport.
- The co-organisation of the TRA conferences every two years and additional dissemination events.

Acronym: ERTRAC II
Name of proposal: Technology Platform for European Road Transport Research
Contract number: TCA5-CT-2006-031495
Instrument: CA
Total cost: 1 550 000 €
EU contribution: 1 550 000 €
Call: FP6-2005-Transport 4
Starting date: 01.02.2006
Ending date: 31.01.2009
Duration: 36 months
Sector: Road
Objective: Horizontal Activities
Website: <http://www.ertrac.org>
Coordinator: Dr Affenzeller Josef

AVL List GmbH
 Hans-List-Platz 1
 AT 8020 Graz

E-mail: josef.affenzeller@avl.com

Tel: +43 (0)316 787 253

Fax: +43 (0)316 787 657

Partners: European Association of Automotive Suppliers	BE
CONCAWE	BE
Centro Ricerche FIAT Società Consortile per Azioni	IT
European Road Transport Telematics Implementation	
Coordination Organisation srl	BE
Faurecia service Group	FR
Forum of European National Highway Research Laboratories	BE
Ford Forschungszentrum Aachen GmbH	DE
Promotion of Operational Links with Integrated Services	BE
Renault SA	FR
International Association of Public Transport	BE

EURNEX

European Rail Research Network of Excellence

The mission of EURNEX – the European Rail Research Network of Excellence – is to create a European network of rail research institutes as world-class players to support the railway sector and assist the members of the EU to operate an interoperable and competitive rail system across the continent. EURNEX involves more than 600 researchers from over 60 rail research institutes across Europe.

Background

The future rail systems are both a component of the door-to-door chain of trans-European and high-speed passenger transport, as well as a valuable alternative to the car in congested areas. With the White Paper, European transport policy for 2010: time to decide, the European Commission aims to increase the safety standards and the degree of interoperability, and to reduce environment pollution.

The European Rail Research Advisory Council (ERRAC) has set a goal of doubling rail passenger traffic and tripling rail freight transport throughout Europe in twenty years, starting in 2000. But the European railway landscape is, due to historic developments, a very fragmented one: it is still a patchwork of disparate systems and networks, each applying technical and operating standards evolved over the last 180 years. This wide range of different rail systems in Europe presents a huge challenge to achieve pan-European interoperability. To achieve the ambitious goals, the competitiveness of the rail system must be considerably improved, with support of innovative products and services. The synchronisation of rail systems in Europe needs harmonised research applications and facilities, but the pre-EURNEX European research landscape was also a very fragmented one.

Objectives

The strategic objectives of EURNEX are:

- to integrate the fragmented European rail research landscape by combining research activities in a network of mutually shared facilities, tools and platforms
- to promote the railway contribution to a sustainable transport policy
- to improve the competitiveness and economic stability of the railway sector and industry, e.g. with flexibility, regarding the new challenges for rail research in a shared process
- to achieve a self-standing and long-lasting business package for the network beyond the granting period, thus creating a durable, integrated network of excellence in rail research, technology innovation and knowledge management from the research capacities of universities and institutions, implementing knowledge from rail operators and the rail industry including SMEs.

Description of work

An important first achievement of the EURNEX integration process was the establishment of a members' family concept in a thematic oriented network substructure, based on ten poles clustering the excellent scientific institutions for specific rail research areas:

Strategy and Economics, Operation and Systems Performance, Rolling Stock, Product Qualification Methods, Intelligent Mobility, Safety and Security, Environment and Energy Efficiency, Infrastructure and Signalling, Human Factors and Training and Education.

Some of the benefits to members are:

- improving own strengths by the development of specialised EURNEX poles, and new and trusting international co-operation with complementary research partners



- improving the efficiency of research facilities by enhanced opportunities for common use
- strengthening the interaction with customers to learn more about the business-driven needs for current and future rail research
- profiting from EURNEX corporate services provided to its members.

The customer-orientation of EURNEX is the essential key factor for its long-term durability. A developing sustainable business has to build on the trusting relationship between the researchers organised in the network and the rail sector's demand for scientific services.

The performance of the EURNEX network therefore has to attract the supply industry and the operators by providing added-value research towards the state of the art in Europe by:

- establishing coherent and integrated knowledge and innovation services for the rail stakeholders
- a new organisation of future excellent rail research, including improving on the existing scientific strengths
- thematic orientation towards the ERRAC SRRA 2020 key priorities: creating poles of excellence in a way so as to efficiently respond on these priority areas
- trusting co-operation of EURNEX members has to result in synergies to enhance the quality of research further and 'time-to-result'
- schemes for education and training, developed by the EURNEX virtual university EURail, have to meet the future requirements of the stakeholders on an international level.

The challenge for EURNEX is achieving a win-win situation for the different players involved by meeting these objectives within the EU granting period. Therefore the development and implementation of a sound business case is of the utmost importance for the EURNEX success.

Results

EURNEX is a new and unique approach to organise the whole rail research domain towards excellence and efficiency. It is particularly distinguished by:

- customer orientation: the international associations UIC, UNIFE, UITP are project partners; rail sector representatives form the advisory board
- the trusting partnership aiming at specialisation and intensive collaboration within the poles of excellence and multidisciplinary co-operation across the poles
- the virtual European Rail University, EURail, providing training and education for the next academic generation, as well as experienced professionals
- the knowledge management system as an internal co-operation tool, showcase and unique knowledge library for the rail sector
- the business package to ensure a durable and sustainable EURNEX network, including a value-added service provision within EURNEX.



EURNEX integrates 66 research institutes throughout Europe



EURNEX 2nd Integration Conference: Establishment of EURNEX poles of excellence, 2-3 March in Berlin

Acronym: EUR2EX
Name of proposal: European Rail Research Network of Excellence
Contract number: TNE3-CT-2003-506513
Instrument: NoE
Total cost: 6,000,000 €
EU contribution: 6,000,000 €
Call: FP6-2002-Transport 1
Starting date: 01.01.2004
Ending date: 31.12.2007
Duration: 48 months
Sector: Rail
Objective: Horizontal Activities
Website: <http://www.eurnex.net>
Coordinator: Mr Steinicke Wolfgang H.

Forschungs- und Anwendungsverbund Verkehrssystemtechnik Berlin /TSB
 Am Borsigturm 48
 DE 13507 Berlin

E-mail: WSteinicke@fav.de

Tel: +49 (0)30 4303 3540

Fax: +49 (0)30 4303 3550

Partners: University of Birmingham UK
 French National Institute for Transport and Safety Research FR
 Institut Superior Tecnico, Lisboa PT
 Institutet for transportforskning SE
 Consorzio Nazionale Interuniversitario per i Trasporti e la Logistica IT
 Union des Industries Ferroviaires Européennes BE
 Union Internationale des Chemins de Fer FR
 International Association of Public Transport BE
 Brandenburg University of Technology Cottbus DE
 Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V. DE
 RWTH Aachen - University of Technology Aachen, Department
 of Rail Vehicles and Materials-Handling Technology DE
 Technical University Berlin DE
 Technical University of Braunschweig DE
 Institut für Arbeits- und Sozialhygiene Stiftung DE
 Deutsches Zentrum für Luft- und Raumfahrt e.V. DE
 Munich University of Technology DE
 University of Karlsruhe DE
 Rail Tec Arsenal Fahrzeugversuchsanlage GmbH AT
 Technical University Graz, Institute for Railway Engineering
 & Transport Economy AT
 Vienna University of Technology AT
 Czech Technical University in Prague, Faculty of Transport CZ
 Czech Railways - Railway Research Institute CZ
 Moscow State University of Railway Engineering RU
 Centrum Naukowo-Techniczne Kolejnictwa PL
 Budapest University of Technology and Economics HU

University of Zilina	SK
Politechnika Slaska (Silesian University of Technology)	PL
University of Pardubice, Jan Perner Transport Faculty	CZ
University of Southampton	UK
University of Leeds	UK
University of Nottingham	UK
Manchester Metropolitan University	UK
Loughborough University	UK
Imperial College London	UK
Delft University of Technology	NL
Université des Sciences et Technologies de Lille	FR
Université de Technologie de Compiègne	FR
Université de Technologie de Belfort-Montbéliard	FR
Ecole Centrale de Lille	FR
Institut National Polytechnique de Grenoble	FR
Université de Valenciennes et du Hainaut-Cambrésis	FR
Multitel ASBL	BE
Université Catholique de Louvain	BE
Centre for Research and Technology Hellas/Hellenic Institute of Transport	GR
Instituto de Engenharia Mecânica	PT
Centro Estudios Investigaciones Técnicas de Gipuzkoa	ES
Universidad Politécnica de Madrid	ES
Politechnical University of Catalonia	ES
Center for Innovation in Transport	ES
Tecnología e Investigación Ferroviaria S.A.	ES
Universidad del País Vasco - Euskal Herriko Unibertsitatea	ES
Chalmers University of Technology	SE
ANSERI - Consultants Ltd	FI
Linköping University	SE
Kungliga Tekniska Högskolan	SE
Danish Transport Research Institute	DK
Swedish National Road and Transport Research Institute	SE
Uppsala University	SE
Luleå University of Technology	SE
Valtion teknillinen tutkimuskeskus (Technical Research Centre of Finland)	FI
Università di Roma 'La Sapienza' - Dipartimento Idraulica Trasporti e Strade	IT
Politecnico di Milano	IT
Università di Catania	IT
Centro interuniversitario ricerca trasporti (Inter-Uni Transport Research Centre)	IT
Centro Interuniversitario di Ricerca Per lo Sviluppo Sostenibile (Interuniversity Research Centre on Sustainable Development)	IT

SIMBA

Strengthening Road Transport Research Co-operation between Europe and Emerging International Markets

SIMBA aims to increase road transport research co-operation between Europe and the emerging markets of China, India, Brazil and South Africa by establishing a collaboration network that will bring together the key stakeholders in the field of intelligent transport systems (ITS), road infrastructures and automotive developments.

Background

Every year more than 1.17 million people die and over 10 million are crippled in road accidents around the world. Road accidents cost about 1% to 3% of a country's annual GDP, which amounts to approximately €110 billion every year for developing countries, almost twice as much as the total development assistance they receive. These losses undoubtedly inhibit the economic and social development of these countries. Improvements in safety applications or support systems in vehicles can make a significant contribution to crash reduction and so limit the high number of casualties.

Congestion is also closely linked with road safety. It affects the flow of goods and people, and both business and leisure travel. In both rural areas and intercity corridors, traffic is disrupted by incidents, maintenance operations, detours and many other problems. To the traveller, congestion means lost time, missed opportunities, frustration, and a waste of personal resources. To the employer, it means lost worker productivity, delivery delays and increased costs. Speed, reliability and the cost of urban and intercity freight movements are increasingly affected by congestion and the cost of congestion in OECD countries is estimated at around €670 billion.

Objectives

The main objectives of the project are to increase road safety, improve mobility and enhance transport efficiency.

In order to achieve this, the SIMBA project will:

- prepare, support and facilitate the rapid adoption and transfer of technologies and research results
- define R&D priorities and future co-operation areas
- make recommendations for new innovative road research activities to be launched locally and in the EU
- increase the visibility of the European industry and support the industry to respond to emerging business opportunities.

This will be done through the following three enablers: an intelligent transport system (ITS), automotive technological development and road infrastructure.

The main activities of SIMBA will be to organise events in the EU and emerging markets that will serve as a means for fostering closer ties between all the countries in the road transport sector and exchanging knowledge in the fields of ITS, road infrastructure and automotive technological development. The main outcome will be trans-national networks of key road transport stakeholders that can help define the priorities, research needs and future co-operation areas for road transport.

Description of work

The aim is to create a co-operation network between Europe and the emerging markets that can be used to disseminate the state of the art of national research activities and to map out future research co-operation opportunities.

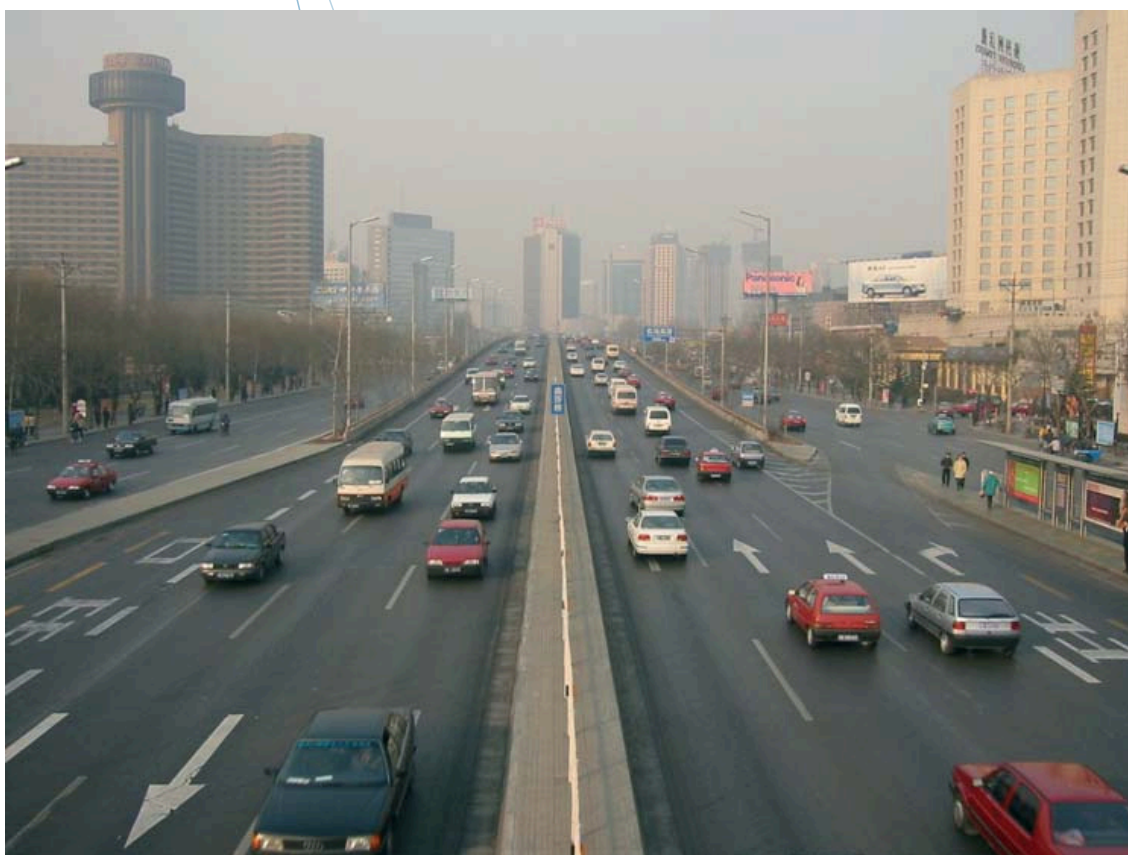
The project's work packages represent the four main areas of activity necessary in order to achieve SIMBA's objectives:

- Project management
- Definition of research priorities and strategies
- National activities
- Dissemination.

Due to the geographical spread of the project, national coordinators have been chosen for all the countries/regions involved in the project (Europe, China, India, Brazil and South Africa). This will facilitate the project coordinator's management of the project, particularly in terms of defining national priorities and preparing the project events. It will also ensure that the right stakeholders are involved at the local level.

Results

SIMBA will bring together European intelligent transport systems (ITS), road infrastructures, vehicle manufacturers and technology providers with their counterparts in China, India, Brazil and South Africa in order to establish a co-operation network that will discuss how to increase road safety, mobility and transport efficiency in these countries through the exchange of technological expertise and closer co-operation. The project will map the national and regional RTD activities, policies and future requirements, and propose demonstration cases to the regional stakeholders, organise seminars, business meetings, and industry visits in order to maintain a close contact between the key players.



SIMBA Project

Acronym:	SIMBA	
Name of proposal:	Strengthening Road Transport Research Co-operation between Europe and Emerging International Markets	
Contract number:	TCA5-CT-2006-031447	
Instrument:	CA	
Total cost:	1,100,000 €	
EU contribution:	1,100,000 €	
Call:	FP6-2005-Transport 4	
Starting date:	01.03.2006	
Ending date:	29.02.2008	
Duration:	24 months	
Sector:	Road	
Objective:	Horizontal Activities	
Website:	http://www.simbaproject.org	
Coordinator:	Mr Bangsgaard Jacob European Road Transport Telematics Implementation Coordination Organisation s.c.r.l. Avenue Louise 326 BE 1050 Brussels	
E-mail:	j.bangsgaard@mail.ertico.com	
Tel:	+32 (0)2 400 07 38	
Fax:	+32 (0)2 400 07 01	
Partners:	The Association of European Vehicle Manufacturers	BE
	Forum of European National Highway Research Laboratories	BE
	China National Intelligent Transport System Center	CN
	Shanghai Automotive Industrial Corporation	CN
	Tongji University	CN
	Associação Brasileira de Engenharia Automotiva	BR
	TATA Consultancy Services Netherlands B.V.	NL
	Society of Indian Automobile Manufactures	IN
	Infrastructure System Operations and ITS Laboratory	ZA
	ITS Denmark	DK

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