EUROPEAN COMMISSION

Community research

Collective Research projects for SMEs Volume 2

HORIZONTAL ACTIVITIES INVOLVING SMEs

Introduction

Collective Research Volume 2

Collective Research projects are one of two distinct types of project supported by the 'Horizontal research activities involving SMEs' of the EU's Sixth Research Framework Programme (FP6, 2002-2006), which together have an overall budget of €473 million.

Collective Research projects are designed to improve the competitiveness of large communities of SMEs by expanding their knowledge base through research and development related to widely-shared technological, environmental, safety or standards issues.

Lasting up to three years, and with budgets of between €2 million and €5 million, these projects are led by transnational industrial associations or groupings (IAGs). The IAGs are responsible for out sourcing the required work to 'research performers' – normally, universities or research centres – and become the exclusive owners of the resulting intellectual property rights. 'Core groups' of individual SMEs test the relevance and quality of the results, and may benefit directly from early access and preferential use of them. The IAGs ensure the widespread take-up and exploitation of these results by their member SMEs.

This folder contains profiles of 22 projects from the first FP6 Collective Research call, prepared in the months immediately following their official launch. Similar folders, presenting a selection of projects from the FP6's first Co-operative Research and Economic and Technological Intelligence (ETI) calls, are also available. All FP6 projects can be found on the SME Techweb.

The Collective Research scheme is managed by the Research and SMEs unit of the European Commission's Directorate-General for Research.

Further information

- **SME Update** is a free quarterly newsletter containing news, opinion, statistics and advice on how SMEs can take part in European research projects, as well as examples of successful projects. Subscribe, and download previous editions, at http://sme.cordis.lu/about/downloadable.cfm

- **SME TechWeb**, a dedicated web service for SME participants in the EU Research Framework Programmes, is at http://sme.cordis.lu/

- Specific enquiries may be sent to the **SME helpdesk** at research-sme@cec.eu.int or posted at http://sme.cordis.lu/assistance/sme_helpline.cfm

- **SME National Contact Points (SME-NCPs)** in each EU Member State and Associated State offer a tailored support service for SMEs. Contact details for each SME-NCP can be found at http://sme.cordis.lu/assistance/NCPs.cfm

Collective Research projects for SMEs
Volume 2

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Sustaining energy and enterprise in rural areas

"The project can sustain rural economies, reduce waste and diversify Europe's energy supplies."

The cultivation of fast-growing tree species (SRPs) that can be used for bioenergy production is a promising alternative source of income for European farmers. The Biopros project will investigate the concept of irrigating and fertilising such SRPs using waste water and sewage sludge. It will develop decision-support tools that will allow farmers to pick the right plant species and the best management practice, depending on their local conditions, to enter this market. Biopros will support sustainable development in rural communities, reduce natural water and chemical fertiliser use, and help diversify and secure European energy supplies.

The economic situation for European farmers has been deteriorating over recent years due to increasing cost pressures on agricultural products. Changing priorities in the EU's common agricultural policy (CAP) foresee a stronger role for farmers in rural development and fulfilling agreed standards for environmental protection, animal welfare and food security. To be globally competitive, farmers are being obliged to seek alternative products and embrace new quality regimes.

Short-Rotation-Plantations (SRPs) are one of the most promising alternative sources of income for farmers. This method involves cultivating fast-growing tree species, such as willow or polar, that can be used as a fuel source for bioenergy and other applications. To further boost the sustainability of this concept, SRPs can be irrigated and fertilised using waste water and sewage sludge resulting in a process that gives highly efficient biomass production together with a low-cost and environmentally safe biological waste water and sludge treatment. The potential for SRPs could be a perfect match to future market and environmental requirements for farmers throughout the enlarged European Union.

Biomass yield

However, there is a wide variation in local climatic conditions, economics and logistical expertise in energy biomass production across Europe. The aim of the Biopros project is to demonstrate the economic, ecological and technical feasibility of the safe application of the technology for high-efficiency biomass production and to transfer the knowledge generated to appropriate SME (small and medium-sized enterprises) partners – in particular, the farming community and agricultural engineers.

The Collective Research project's main focus is to achieve high biomass yields without any negative environmental or hygiene impacts. Biopros will work to promote knowledge about the potential for SRP as a main crop for farmers, and to address any prejudices in the wider community against the application of human waste to crops. The project will also look at barriers that could limit the application of SRP-produced biomass, and its research will cover a wide range of aspects including SRP best practice, its cost structure and related legislation and standards.

The use of sewage sludge and waste water could enable a three-fold increase in the efficiency of SRP biomass production and use of waste to create real value. The project has a number of environmentally sustainable aspects. The crop itself is a CO_2-neutral energy source and the use of waste water will reduce the need for natural water by 30%, whilst sewage sludge should eliminate the use of chemical fertilisers and contribute to soil improvement. The project will develop standards for the safe and efficient operation of SRP that will completely prevent the pollution of aquifers and surface water which might arise from the uncontrolled reuse of sludge and waste water.

Rural boost

From a social point of view, the project aims to increase farmers' income by 10% and help to reduce dependency on CAP subsidies. It will also protect and create employment in rural areas and in the wider biomass sector.

The European Biomass Industry Association, based in Brussels, is the main project coordinator for Biopros, with the scientific and technical aspects being managed by the Technologies Transfer Centrum Bremerhaven (TTZ). The consortium brings together farmers' associations from Spain, Bulgaria, Northern Ireland, Poland, Estonia, Silesia and Italy as well as individual farming SMEs from Spain, Estonia, Germany, Poland and Bulgaria, bringing a wide range of hands-on agricultural experience to the project. A further industrial association is the International Ecological Engineering Society based in Switzerland. The biomass industry is represented

Bioenergy crops offer a new market for farmers.

"Sustainable energy crops can reduce farmers' reliance on the CAP across Europe."

by the Czech and Slovak Biomass Association as well as a Slovak biomass SME. Other SMEs involved are a Spanish and Italian environmental consultancies and a Swedish irrigation equipment manufacturer. Working with TTZ to provide research inputs are the Estonian Agricultural University, the Swedish Agricultural, the University of Warmia and Mazury in Poland, and the Italian Industrial Crops Research Centre.

Biopros will develop decision-support tools that will allow farmers to choose the most suitable SRP species to plant for their local climate, soil properties, types of waste water and sludge available and the regional market situation for biomass. The tools will also enable a farmer to decide on the best crop management in terms of planting, fertilisation and irrigation rates, the need for additional fertiliser and when to harvest. These tools will help farmers enter the market on a sound economic basis, and the project can make a significant contribution to sustainable development in rural areas throughout Europe.

Project title
Solutions for the safe application of waste water and sludge for high efficient biomass production in Short-rotation-plantations

Contract number
CT-2005-012429

Start date
01/09/2005

Duration
36 months

Total project cost
€ 2 758 385

EC contribution
€ 2 045 815

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Breeding corals for aquaria

CORALZOO

"The main objectives are to produce a book of user-friendly protocols for growing corals, and to work towards a European breeding programme for corals."

Public zoos and aquaria increasingly use corals obtained from sustainable breeding programmes. However, there is a need for improved cultivation techniques to meet the demand from the expanding aquaria sector. The Coralzoo project brings together expertise in aquariology, marine biotechnology, molecular biology, toxicology, nutrition and mathematics, to develop protocols for the husbandry and breeding of hard corals in captivity. The outcome, in the form of a book and staff training, will enhance the quality of reef displays. The project will establish a coordinated European breeding programme for corals, and will make an important contribution to the protection of wild coral reefs.

Interest in marine life has driven growth in the public aquaria industry. The trend is towards bigger displays that mimic natural habitats. Hard or stony corals are the primary reef-builders in aquaria. Collecting wild coral is one of the causes of reef degradation, however, and the policy of many zoos and aquaria is to obtain coral only from sustainable breeding programmes. There is therefore a demand for improved methods of coral husbandry and breeding.

Coralzoo is a four-year Collective Research project that links the European Association of Zoos and Aquaria (EAZA), representing zoos and public aquaria across Europe, with four research institutes. Four public aquaria and one ornamental trade company complete the consortium, while seven EAZA-associated aquaria provide additional support. The project has two main objectives, according to Dr Ronald Osinga representing the project's coordinating partner, Wageningen University. First, to produce a book of user-friendly protocols for the use of everyone involved in growing corals; and secondly, to work towards a European breeding programme for hard corals.

Coral nubbins

The consortium members bring complementary expertise to the project. Researchers at Wageningen University have experience in water recirculation systems and the culturing of marine organisms. Microbiologists specialising in coral diseases are based at the Italian Consortium for Marine Sciences, while coral biologists at the Israel Oceanography and Limnology Research Institute are primarily investigating nutritional aspects. Finally, a group at the Technical University of Dresden is modelling the data obtained from the other research partners, to predict how corals will perform under particular aquarium conditions. The academic competences are complemented by the applied aquariological research skills of the SME partners.

A recently developed technique – the coral nubbin bioassay – is being used to study the effect of abiotic and biotic factors on coral growth. Nubbins are isolated coral fragments allowed to grow two-dimensionally over a flat artificial support. Arrays of nubbins growing under different combinations of light and food supply, and water movement and water quality, will enable scientists to determine optimal conditions for several hard coral species, such as the branching coral Stylophora pistillata. Improved methods will also be developed for the identification and treatment of coral diseases, for transporting corals, and for acclimation procedures in new environments.

Breeding coral

Corals have been actively cultivated in tanks for about 20 years. They reproduce by two methods in captivity: cloning and sexual reproduction. Cloning involves breaking off a section of coral to start a new colony. The Coralzoo project will establish the preferred conditions for obtaining and growing new colonies through cloning. However, to maintain a high genetic diversity among corals, sexual reproduction through spawning is also required. Spawning is a spontaneous event in captivity, however, and little is known about its induction. Simulating the conditions that induce coral spawning is one of the biggest challenges facing the Coralzoo project. Protocols for asexual and sexual breeding will form the basis for a coordinated European breeding programme for hard corals.

Better reef displays

A number of public aquaria are directly involved in the project. Their tanks will be used as pilot systems to test out new protocols. However, the whole industrial sector – that is, all members of the EAZA – will benefit from the project. In addition to a book of protocols for coral husbandry and breeding, a key part of the Coralzoo project will involve the training of public aquaria staff. All aquaria will potentially benefit

Adult colony of Stylophora pistillata. *© Shai Shafir*

"Simulating the conditions that induce coral spawning in aquaria is one of the big challenges for the Coralzoo project."

from the establishment of large stocks of coral colonies with natural growth forms. The project will help aquaria to maintain spectacular, healthy and representative coral reef communities. This will improve the quality of exhibits in European zoos and aquaria, drawing in more crowds and increasing European competitiveness in this sector.

Conservation benefits

The Coralzoo project will contribute to the conservation of wild corals, as European aquaria become self-supporting in coral stocks. However, destructive large-scale harvesting of corals still goes on, for example, to supply the ornamental trade. One project partner, Red Sea Corals, Israel, is involved in this trade, but has started to breed corals in captivity. They will implement research findings to reduce pressure on natural environments and to decrease the high mortality that can occur during coral transportation. It is expected that the project will stimulate a further shift towards production of captive-bred corals within the ornamental trade.

Project title

The development of an SME-friendly European breeding programme for hard corals

Contract number

CT-2005-012547

Start date

01/06/2005

Duration

48 months

Total project cost

€ 3 224 182

EC contribution

€ 2 610 278

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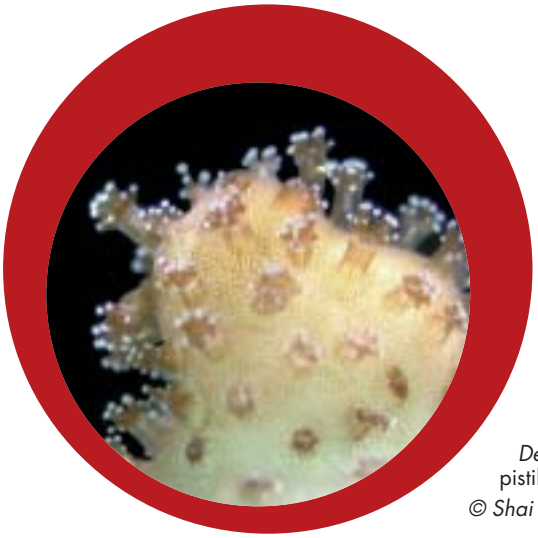
7 EMIH (UK)
8 Costa Edutainment SpA (IT)
9 Astridplaza N.V. (BE)
10 Red Sea Corals (IL)



Detail of a young colony of Stylophora pistillata *(a few months after nubbing).*
© Shai Shafir

A chipboard for the 21st century

DIPP

"The recycling of old furniture made of particleboard is really important – we can no longer just dump it in landfill sites."

Chipboard is a ubiquitous material used in all types of modern furniture from kitchen units to office suites. Yet furniture-makers – most of them SMEs – report that the quality of supplied chipboard has fallen in recent years due to the increased proportion of recycled materials. DIPP, a Collective Research project including SMEs, trade associations and research centres from seven countries, aims to devise new ways of manufacturing strong, lightweight chipboard panels from recycled materials while, at the same time, reducing the impact on the environment. The new materials should give European SMEs a competitive edge in a global market.

The chances are that wherever you live you are surrounded by chipboard. It may be in the floor, shelves and cupboards, in your desk or in the kitchen. Chipboard (also known as particleboard) is a very common material in construction and furniture-making because it is cheaper than wood, has more uniform properties and does not warp. It is made from small wood chips glued together under heat and pressure with a binder such as adhesive or resin, and is supplied in large, smooth boards called panels.

Chipboard is now a staple of the modern furniture industry where it can be laminated with a range of attractive and hard-wearing finishes often closely resembling natural wood. Many of the 'flat pack' items sold by furniture stores and assembled at home are made from chipboard, as are the carcases of kitchen units and a wide range of office furniture. About 45 million cubic metres of chipboard are produced in the EU every year.

Quality problems

One advantage of chipboard is that it can be made with recycled materials, such as wood waste. Discarded furniture itself is now a common source, which means that old chipboard is being used to make new chipboard. While this practice seems environmentally sound, furniture-makers report that modern chipboards are not as good as they used to be. They are denser and weaker, meaning that thicker and heavier components are needed to achieve the same strength. It is also common to find foreign bodies such as metals and glass within the panels. Recycled panels are harder to work than those made from new wood, and drills and cutters are wearing out faster than they used to. Machine manufacturers now have to supply diamond-tipped tools for working chipboard, which adds to the production costs.

Cosmob is a furniture technology centre serving about 220 companies in the Marche region of Italy. So many SMEs (small and medium-sized enterprises) were reporting chipboard problems that Cosmob put together a proposal to tackle the problem on a European scale. The EU furniture sector is dominated by 90 000 SMEs, none of which is big enough to attempt to solve this problem alone. The result is DIPP – a Collective Research project to develop improved types of chipboard for the furniture industry.

Better mechanical properties

DIPP has two aims. The first is to make panels which are stronger, yet less dense and more workable than today's panels. The second is to reduce the environmental impact of the whole process. Vast amounts of chipboard furniture are discarded every year and the new chipboards themselves should be easier to recycle and could also be used as a biomass feedstock for energy recovery processes. The project will look at innovative sources for recyclable materials, new binders and improved production and quality control.

The project is extremely well supplied with research expertise. Germany's Fraunhofer Institute will investigate the process of making panels and perform laboratory tests, while Italy's CNR-CTP will lead on binder research along with Cidemco in Spain and Campec in Italy. Aidima in Spain, a similar organisation to Cosmob, will provide laboratories for mechanical tests. CTBA in France is a major centre for research into wood materials for the furniture sector and Universitá Politecnica delle Marche will monitor panel production processes. Two large enterprises Falco (a panel-maker) and Biesse (a maker of woodworking machines) will act as RTD performers as well and provide research facilities on their premises.

Competitive edge for SMEs

The other partners include SMEs at all points in the value chain; some of which make panels, others apply veneers, laminates and other finishes, while others are makers and suppliers of furniture. Also taking part are several trade associations –

Office furniture.

"It is not a matter of research centres giving technologies to SMEs, but SMEs asking for technologies to solve real problems."

IVTH, Assindustria Pesaro-Urbino, Medifa and Innovawood along with Cosmob and Aidima – whose personnel have a deep knowledge of the furniture industry and will be able to monitor and guide the research work to ensure that it meets the needs of the SMEs. They will also be involved in testing and will support and organise dissemination and training activities.

If the project is a success, then the targeted SME community will have access to a range of superior materials that will enhance the quality of their products, leading to more business opportunities and expanded markets. The new, strong, lightweight boards may also allow greater creativity in design, such as the use of curved panels.

European furniture-makers are starting to face strong competition from Far East countries, especially in export markets. Customers expect higher quality and many are becoming more conscious of environmental issues. By taking the initiative to develop new and improved materials, European SMEs should be able to keep their heads above water in what is becoming a very competitive international market.

Project title
Development of innovative particleboard panels for a better mechanical performance and a lower environmental impact

Contract number
CT-2005-012609

Start date
15/09/2005

Duration
36 months

Total project cost
€ 2 850 750

EC participation
€ 1 782 375

Instruments for the emission of formaldehyde.

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Remoulding the plastics industry

"Our group brings together the mixture of chemical and electrochemical expertise that we hope will be able to deliver a unique innovation."

The aim of the Dynamic project is to adapt the established technique of reaction injection moulding for the creation of components made from thermoplastics. The key research challenge is to develop new sensors to detect the progress of chemical reactions that form the plastics within a mould. Success will allow companies to expand the range of plastics they can use for specific applications, while reducing capital investment costs and creating more environmentally friendly processes. Maintaining the international competitiveness of the European plastics industry will depend on technical innovations such as those offered by the Dynamic project.

Reaction injection moulding (RIM) is a process for making plastics that depends on chemical reactions occurring after the starting materials have been injected into a mould. The partners of the Collective Research project Dynamic are hoping to develop technology allowing RIM to be applied to a wider range of plastics and more diverse products than is currently possible. Success will bring both commercial and environmental benefits.

The thermoplastic challenge

Plastics come in two basic forms: thermoplastics, which soften on heating, and thermosetting plastics that do not soften but may actually harden when heated. At present, the RIM technique is only commercially applied to the formation of thermosetting plastics. The key aim of the Dynamic project is to find ways to make RIM work with thermoplastics on an industrial scale. This would greatly extend the versatility of this technique, permitting greater use of thermoplastics to make composite materials. The environment would also benefit because it is much easier to recycle thermoplastics than it is to recycle thermosetting plastics.

Previous work in the field has made it clear that success will depend on getting the plastic-forming reactions to proceed within the mould in a manner that can be closely monitored. Without precise feedback the material would generally be left in the mould too long, producing an uneconomical product.

Crucial sensors

The key requirement is to develop new 'dielectric sensors' to detect the progress of the chemical reactions inside the mould. This would allow the reaction to be effectively controlled, and would enable operators to know exactly when the reaction was complete. Getting this time right is crucial from both a chemical and commercial point of view. Chemically, it is important to produce plastics with the correct properties. Commercially, it is important to avoid delays in production. The partners hope to achieve cycle times through the mould in the region of 45 seconds, instead of the three minutes or more that would be required if attempting the procedure without suitable sensors.

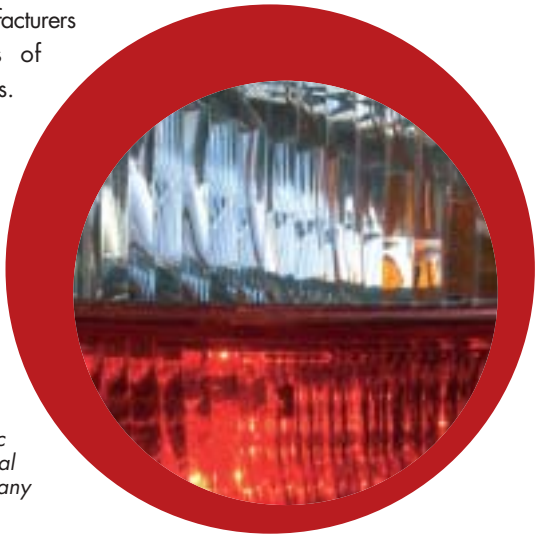
In addition to perhaps a three-fold advantage in production output, the research undertaken by the project will also lead to other advantages as a result of the insights into polymer chemistry that should be gained. The partners hope to develop a better understanding of, and control over, the viscosity of the plastics as they form. This should allow lower pressures to be applied to the materials, increasing the efficiency and versatility of the technique, and minimising waste. It should also reduce energy consumption which, in any case, will be lower due to the faster throughput that uses less energy per part.

Another expected advantage is that the process should be applicable to smaller-scale machinery, thereby reducing capital costs for companies that invest in it.

From concept to market

Most of the research will be performed by Pera Innovation Ltd of the UK, the National Technical University of Athens, and the Université Claude Bernard in Lyon, France. These research partners will initially focus on working with 'polyamide' materials such as nylon and a 'polyester' product known as CBT. The first step will be to develop and test appropriate sensors to report on the chemistry in the mould, and get them working on a laboratory scale.

The next stage will be to scale up the innovation and to perform commercial-level trials. The expertise needed to advise on the scaling up process and to perform the trials will come from the SME (small and medium-sized enterprise) partners. These include various companies, including electronic instrument manufacturers, processing machinery manufacturers and producers of plastics products. They are based in France, Greece, Poland and the UK.



Plastics and plastic composites are vital components for many industries.

"We hope to make using the best thermoplastic composite for many applications both economically viable and environmentally sensible."

The industry associations or groupings are led by The Composites Processing Association of the UK which are coordinating the project. They are joined by the European Association of Innovating SMEs and the Association of the Hungarian Plastics Industry. These partners will oversee the eventual dissemination of the results throughout the more than 1 000 operators within the European plastics industry that might benefit from the project.

The annual RIM market is predicted to reach €700 million in Europe, and €1 300 million worldwide by 2008. Much of this market is served by SMEs, because so many of the applications are highly specialised. These small-scale companies will gain particular benefit from the reduction in the capital outlay for the equipment that a successful Dynamic project could offer. It is also likely, however, that larger companies will be interested in the results, and the long-term impact of the project could be widespread.

Project title
The Closed Loop, Active Control of Reaction Dynamics, through Dielectric Monitoring, Enabling Greater Competitiveness of the European SME Plastics Processing Community

Contract number
CT-2005-516258

Start date
01/10/2005

Duration
36 months

Total project cost
€ 2 360 906

EC contribution
€ 1 382 255

Thermoplastic fibre

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Better future for welding

ECONWELD

"Making welding safer and less strenuous will improve productivity."

Welding is a vital part of metal product manufacturing. But welding can be strenuous and exposes workers to potentially unhealthy fumes. Over the years this skilled profession has become less attractive to new workers and the industry itself is subject to intense competition. Econweld will address both these problems by investigating the ergonomics and economics of welding. It will develop new prototype welding equipment that will improve productivity and health and safety aspects. This will boost the competitiveness of SMEs in the European welding sector and improve the attractiveness of welding as a career for young people.

The metal-working sector of manufacturing has an annual turnover of € 970 billion and represents 8% of the total EU business. Within the sector, welding is the most important metal joining process and provides work for about 730 000 full-time employees with a further 5.5 million welding-related jobs across Europe. The European welding industry is currently facing strong competition from low wage countries that are attracting business from Europe. This has led to a decrease in European welding and welding-related jobs of around 3% per annum – effectively a loss of employment for some 165 000 people across Europe.

In addition, welding is a highly physically demanding occupation and can have a significant impact on health, leading to high levels of sickness absence. The average annual sick leave is in the order of 160 working hours per welder; high sick leave costs are a significant financial issue for SMEs (small and medium-sized enterprises), further endangering their competitiveness.

The Econweld Collective Research project aims to address a number of competitiveness issues in European welding to benefit industry and help to improve working conditions for its skilled employees. This will help present the welding profession as an attractive option for new workers. The project has some ambitious targets: to reduce welding costs by 5-20%, to improve production by 10-15% and reduce sick leave for welders by 50%. This last objective means, in effect, ten extra working days per welder per year and a further boost for productivity. In addition, the researchers will work on virtual welding systems to improve design and welding efficiency, and will produce promotional literature to encourage young people to consider a career in welding.

Safer and more efficient

The project will devise new economic solutions to increase mechanisation of mundane welding processes, including appropriate use of flexible robotic systems. The benefits of alternative (high-speed and/or high-deposition) welding processes will also be demonstrated.

The efficiency and safety of manual welding will be improved by examining ways of reducing welding fumes and, most importantly, launching the first comprehensive examination of the ergonomics of welding. This area will consider best practice in welding techniques and look to develop new welding torches – together, these will make work with welding tools much easier and less strenuous.

Econweld hopes to reduce employees' exposure to welding fumes by 30% for Gas Metal Arc Welding (GMAW) and by 20% for other processes. This will be achieved by reducing welding fumes produced at the welding source through the adoption of new techniques such as dry welding, reducing the temperature of welding blades and use of other cost-effective shielding concepts.

A smart prototype of an exhaust arm that moves in conjunction with the welding operation will be developed as well as a prototype welding helmet with sensors indicating when fume concentrations exceed safety limits. Prototypes of welding torches with better ergonomics and integral fume extraction will also be developed. The aim of the work is to enable the European Maximum Allowable Concentration (MAC) for fume particulates to be reduced from 5 mg m^{-3} to 3.5 mg m^{-3}. This will be a major boost to health and safety for workers in the industry and should reduce sick leave.

Virtual welding

The development of virtual welding software (ViWeld) will also assist safety and efficiency by enabling prediction of ergonomics and fume production at an early stage of the design and production process. It will help work-flow management in busy welding shops.

Welding is a highly skilled profession.

"A happy welder is a productive welder."

The consortium behind Econweld is coordinated by the Dutch research organisation TNO and includes four other research bodies from Italy (University of Genova and the Italian Institute of Welding), Poland (The Polish Welding Technology Centre of Excellence at Gliwice) and Portugal (Lisbon Technical University). Four Industrial Association Groups, the European Federation for Welding, Joining and Cutting, the Dutch Institute of Welding Technology, the Hungarian Association of Welding Technology and Material Testing and the Polish Welding Association, will provide wider access to core SMEs groupings across the EU-25. In addition, ten SMEs offering a wide geographic spread across Europe and a diverse skills portfolio are directly involved in the project to provide feedback and experience.

Application of the results obtained in Econweld will give SMEs in Europe a much improved competitiveness and will also boost the image of welding as a profession. Recruitment and retention of skills in this area are of vital importance and Econweld will improve conditions to make welding much more pleasant and attractive.

Project title
Economically welding in a healthy way

Contract number
CT-2005-516336

Start date
01/10/2005

Duration
36 months

Total project cost
€ 2 701 900

EC contribution
€ 1 713 448

Welding helmet.

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Raising the roof profile

EURACTIVE
ROOFER

"By upgrading the roofer's training and knowledge, we upgrade roofs, bring more sustainable systems into use and minimise the costs of failure."

Roofs are no longer just the covering on top of buildings; 'active roofs' are complete systems involved with weather protection, ventilation, lighting, heating and cooling, solar energy, insulation, safety and maintenance devices. It follows that the roofers who build, assemble and maintain 'active' roofs need many more skills than ever before. The Euractive Roofer project enables thousands of SMEs in the roofing trade to benefit from advances in design, construction and fitting, thereby upgrading the knowledge of roofing specialists and raising the value of their input to the building industry.

Until now, traditional roofing has been an essential but limited part of the building trade – roofers have delivered and fitted well-known, conventional products like roofing tiles or asphalt. But today, roofing has the potential to house diverse systems and products which offer a whole range of services to the building. In effect, the roof has become an active system – an 'active roof'. While this is a novel idea, it is much more than just a roof with added gadgets. Offering the many thousands of SMEs (small and medium-sized enterprises) in Europe's roofing trade the opportunity to gain the skills needed to install and maintain active roofs, the project will give added value both to their services and to the SMEs themselves.

What's up in the roof?

Active roofs have the potential to contribute significantly to the quality of the living space in the building, both immediately under the roof (for example, by offering insulation, ventilation or light) and in the whole building (through the contribution of photovoltaic energy from solar panels to provide electricity and hot water). They can also offer safety features for the benefit of roofers working on them, and intelligent devices to detect leakage or condensation.

However, at present the quality of these various components, when installed in a roof, is less than adequate because they have developed much faster than appropriate quality standards. Potentially good new features can under-perform through poor installation by inexperienced roofers, leading to leakage and damage. Failure costs in the EU, which are preventable, are estimated at € 2bn per year, plus perhaps as much again through damage to building interiors. The problem is often worse when new roof products are fitted to older, existing roofs because they were never designed to support and withstand the stresses of extra components. At present, there is insufficient data on the physical interaction between traditional roofs and roof-mounted components. And on top of these difficulties, in various parts of Europe the roof with its fittings may be subjected to driving rain, wind, freezing and thawing, or even seismic movement.

A better standard of roof

The Euractive Roofer Collective Research project will address these problems in several different ways; bringing together the expertise of universities or other research institutes, national and international roofing associations or groups, and SMEs working in roofing and solar panel installation. Its main objective is to help these companies to meet the new demand for integration of roof fittings and to upgrade their skills and services to enable them to deliver entire active roofs.

One of the key areas is to develop knowledge, performance criteria and methods of assessment for the effect of the environment on different types of roofs. This should enable the consortium to develop best practice guidelines and pre-standardisation documents, which will contribute to the standards-making processes of CEN and EOTA (European Organisation for Technical Approvals). The research will include wind-tunnel and full-scale studies, and numerical modelling. This work is vital as at present building specifications vary considerably from country to country. Traditional pitched roofs in particular have strong national and regional features, and existing national building standards lack provision for new products built into roofs.

Euractive Roofer will develop a database on regional building styles and climate, which will be available to roofers, together with examples of best practice which will be demonstrated in real buildings at four European locations as an example and inspiration. Guidelines for installing new roof products will be developed, and the project partners estimate that this will reduce the number of reported roof failures from 20% at present to 5% within five years. Best practice examples for maintenance and safe working at a height will be developed, and most importantly, national programmes will offer training for roofers in the installation and maintenance of integrated roof systems.

Impact

The results of the project are expected to make a material difference to the outlook for roofing SMEs in Europe. About 160 000 SMEs

Roofing products installed in an amateurish way

"With these new skills, an SME constructing an active roof with all its components would be a more mature partner for a contractor or building owner."

currently operate roofing services in the EU. Project participants estimate that upgrading a roofing company from laying roof tiles to delivering a total roofing system with multiple components would raise their turnover by a factor of six, while including solar energy fittings would raise it by a factor of 27. The vast potential for the industry to improve its value to the public is only achievable at a European level because of the need for a wide range of skills to develop the necessary infrastructure and training. The project will also contribute to meeting EU targets of increased use of sustainable energy.

Project title
EURopean performance requirements and guidance on Active Roofs

Contract number
CT-2005-012478

Start date
21/07/2005

Duration
36 months

Total project cost
€ 4 081 053

EC contribution
€ 2 571 080

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A much more professional approach: the active roof.

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Keeping a close eye on fish

"The overall quality of wine has got a lot better in the last ten to 15 years. Why? Better practices. We are looking to do exactly the same in our field."

High numbers of malformed fish can cause severe financial losses for small and medium-size enterprise (SME) growers of almost all aquaculture species across Europe. The similarity of malformation symptoms across different fish species and culture environments implies a general effect within rearing conditions. A wide-scope research effort is needed to identify the causes and develop solutions. With 19 partners in nine countries, the Collective Research Finefish project aims to generate new scientific and practical knowledge to help SME hatcheries reduce the incidence of malformations in the major fish species used in European aquaculture production, thus increasing yields.

Fish are an important component of a healthy diet, and regular consumption helps combat obesity-related diseases which have the heaviest cost impact on health services in the European Union. Consumer demand for seafood is mounting steadily. However, as the tonnage of landed ocean fish declines almost yearly, for a variety of reasons, Europe's fish farmers have struggled to fill the gap. European Union fish farming generated revenues exceeding €2 million in 2002, on an estimated 600 000 tonnes produced in the EU, and accounts now for about 15% of total EU fish production, up from 12% in 2002. Since many hatcheries are already working to full capacity, one of the best ways to improve production is to increase their performance and efficiency.

During 2003-2004, the Federation of European Aquaculture Producers (FEAP) conducted a series of small workshops to assess the health of Europe's varied fish-farming sectors, including growers of Atlantic salmon, carp, rainbow trout, sea bream, bass, cod and other species. During these gatherings, hatchery managers from across Europe reported high levels of skeletal, backbone and gill malformations in fingerlings – juvenile fish about the size of a human finger. Since malformed fish cannot be sold to consumers, and thus have to be discarded, they represent a major source of financial losses for SME hatcheries and growers. Another related problem that came up was that food conversion efficiency had decreased, i.e. production efficiency had declined because stressed, malformed fish consume more food.

Healthier fish, better yields

The main conclusion coming from the coordinator FEAP's workshops was that a major study was needed to assess these problems and find solutions. The Finefish (Reduction of malformations in farmed fish species) Collective Research project aims to accomplish these objectives, joining ten top European fish hatcheries with scientists specialising in fish development, for a long-range study of the health of young fish. Project research and technology (RTD) partners include the Centro de Ciencias do Mar do Algarve, of Portugal, the UK's Royal Veterinary College, the Israel Oceanographic and Limnological Research and Akvaforsk of Norway. SME hatcheries include Tinamenor, of Spain, Andromeda, of Greece, Viviers de France, and the UK's Brow Well Fisheries.

Combining scientific know-how with hands-on experience, the Finefish partners plan to conduct a series of studies covering the major species in European aquaculture production to examine possible causes of malformation. They will employ state-of-the-art morphological methods as well as molecular tools and diagnostic procedures. With data from a hatchery monitoring system, they will establish a benchmark for malformations that will allow scientists to calibrate how certain factors, changing a feed nutrient for example, reduce or increase malformations.

Since fish do not have selective digestive processes like humans, they assimilate what they eat. An incomplete diet will thus be reflected in the state of the adult fish. The question is, at what point does this happen – at the egg, larvae or fingerling stage? Scientists will concentrate on early-life nutritional quality and its impact on bone mineralisation of both starter and grower diets. They will consider the hatcheries' physical conditions: tank design, gas supplementation, hydrodynamics and temperature. What direction do the fish swim in? How much light do they get?

The project is the sector's first large study. Unlike chicken farming, which uses the same species throughout the industry, fish farming deals with many different species, providing a complex problem. For example, the biological parameters affecting morphological development of salmon are very different from those of bream or bass. Much less work has been done on studying fish than on chickens – which is not that surprising since poultry is sold in far higher volumes.

"The project includes ten top, very professional hatcheries from across Europe, widely varying in size."

Finefish aims to facilitate interaction among partner SMEs, industry association groupings (IAGs) and scientists to ensure that it addresses the fish-farming industry's RTD needs. The project will disseminate results, using FEAP's network, throughout the European fish-farming sector and scientific community. It will develop a web portal, and a collective training programme for SME personnel.

The main objective is to provide SME growers with practical guidelines on how to avoid malformations and produce better quality fish and improved production yields. Fingerlings make up as much as 20% of the overall costs for growers in some sectors. Reducing that cost can lead to lower consumer prices for fish. Another possible result could be the supply of more effective, healthier fish feeds.

Project title
Reduction of malformations in farmed fish species

Contract number
CT-2005-012451

Start date
17/10/2005

Duration
36 months

Total project cost
€ 4 789 739

EC contribution
€ 3 022 611

Close-up of a fish larva with a malformed jaw.
© Courtesy of Akvaforsk

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Fast plastic

FREEFLOW

"If you can make these processes faster and easier then less energy will be used, so the environment will benefit as well as the companies."

The Freeflow project is working to help the European plastics extrusion industry to increase production rates and reduce processing temperatures and energy consumption. This promises significant commercial and environmental benefits. The research partners are adapting extrusion equipment to allow carbon dioxide gas to be introduced into the material. This will assist the process and allow new processing steps, that are not currently feasible, to be exploited, adding value to Europe's plastics industry. After testing by SME partners, widespread adoption of the improved technology could help European plastics manufacturers resist the growing competition from abroad.

Products made from plastic are an essential part of the modern world. Anything that improves the efficiency of their manufacture could have a big impact on the companies involved and the economy at large. Achieving such an advance is the principal aim of the Freeflow project.

A key technology in plastic manufacture is the extrusion process, whereby the molten plastic is forced through dies or tooling which impose the desired shape on the material. The partners involved in this Collective Research project are exploring a new method for extruding plastics that offers savings in costs and time, in addition to environmental benefits.

Faster with gas

For some time, it has been possible for plastics manufacturers to use compressed carbon dioxide gas (CO_2) to create a foam effect within certain types of plastic. This has proved useful to control such factors as density and weight, but it can only be applied when the resulting internal foamed structure is either desired or can be tolerated.

Two of the Freeflow project partners, Rapra Technology Ltd and Queens University in Belfast, have shown in the laboratory that plastic extrusion equipment can be modified to enable compressed carbon dioxide to assist the extrusion process, without creating a foamed product. They and other users have discovered that the CO_2-based system can reduce the viscosity of the plastic, which opens up the potential of processing it at lower temperatures and therefore reducing energy costs. Working at lower temperatures can also permit faster processing times, and can allow processing steps that are not possible at higher temperatures because the plastics may suffer from chemical degradation or other drawbacks.

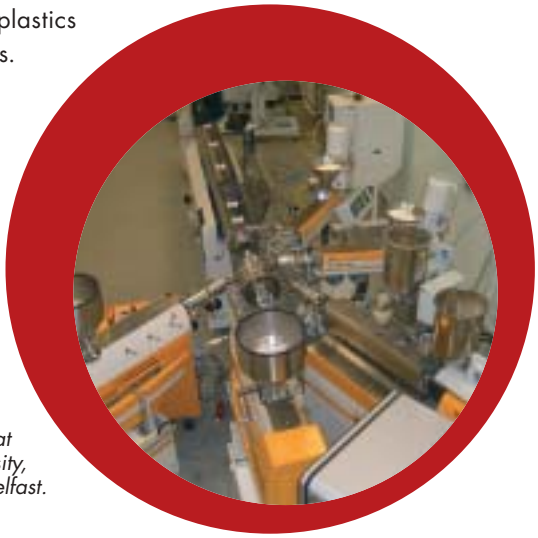
These insights have prompted the Freeflow project to be set up, to explore the potential of the beneficial processing effects of using CO_2, without an accompanying foam structure. Achieving this would greatly expand the range of applications in which the gas-assisted process would be useful.

Moving out of the lab

The possibilities have already been demonstrated on a laboratory scale, so the research undertaken during this project is intended to scale-up the development on an industrial-size extruder, allowing the full commercial potential to be realised. This work will be largely carried out by the three research partners: Rapra Technology, Queens University Belfast and Aimplas of Spain. Queens University will be responsible for most of the extrusion trials, which will involve exploring a range of different modifications to the equipment and using different polymers and processes to discover which is optimal. This practical work will be assisted and supported by the research and development expertise available at Rapra Technology and Aimplas.

The resulting technology will be tested by the five SME (small and medium-sized enterprise) partners, which all use plastic extrusion but with different applications or materials. These trials should reveal which processes and materials are most suited to the technology. They will also identify if any problems which arise are specific to certain applications. Feedback from the SME trials can be expected to permit further modifications by the research partners until the process is optimised for a variety of real-life uses.

Working together, the research and SME partners should discover where the greatest commercial and environmental benefits lie. The partners hope that the system will be widely applicable to many of the most common plastics and applications.



Experimental extrusion line at Queen's University, Belfast.

"We are trying to keep the European plastics industry competitive and at the forefront of technology."

Maintaining competitiveness

The remaining partners in the project are industry associations or groupings that are ideally suited to the eventual task of disseminating the project's findings amongst the enormous variety of European SMEs and other enterprises that might benefit from it.

The SME partners in the Freeflow project should gain commercial benefits by having first access to a technical advance that will let them make their products faster and cheaper. The subsequent transfer of these benefits throughout the European plastics industry will contribute to keeping the industry competitive in a market that faces increasing challenges from Asia, where labour costs are much lower. A significant transfer of plastics production to these foreign markets has occurred in recent years. Technical innovations, such as the one targeted by the Freeflow project, will be essential to slow or reverse that trend.

There are approximately 1 100 plastic extrusion operations in Western Europe alone, extruding some 10 million tonnes of thermoplastic each year. The European environment will therefore also be a big winner if Freeflow can enable all this activity to be performed in a more energy-efficient manner.

Project title

The development of a high output processing method for the extrusion of solid thermoplastic sheet and profile

Contract number

CT-2005-516225

Start date

01/09/2005

Duration

36 months

Total project cost

€ 2 513 852

EC contribution

€ 1 394 597

Extruded material.

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10 Yelkenciler Makina San Ve Tic Ltd Sti (TR)
11 Agor GmbH & Co Kg (DE)
12 Presearch (UK)
13 British Plastics Federation (UK)
14 Queens University Belfast (UK)

Temperature tag for food freshness

FRESHLABEL

"This product will make it possible for the consumer to know whether the food has been correctly handled."

New European Union regulations require the food industry to establish traceability of the cold storage chain to ensure that food products keep their freshness en route from farm to fork. As from 1 January 2006, the new food hygiene and safety regulations are part of a broad EU effort to restore consumer confidence in the food supply, following several contaminated-food episodes. With 21 partners from eight countries, including one from Israel, the Collective Research Freshlabel project is aimed at developing temperature-sensitive tags to give small and medium-size enterprises (SMEs) an inexpensive method for verifying that cold storage temperatures are correctly maintained at all points along the food chain.

Sales of chilled and frozen food products have grown rapidly in the European Union in recent years. At the same time, outbreaks of contaminated food linked to improper product handling – sometimes causing serious illnesses, even death – have multiplied. These cases have dented public confidence in the EU's food supply. In response, the Commission has heightened scrutiny of the industry. On 1 January 2006, strict new EC food and feed hygiene laws (Regulations 852/2004, 853/2004, and 854/2004) established technical requirements on infrastructure and equipment, food handling, water quality, and maintenance, including traceability of the cold chain. The EC also established enforcement mechanisms and penalties.

Tell-tale indicators

Spoilage of fresh, chilled meat and fish food products mainly stems from breaks in the cold chain during transport and storage. Since many different people and companies handle these products along their way to the consumer, it is currently impossible to ensure that correct storage temperatures are maintained throughout. The Freshlabel (Integrated approach to enable traceability of the cold chain of fresh, chilled meat and fish products by means of tailor-made time/temperature indicators) project aims to develop time-temperature indicator (TTI) tags that provide consumers and inspectors with clear visual information about the freshness of chilled and fresh meat and fish products. This does not include frozen food products.

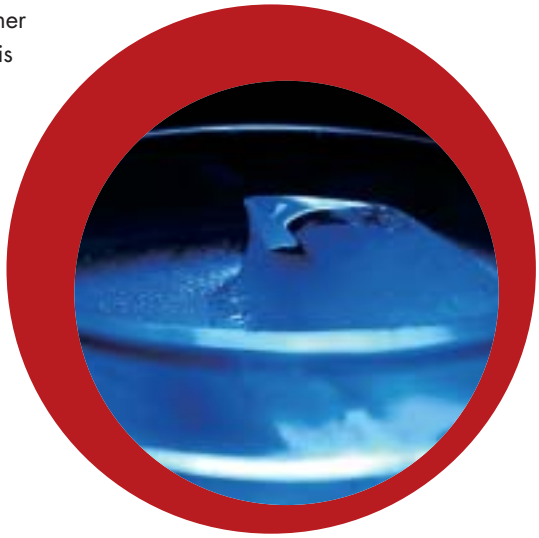
Led by the research and technology developer Technologie-Transfer-Zentrum, of Bremerhaven, Germany, the project will use TTIs from the Israeli SME partner FreshPoint Quality Assurance. Other RTDs include National Technical University of Athens and Rheinische Friedrich-Wilhelms-Universitat of Germany, as well as the Technical Research Centre of Finland VTT. The project will optimise TTIs for eight specific meat and fish products of partner SMEs, including the Centro Frigorifico Conservero of Spain, French meat wholesaler Covial, and wholesaler Kuopion Kalatuote of Finland.

Freshlabel's industrial association/grouping (IAG) partners range across Europe, including France's Syndicat National de l'Industrie des Viandes, Finland's Pro Fish Association, the Norwegian Seafood Association and, from Germany, Bundesverband der Deutschen Fischindustrie und des Fischgrosshandels, and Budersverband der Deutschen Fleischwareindustrie.

Already used by the pharmaceutical industry, the type of TTIs used by the Collective Research project will be based on organic microcrystals that react to changes in temperature over time by losing colour, thereby indicating the freshness of temperature-sensitive products. The crystals turn dark blue when exposed to ultraviolet (UV) light. The amount of UV light applied – more light absorbed means a longer time for the tag to lose its colour – will be calibrated during production, according to specific food products' relevant parameters, such as temperature requirements and shelf-life. Parameters will vary widely for various fish, meat and other products. The crystal will be encased in transparent plastic foil to block UV light, to prevent further colouring. The tag can either be part of a product's packaging or label.

Hypothetically speaking, the tag crystals in a product could be calibrated to keep their colour for five days at a temperature of 4°C. If the refrigerator unit in a transport truck broke down along the way from warehouse to supermarket, exposing the food products inside to a temperature of 20°C, for example, the TTI's colour would change to clear in just one day, indicating probable spoilage. Tag information is irreversible.

Used properly, TTIs can significantly improve traceability of the cold chain followed by these food products, increasing food safety and satisfying the new EC regulations.
Consumers will be able to easily see whether a food product is



"It is very important to integrate the SMEs and IAGs. That's the way we can disseminate the final product."

fresh or not, so this should help restore some of their confidence in the food supply. However, TTIs will not detect other kinds of contamination caused by hygiene problems when the product is manufactured, chemical contamination, or deliberate tampering.

Once trained by Freshlabel, participating IAGs will have the job of disseminating use of TTIs to their own SME members. The goal is widespread use of TTIs among all SMEs in the European Union working with fresh, chilled fish and meat products. Partner SMEs, which will help design the tags, will be the first able to use the indicators, giving them an initial, although temporary, advantage over competitors. Later, partner SMEs will be able to purchase the tags under favourable conditions.

Project title
Integrated approach to enable traceability of the cold chain of fresh, chilled meat and fish products by means of tailor-made time/temperature indicators

Contract number
CT-2005-012371

Start date
15/09/2005

Duration
36 months

Global project cost
€ 2 318 663

EC contribution
€ 1 545 186

A TTI tag used to indicate freshness of a pack of ground beef.

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European greenhouses grow more energy efficient

"Improvements in greenhouse design will cut energy use and cost and improve growers' competitivity."

The European Union is the world's top grower of greenhouse products, with an estimated 41 000 hectares under glass. However, greenhouse farmers are facing stiff price competition from foreign growers as well as strict new EU regulations aimed at reducing the high use of fossil fuels which is contributing to global warming. With 27 partners from 11 EU countries and Romania, the Collective Research Greenergy project aims to help Europe's SME greenhouse businesses streamline energy consumption, to cut costs to compete more effectively against foreign competition, and to become environmentally cleaner.

Greenhouses enable farmers to cultivate tender plants and plants grown out of season, protecting them from excessive cold or heat, and balancing the moisture and light they need. The systems they use to circulate steam, hot water or air in winter, and ventilators and fans to reduce summer heat, often burn fossil fuels, a major expense and a source of global-warming emissions of carbon dioxide. Subject to climate change agreements, such as the Kyoto Protocol, and the EU Integrated Pollution Prevention and Control Directives (96/61/EC), the sector will soon be required to use energy much more efficiently to reduce its output of these gases.

At the same time, as Eastern European markets open up, EU greenhouse growers have been able to capitalise on this nearby source of business, benefiting from lower transportation costs compared with foreign competitors. Consequently, Europe has become the world's leading consumer of greenhouse products, which include tomatoes, cucumbers, peppers, as well as flowers. However, European producers' tenuous hold on their own market is under threat from rising fuel costs and price competition from foreign growers able to produce at a lower cost. Unlike field agriculture, which bases production costs on hectares, greenhouse farmers calculate costs per square metre of growing area or per plant. These costs represent around 78% of the total chain cost of greenhouse operations, with energy consumption the largest expense.

Twofold target

The Greenergy Collective Research project aims to help European greenhouse-grower SMEs tackle these two related problems at the same time. It will help reduce energy consumption by improving greenhouse design, technology and operating procedures, which will make them more competitive and cleaner for the environment. The project draws on advanced agricultural and scientific expertise from throughout Europe, with scientific management provided by the research and technology developer (RTD) Technologie Transfer Zentrum Bremerhaven of Germany and administrative oversight by the Panhellenic Confederation of Unions of Agricultural Cooperatives of Greece.

Other partner RTDs include the UK's Horticultural Development Council and the University of Hertfordshire, the Estonian Agricultural University, Universidad de Almeria of Spain, Universitatea Politehnica din Timisoara of Romania, as well as Wageningen Universiteit of the Netherlands, and the Danish Royal Veterinary and Agricultural University.

The three-year project, which held its inaugural meeting Thessaloniki, Greece, in October 2005, will kick off by reviewing current energy use by European greenhouses in different climatic regions. It will use its findings to devise a comprehensive plan for SMEs to adopt modern cost-reduction strategies, such as standardisation and benchmarking. A chief objective is to develop a software package that will enable growers to see, with graphs, charts and other on-screen tools, how they are using energy. The application will propose potential energy savings which farmers could achieve with various types of technology, weighing energy gains against economic impacts.

Raising standards

Greenergy will assess possible technical improvements to greenhouses, such as cogeneration of heat and power, solar and wind power, biomass fuel like wood chips, and aquifers to store heat and/or cold underground. Structural improvements could include better glass insulation, for example, newer plastic films containing infra-red inhibitors to reduce thermal radiation loss, and energy screens. Automated climate control could optimise heating, ventilation and lighting, using sensors, temperature integration and automated heat screens to respond to daylight levels. The project will conduct case studies taking into account current and upcoming European environmental legislation, and will propose a European quality standard for energy use in European greenhouses.

The SME members, including Bioazul of Spain, Hevi-Kolmio of Finland, and Gärtnerei

Greenhouses require large amounts of energy to maintain temperatures.

"Greenergy will help reduce energy consumption by improving greenhouse design, technology and operating procedures, which will make them more competitive and cleaner for the environment."

Paetz of Germany, will contribute practical knowledge and help test tools developed by the project. Industrial/association groupings (IAG), such as the UK Tomato Growers' Association, Asociación de Cosecheros Exportadores de Frutas y Hortalizas de Almeida of Spain, and the Finnish Glasshouse Grower Association, among others, will ensure that findings and tools are disseminated to their SME members across Europe. The European Commission will contribute about 72% of Greenergy's estimated budget of € 2.437 million.

Project title
Energy optimisation in European greenhouses

Contract number
CT-2005-012566

Start date
10/06/2005

Duration
36 months

Total project cost
€ 2 437 913

EC participation
€ 1 751 622

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4 Finnish Glasshouse Growers Association (FI)
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6 Estonian Horticulture Association (EE)
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Reducing risks in heat-treated processed foods

ICARE

"Reducing these compounds in processed food products will have beneficial health effects."

The agro-food industry uses heat treatment to produce many flavours, tastes and colouring in its products. However, some by-products from this treatment, called neo-formed contaminants (NFCs), have been linked to possible deleterious health effects, including cancer. The recent discovery of neo-formed acrylamide in a variety of fried and baked foods has highlighted the fact that agro-food businesses, especially small and medium-sized enterprises (SMEs), are poorly equipped to confront this emerging problem. With 27 partners from eight countries, the Collective Research ICARE project aims to learn more about how NFCs form in processed foods, and to develop rapid, cost-effective methods to enable SMEs to monitor them during production.

The processed food industry makes extensive use of heat treatment to induce a chemical effect, known as the Maillard reaction, to produce hundreds of different flavour compounds and aromas. Discovered by the French biochemist Louis-Camille Maillard (1878-1936), the reaction normally occurs in food heated to very high temperatures, causing a non-enzymatic browning, as amino acids and sugars recombine. The phenomenon is responsible for the browning of bread and meat and gives us the colour of caramel, chocolate and beer, as well as the taste of French fries, toasted bread, artificial maple syrup, and many other things. It can produce antioxidants in food, which have beneficial health effects.

The Maillard reaction can also produce undesired effects, bitter flavours, spoilage, unwanted darkening and reduced nutritional availability of certain amino acids. A more serious, recently discovered problem, is that it can produce neo-formed contaminants (NFCs) which have been linked to serious health problems. A recent study found neo-formed acrylamide in a variety of fried and baked foods. Acrylamide can damage the nervous system and is carcinogenic in laboratory animals. As part of its wide-ranging food safety and security programme, the European Union wants to reduce these substances in processed foods. The problem is that SMEs in the food-processing sector lack the knowledge and analytical and technological tools to monitor and control NFC formation in their products during the heating process. EU regulatory officials, for their part, are unable to detect these substances in products or monitor their health effects.

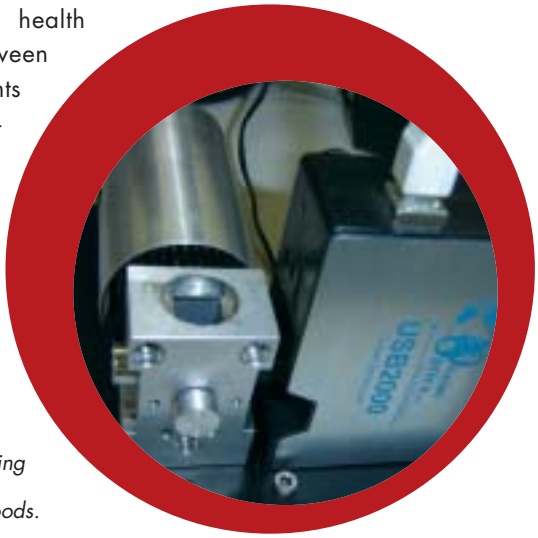
Collective care

These factors inspired the ICARE (Impeding neo-formed Contaminants Accumulation to Reduce their Health Effects) project. Led by the French Association de Coordination Technique pour l'Industrie Agroalimentaire, the project will combine the work of seven research and technology developers (RTD), 14 partner SMEs, and five European industrial association/groupings (IAGs) in an effort to boost the technological capacity and understanding of agro-food SMEs and EU government officials to monitor NFC formation in processed foods and find ways to control these substances.

The Collective Research project has three phases: in the first, RTD partners, including partners from the Czech Republic and Slovakia, among others, will develop tools for measuring NFCs produced in food by particular processes. These will be the basis of a quick, inexpensive method for SMEs to monitor these compounds during production, and for EU regulatory authorities to detect them in food products.

In the second phase, project researchers will attempt to quantify various NFCs in infant formulas, potato chips and cereal products, determine which heating processes produce them, and collect a database of their levels in foods, while seeking ways to reduce them. They will look for alternative industrial cooking methods that do not burn or brown products – for example, microwaving, and ohmic heating, which passes electrical current directly through the food to heat or sterilise it. Since the Maillard reaction has many desired effects, the object is to reduce NFCs, not the flavours, or the colour of beer, for example.

Finally, the team will conduct epidemiological clinical trials to determine NFCs' effects on human health. A group of young volunteers will be fed a diet emphasising foods for which the cooking processes minimise the Maillard reaction, such as boiled or steam-cooked dishes. Another group will receive a standard diet containing many fried and grilled foods. The scientists will compare data from both groups, looking for human markers of NFCs, as well as health effects, and attempt to correlate them. Another clinical study will try to determine any differences in health indicators between breast-fed infants and infants receiving sterilised or powdered formulas.



A prototype of a device for measuring neo-formed contaminants in foods.

"Awareness of these chemicals has only begun to take shape in the last five years or so."

On the right track

ICARE will attempt to determine the pathways that NFCs follow from foods into human tissue and fluids – for example, if they can pass from a mother's milk into her baby. They will examine how various foods, cooked in certain ways, cause these compounds to get into humans.

The Collective Research project will compile manufacturer's guidelines to help SMEs develop foods with reduced NFC levels, as well as economic studies and techniques to market these improved foods to the public. Partner SMEs will test results and any tools developed, in-house. Later, ICARE's IAG partners, representing 9 200 SMEs in all food processing sectors – including dairy, baking, and beverages – will be responsible for training their members and disseminating the project's findings, methods and tools, including guidelines.

Project title

Impeding neo-formed contaminants accumulation to reduce their health effects

Contract number

CT-2005-516415

Start date

02/01/2006

Duration

36 months

Total project cost

€ 2 981 060

EC contribution

€ 2 014 602

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In clinical trials, one group's diet will emphasise foods for which the cooking processes minimise the Maillard reaction. Another group will receive a diet containing several fried and grilled foods.

Putting a label on agricultural plastic waste

LABELAGRIWASTE

"The main objective is to develop a labelling scheme for agricultural plastic waste in Europe, covering the whole chain from use to disposal and reuse of the waste."

Plastic is increasingly used in agriculture and creates an environmental hazard when it is dumped, buried or burnt. It is a potentially valuable resource, but high collection costs make desirable disposal options uneconomical. The Labelagriwaste Collective Research project addresses the need for a comprehensive and cost-effective system for the collection, labelling and exploitation of agricultural plastic waste. The project will establish specifications for grades of plastic so that waste can be labelled on-site and delivered to the best possible disposal options. The enhanced marketability of plastic waste will provide an incentive to increase its collection, to the benefit of the environment.

Plastic is used extensively in agriculture, for example, in greenhouses, polythene tunnels, irrigation pipes, silage wrap and packaging material. It accounts for a high proportion of total agricultural waste. Although legislation governs the disposal of plastic, only a small percentage is currently recycled. This is due to high collection costs and the low value of the waste material. Instead, a tremendous amount of plastic waste is left in the fields, buried in the soil or burnt in an uncontrolled manner, with adverse effects on the environment.

The main aim of the Labelagriwaste project is to develop a labelling scheme for agricultural plastic waste. He says the project fulfils the need for a scheme covering the entire chain, from use to disposal and reuse. Procedures for the collection, sampling and labelling of plastic waste will enable it to be valorised, with economically valuable grades being streamed to specialised exploitation disposal options and low-value grades being routed to other appropriate disposal options. Agricultural plastic waste will therefore be transformed into a valuable commodity to be traded at the European level.

Research to grade plastics

Labelagriwaste is an EU-funded Collective Research project designed to bring together European industry associations with research partners, for the benefit of the numerous small and medium-sized enterprises (SMEs) the associations represent. In this case, eight industry associations, representing companies involved in all aspects of plastic waste collection, transportation, compaction and pretreatment, recycling, energy recovery and other disposal options, are linked with four research institutions. The research partners address the need for better procedures for the labelling of agricultural plastic waste, on the basis of its physical and chemical properties.

Laboratory experiments will establish specifications for plastic waste so that it can be graded for use in particular products and applications. The research objectives are to develop collection, sampling and labelling procedures for plastic waste, along with methodologies to ensure that different waste streams are routed to the best possible disposal options. The best options will be both economically valuable and environmentally friendly.

Reuse or disposal chain

The specifications defined by the research will enable clear guidelines to be drawn up for farmers, so that plastic waste is effectively labelled. The training of farmers in these procedures is a key aspect of the project. Transport companies can optimise the collection of plastic waste, while recycling, energy recovery and other disposal facilities receive pre-sorted raw material that meets their specifications. Improvements throughout the use-to-reuse chain provide incentives to reuse plastic waste, to the benefit of the companies involved and the environment.

A major task for the Labelagriwaste project is to organise a technical, financial and legal framework for the exploitation of agricultural plastic waste. Labelling facilitates the cost-effective routing of plastic waste on the European market, while harmonisation helps in the formulation of legislation governing waste-commodity disposal at the European level.

The procedures developed will be field-tested in pilot schemes, involving representative SME partners in several countries. Polyeco specialises in the handling of agricultural waste, for example, while Alfa Edile and Inserplasa recycle plastics, and PATI produces plastics for agricultural applications. The SME partners directly involved in the project benefit from training and early involvement in the scheme. Ultimately, the whole industrial sector in Europe will benefit.

Plastic is used extensively in agriculture.

"The project will bring major benefits to the environment, to consumers in terms of food safety, and to the European economy due to the recycling of valuable materials or energy recovery."

Benefits of reclaiming plastic

A major driving force behind the project is the environmental benefits gained from the reuse and proper disposal of agricultural plastic waste. Burning plastic in fields may release dioxins and other harmful chemicals which pollute the soil and reduce air quality. Buried plastic does not degrade and can create long-term environmental problems. Soil contamination, for instance, has implications for consumers of agricultural products.

Plastics are oil-based, and therefore made from an expensive and unsustainable raw material that is imported into Europe. When plastic is thrown away, a valuable resource is lost. Recycling or the recovery of energy from plastic waste therefore profits both the immediate industry and the wider economy. The Labelagriwaste project consequently offers major benefits in terms of the environment, energy resources, food safety, the recycled plastics sector, and the European economy.

Project title

Labelling agricultural plastic waste for reuse or disposal

Contract number

CT-2005-516256

Start date

15/01/2006

Duration

36 months

Total project cost

€ 2 997 506

EC contribution

€ 2 180 233

Discarded agricultural plastic.

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Flaw detection offers route to disaster prevention

"With the national non-destructive testing societies joining our consortium, we have a ready-made and effective dissemination network."

Long-range ultrasonic testing of difficult-to-access fabricated metallic structures and pipelines is a non-destructive inspection technique developed largely from ground-breaking European research. A number of national and EU-funded initiatives have built on the original discoveries, forming the basis of a service industry with broadening application potential. The LRUCM Collective Research project is extending the technology into more new fields while establishing a training and certification framework. This will enable SME contractors to demonstrate compliance with the expectations of major industrial asset owners such as energy utilities and transport infrastructure operators.

When faced with the need to check for leaks in liquid- or gas-filled storage vessels, or in buried pipelines, the conventional inspection options can entail prohibitively costly downtime to allow access. Moreover, corrosion in building components, from the hidden steel reinforcement of concrete to tall masts and aerial or submerged structures, may be difficult or dangerous to detect using traditional means. Despite heavy expenditure on maintenance of the world's industrial and infrastructural assets, unexpected failures thus continue to bring catastrophic consequences in terms of economic loss and human tragedy.

Headline-grabbing events range from oil and gas pipeline spillages, responsible for a yearly total of around 1 000 serious injuries and fatalities, to frequent railway line fractures that cause major delays and derailments. Many cable-stayed and suspension bridges are threatened by corrosion of their cables. And sea and river defences are degraded by the corrosion of sheet piling, often endangering their integrity and exposing high-value real estate to flooding or erosion.

Under inspection

Long-range ultrasonic testing (LRUT) is a recent addition to the battery of techniques available to combat such hazards. Based on the use of guided ultrasound waves transmittable over distances in excess of ten metres, it has been shown to provide a cost-effective and efficient solution to these otherwise intractable problems. LRUT has the advantage of full-volume coverage and the ability to permit examination from readily accessible vantage points.

Ambitious development of the technology and formalisation of its application environment is now being undertaken in the Collective Research project LRUCM. This three-year EU-funded initiative is led by TWI, a UK-based independent organisation that pioneered LRUT research in the 1980s.

Subsequently, use of technique has won increasing acceptance, principally for the inspection of pipelines. Several follow-up projects are now under way, seeking to advance various aspects of the technology and broaden its application.

Exploring new areas

While valuable inputs will come from the ongoing work, LRUCM aims to explore a number of important new areas, including:

- establishing that LRUT is a viable method for long-term monitoring of the structural integrity of engineering components and structures, including offshore installations;
- extending inspection to small-bore heat exchanger tubes (less than 50 mm diameter), which requires much higher frequencies and more robust transducer designs than those used for large diameter pipes;
- examination of sheet piling for sea defences, jetty walls and the like, involving study of the behaviour of guided waves in corrugated plates and development of systems suitable for operation in this context;
- design of an effective long-range inspection process and equipment for rail tracks;
- inspection of stranded cables and solid tendons used in bridges, which again requires the acquisition of knowledge about a specific class of wave modes.

In all of these cases, techniques for the mounting and protection of the sensors will have to be refined to meet the specific circumstances and geometries encountered. In parallel with the theoretical and hardware aspects, attention will also be given to the development of defect analysis methods, data interpretation software and human/machine interfacing. Equally important is the provision of education, training and business development support.

Teletest tool mounted on a 1.2m-diameter pipe in a refinery, to examine for corrosion.

© Courtesy of TWI Ltd

"Service companies will be able to enlarge their testing portfolios, and this will lead to an increased demand for equipment and tools."

Spreading the word

The 11-nation consortium assembled to fulfil this demanding brief brings together research performers, core SMEs (small and medium-sized enterprises), a European umbrella organisation and national industry associations in the fields of non-destructive testing and industrial maintenance – which themselves represent a further large population of SMEs.

A particular advantage in terms of information dissemination is the presence of the non-destructive testing bodies from several countries, which will greatly facilitate the spread of training and establishment of a common certification standard confirming the competence of service technicians and companies.

A current business trend is for asset owners to outsource much or all of their maintenance work to specialist service providers, many of which are SMEs. The outcomes of LRUCM will help more of the 16 000 EU enterprises active in this field to profit from participation in a growing market already worth € 225 billion/year in Europe.

Project title

Long-range ultrasonic condition monitoring

Contract number

CT-2005-516405

Start date

15/10/05

Duration

36 months

Total project cost

€ 4 291 441

EC contribution

€ 2 545 225

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Lubricating industrial competitiveness

META-MODAS

"It will reduce production costs and benefit health, safety and environment issues too."

Cost competitiveness is key for the future of the European engineering sector and in the metal-working sector a significant cost is associated with the use, management and disposal of metal-working fluids (MWF). MWFs degrade over time due to growth of micro-organisms and optimising their useful lifetime would produce significant savings and benefits in terms of health and safety and environmental issues associated with disposal of the fluids. This project will produce a practical and robust tool comprising a sensor package and software systems that will help to optimise MWF management and should extend average MWF lifetimes by over 50%.

The European engineering sector is worth some € 3 000 billion and consists of around 375 000 individual companies, of which 90% are SMEs (small and medium-sized enterprises). The sector provides employment for over 20 million EU citizens. However, it is under intense pressure from the low labour cost competitors in other regions. This has led to a dramatic reduction (20%) in the number of SME (small and medium-sized enterprises) engineering firms in Europe over the last five years. Further pressures on the sector have arisen from the tightening of environmental legislation in the EU, with additional costs.

Clearly, a response from the sector is required if it is to prosper. The Meta-Modas Collective research project is part of that response by optimising the use and disposal of a vital component of the metal-working process – metal-working fluids (MWFs). These fluids literally keep the wheels of this industrial sector turning by lubricating and cooling metal pieces as they are shaped, cut and finished. Over 75% of metal workshops use water-miscible MWFs as an integral part of metal machining. Around 16% of total metal manufacturing costs are attributed to MWFs, so significant savings are possible. In addition, some 3 200 million litres of spent MWF need to be disposed of every year with significant potential for adverse environmental impact. In addition, improper handling of MWFs can create health concerns for operators, including dermatitis and asthma.

Science-based systems

Currently, the engineering sector has a fairly limited understanding of MWF management, including its lifespan and disposal. An initial questionnaire will be issued to sector SMEs via the consortium's IAG partners to help define the true state of MWF management across EU companies. At present, this is a 'black art' based on the experience of individuals, so there is a obvious need to move to a science-based system. Laboratory testing will define the best measurement parameters to determine the optimum time to change and/or dispose of MWF in metal- working machines.

The mineral oil base that is mixed with water to form the MWF emulsion is a good nutrient for micro-organisms. Biocides are added to the oil to reduce the level of micro-organism growth but there are limits to amount that can be added, and exposing the workforce to biocides for prolonged periods is not good practice. Biocides can be harmful for individuals and also increase the environmental issues associated with safe disposal. The technology to be developed will measure when the bioactivity in the mineral oil becomes too high. As well as reducing the effectiveness of the MWF, micro-organisms also produce acids that can attack metal and degrade finish quality.

Currently bioactivity can be measured using a 'dip slide' that must be analysed off-line by a laboratory. This usually means a 48-hour turnaround for results that give an order of magnitude data for bioactivity.

Total MWF monitoring

The Meta-Modas project will develop a total MWF monitoring, optimisation and disposal advisory system that will extend the useful life for MWFs by at least 50%. This involves the development of innovative MWF concentration and bioactivity sensors plus a sophisticated software algorithm defining the inter-relationships between pH, concentration and bioactivity. The technology will help cut production costs through reduced fluid purchase and disposal costs, and will also contribute to improved machining, environmental and health and safety performances, assist companies to comply with EU environmental legislation and be part of a general re-skilling of the large SME engineering family.

The robust system will use an operator-friendly 'press and record' function. The data analysis algorithms will enable swift verdicts to be reached on whether to change the MWF or not, and allow comprehensive records of MWF management to be compiled for regulatory purposes.

Metal- working fluids lubricate and cool machined parts.

The project is coordinated by the UK's Engineering Employers Federation alongside two prominent IAGs in the sector from Norway and Poland. The research element is being coordinated by PERA Innovation Limited in the UK with two other research institutions: ICARE Laboratories from France and the Norwegian Technologist Institutt. Specialist instrumentation and integration skills are being provided via SME partners, while other SMEs in the metal-working sector will supply MWF samples and participate in testing. The consortium also includes a MWF distributor, Bayer-Wood Technologies, to complete the supply chain input.

The combination of innovative RTD providers developing the scientific and technical capability, core SMEs to manufacture the products, and IAGs to disseminate and train sector companies will ensure that a practical and cost-effective solution is delivered to the 253 000 European engineering SMEs currently using MWFs.

Project title
A total metalworking fluid condition monitoring, optimisation and disposal advisory system

Contract number
CT-2005-516319

Start date
01/09/2005

Duration
36 months

Total project cost
€ 1 994 103

EC contribution
€ 1 139 853

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Keeping a cool head for refrigeration design

MINIREF

"We specialise in applied science, transferring new research into actual manufacturing systems to benefit businesses and the environment."

New limits on greenhouse gas emissions present an urgent challenge for the refrigeration industry, where fluorinated gases such as HFCs are used in the manufacture of refrigerants. Small and medium-sized enterprises are particularly hard pressed to respond as costly new research is needed and the industry must act together to develop cleaner technology. Now a Collective Research project is making real progress in a revolutionary new design of refrigeration system that would use up to 95% less refrigerant. SMEs operating at all stages within this sector are taking part and others stand to benefit directly from the new technology when it is disseminated by their European associations.

In the past, manufacturers of refrigeration systems had two main priorities to consider: keeping the costs of components to a minimum while achieving maximum cooling capacity. Today's environmental priorities present a much tougher challenge. As part of implementing the Kyoto Protocol in Europe, EU legislation on F-gases will progressively phase out the use of both CFCs and HFCs. Natural refrigerants such as ammonia and propane are available, and although they do not harm the ozone layer, there are other health and safety issues to address. Their flammability is of prime concern, as well as the harm they can do to people who are exposed to them. Ideally, any natural product must have the right thermo-dynamic qualities for refrigeration and no adverse environmental impact.

The Miniref project is meeting both these challenges head on by pioneering a totally new approach to refrigeration where far less refrigerant is required in each installation. Once EU legislation on fluorinated gases has been implemented, manufacturers will be forced to switch to natural alternatives for charging refrigeration systems. But given the other health and safety concerns, they also need to minimise the use of all refrigerants. Miniref is making this possible by applying an integral designing approach for industrial refrigeration units and applying new technologies, such as micro channel technology for heat exchangers which cuts the required amount of refrigerant dramatically. By reducing or, even better, eliminating buffer volumes, the amount of refrigerant can be further decreased enabling a small volume of refrigerant to be used far more efficiently to achieve the same degree of cooling. In fact, buffer volume is replaced by circulating the refrigerant more frequently through the system.

Cool and collected

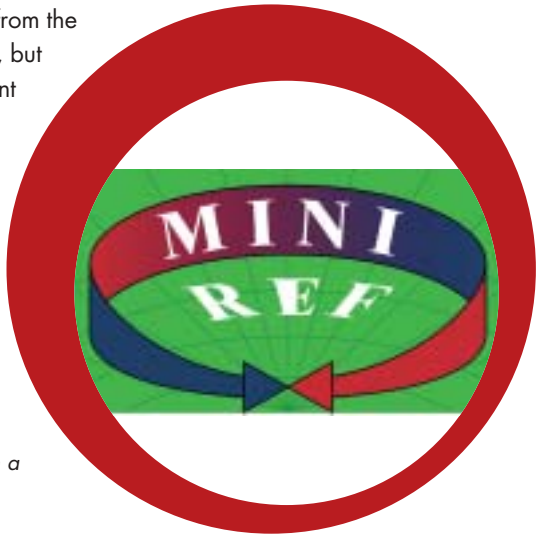
The project partners in this three-year Collective Research are being coordinated by the Dutch research organisation TNO which has a proven track record in matching environmental challenges with innovative industrial design. As a contract research provider, TNO is able to take new areas of research, often generated through university study, and apply them to specific manufacturing situations. In this case, TNO is using new scientific knowledge of integrated system design to solve the environmental and commercial problems of current refrigeration techniques.

Fifteen other partners have been drawn from across the EU, pooling expertise in cold storage and refrigeration, air-conditioning, electronics and engineering. Together they cover each stage of the refrigeration chain from component manufacturers to installers and commercial users of refrigeration systems. SMEs account for a high proportion of component manufacturers and installers whose businesses will be under threat if they cannot switch from HFC-based products to natural alternatives. Their fragmentation and low R&D capacity makes it hard to address new technology, and yet they could be forced out of the market if they cannot adapt quickly enough.

The Miniref project has seized the initiative on behalf of SMEs, and hopes to give a new commercial edge to these companies by exploiting an environmentally friendly solution to their problem. The component manufacturers and installers will regain a market advantage by offering cutting-edge technology when more traditional techniques are being phased out. Further down the chain, industrial and commercial users of refrigeration, such as food processors, will have a business advantage over their rivals if their operations are less polluting and carry less health risks to people in the vicinity of the plant. This could be of particular benefit when applying for operating licences.

Preserving the environment

The project partners will benefit directly from the new technology, but it is also important that this research is disseminated widely and rapidly to



The constant cooling process in a green world.

"All parts of the refrigeration industry are represented in the project, giving immediate benefits to the SMEs involved and ensuring that the whole sector moves forward commercially and environmentally."

other SMEs in the sector. Industrial Association Groupings (IAGs), including European trade associations are playing a key role here by participating in discussions early on in the research phase and then again once the new technology is available commercially.

This project is all about making refrigeration less polluting and safer for the public. When we buy chilled foods or use air-conditioning, our environment pays the price for our convenience. In future, we will not have the option in Europe to continue polluting our atmosphere in the same way as before. We all stand to benefit from this new approach to refrigeration which will not only safeguard the convenience and comfort we enjoy but will also help to better protect our environment.

Project title
New refrigeration concept for the reduction of greenhouse gas emissions by minimising refrigerant charge

Contract number
CT-2005-012452

Start date
01/08/2005

Duration
36 months

Total project cost
€ 2 285 816

EC contribution
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At the cutting edge

PROLIMA

"EU machine tool manufacturers are facing big competition from the Far East."

European machine tool manufacturers, most of which are SMEs, dominate the world market. But low labour costs in other parts of the world are increasing the competition, so European producers must focus on quality, value for money and low environmental impact. The Prolima project aims to help manufacturers to develop machine tools to meet this challenge. Its results should enable thousands of machine tool SMEs throughout Europe to benefit from research and best practices identified in design, operation and use. The key factors to be optimised are the life cycle cost, a standardised approach for assessing environmental impact, and reliability, availability, maintainability and safety.

Manufacture of machine tools has been a strong, traditional industry in Europe since the late 19th century. Some 70% of European manufacturers are SMEs (small and medium-sized enterprises) accounting for 49% of world production by value. However, in recent years the industry has become global, and producers in Japan, Taiwan and Korea are developing strong competition through low labour costs. China is also showing signs of major improvements in this sector; and all these nations are increasingly active in the world market.

In Europe, the recent economic recession has forced the machine tools industry to look hard at its own performance – many manufacturers have chosen to downsize or restructure. At the same time, users are demanding better performance, quality and reliability. Europe's machine tools industry urgently needs to improve its performance by investing in the most advanced equipment, if it is to maintain its competitive edge.

The Prolima Collective Research project aims to enable SMEs to produce machine tools with optimised life cycle costs and minimal environmental impact. To do that it will develop a system to support design decisions which will incorporate very different sorts of information on life cycle cost (LCC), assessment of environmental impact throughout the life cycle (LCA), and reliability, availability, maintainability and safety and reliability (RAMS). This will make a fundamental difference to the quality of machine tool design, since 80% of life cycle costs are incurred in the design stage. Access to information on all these aspects will enable comparison of different design options, and evidence-based decisions.

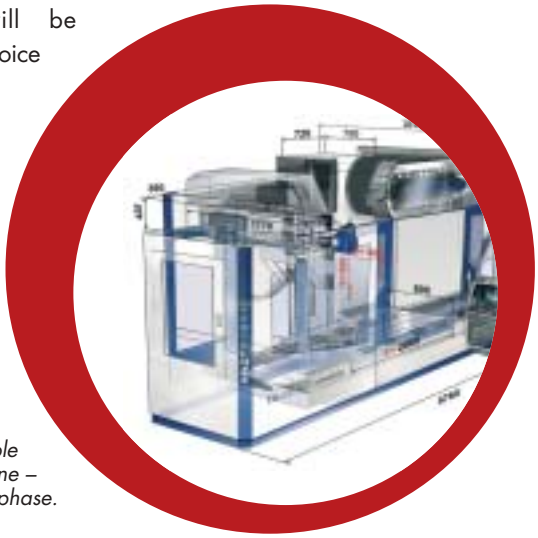
Prolima brings together European and national machine tool manufacturers' associations, research and technology centres, and ten SMEs active in the sector. Because of their particular skills, the project will focus on cutting-machine tools, including grinding, milling and turning, although its outcomes will be widely applicable in the industry. Some of the SMEs are concerned with manufacture of machine tool components, some are tool users, and one is active in software development.

Better design decisions

Until now, the life cycle costs of machine tools (a valid request from a purchaser) have been very difficult to quantify. Prolima aims to define an LCC model for machine tools, including a structured cost breakdown and mathematical models relating component costs with the whole system. The model will be in the form of a database which can be queried by SMEs to determine the exact needs of their customers.

The effect on the environment of machine tools to be purchased is a second key area where customers are asking increasingly searching questions, and pressure is also coming from governments and workforces. Prolima will set up a standardised RAMS methodology by which SMEs can assess the environmental impact of products and make improvements. The process will make it possible to integrate information on the technical specification of machine components, engineering processes and environmental factors. Studies will include the design and development of techniques to define failure possibilities and their effects on the performance of the equipment. The overall aim is to minimise environmental impact.

The life-cycle assessment will enable SMEs to evaluate lifetime environmental impact of machine tools. The project will also develop a manual of best practices to offer practical solutions for environmentally aware decisions on machine tool design, use and disposal. For example, improvements can be made by choice of biodegradable coolants and lubricants and low-friction coatings, and heat generation will be influenced by choice



Moving table milling machine – design phase.

"It's very important that our products are competitive in their life-cycle cost and environmental impact, so they are more effective, more reliable and better value."

of wet or dry machining. Safety practices with metalworking fluids and dry materials like graphite will be examined, and waste handling and recycling processes defined. Development of standby facilities and analysis of different machining processes will reduce energy consumption.

Cuts all round

The Prolima project has the clear objective of producing an integrated system to give SMEs a much better-informed basis for design decisions. It is estimated that machine tool manufacturing SMEs can expect to reduce design time by 20% by removing the need for reworking, and to reduce life cycle costs by 15%. This will clearly lead to greater profitability, and on the environmental side, impact of machine tools will be reduced by 20%. The project will increase the technical knowledge base and data management systems of SMEs, and improve their competitiveness. On a larger scale, it should contribute significantly to the output of many European manufacturing sectors, notably the automotive, aerospace and supply chain industries.

Project title

Environmental product lifecycle management for building competitive machine tools

Contract number

CT-2005-012442

Start date

01/10/2005

Duration

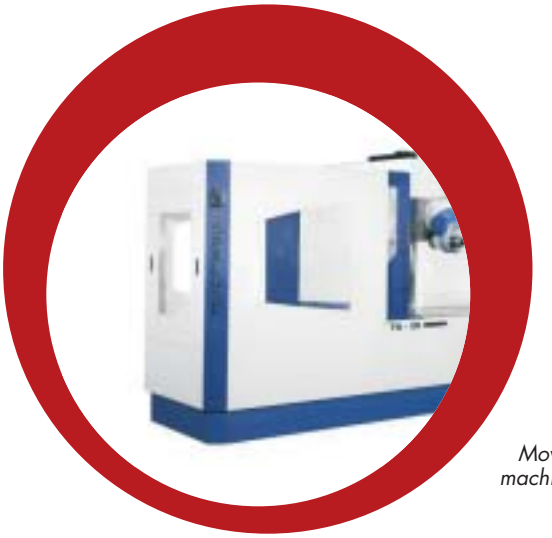
36 months

Total project cost

€ 2 480 655

EC contribution

€ 1 495 485



Moving table milling machine – ready for use.

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Improving an industry with stone-age roots

PRO-STONE

"Let's say an Italian entrepreneur has an idea for block-squaring technology. This tool will help him get the information on the capacity of shape-memory alloys for that particular function."

Europe's stone industry employs more than 500 000 people. However, relative newcomers to the industry, especially from Asia and South America, are chipping away at market share with newer technology and cheaper labour. With 25 partners in nine countries, the Collective Research Pro-Stone Collective Research project aims to help increase the global competitiveness of the European stone sector. It will do this by developing a knowledge-management tool to allow small and medium-sized enterprises (SMEs) to introduce the use of shape-memory alloys, to develop new-generation equipment for extracting and processing stone more efficiently and in a way that is safer for the environment.

The quarrying of natural stone originated in preclassical times. Used in building, industry and art, among others, stone remains the world's most abundantly extracted natural raw material, ranking second only to energy minerals, such as coal and petroleum, in economic terms. More than 60 000 SMEs, half a million people, work in or with Europe's stone sector, which is particularly important to economies in Italy, Greece, Portugal and Spain, with growing significance in Germany and recent Member States, like Bulgaria. However, recent statistics indicate that, in the last four years, competition from more efficient companies from China and Brazil has chiselled away more than 15% of the EU's share of the world stone market.

The main reason is that Europe's stone sector is using equipment over a decade old and, consequently, productivity and efficiency are very poor. Quality of the final stone product is erratic, and energy use is high. Although stone is a non-renewable resource, stone operators generate huge quantities of waste material, losing valuable product in run-off water containing several chemical pollutants. The EU recently put the industry on notice for critical environmental and worker safety and health issues – caused by dust, water pollution, and noise from quarry explosions.

Modernising an industry

Responding to stringent EU regulations that require alternative extraction technologies, the stone industry has sporadically attempted to use high-tech materials in equipment, the most promising based on shape-memory alloys (SMAs), which the medical-equipment sector has successfully employed on a small scale. However, the stone industry's traditional character, with SMEs scattered across many European regions, has impeded a collective approach to innovation.

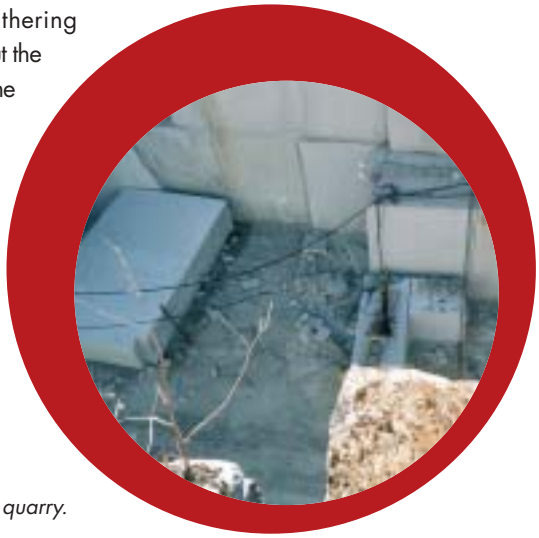
Managed by D'Appolonia SpA, of Italy, the Pro-Stone (Eco-efficient and high productive stone processing by multifunctional materials) project aims to help transform Europe's stone SMEs into a more coherent, modern and globally competitive industry. Specifically, it will create a web portal to help SMEs conceive and develop new-generation extraction and processing equipment and machinery, and renovate existing equipment, based on shape-memory alloys. The idea is to have more efficient, productive and environmentally safe tools and processes, on the way to significantly improving reliability and quality of final stone products.

SMAs get their name from their ability to return to, or 'remember', their original shapes when bent or otherwise changed, and their so-called pseudo-elasticity. With minimal temperature changes, shape-memory alloys undergo a solid-state phase change in which molecules are rearranged but remain tightly packed, so the substance stays solid, rather than changing to liquid or gas. These properties make them ideal for components used for stone work, such as springs and wires. Nickel-titanium alloys are currently considered the most useful such alloys. Others include copper-aluminium-nickel, copper-zinc-aluminium, and iron-manganese-silicon alloys.

Shaping up

The Pro-Stone portal will concentrate on two areas: disseminating knowledge/e-training and supporting design. The latter area combines knowledge about how the stone industry works with detailed data about shape-memory alloys. Engineers will get information on a particular alloy's potential to perform a particular function, including data on environmental constraints, and pointers on ways that small changes in alloy components can cause major effects on properties – which changes are useful and which are not. New procedures should ensure that alloy performances are repeatable and reliable, and their life cycles predictable enough to make wide use practical.

Since July 2005, the project has been gathering information about the sector's state of the art, meeting with SMEs to identify common



A typical quarry.

"The idea is to gather knowledge from people working in stone, and from people working in these alloys, as well as from other partners in this project, and to create a knowledge repository."

needs and problems and looking for ways they can work collectively. It is working to identify the many sub-families of marble and granite that exist across Europe, and to determine how these variations change tool needs. To test its portal, Pro-Stone plans to design two working prototypes machines that employ shape-memory alloys. When the project is finished, the participating industry association groupings (IAGs) will become the main owners of the portal and its tools. They will make their services available to SME members, and to other SMEs, for a price.

Project title
Eco-efficient and high productive stone processing by multifunctional materials

Contract number
CT-2005-516417

Start date
01/07/2005

Duration
36 months

Total project cost
€ 3 006 716

EC contribution
€ 1 930 326

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The acid test for fruit juice freshness

QUALI-JUICE

"The industrial and research communities shared opinions in framing a project that responds to the sector's real requirements."

Contamination arising from the bacteria naturally present in most types of agricultural produce is responsible for the loss of an estimated 4% of Europe's total output of fruit juices, costing around € 800 million annually. Collective Research project Quali-Juice is developing a method to provide early warning of the activity of lactic acid bacteria, which are currently among the most difficult to detect. The aim is to provide an easy-to-use biosensing system that will permit even SME juicers to conduct effective on-line quality control, making it possible to identify shortcomings in production processes – and enabling countermeasures to be taken before spoilage occurs.

Naturally occurring bacteria are present in most agricultural raw materials such as fruit, cereals and vegetables. Often, they serve a useful function by provoking the taste-enhancing fermentation of foodstuffs ranging from dairy and meat products to pickles and olives. In fruit juices, however, such effects are far from desirable, rendering the products unfit for human consumption.

Among the principal causes of such spoilage are lactic acid bacteria (LAB). These are also extremely difficult to detect at an early stage, either by tasting or by using analytical methods applicable in a production environment. Their presence may thus remain unnoticed until several days after the onset of activity, by which time large volumes of juice can become infected.

Coordinated by Technologie-Transfer-Zentrum Bremerhaven, Germany, the Collective Research project Quali-Juice assembles a consortium of industry associations (IAGs), RTD providers, technology-based SMEs (small and medium-sized enterprises) and end-users to tackle this problem. Seven of its 17 participants are from Eastern European states, where agriculture is a prime source of wealth.

Targeting SME needs

Sophisticated laboratory techniques, such as high-performance liquid chromatography and DNA fingerprinting, are inappropriate to the needs of this sector. The Quali-Juice partners will therefore pursue an approach based on the biosensing of LAB. The biosensor consists of a biological receptor, L-lactate oxidase, closely connected to a transducer and coupled with electronic systems. The product of the bacterial action is lactic acid, which can be transported via a dialysis membrane to the biosensor, where the immobilised enzyme L-lactate oxidase produces hydrogen peroxide (H_2O_2) during the reaction. The concentration of the H_2O_2 generated is measured electrochemically at the transducer.

The underlying principle is already well-known, and equipment employed in the pharmaceutical and biotechnological sectors provides some indication of how it might be implemented.

Two German SMEs – Sensolytics and Trace Analytics – will work together with the research institutes to develop the concept. Existing biosensors will be selected, tested, optimised and applied in combination with systems that allow analysis to be carried out directly in processing and storage tanks, by automated sampling systems, or via hand-held devices suitable for use on small juice production lines or by companies lacking automated process control facilities.

The remaining SME partners are juice producers which will offer access to their facilities as test-beds for the new concept, and provide feedback reflecting a considerable diversity of individual practices and industrial traditions.

Prototype hardware will be linked to software providing automatic indication of increasing lactate concentrations at the very beginning of a spoilage process. Sampling at various points along the production line will enable inherent 'bacterial breeding grounds' to be pinpointed. Often, early detection of the onset of fermentation will also allow time for re-pasteurisation, before a batch is irrevocably condemned.

Shared benefits

The knowledge generated by Quali-Juice will be owned by the participating IAG partners. The management of intellectual property rights by the Polish association of fruit juice and soft drink producers (Stowarzyszenie „Krajowa Unia Producentów Soków I Napojów Bezalkoholowych"), will coordinate the IAGs' further dissemination of the results, so that non-members can also take advantage of them, to the benefit of European industry in general.

In addition to the fruit juice sector, the LAB early-warning system is likely to be of great interest in other areas of food processing where similar contamination problems are known and reported.

Samples of apple juice taken from a storage tank.
© André Kuenzelmann, UFZ

"Strong participation of the eastern states has helped us to assemble a broad spread of expertise and address diverse industrial practices."

Another key aspect of Quali-Juice is the preparation of training packages for the operators who will be required to carry out testing as a day-to-day routine. As well as maintaining a website and producing documentation on project progress, the consortium will prepare specific instruction material related to measurement procedures and quality control best practices. This will be communicated to the national industry associations which, in turn, will disseminate it to their memberships, in which SMEs figure strongly.

A further outcome will be to identify weak points or omissions in current food quality and safety regulations, which can then be addressed on the basis of firm evidence supported by the latest scientific and technological data.

As well as helping to secure a higher degree of protection for European citizens, Quali-Juice has the potential to generate employment opportunities for skilled workers in manufacturing, installing and operating LAB sensors on behalf of food producers across the EU.

Project title
Quality assurance and development of an early-warning system for microbial contaminations for the European fruit juice industry

Contract number
CT-2005-012461

Duration
36 months

Total project cost
€ 1 610 580

EC contribution
€ 1 010 899

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Control networks designed for safety

SAFETYLON

"Safetylon will make communications in local operating networks safer by at least a factor of 1 million."

Local Operating Networks (LONs) are widely used in automated control systems such as fire detection and alarms, access control, heating and ventilation installations in office buildings, airports, hospitals and shopping centres. Although designed to be reliable, present-day LONs are not suitable for safety-critical applications such as industrial process control and transport. The Safetylon Collective Research project will develop a significant enhancement of LON technology that will not only meet the demands of new international safety standards for automated equipment but will also open up new markets for the many European SMEs working in this area.

The next time a door opens for you automatically you may well have been served by a technology known as a Local Operating Network or LON. Such networks are increasingly used in public buildings such as offices, airports, hospitals, shopping centres and others, to control many different building functions. A LON is a network of sensors and actuators connected together. The sensors detect changes while the actuators cause things to happen. The door is a common example – a sensor detects when someone is approaching and sends a signal to the actuator which opens the door. More complex examples include heating and ventilation systems, lifts, fire alarm systems, any of which may be interconnected to form yet more complex networks.

What distinguishes LONs from earlier automated systems is that there is no central controller – the devices in the network communicate with each other independently and act on messages exchanged between them.

Ideal market for SMEs

Since the early 1990s, the protocol for running LONs – known as Lonworks – has become an effective global standard with about 50 million devices now installed. Lonworks is an open, interoperable system, so devices from different manufacturers can be connected together. This makes it an ideal technology for SMEs. There are more than 1 000 companies in Europe – 90% of them SMEs – which make a living from LON technology, and more than 3 000 worldwide.

The problem is that the LON technology was not intended for safety-critical applications. Complex networks can include thousands of devices and millions of electronic components. Although failures are routinely detected and dealt with safely, the possibility of an undetected failure which endangers life – such as a fire safety door that fails to open – is higher than regulatory authorities now regard as acceptable. The possibility of a terrorist attack, such as those on the transport networks in Madrid and London, has focused attention on designing much more robust safety systems. New standards for the safety of automated systems are being set by international standard IEC 61508, but there is no way that conventional LONs can meet those demands.

Raising the standard

The LON User Group in Germany was concerned that a very successful technology was about to be eclipsed in favour of expensive proprietary systems, so they decided to try to develop an enhanced LON specification that would meet the IEC standard. It soon became clear that the cost would be beyond the means of SMEs so they put together a proposal for a Collective Research project called Safetylon.

The idea is to modify the LON technology so that existing conventional networks can coexist with new Safetylon sub-networks meeting the IEC standard 'on the same wire' without having to replace the entire installation. The key is to add two new chips to the electronics of each device that will process redundant information independently of each other. By continually comparing the messages from each chip, the chance of a failure going undetected will be reduced by a factor of at least a million. As LON networks are not synchronised, additional precautions must be taken to check that sent messages arrive within a set period. This will be especially important for very large networks such as complex fire protection systems containing thousands of devices.

Safety-critical applications

The project is coordinated by the German LON User Group supported by similar organisations in Poland and Sweden. Between them they will own the intellectual property rights for the new technology. The consortium includes three universities, in Dortmund, Vienna and Krakow, and three industrial research partners – Innotec, Loytec and who.

LONs are increasingly used in public buildings, such as airports.

"By the end of the project we will have developed a solution which is probably much better than any of the proprietary solutions on the market."

Eight SME partners, from Germany, Poland, Switzerland, Sweden, Italy and France, will have free access to the technology which should help them develop and expand their businesses into what is likely to be a growing field.

With the next generation of LON systems able to meet the highest standards of safety, it will become feasible to use them for applications that had not been possible before, such as in transport networks and in production control in factories.

Safetylon will create a number of hardware and software modules which the SME partners will then use to put their own products on the market, possibly as early as 2008. As an open and interoperable system, the technology will then be licensed to other companies which will be able to use it to develop their own innovative applications. Nothing similar is being developed anywhere in the world so, as well as boosting public safety, Safetylon will give European SMEs a valuable lead in a key area of modern technology.

Project title
Development of an interoperable platform technology for safety-related data transfer and secure communication in local operating networks

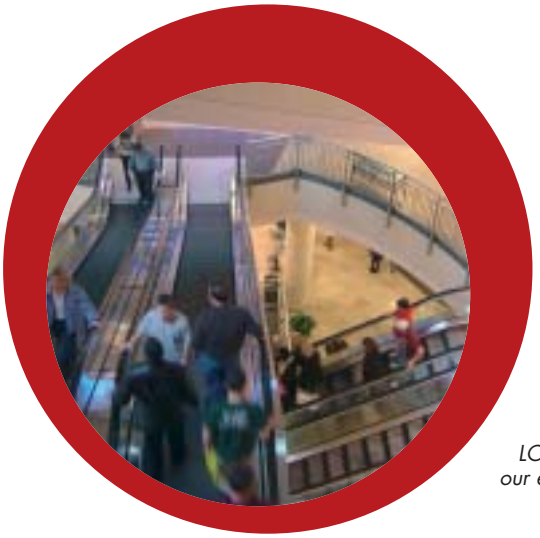
Contract number
CT-2005-012611

Start date
23/05/2005

Duration
30 months

Total project cost
€ 2 855 560

EC participation
€ 1 997 840



LONs form part of our every-day life.

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Timber treatment for lasting protection

SURFASAM

"The project benefits from the two-way communication between the partners, as each educates the other on how their part of the industry functions."

A technological breakthrough in preserving wood is at the heart of a Collective Research project for the timber industry. Wood is a popular material with an environmentally friendly image, but toxic preservative compounds must be used to prolong its life. These substances are now being challenged by a new EU Directive on biocides (98/8/CE) which will come into force in 2008 to regulate all compounds used in the non-agricultural sector. As national governments introduce implementing legislation in response to this Directive, most of the preservatives in common use today will disappear. For the many SMEs operating in this sector, a non-polluting way of preserving wood is an urgent priority to secure their future in the market.

New legislation is fast putting an end to old methods of treating wood, typically using compounds containing creosotes or arsenic. Some Member States are already planning to outlaw arsenic compounds this year, ahead of the EU Biocides Directive, so the pressure is on to find 'green' alternatives that protect wood up to the level of Use Class 4, the degree of treatment suitable for outdoor conditions.

The Surfasam project has been set up to develop a new generation of wood-preserving compounds and techniques that will put SMEs ahead of their rivals in marketing treated wood. Previous research projects in this area have tended to concentrate on developing new compounds to kill predators, whereas Surfasam is developing a totally new kind of product that focuses on repelling predators.

The Collective Research project aims to create a new molecule that penetrates the wood and alters it to the point where predator insects and organisms are no longer attracted to it. The chemical is based on vegetable oil, such as rapeseed or sunflower oil, which is then reacted with cellulose to produce the molecular modification. This scientific technique has been used before, but only with shorter molecules with less water-repellence, whereas this development achieves a more fundamental change in properties.

The research must also concentrate on how to force the new compound into the wood through a combination of pressure and vacuum. Once it has deeply penetrated the green wood it becomes grafted on to each wood fibre, bringing about a permanent change in its structure.

Pioneering technology

Surfasam is being led by Dr Vaca-Garcia of the Agro-Industrial Chemistry Laboratory at Toulouse Polytechnique in France. His scientific background in the chemical modification of biomass with fatty compounds is ideally suited to this pioneering development. He is excited by this new scientific breakthrough and sees it as the practical application of scientific research which, until now, has been purely theoretical. It also represents an interesting new area of research for his laboratory where the work is concentrating mainly on bioproducts from the agricultural sector.

Sixteen other partners are involved from across the EU and together they cover each stage in the wood-processing industry. Some are timber companies at the beginning of the chain, others are processing vegetable oils and developing the treatment products, while further down are the end-users such as furniture manufacturers and construction companies. The project benefits from the two-way communication between the partners, as each educates the other on how their part of the industry functions. All the practical knowledge on how to apply the new treatment comes directly from companies dealing in treated wood.

At the end of this project, the partner IAGs involved will have first-hand knowledge of the new treatment process that can replace traditional toxic preservatives, and they will own the intellectual property rights to the research. These developments will be disseminated more widely among the numerous SMEs (small and medium-sized enterprises) in this sector by members of the six IAGs that make up this consortium.

Green credentials

All these companies can look forward to further exploiting the environmentally friendly image of their product and capitalising on the strong demand for natural materials in construction. While large construction companies tend to rely more heavily on concrete materials, sawn wood products are more commonly supplied by SMEs – over 1 000 businesses are set to benefit from this project.

"Until now the molecular modification of cellulose has only had a theoretical application, but now the timber industry can benefit commercially from its practical use."

For the end-users of treated wood, the Surfasam project team has the potential to develop wood which can be marketed with a guaranteed lifespan, that would be of great commercial benefit in construction and other outdoor markets. At the moment, some manufacturers import wood to achieve greater resistance to rot whereas, in the future, the new treatment process could allow more locally grown, cheaper wood to be used to supply the same markets. This in itself is a marketing advantage for firms which actively publicise their green credentials.

As consumers, we can continue to rely on wood as a natural construction material with many appealing properties, and its environmental credentials are set to increase, too. The new EU legislation on biocides will bring in valuable safeguards for our environment and, thanks to this research project, the timber industry will be well placed to respond.

Project title
Innovative 'green wood treatment' to achieve Risk Class 4 protection

Contract number
CT-2005-012467

Start date
01/04/2005

Duration
36 months

Total project cost
€ 2 094 255

EC contribution
€ 1 366 972

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Reshaping Europe's thermoforming industry

T-FORM

"Although the sector's SMEs are unused to transnational collaboration, once convinced of the benefits, they give more than 100% commitment."

The thermoforming of sheet plastics and composites is used to produce items ranging from disposable packaging trays and pots to automotive trim panels and other industrial components. At present, the design and manufacture of moulds for this purpose, as well as of the products themselves, is based largely on craftsmanship and empirical knowledge. T-ForM is the first Europe-wide collaboration aiming to put the whole process on to a more scientific footing. It brings together industry associations, research providers and actors from the whole supply chain in a bid to improve efficiency, cut costs and reduce time-to-market for the SMEs making up the bulk of this sector.

Thermoforming is a family of processes used to form thermoplastic sheet materials into three-dimensional shapes. Essentially, it involves clamping the sheet into a frame, heating to render it soft and pliable, then applying vacuum, air or mechanical pressure to make the sheet conform to the shape of a mould or die positioned below the frame. This may be assisted by preforming, using a solid plug pressed into the mould or by draping the sheet over a male former. Excess material is then removed by trimming to leave the finished mouldings ready for use.

Typical of the items produced using these techniques are the familiar supermarket blister packs, yoghourt pots and meat trays. On a larger scale, they find application in transport containers, point-of-sale displays, equipment housings, automotive panels and many other industrial components. According to the scale and volume of operations, the various stages may be integrated to a greater or lesser degree. However, the industry is characterised by a design process that is heavily dependent upon traditional craft skills, empirically acquired knowledge and trial-and-error fine-tuning.

Multi-billion market

In Europe, thermoforming generates an annual turnover of around € 27.5 billion and employs 275 000 people. Some 85% of the businesses in the sector are SMEs (small and medium-sized enterprises), but their customers include major food processors, automotive manufacturers and other cost-driven large industrial corporations. At present, this activity is under severe threat from lower-wage economies in the Far Eastern countries – which, due to the reliance on craftsmanship, is difficult to combat.

The Collective Research project T-ForM is therefore seeking to advance the state of the art by realising an innovative approach extending from predictive design to manufacturing in an end-to-end system permitting first-time-right production and a dramatic reduction in project realisation times.

Leading a consortium drawn from eight EU Member States is the Nederlandse Organisatie voor Toegepast Natuurwetenschappelijk Onderzoek (the Netherlands Organisation for Applied Scientific Research – TNO). It is joined in the three-year initiative by six more research institutes which will undertake the research, 13 core SMEs spanning the design, mould-making and production phases, and six national industry association groups (IAGs) representing the sector at large. The consortium's steering committee is chaired by Ms Jaitske Feenstra of the Dutch IAG PVT (ProducentenVereniging Thermoplasten).

End-to-end innovation

T-ForM is addressing a number of related issues:

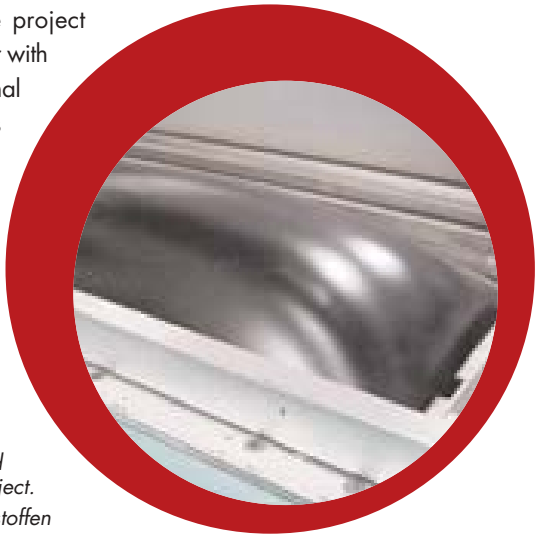
- investigation of modelling theory regarding the behaviour of thermoformable materials, and the determination of design guidelines for optimal processing;
- development of algorithms and prototype software for predictive mould design;
- definition of a complete production simulation environment, deriving parameter settings from the mould design system.

The resultant technology will permit the generic description of 'ideal' thermoforming moulds in a neutral, digital form suitable for immediate generation of tool paths, using commercially available CAD/CAM packages.

In each of the participating countries, the studies will be coordinated by the relevant IAG, working closely with a designated research institute and the core SMEs. The results will be tested by the SMEs under real working conditions, and validated in a series of test cases – permitting an evaluation of costs, throughput times and energy consumption in comparison with the conventional methods.

Push for participation

As this level of co-operation is a new experience for the industry, early actions have been to stimulate interest and encourage net-working through a leaflet featured on the project website, together with a series of national kick-off meetings inviting SMEs to take part via their IAGs.



Thermoforming module developed for the T-ForM project.
© Batelaan Kunststoffen

"This is an industry 'first': we expect it to produce a big step forward."

While the IAGs themselves will manage the intellectual property rights to the project's outcomes, dissemination of public information on the new methodology is seen as crucial to enhancing competitiveness and boosting employment in the industry. Three-monthly meetings will present the results and provide a forum for discussion by thermoforming companies, mould-makers and product designers.

National demonstrations facilities will also be set up by the core SMEs and RTD providers, while UK partner RAPRA Technology will head the development of training programmes for the staff of commercial companies throughout the EU.

Design expertise is an acknowledged strength of European manufacturers. By channelling their ability into a knowledge-based system that underpins sound decision-making, eliminates production bottlenecks and shortens delivery deadlines, T-ForM will do much to help ensure a healthy future for an industry whose products make a valuable contribution to public health, safety and well-being.

Project title
Throughput-time reduction and first time right production for the thermoform industry by introducing a predictive mould design and manufacturing system

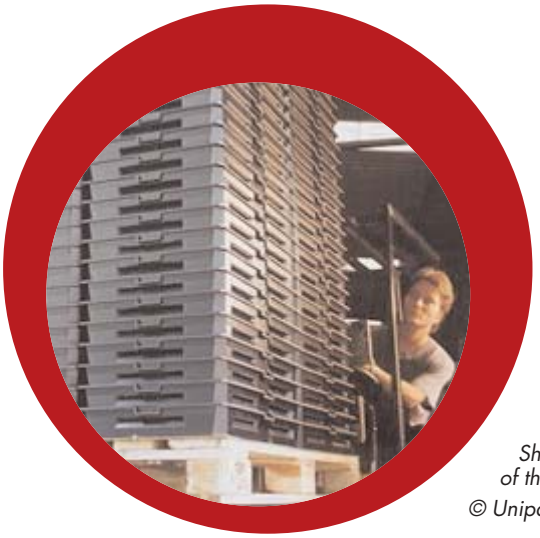
Contract number
CT-2005-516374

Start date
01/09/2005

Duration
36 months

Total project cost
€ 4 584 500

EC contribution
€ 2 846 150



Shaped trays for transport applications are typical of the products produced by thermoforming.

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Triggering better agriculture

"We will help to solve the most important problems caused by the agricultural use of plastic films."

The Trigger project is developing agricultural plastic film for mulch and low-tunnel applications that will maintain its functional properties during its lifespan, but will break down quickly after harvest. The aim is to devise a trigger system to start and accelerate the biodegradation process when the film has done its work. The trigger must be activated independently of the crop, the type of soil and climate conditions. Success will give a boost to the agricultural sector by solving the key problems that currently limit the use of agricultural plastic films and the commercial advantages they offer. It will also help the environment by reducing contamination by plastic waste.

Agricultural plastic film is a familiar sight across the European countryside. It is used to accelerate crop growth and minimise weeds in a wide variety of applications. But all that plastic has to go somewhere once it has done its job. It cannot be reused indefinitely, so the best solution is to use biodegradable forms of plastic to avoid the problem of long-term plastic waste.

Through contacts with users of agricultural plastics, Aimplas, the coordinator of the Collective Research project Trigger, has identified a significant problem with the materials currently available. It is difficult to vary the rate of biodegradation to match the needs of different crops. Some need film protection for two months, others for up to six months. In some cases, the film will biodegrade too soon, while in others the biodegradation will not even have started by the time the film is ready to be disposed of.

Trigger is designed to solve this problem by developing biodegradable plastics that include a chemical trigger system that will allow farmers to accelerate the biodegradation as soon as the film has done its job. So the film will remain stable for as long as is required, but then degrade very quickly when the farmer activates the trigger.

Two routes to explore

Two alternative approaches are being explored by the project. The first will use a plastic with a low inherent biodegradation rate, but with a chemical salt as a filler that can undergo a heat-releasing reaction in contact with water, initiating biodegradation. When the film is in use the internalised salt will be isolated from water, so rain or irrigation will not stimulate the biodegradation process. At the end of a crop's season, the film will be ground, mixed with the soil, and water will be applied by specially adapted agricultural machinery. The filler will come into contact with the water, increasing the temperature and humidity of the film and accelerating its biodegradation.

The alternative approach will use a plastic with a high inherent biodegradation rate, but with the biodegradation inhibited by an anti-microbial additive. When the farmer has finished with the film this additive will be removed, allowing rapid biodegradation to begin.

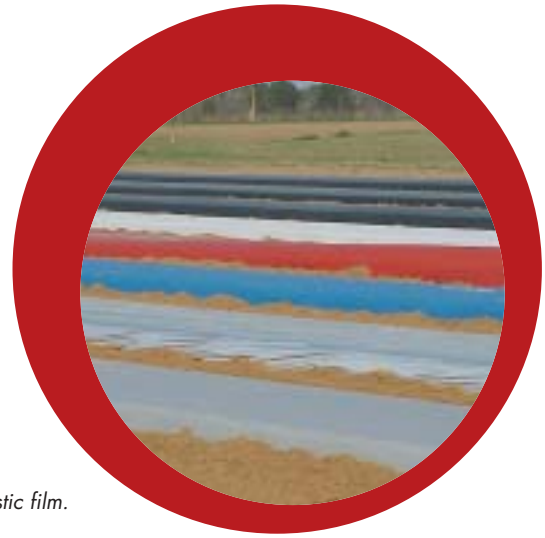
In both approaches, the plan is to manufacture the film using starch isolated from pea seeds. This raw material has been chosen because pea starch is already known to have chemical properties suited to the project's requirements, and it can be produced in an environmentally friendly manner.

Expertise from five nations

The research to develop the triggered plastic films will be lead by Aimplas of Spain, the UK Institute of Food Research, and Rapra Technology of the UK. These partners have a wealth of experience in research and consultancy in plastics and agricultural applications.

The six SME (small and medium-sized enterprise) partners from France, Lithuania, Spain, and the UK comprise crop growers, seed specialists and providers of agricultural plastics and related machinery. They will help to define the requirements for the plastic films, and assist in developing and testing the research results on a commercial scale.

The remaining partners are industry associations or groupings from Bulgaria, France, Spain and the UK. They will contribute their experience and ideas at all stages, but will play the crucial role in disseminating the results across Europe. This work is likely to include the development of training activities to help and encourage farmers and agricultural SMEs to adopt the new methods.



Agricultural plastic film.

"This project promotes a new generation of materials obtained from renewable resources and, at the same time, it will improve and facilitate agricultural activity."

A helping hand

The Trigger project consortium hopes to develop films for mulch and low-tunnel applications that can be used on the widest possible range of crops in all kinds of climatic conditions, and at a competitive cost. Achieving these aims will ensure that the end-product is of real use to a wide variety of growers across Europe, and beyond.

By spreading its results widely, the project will help to solve the most significant problems currently associated with the use of agricultural plastic films. It will make removal and disposal of the used film easier and more environmentally friendly. And it will greatly reduce the contamination of soil by scattered plastic remains.

Solving these problems will have important economic consequences for farmers. It should enhance the use of plastic film to increase crop use and extend growing seasons, while reducing the costs and environmental problems associated with disposing of the plastics after use.

Commercial benefits will also be gained by manufacturers of the new films and the machinery required for their manufacture and use. The overall effect will be to increase the competitiveness of the EU's agricultural sector.

Project title

Development of a pea starch film with trigger biodegradation properties for agricultural applications

Contract number

CT-2005-516231

Start date

01/06/2005

Duration

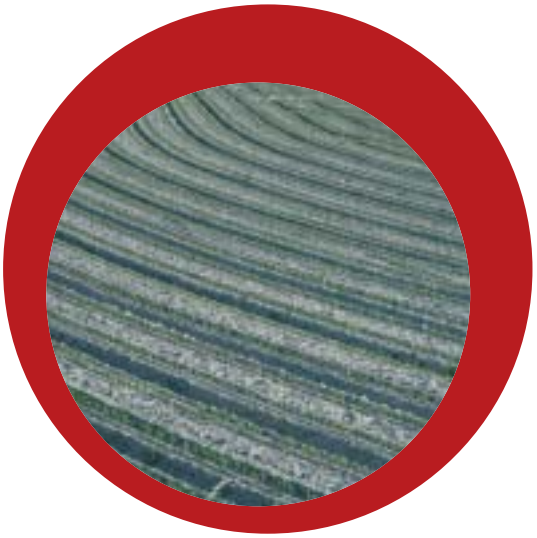
36 months

Total project cost

€ 2 798 497

EC contribution

€ 1 551 085



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15 Rapra Technology Ltd (UK)

Collective Research projects are one of two distinct types of project supported by the *Horizontal research activities involving SMEs* of the EU's Sixth Research Framework Programme (FP6, 2002-2006), which together have an overall budget of €473 million. They are designed to improve the competitiveness of large communities of SMEs by expanding their knowledge base through research and development related to widely-shared technological, environmental, safety or standards issues. This folder contains profiles of 22 projects from the first FP6 Collective Research call, prepared in the months immediately following their official launch. Similar folders, presenting a selection of projects from the FP6's first Co-operative Research and Economic and Technological Intelligence (ETI) calls, are also available. All FP6 projects can be found on the SME Techweb.

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