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Collective Research projects for SMEs Volume 1

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HORIZONTAL ACTIVITIES INVOLVING SMEs

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 outsourcing 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 23 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>

Contract number	Project Acronym	
CT-2003-500305	AQUAETREAT	Farming out waste to help the environment
CT-2003-500536	CRAB	Fishing around for cleaner aquaculture
CT-2004-500224	DERMAGENESIS	Material benefits for Europe's leather trade
CT-2003-500779	ECODIS	Eco-design made accessible
CT-2004-500291	ESECMASE	Building a brighter future for masonry construction
CT-2004-500351	GENDIS	Going with the flow in distributed generation
CT-2004-500225	GREENROSE	Greening electronics
CT-2004-500319	HIPERMOULDING	Cool it – quickly
CT-2004-500467	INASOOP	New label to boost olives' image
CT-2003-500529	INTRINSIC	E-business boost for regional products
CT-2004-500276	KNOW-CONSTRUCT	Clicks and mortar
CT-2004-500454	LEADOUT	Support for switch to lead-free solders
CT-2004-500399	LOW-HEAT	Waste water saves energy at home
CT-2003-500450	MAP-MILLING	Sowing the seeds for safer food
CT-2004-500394	NANOMED	Harnessing the muscle in nanotubes
CT-2004-500352	P2P	A recipe for success
CT-2004-500736	PREWIND	Hot technology boosts wind power
CT-2003-500233	PYROL-X-TYRE	Microwaves can recycle a big problem
CT-2004-500229	SHERHPA	Heat pump technology – cleaning up its act
CT-2004-500896	SILICERAM	Sensible safety measures for ceramics
CT-2004-500279	SMART FOUNDRY	SMART decisions support competitiveness
CT-2004-500452	VAR-TRAINER	Simulators make construction safer
CT-2004-500223	WEB-TEXPERT	Tailoring innovation for textile SMEs

“Our goal is to turn a problem into a solution that will bring benefits to the aquaculture industry and the environment.”

The health benefits of eating fish have been well documented, but farming is not always so good for the environment. Fish farms produce effluents that can, if not properly handled, contribute to the pollution of water courses and rivers.

A Collective Research project aims to produce a double benefit while combating problems caused by fish farm waste. Aquaetreat will examine the feasibility of producing systems to treat aquaculture effluent and look for ways to reuse the products and by-products created by such methods. The goal is to reduce the environmental impact of commercial aquaculture and to improve the sector's credentials for sustainable development.

As the world population and economy continue to grow, water will become an increasingly scarce commodity. The European Union is therefore committed to promoting and encouraging the sustainable use and efficient management of water resources across the continent. Innovative projects that help industry minimise water usage and reduce water pollution are particularly welcome. Fish farming takes place throughout Europe in a variety of environments and is a significant user of both fresh and sea water. Unfortunately, despite being well run and observant of regulations, this industry can have a negative impact on the local aquatic environment because of the waste produced by the fish. Although filters are currently employed to clean water in the farms, there are no means of reusing waste products.

Waste not . . .

The Aquaetreat project has set out not only to produce treatment systems that can be adapted to most types of fish farm, but also to find ways of turning effluent into useable, value-added products. The recycling of waste water and the use of sediment extracted from effluent could bring financial benefits to fish farmers and produce the incentive they would need to install a finished Aquaetreat system. At the moment, fish farmers must bear the cost of disposing of their aquaculture waste. But if the project succeeds, waste could be turned into valuable products such as compost for agriculture, and may also find uses in the pharmaceutical, food and cosmetic industries. Therefore, the project and the treatment systems it creates should be warmly welcomed by fish farmers as they will be able to reduce the amount of waste they produce – thereby lowering disposal costs – and create products that are commercially viable.

Aquaetreat intends to harness existing aquaculture technology to produce new, integrated treatment systems. The project will create and test systems that could, if successful, be applied to 90% of Europe's aquaculture farms. Indeed, test work will be carried out on the four most common types of farms: the closed circulation system of farming which re-circulates water in the farm with little input of new water (used both in fresh water and sea water farming); and the flow-through system that uses water which passes through the farm – here again, tests will be implemented in a fresh water and a sea water environment.

Farms in Italy, France, Denmark and Wales have been earmarked to test the Aquaetreat systems. Mechanical filtration methods will be used to reduce concentrations of sediment in farm waste, and biological filtration will lower the amount of solvent nutrients present in the effluent. The project will also measure and evaluate the benefit of its treatment systems on fish farm water sources and local ecosystems, whether these are rivers, lagoons or sea areas. All the products and by-products produced by Aquaetreat will be identified and categorised, and work will then be carried out to identify their possible future uses. In particular, the project will assess the potential of using treated water, for example in the production of algae, aquatic plants and fish food products.

Pooling resources

The aquaculture business is dominated by SMEs (small and medium-sized enterprises) and family businesses that operate in rural and coastal areas where jobs are harder to come by. This Collective Research project aims to give the sector an economic and environmental boost by providing it with new tools that can reduce pollution and lower waste-handling costs. Research institutes in Italy, France and the United Kingdom will act as the project's RTD performers. They will be supported by an Italian engineering SME that is expert in treating effluent.

To ensure that Aquaetreat's findings are widely understood, the project team has put in place an extensive training and dissemination package.

Improving the sludge thickening process is a crucial element for reducing costs and increasing the opportunity for reuse.

© STM Aquatrade



Training will be aimed at the managers of national aquaculture associations and technical staff employed by SMEs and will cover water treatment and reuse, the use of by-products, and the environmental impact of farming activities. Both training and dissemination will be carried out through the Federation of European Aquaculture Producers, which has a presence in 22 European countries. Its input will ensure the effective transfer of skills and information to all parts of the fish-farming sector.

A regional workshop will be organised at one of the Aquaetreat test sites to give farmers the chance to see the project's technology in action. The project website will feature a virtual tour that will act as a training module. Farmers will be able to log on to see how the system functions and operates step by step in different aquaculture environments.

Project title

Improvement and innovation of aquaculture effluent treatment technology (AQUAETREAT)

Contract number

CT-2003-500305

Duration

36 months

Global project cost

€ 1 695 847

EC contribution

€ 1 383 741

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- 8 STM Aquatrade S.R.L (IT)
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Natural or constructed wetlands and algal ponds function as biological filters thus improving effluent water quality.

© Vincenzo Zonno



“The project will create understanding of the problem and its solutions across Europe.”

The infiltration of unwanted organisms like algae and barnacles into fish and shellfish farms can damage infrastructure and threaten the health and market value of livestock. The CRAB Collective Research project is looking at innovative solutions to the problem for SMEs. It brings together a number of research institutions, small aquaculture farms and industry associations from across Europe to pool their knowledge and develop novel, inexpensive antifouling technologies and strategies. The aim is to reduce the cost of bio-fouling prevention and removal and make aquaculture more economically viable for smaller companies.

You are sitting at the restaurant table waiting for your seafood platter. Imagine your horror when the oysters arrive covered in barnacles, the mussels green with algae! Of course, it would never happen – only seafood in perfect condition actually reaches the customers.

More than just a mess

Yet the aquaculture industry faces an uphill battle to keep their fisheries and farms free from bio-fouling. Seaweed, barnacles and a host of other unwanted organisms invariably settle on the cages and nets, even the livestock. But bio-fouling is more than a mere nuisance. It clogs cages, prevents the flow of clean water, and deposits waste within the farm. It reduces the growth of livestock, threatens its health, and lowers its market value.

Around 5-10% of the aquaculture industry's annual expenditure currently goes on dealing with bio-fouling. There are no simple technological solutions. Aquaculturists must either coat their nets and cages with toxic coatings (some of which inevitably leaches into the surrounding environment) and/or physically clean the infrastructure (and sometimes the stock in the case of shellfish farms). Local knowledge can also help; if farmers know when bio-fouling usually occurs they can remove cages from the water before it settles.

Although the problem touches every aquaculture business, it is particularly damaging to small producers who struggle to survive on low profit margins. The CRAB project has these companies in mind. It aims to develop a number of relatively cheap anti-fouling technologies and strategies that will reduce the frequency and cost of infrastructure maintenance and cleaning. By reducing the expenditure of small and medium-sized enterprises (SMEs), the project should help to keep them in business and the European aquaculture industry healthy and competitive.

CRAB (Collective Research on Aquaculture Bio-fouling) has its origins in a previous FP5-funded pilot project, BRIMA, which involved fish and mussel farmers. This earlier project looked at a variety of antifouling strategies and also analysed and disseminated different management practices for bio-fouling prevention. The CRAB Collective Research project extends and expands this work, combining the expertise of four research partners, 15 SMEs (of which

12 are aquaculture SMEs) and four industry associations (IAGs) representing aquaculturists from across Europe.

Testing times

A variety of antifouling approaches are being developed by the project's RTD partners. These include new materials (e.g. non-toxic, spiky coatings that prevent organisms settling on aquaculture infrastructure) and biological controls (e.g. using starfish or sea urchins that eat bio-fouling organisms). The project will also trial technologies already used in other industries, for instance the electrolysis of seawater to produce localised, toxic chloride radicals.

Alongside the technology development, the project partners will investigate different husbandry approaches and look at how the operational management of aquaculture farms can also affect the impact of bio-fouling.

The SME partners on the project have a key role to play. At first they will share their experiences of bio-fouling and its management as well as having input on their particular requirements and specifications for antifouling technologies. Later they will field test the different solutions and provide valuable end-user feedback. The SMEs will be the first to access innovative antifouling solutions suited to their particular requirements; they hope that the financial savings will quickly give them a return on investment for their participation in the project.



A net with bio-fouling.

"SMEs will get knowledge and tools that they could never acquire on their own."

Although the CRAB project does not expect to develop a wonder cure for bio-fouling, the partners do intend to develop comprehensive guidelines and decision-support tools that could help farmers predict when bio-fouling is likely to occur and select the best combination of preventative measures and technologies.

Although the participating SMEs will have a head start on their competitors, the knowledge produced by CRAB will be communicated to the wider aquaculture community across Europe. The consortium IAGs will be the key disseminators. They will report back to their members on the project's findings, make recommendations on farming practice and offer advice and training.

The CRAB solutions could provide a lifeline for many farms, lowering overheads and making their businesses viable once again. The project should also help the industry remain competitive in the global market – and ensure that Europe's restaurants continue to serve top-quality seafood platters.

Project title

Collective Research on Aquaculture Bio-fouling (CRAB)

Contract number

CT-2003-500536

Duration

36 months

Global project cost

€ 2 296 123

EC contribution

€ 1 584 733

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- 4 European Aquaculture Society (BE)
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- 6 Boris Net Company Ltd (UK)
- 7 Materials Innovation Centre (NL)
- 8 Bomlo Skjell (NO)
- 9 Val Akva (NO)
- 10 James Newman (Crookhaven fisherman's Ass.) (IE)
- 11 Curryglass Enterprises Ltd (IE)
- 12 Fastnet Mussels (IE)
- 13 PROMOCIONES MARSAN SL (ES)
- 14 Cudomar SL (ES)
- 15 Alevines y doradas SA (ES)
- 16 Viveiros Ana Manjua Unipessoal Lda (PT)
- 17 Quinta Formosa, Producoes Aquicolas Lda (PT)
- 18 Lakeland (UK)
- 19 Sagremarisco- viveiros de marisco Lda (PT)
- 20 Netherlands Organisation for Applied Scientific Research (NL)
- 21 National University of Ireland (IE)
- 22 University of Newcastle upon Tyne (UK)
- 23 Global Aquafish SL (ES)



Oysters covered in bio-fouling including mussels and barnacles.

"Europe will have a new material that no other country or region will have."

Fluctuations in the cost, quality and availability of cowhides make it hard for tanning companies to meet the demands of their clients. The Collective Research project Dermagenesis aims to prevent these problems by applying the latest biomedical advances in tissue engineering to produce an alternative raw material for leather production. In the future, European tanneries may be able to produce leather artificially to set size, shape and quality specifications, and use more eco-friendly tanning processes. The development of 'engineered leather' could establish a new industry sector, and benefit leather goods manufacturers – and consumers – by means of stable, competitive prices and consistent quality.

We like the feel of leather on our feet, and shoes that give good support, are hard wearing and weatherproof. Leather is also a versatile material which is suitable for a wide range of products, from fashion accessories to sofas.

Yet the selection of high-quality leather goods available today does not reflect the many difficulties that European tanning companies face trying to supply manufacturers with the leather they demand. Unfortunately, the availability of animal skins (mostly cowhide) is inconsistent, and tanners are rarely able to source long-term, guaranteed supplies of premier-grade hides. Furthermore, tanners have to import hides from around the globe and are prone to fluctuations in exchange rates and exporters' protectionist policies which make imports expensive and Europe's leather industry less competitive in world markets.

The Dermagenesis project hopes to find a solution to these problems by developing an alternative raw material for leather production. The consortium is using the same biotechnological advances in the emerging field of tissue engineering to find a way for tanneries effectively to grow their own 'hides'. Cell lines can be stimulated to form layers of skin and tissue over a matrix of protein and other structural molecules. Similar technologies are already being used in biomedical applications, but have never before been employed for product development in traditional light industry.

Engineering success

There is no doubt that this is an ambitious project. First, the partners have to master the biotechnology and produce an acceptable engineered tissue. Then they must develop a bioreactor for tanneries to produce the novel material on a commercial scale at a competitive price. Finally, the tanneries will have to adapt all their treatment processes to cater for the new bio-techno-leather.

As a Collective Research project, Dermagenesis has every chance of success, drawing on the most relevant expertise from across Europe. The bulk of the R&D will be conducted by three leather research institutes from Italy, Spain and Hungary, in collaboration with three universities which are leaders in the fields of collagen research (University College Northampton, UK), tissue engineering (Università Degli Studi di Napoli Federico II, IT) and genetics

(Università Degli Studi dell'Insubria, IT). The research teams will work on producing suitable cell lines and growth matrices, optimising protocols and developing techniques to produce high yields of consistently good-quality material at a competitive price.

The consortium also includes six tanneries and two footwear manufacturers, representing the 'end-users' of the novel material. The tanneries will be involved in specifying and testing the innovative raw material and assessing the feasibility of running industrial bioreactors within their plants. They will also be involved in piloting new, environmentally friendly tanning and treatment processes to turn the engineered tissue into workable leather. The two footwear companies will then take the finished leather and assess its quality and suitability for end products. They will make demonstration shoes from the new material that can be compared with footwear produced from natural leather.

The consortium also includes an SME RTD performer from Italy that manufactures bioreactors and will be involved in scaling up laboratory and pilot processes. If the project is successful, this company will become an equipment supplier to tanneries wishing to produce the bio-techno-leather.

Market growth

However, even if the project achieves all its technical objectives, its real success will be measured in the uptake and application of the new leather. Here, the six participating



The interior of a typical tannery.

leather and footwear industry associations from Italy, Spain, Hungary and Belgium have an important role to play. They represent a large number of Europe's tanning firms and footwear manufacturers and have a crucial role in communicating the availability and benefits of any commercialised engineered leather to association members. By spreading the word about Dermagenesis, these organisations should stimulate early adoption of the material and quick market growth.

Tanners could cut their production costs whilst improving their environmental performance, while footwear manufacturers will reduce their waste and benefit from the consistent quality. In short, the appearance of on-demand production of pre-shaped material with guaranteed quality could radically change Europe's tanning and leather industries – and give them a significant competitive advantage.

Project title

Bio-engineering of leather: structure design, biosynthesis – Towards zero emission production (DERMAGENESIS)

Contract number

CT-2004-500224

Duration

48 months

Global project cost

€ 4 176 523

EC contribution

€ 2 088 233

"The new leather will reduce waste and avoid the need for harsh treatment processes."

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- 4 B.Z. Moda SRL (IT)
- 5 Bimeo (HU)
- 6 Biofin Laboratories SRL (IT)
- 7 BLC Leather Technology Centre LTD (UK)
- 8 Bor Es Cipoipari Egyesules (Association for Hungarian Leather and Shoe Industry) (HU)
- 9 Borge Garveri AS (NO)
- 10 Calzados LIS , S.L (ES)
- 11 Bonaudo – S.p.A. (IT)
- 12 Confederacion Española de Curtidores (ES)
- 13 Confederation des Associations Nationales de Tanneurs et Megissiers de la Communaute Europeenne (BE)
- 14 Fontanellas y Marti SA (ES)
- 15 Università degli studi dell'Insubria (IT)
- 16 Pecsı Borgyar Reszventyarsasag (HU)
- 17 Unione Nazionale Industria Conciaria (IT)
- 18 Universita Degli Studi di Napoli Federico II (IT)
- 19 University College Northampton (UK)
- 20 Veneta Conciaria Valle Agno S.p.A (IT)
- 21 Vivapel S.A (ES)

Leather is also a versatile material.



"SMEs will be able to develop their own product environmental improvement strategies."

Environmental concern is moving up the business agenda, thanks to a combination of consumer demand and legislative pressure. Most large companies now take environmental management seriously and increasingly expect their suppliers to do the same. But the majority of SMEs do not have access to the necessary knowledge and tools to make their products more environmentally friendly.

So, the Collective Research project Ecodis aims to develop an eco-design platform that will enable small firms operating in particular in the electric, electronic, automotive and aeronautical sectors to go green, comply with the law and satisfy customer demands.

Green is good: it is good for the planet, good for ecosystems, and good for our health. And it is increasingly good for business, too. A combination of consumer demand and legislative pressure is forcing environmental issues on to the business agenda.

For instance, the WEEE and End of Life Vehicles Directives set targets for the reuse and recycling of waste in the electric, electronic and automotive sectors. The legislation is forcing manufacturers to consider recyclability in their product designs. Consumers, meanwhile, are increasingly aware of climate change and environmental degradation. Their demands for eco-friendly products are beginning to be heard.

Many large manufacturers are already embracing the environmental challenge, seeing it as good for business. They are investing time and money into developing environmental policies, management systems and implementing standards such as ISO14001. And now they are beginning to demand that their suppliers also meet a satisfactory level of environmental performance.

But many small and medium-sized enterprises (SMEs) are struggling to comply. They do not have the basic information they need, such as data on hazardous substances, the environmental impact of manufacturing processes and different end-of-life scenarios. Furthermore, most do not have the cultural or technical know-how to incorporate the environmental dimension into their work. Design teams are used for quality, cost and time parameters, but now they must consider the environmental impact of their designs, too.

Eco-design made easy?

The ECODIS Collective Research project is coming to their rescue. It brings together industry associations (IAGs) and groupings from France, Belgium, Hungary and Spain to represent SMEs in plastic conversion, mechanical processing, electrical goods and electronics manufacturing, and automotive components and parts production. Together with seven research contractors and ten SMEs, these IAGs aim to develop and distribute an innovative eco-design platform that will enable small businesses to meet the requirements of their customers and legislators. Ten large companies will also contribute to the project by participating on the Advisory Board.

The Ecodis tool kit, operating either through software installed in a company or accessible over the Internet, will integrate four different systems to support and improve eco-design within a firm. First, it will offer an interactive information system enabling companies to manage and monitor the materials and components that are used in their manufacturing processes and which are potentially harmful or hazardous for health and/or the environment. Almost 3 000 substances are regulated in Europe, the vast majority of which remain unknown to most SMEs. This system will help them select more environmentally friendly materials.

The Ecodis platform will also include modules for life-cycle and environmental impact analyses. Firms will be able to compare different industrial processes so that they can reduce the environmental impact of the manufacturing phase. A complementary system will assess different scenarios for end-of-life processing so that products can be designed with reuse and recycling in mind.

The Ecodis platform is also designed to permit the transfer of data and information along the supply chain. This will help SMEs to monitor the environmental status of their suppliers and satisfy their own customers that they have followed eco-design principles.

Although no eco-design tool currently exists for Europe's SMEs, the project is not starting from scratch. Two of the IAGs involved have been working on such systems for large companies for many years. However, these are complex

The End of Life Vehicles Directive sets targets for recycling scrap cars, which car designers must take into account.



tools requiring expert knowledge – and they tend to be inappropriate for small businesses. The expanded Ecodis project should allow these systems to be adapted for smaller businesses and configured so that they could also be used in other manufacturing sectors across Europe.

Green light for sustainability

Electronic tools are ineffective if they are not backed up by cultural and organisational changes within a business. The Ecodis project will also develop Product Oriented Environmental Management Systems (POEMS) that SMEs can adopt in order to embed eco-design within their organisations. Again, the IAGs will be central to encouraging the implementation of POEMS within member companies through training programmes and workshops.

With access to all these innovative tools and approaches, the ten SMEs participating in the Ecodis project will certainly lead the green movement in their markets. However, the project has the potential to benefit around 10 000 European SMEs working in the automotive, transportation and electrical and electronic goods sectors. Sustainability in these industries is absolutely dependent on the environmental performance of SMEs – Ecodis will help to put green business within their grasp.

Project title

Ecodesign Interactive Systems (ECODIS)

Contract number

CT-2003-500779

Duration

36 months

Global project cost

€ 2 917 500

EC contribution

€ 1 666 250

"Ecodis will allow SMEs to turn legislative pressures into market opportunities."

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- 10 TECPOL (DE)
- 11 Technidata AG (DE)
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- 18 Addiplast (FR)
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Eco-design is essential to develop more environmentally friendly consumer goods.
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Building a brighter future for masonry construction

ESECMASE

"Improving tests for lateral loads in masonry house construction will safeguard an important sector of the building industry."

Many houses in northern Europe are built using masonry construction – essentially load-bearing structures that use products such as bricks and mortar. But this century-old way of building has been put under threat after research showed that lateral loads on masonry walls, caused by earthquakes and storm winds, were much higher than previously thought. New building codes – called Euro Codes – reflect these findings and call for masonry-constructed houses to be built with more precisely defined lateral load tolerances. The ESECMaSE Collective Research project intends to provide designers and builders with a better understanding of lateral loading issues and help them to meet the requirements of the new regulations.

House building is inextricably bound to the social, cultural and economic history of a country – and, of course, reflects the practical needs of the local environment and weather conditions. Masonry-built houses have been popular in countries like France, Germany and the United Kingdom for many years. Robust and warm, a traditional 'bricks and mortar' build is far more common than other types of construction – in these countries, about 80% of all houses are built in this way. However, the situation is much different in southern Europe, where house building incorporates frame construction to provide structural strength – masonry is used to fill the gaps in the frame, but is not required to provide lateral support.

A potential crisis

Traditionally, house builders who specialise in masonry construction have never had to think much about lateral loads, or about the potential damage caused to their walls by earthquakes or wind. As far as earthquakes are concerned, the prevailing view has been that they do not occur frequently in Europe and do not cause much damage. For many years, builders tended only to think about vertical loading to make sure a building could support its own weight. But the eight new Euro Codes, recently introduced by the European Union, have changed all that. Now the requirements present in EURO Codes No. 1 and 8 – the codes that most directly relate to lateral loads – could potentially see an end to masonry-built houses. The problem is that architects, builders and engineers do not know how to accurately measure lateral loads in masonry house construction. It would be easier for them to change to building houses using other methods and materials. Brick and mortar could possibly be replaced with concrete, steel or wood constructions. Such a move would have a profound effect on the construction industry. SMEs (small and medium-sized enterprises) that make products for masonry buildings – for example, clay brick makers – would be hard hit, and many could go out of business.

Finding solutions

The difficulties of making structural design calculations for load-bearing masonry under the new codes were identified by the German construction industry. Over the last few years, it has done some preliminary research on the issue. But it has become apparent that the challenge has to be met by a Europe-wide project. ESECMaSE – Enhanced Safety and Efficient Construction of Masonry Structures

in Europe – is a Collective Research project that has attracted 26 partners from Europe's building industry. Their aim is to improve understanding of the lateral design of masonry and to create a harmonised approach to design standards. The project seeks to improve building products so that masonry structures can withstand lateral loads better.

ESECMaSE will also create test methods that can be used by designers and producers so that they can design buildings that match the requirements of the new codes. The project will carry out the most extensive investigation ever of lateral loading in masonry. The work will start with theoretical investigations on the types of stress faced by masonry that is subjected to lateral loads. This information will be used to produce a battery of tests on the ability of masonry members and walls to withstand different stresses. This should refine testing methods that could eventually be used by the construction industry.

The project consortium will also seek to improve the properties of masonry materials that are produced by SMEs. Hopefully, these firms will be able to incorporate such enhancements in their construction processes and thereby improve the ability of masonry products to withstand greater lateral loads. Research will cover recent developments in the building industry such as the use of more and more lightweight materials – for example, many lighter mortars and more highly perforated masonry units have never been tested for their lateral load bearing potential.



Shaking out problems

During the second half of the project, results will be tested and verified at engineering institutes in Greece and Italy that are expert in assessing earthquake damage in buildings. These institutes can examine the behaviour of structures and construction products on shaking tables that mimic the effect of an earthquake. ESECMaSE's research performers will carry out the lateral loading tests and, with the help of the project's SME partners, will help to improve the material properties of building products. Meanwhile, the solutions they come up with will be disseminated to Europe's construction sector by the industrial associations that have signed up to the project.

Project title

Enhanced Safety and Efficient Construction of Masonry Structures in Europe (ESECMaSE)

Contract number

CT-2004-500291

Duration

36 months

Global project cost

€ 3 011 009

EC contribution

€ 2 174 026

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Testing the strength of masonry walls.

"Gendis will define the opportunity for SMEs."

The increasing use of distributed generation in Europe means that new models for electricity distribution need to be developed. These distribution networks, which must be able to control and meter bidirectional energy flows, will provide new opportunities for electrical components suppliers. The Gendis Collective Research project will help European SMEs gain improved understanding of this valuable global market, its challenges and technical solutions. The results will be widely disseminated to support competitiveness and growth in the sector and should encourage innovative activity that can enable greater uptake of DG, thus bringing environmental benefits.

Distributed generation (DG), the connection of small-scale generating units to local electricity distribution networks, is likely to become increasingly common in Europe. This is mainly due to European Union support for efforts to reduce the dependence of Member States on fossil fuels and to boost the use of renewable energy sources.

DG can already be found in many applications, notably in Combined Heat and Power (CHP) units used in many larger commercial and public buildings, but its uptake has been hindered by several key problems. First, buildings with distributed generation units installed have to be able to export energy to their distribution network operator (DNO) as well as import. Current electricity distribution networks were not designed for this two-way flow and how local and regional networks will perform with bidirectional energy flow is not well understood. In addition, the metering of power flows in and out of the unit is not a simple task. This is particularly so if power is being bought and sold in an open electricity market where the value of the power marketed varies during the day as demand and supply are matched. This means that DG may not be economical to install and may not be used to its best efficiency.

SME opportunity?

Many small and medium-sized enterprises (SMEs) supply components to the electricity control and supply system sector but do not have the financial resources to improve their understanding of the technology required for managing the new emerging distribution systems. This puts them at a disadvantage compared to larger enterprises and may inhibit innovation in the sector as a whole.

The Gendis project aims to tackle this problem in a number of ways. The Collective Research consortium will undertake a detailed prenormative study of the DG/DNO problem, with particular regard to SME concerns and opportunities. This will include an investigation into the challenges posed by metering to measure two-way power flow fairly and accurately. The project will then go on to use laboratory and full-scale trials to determine the effect of embedded loads, such as those provided by DG, on model distribution networks. The model networks will reflect the current spread of models operated across Europe as well as the new paradigms, such as mini-grids, active networks and 'internet-like' networks, that are being

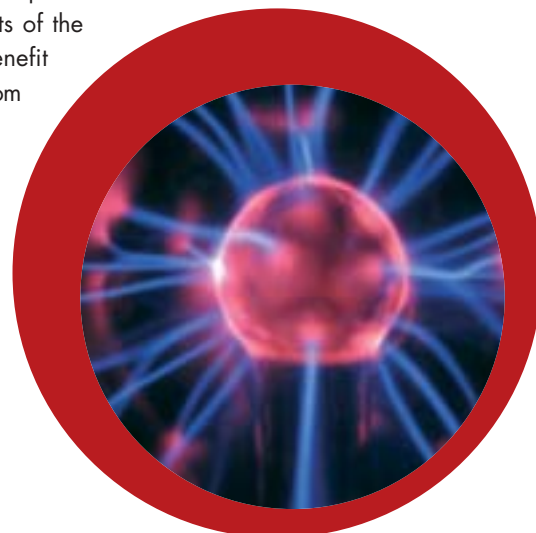
proposed to accommodate very large total contributions to power supply from DG.

A model distribution grid will be constructed to test proposed solutions, including new component concepts, and a structured training package assembled to disseminate the results to SMEs. Depending on progress in the project, some field testing may also be undertaken.

GENDIS components

The project is coordinated by Chalex Ltd, an Irish company with specific skills in thermoelectric technology and research project management. The consortium also includes three national industry associations from Italy, Spain and the UK as well as the European trade association for the promotion of cogeneration (COGEN Europe) whose membership includes 160 power companies, power authorities and other companies in 30 countries. The broad range of SMEs included in these four associations will ease the transfer of technology generated by the Gendis project and ensure that the research is appropriate to their members' needs.

The five SMEs involved directly in the project have been carefully selected to represent a broad spectrum of the European renewables sector, including expertise in photovoltaics, generators and other renewable energy technology. They will be in an excellent position to apply the results of the project and benefit commercially from its exploitation.



"Developing new components will provide a competitive edge."

Three expert providers will undertake the research itself. EA Technology in the UK is a world leader in energy research and will head up the testing and evaluation of the impact of DG on the model networks. Elsam Kraft A/S from Denmark is the country's largest electricity generator and will investigate the effect of embedded generators on actual distribution grids. Denmark has a significant DG load due to its widespread adoption of wind power. The University of Genova will perform similar tests in Italy.

Competitive edge

The project will give European SMEs in the sector a much greater understanding of the challenges and opportunities in DG. Consequently, they will be able to compete on more level terms with large industrial corporations already active in the field and stimulate competition and innovation. This, in turn, will encourage the uptake of DG and bring benefits to the European environment, creating and safeguarding jobs in the industry. As the provision of electrical power develops globally, DG networks are likely to predominate and will provide a significant opportunity for European SMEs equipped with the competitive edge supplied by Gendis.

Project title

Distributed Generation: Its Impact on Electricity Networks from an SME perspective (GENDIS)

Contract number

CT-2004-500351

Duration

36 months

Global project cost

€ 2 374 883

EC contribution

€ 1 431 188

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Distributed generation will need new infrastructure.



"Greenrose will show how SME producers can manufacture electronics goods that contain none of the prohibited substances."

Concern about the heavy burden placed by the electronics industry on the environment is spurring European legislators to regulate production, use and disposal of electronics products. Industry's response has concentrated on how to deal with the pending ban on one hazardous substance, lead, but has neglected others in spite of their widespread use. Greenrose is a Collective Research project aimed at helping SMEs to eliminate these substances from their products. The SMEs that make up its core group will be able to avail themselves of facilities geared up to perform R&D, pilot production trials and product testing for their specific needs.

European environmental legislation relating to electrical and electronic equipment (EEE) has generated a lot of interest in lead-free soldering. Getting this right is critically important to producers if they are to be compliant when the legislation comes into force. But spotlighting this issue has had a couple of unfortunate side effects – side effects that Greenrose, a Collective Research project launched in June 2004, is set to remedy.

First, for many in industry, converting to lead-free has become not just necessary but also sufficient for compliance with the Restriction of Hazardous Substances (RoHS) Directive. Other substances the Directive prohibits have been left in the shadows, in spite of the fact that some are in widespread use in electronics goods – for example, as flame retardants.

Future of electronics

Secondly, too little attention has been given to the legislation's open-endedness. Article 4.3 of the RoHS Directive explicitly contemplates prohibition of additional hazardous substances "as soon as scientific evidence is available". Reducing the impact of environmental pollution on human health is, after all, one of the four priority objectives of the EU's Sixth Environmental Action Programme. Precaution and risk prevention are central to its approach. While pressing for implementation and enforcement of existing legislation, the programme anticipates further actions in individual policy areas.

By contrast with the lead-free 'fixation', Greenrose's remit includes the entire gamut of hazardous substances in EEE. And unlike most R&D projects addressing environmental issues for industry, Greenrose is as future oriented as the framing legislation. Its objective is to provide European SMEs in the electronics sector with the knowledge and tools they need now and in future to design and produce electronics goods that satisfy all hazardous-substances legislation while meeting customer quality and reliability requirements.

SME lifeline

For the SMEs that make up Greenrose's core group, it could be a lifeline. For example, there is significant concern in Poland, one of the eight Member States represented in the consortium, that the costs of satisfying the legislation will put many of their small electronics manufacturers out of business. This is a real danger for SMEs selling a small range of niche products. If their markets are not big enough, income from post-compliance sales may be insufficient to compensate for the upfront costs of converting their operations.

The core-group partners will directly benefit from the combined R&D resources of several leading research institutes. The consortium has already set up facilities in Poland and Latvia to provide practical technical support. They will be performing research and development tailored to the specific needs of these SMEs, pilot production trials and testing of products for the presence of any substances prohibited by the legislation.

The industrial associations and groupings (IAGs) among the partners will own the intellectual property rights arising from this work. Their member companies, several hundred in number, will thus have ready access to Greenrose's findings, too. In other words, the project shares the cost, effort and risk of the switch to producing goods free from hazardous substances between a very large group of European electronics companies, including a large number of the most vulnerable.



First experiments on the pilot production line.

Greenrose Virtual Academy

From the technologies and processes to be developed in the course of solving compliance problems at each core-group SME, the consortium will select a set of instructive examples to be the subjects of case studies for wider dissemination. They intend to publicise these through a wide array of outreach channels, including publication of articles, provision of training materials in regional languages, delivery of training courses at all core-group sites, and delivery of off-site training courses in each region represented in the consortium.

The project's end date will not be the end if the consortium realises its ambition of promoting green electronics design and manufacture for a future extending beyond the immediate demands of the RoHS and EEE Directives. The idea is to set up a self-funding Greenrose Virtual Academy, assimilating the findings made during its three years of EU support. Developments inside the Union alone point to a need for such an undertaking – the proposed directive on eco-design of energy-using products (EuP), the integrated product policy (IPP) and the possibility of extensions to the RoHS Directive. Global developments can only reinforce it.

Project title

Removal of hazardous Substances in Electronics: Processes and Techniques for SMEs (GREENROSE)

Contract number

CT-2004-500225

Duration

36 months

Global project cost

€ 3 280 195

EC contribution

€ 2 216 917

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The associated quality lab.

“The future of the European industry does not depend on working harder but on working smarter.”

Like many industries reliant on highly skilled labour, injection moulding and mould making are losing ground in the EU to countries where labour costs are low. The Hipermoulding Collective Research project proposes to turn back the tide by enabling mould-makers and moulding companies to slash injection-moulding cycle times. Their path begins with layer-based manufacturing technologies. These give mould-makers the power to build cooling channels into their moulds that hug the contours of the part being moulded and enable far more efficient cooling. If all goes according to plan, moulding companies will be able to reduce the cost of an average moulded part by as much as one fifth.

Recent years have seen a slow but steady ebb of injection-moulding and mould-making businesses out of the EU to the Far East. Approximately five percent of turnover is lost each year, which is no small matter. EU moulding and mould-making companies turn over €22 billion and €12 billion per year respectively. They employ 225 000 and 120 000 workers. It is the type of situation collective projects were designed for, and one such, Hipermoulding, is already poised to stem the tide. Its aim is to rescue competitiveness by ratcheting up productivity among the EU's moulding and mould-making SMEs (small and medium-sized enterprises).

Rapid tooling

In the injection-moulding process – which gives us everything from mobile-phone casings to car dashboards – molten polymer is injected into a mould and left to cool. As soon as it is solid, the resulting part is ejected from the mould, and a new cycle begins. Of the three phases to the process – injection, cooling and ejection – cooling takes longest and, as such, is the most critical to productivity. It is accelerated by pumping water under pressure through cooling channels drilled in the moulds.

The key to Hipermoulding's strategy is rapid tooling. The two halves of an injection mould are traditionally machined from steel blanks. Voids machined in the blanks form the all-important space between the two halves of the mould – the space into which the polymer is forced during moulding to produce the 'impression'. In rapid tooling, however, there are no blanks. Instead, the metal surrounding the desired voids is built up from nothing in a sequence of very thin layers, one on top of the other, typically by lasers scanning and fusing metal powder.

Rapid tooling is faster than machining. But it enjoys another important advantage. It gives mould-makers the possibility of creating intricate three-dimensional shapes that are impossible with machine tools. It is this capability that has put conformal cooling on the industry's agenda. Rather than following the simple, mostly straight paths that drilled cooling channels are limited to in machined moulds, conformal channels can be designed to hug the contours of the impression or specific problem areas around it and so remove heat more effectively.

Figuring things out

The consortium's objective is to develop a detailed method for optimising the geometry and positioning of conformal cooling channels. When their work is complete, the Hipermoulding module will be capable of taking as input a mould design in the form of the usual digital CAD (computer-aided design) file and generating from this a CAD design incorporating optimised conformal cooling channels. At the same time, the module is expected to select the most appropriate rapid-tooling technology from the various options available for manufacture of the mould. It will also produce a plan for machine-finishing the mould and determine the machine settings to be used on the moulding machine for which the mould is destined.

The partners have put numbers on their ambitions. They are looking at a 30% reduction in mould-filling time and a halving of part-cooling time, jointly resulting in a 30% cut in energy consumption. This should, they reckon, put moulding companies in a position to knock 20% off the price of an average injection-moulded part.

Six Member States are participating – Belgium, the Netherlands, Poland, Portugal, Spain and the UK. In addition to the support and direction given to the consortium by industrial associations in each participating Member State, one or two SMEs in each will collectively steer the project as the core group. They range in size from around 20 to 150 employees. The research and development work will be carried out by a team of six research institutes drawn from



Mould-maker with the end result.
© Promolding

all of the participating Member States. Quarterly project meetings will also be attended by representatives from between ten and 20 further SMEs from each of these states. There they will be kept informed of progress and have the opportunity to ask questions and make suggestions. They will communicate what they learn from the project to their staff and take advantage of the project results.

At its kick-off meeting in December 2004, representatives from two of the participating industrial associations set out their expectations for Hipermoulding. The project, they hope, will help usher in important technical improvements, especially in manufacturing processes and the ability of moulding and mould-making companies to get the best from their equipment. But they also hope for less tangible benefits – the formalising of partnerships and promotion of technological innovation as two unique selling points for the European moulding and mould-making industry.

Project title

Extreme Cycle Time Reduction of Injection Moulding Processes by using High Performance Injection Moulds and Moulding Processes (HIPERMOULDING)

Contract number

CT-2003-500319

Duration

36 months

Global project cost

€ 4 429 750

EC contribution

€ 2 653 750

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Example of CAD-file with internal conformal cooling channel configuration; separate channel shown in extraction.

© TNO

"Inasoop will help thousands of small, traditional producers to tackle today's big environmental concerns."

World demand for olives and olive oil is rising, yet many European olive producers are finding themselves facing the threat of closure. The cost of complying with stringent EU regulations, combined with growing competition, is posing serious problems for smaller companies, and many are finding it difficult to cope. In the Inasoop project (Integrated Approach to Sustainable Olive Oil and Table Olives Production) ten industry associations are working with key research institutes and environmental consultancies to help around 12 000 small and medium-sized enterprises (SMEs) across Mediterranean Europe to compete more effectively in the world olive market.

Olives are big business in Europe. European companies produce around 80% of the world's olive oil and up to 45% of its table olives. Not only that – as more and more people recognise the health benefits, they are demanding more and more olives and olive-based products, driving growth in world demand up by around 4% each year.

At the moment, most of the table olives and olive oil from Europe are produced by SMEs. Many of these are family owned and have a long tradition of olive farming or oil processing behind them. But, like SMEs in other sectors, these small producers are especially vulnerable when faced with environmental or other concerns. One of the biggest concerns now affecting olive oil companies is that of dealing with olive mill waste – liquid and solid wastes produced during the oil extraction process.

The issue of waste disposal has long been a headache for the olive industry. Although free of heavy metals or other, similar toxins, the pungency of the waste poses a significant aesthetic problem, while the high organic content of the residues can, without proper treatment, lead to eutrophication and groundwater contamination. Larger companies usually have the resources to manage this by investing in new technologies. But with limited access to information and know-how, and few resources available to improve equipment, SMEs often lag behind.

Doing the groundwork

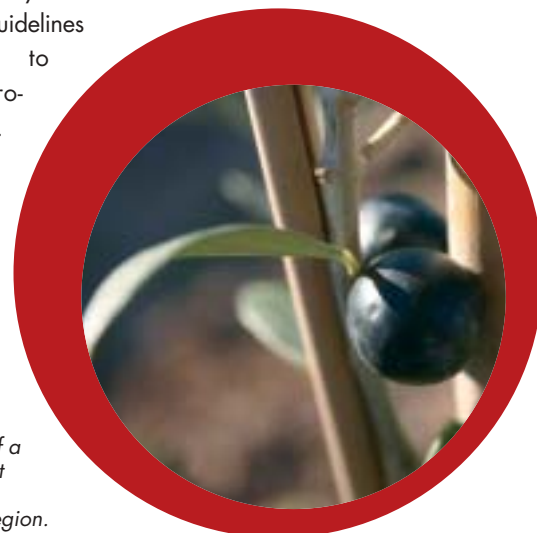
Determined to help these SMEs to improve their competitiveness on the olive market, the Inasoop project consortium brings together 21 experienced producers and professional organisations. Coordinated by German R&D specialist Itz Bremerhaven, the group of growers, industry associations, universities and consultancies from Italy, Spain, Greece, Portugal and Germany, are pooling their expertise and experience to help solve the SMEs' problem. Their goal, over the next three years, is to develop a set of environmental quality standards (EQS) which guarantee compliance with European legislation, and which will form the basis of an environmental label – a potentially powerful marketing tool – to promote European products in the global market.

All in all, it would appear that the SMEs in this sector have good grounds for optimism. First, the consortium pulls together a really diverse range of expertise, from small-scale olive production to global marketing, and from oil chemistry to environmental engineering. Secondly, the project aims to provide much more than the proposed EQS. It will develop and disseminate state-of-the-art information, it will supply the EQS assessment software tool (Expert System) to assist in attaining standards, and it will provide dedicated training for industry associations or groupings (IAGs) and for SMEs. Consequently, the project will deliver both the desired standards *and* the support required to achieve them.

Growing strengths

The ambitious Inasoop provides a perfect illustration of how the European Commission's Collective Research projects can benefit European SMEs. Each small table olive or oil producer faces the same problems – of meeting new environmental standards while fighting greater competition. Yet, on their own, the SMEs lack the capacity either to research these issues in sufficient depth, or to explore the range of possible solutions. The consortium, on the other hand, can combine its diverse research, practical and innovation skills to meet the common needs of these various companies.

The Inasoop team envisages the end result as an international network of SMEs and IAGs, each armed with the information they need and the necessary guidelines and training to achieve the proposed EQS. This, in turn, will guaran-



The humble olive forms the basis of a vital industry right across the Mediterranean region.

"The label will add value to European olive products in a growing global market."

tee compliance with any relevant environmental legislation, along with the right to use Inasoop's environmental product label. The scheme could also see SMEs enhance their economic performance through more efficient use of resources, either by improving energy efficiency and/or by reducing water consumption. It is even hoped that companies may, in the future, add value to their outputs if experimental techniques to convert waste to useful products prove successful.

The project will also have direct benefits for the Mediterranean region and its people. Better implementation of environmental regulations will reduce environmental degradation while protecting Europe's groundwater – the region's most important source of drinking water. Meanwhile, the development of better-qualified staff, a more efficient use of resources, and improved management systems should dramatically increase the competitiveness of Europe's olive industries. And, given steadily increasing interest from other Mediterranean countries and from new producers like Australia and the US, a more competitive edge is something Europe's olive and oil-producing SMEs definitely need.

Project title

Integrated Approach to Sustainable Olive Oil and Table Olives Production (INASOOP)

Contract number

CT-2004-500467

Duration

36 months

Global project cost

€ 1 584 583

EC contribution

€ 1 070 813

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"We hope to give greater visibility to the most traditional, identity-rich products of these rural regions."

Carefully made regional products are often very evocative of local cultures and traditions. Such identity-rich goods are usually produced by small, rural SMEs that make and sell their wares in time-honoured fashion. Now, in the internet age and with the help of the latest information society technologies, it is possible for many more European SMEs to reach a global market. Unfortunately, many of these smaller, rurally based firms do not always know how to exploit new e-business applications. The Intrinsic Collective Research project aims to help them gain access to e-commerce facilities so they can improve their own businesses and raise the profile of the regional economies in which they operate.

It is part of the charm of a culturally diverse continent like Europe that a visitor to different regions can take away a feeling of tradition by buying goods that are made to reflect local culture and customs. It could be a piece of pottery, a food product, or jewellery, all of which are likely to have been made by a small producer. As skilled as they are in producing their goods, these SMEs (small and medium-sized enterprises) could do more to reach a wider market. Working in rural regions, they have largely missed out on the internet revolution and the chance to use web-based applications to grab a larger customer base.

Innovative solutions

The Intrinsic project, which brings together 13 partners including information technology specialists, chambers of commerce, and handcraft SMEs, will provide a way round this challenging situation. The Integrated Transactions and Imagination Engineering to Support the Identity value Chain project began its work by analysing the activities and working processes of SMEs in two areas of production – food and quality handcraft products. The aim is to find out what their needs are in terms of e-businesses applications and services that could support what is known as the 'transactional value chain'. Intrinsic will also develop applications and services that can help convey the image and identity of a product to support what the project team call the "imagination engineering value chain". Essentially, this means creating marketing tools that SMEs can use to improve their businesses and to attract new customers.

The promotional activities and e-business applications produced by Intrinsic will be made available to local SMEs through Regional Service Centres. For a commission, these centres will manage the e-business applications which can be accessed by local SMEs. (The project team hopes to show firms that the benefits of using new e-commerce technology will be well worth a small fee.) Setting up access to services in this way should help to attract SMEs to a regional centre and create critical mass for the Intrinsic venture.

Intrinsic is carrying out its work in three 'test-bed' regions that each produce distinct, identity-rich products: Catalonia in Spain, where the focus will be on food and beverages that have a regional tradition and appeal; the Turkish Region of Beypazari, which is famous for its silver filigree jewellery, produced by traditional

processes not seen in other parts of the country; and Sardinia, where valuable handicrafts such as ceramics and carpets are made using traditional techniques.

A tailored approach

By using three different regions to test its work, the Intrinsic project will be able to develop a common approach that can be tailored to local needs. This should mean the results are transferable, with some adaptation, to other European regions. Careful preparatory work will be carried out before the technology solutions are created. The Intrinsic team needs to examine in detail the production and selling processes currently used by the consortium's SMEs so that they can understand which e-businesses and marketing tools will be most useful. For example, some SMEs in Catalonia are distributors supplying foodstuffs to restaurants, so they will need e-commerce and e-procurement facilities to help their business-to-business activities. In Sardinia, however, handcraft SMEs are more likely to use e-commerce facilities tailored to selling directly to customers.

The aim is to install the three regional service centres, providing both e-business solutions and marketing tools, to give local SMEs visibility in international markets. To do so, training activities are foreseen involving the project's grouping associations – and supported by Intrinsic's technology partners – in favour of the consortium SME members. Then the network will be widened to include the other SMEs that operate in the same market fields



(food and beverages in Catalonia, silver filigree jewellery in Belpazari, and handicraft ceramics and carpets in Sardinia) so that the knowledge generated by the project can be passed on to a wider business community.

Project title

Integrated Transactions and Imagination Engineering to Support the Identity value Chain (INTRINSIC)

Contract number

CT-2003-500529

Duration

24 months

Global project cost

€ 2 618 600

EC contribution

€ 1 475 200

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"The real challenge is to help SMEs to work in this knowledge-based society."

Take-up of information and communications technologies (ICTs) has been slow in the construction industry. As a result, coordination and collaboration between actors have not made the strides they have in other sectors, where business-to-business platforms have enabled substantial improvements in supply-chain efficiency. The Know-Construct consortium's ambition is to take a leaf out of the automotive industry's book by developing a software system to facilitate knowledge sharing between construction industry suppliers. In a European market place worth around a thousand billion euros per annum, the savings could be enormous.

Manufactured products they may be, but buildings differ from virtually all others. They have to be built at the precise place where they will be used. Nor are they disposed of and replaced after a few years' use. Combine these points with other salient characteristics of construction – labour intensiveness and a strong dependence on small and medium-sized enterprises (SMEs) (95% of suppliers) – and you can begin to see why the construction industry (CI) is one of the most heterogeneous, fragmented and geographically diverse.

Knowledge shared

You also have the beginnings of an explanation for why ICTs have yet to establish the same foothold here as they have in other sectors. The Know-Construct Collective Research project aims to be part of the solution to this challenge. The partners want to make it much easier than at present for CI suppliers, whatever their particular expertise, to share their knowledge effectively – with their customers, naturally, but also with one another.

At the project's helm is a trio of industrial associations from Spain, Portugal and Germany. A fourth will add a French perspective. Their role is to represent their members' needs and communicate project results to them. A core group of SME partners will directly represent the needs of CI SMEs and validate the software tools as they become available. The software engineering itself will be carried out by Spanish, Portuguese and German research institutes. Partners will be working together most intensively within their own regional hubs centred on Bilbao, Porto and Bremen, but are excited about the opportunities the project will open for them to learn from their international partners.

What they propose is a common internet-based CI platform with in the means of SMEs. It will offer users two facilities: a customer-needs management (CNM) system based on the characteristics of building-supply products, their applications and related consultancy services; and a knowledge-communities support system (KCS) to support advanced forms of industrial co-operation, enabling CI SMEs to come together in industrial knowledge communities.

Customers and peers

Put yourself in the shoes of an architect who has an idea for an innovative light front for a new building but is unsure of how best to put it into effect. At present, you might go to a trade directory, identify dozens of potential suppliers, discuss your needs at length with each and still emerge without being quite certain that you had singled out the very best solution.

With the proposed CNM, the task would be faster and the result more reliable. You could go to a website and in a few mouse clicks find the section for windows and light fronts. There you would find much of the advice you can now only get by phoning around lots of suppliers, but it would be organised logically and consistently. So you would be able to narrow down your options quickly. On top of that, there would be contact details for a specialist advisor who could give you more detailed advice on windows and light fronts and their suppliers.

The KCS, by contrast, is going to facilitate productive supply-chain collaboration. The system will enable suppliers to set out for one another their own experience and expertise in very practical terms. Appropriately organised, this information will make it possible for a handful of small companies, for example, to recognise a common problem they face and identify another company with the expertise to solve it.

Collaboration in the value chain will also benefit. It is common nowadays for the several components required for an assembly that



CNM: Innovative Customer Needs Management System.

"Problems can be solved more easily with help from partners who have been in the same situation."

will form part of a building to be supplied separately and put together on the building site before incorporation into the building. With the KCS in place, the suppliers of those components will be able to identify one another and team up to supply the assembly ready-made to building contractors. The strategy has been proven for sub-assemblies in the automotive sector, so why not in construction, too?

Productivity gains

In 2001, investment in construction in just one of the Member States participating in Know-Construct came to €226 billion. However, that was Germany where the 79 000 SMEs – 99% of German construction companies – made only 73% of the turnover. In these SMEs, average turnover per employee is just one-third to one half of what it is in larger companies. Productivity gains realised through improved customer relationships and stronger value-chain collaboration can make a big dent in that stark gap.

The SMEs in the Know-Construct consortium will undoubtedly be the first to benefit. Those represented by the consortium's industrial associations will be next. And if early talks with a large third-party software house pay off, the project's results will be available right across Europe.

Project title

Internet Platform for Knowledge-based Customer Needs Management and Collaboration among SMEs in the Construction Industry (KNOW-CONSTRUCT)

Contract number

CT-2004-500276

Duration

30 months

Global project cost

€ 1 887 205

EC contribution

€ 1 139 688

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"Best-practice procedures for production processes, product inspection and on-line monitoring will improve reliability."

A hard-hitting European Union ban on lead in electrical and electronic products is imminent. Know-how generated over many years will become irrelevant. In the face of continuing uncertainties about lead-free solders, producers must select from the many on offer and adapt their operations accordingly. As most of the preparatory research has been conducted by and for large-volume producers, the challenge for SMEs is greatest. The Leadout Collective Research project offers them a range of technical support to ease the transition. For the small and medium-sized enterprises in the 11 industry-association partners, this means the special needs of their small-scale operations will finally be addressed directly.

1 July 2006 will be a day of reckoning for Europe's electronics producers. From that day forward, most of their products must be lead-free. The Directive responsible for this – Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment – will finally come into force.

A few companies – several of them outside Europe – are already compliant but for many of Europe's producers, especially SMEs, going lead-free is no simple matter. Tin-lead solder has been a mainstay of the electronics industry for half a century and not without good reason. Its properties make it well-suited to a solder's dual role – connecting components to printed circuit boards (PCBs) electrically while holding them in place mechanically.

No drop-in replacement

Despite their best efforts, researchers have so far failed to devise a substitute that does not necessitate modifications to manufacturing processes. But they have devised a host of lead-free solders, each necessitating its own work-arounds. SMEs starting out on the road to lead-free compliance are thus forced to carry out a complicated multidimensional selection process exacerbated by outstanding uncertainties about the new solders.

Leadout is a large Collective Research project with a mission to ease the transition for small and medium-sized electronics producers. Through a programme of technical support, the partners aim to help them overcome the obstacles standing between them and compliance before the deadline.

In the early stages, the partners will concentrate on awareness raising, and on production-status assessment and on-line monitoring for core-group SMEs. The passage of Europe's lead-free legislation has been so bumpy at times that industrialists doubted it would ever get on to the statute books. Absorbed by the demands of everyday operations simply to survive in the declining European market of the last few years, many SME managers have allowed their attention to the legislation's progress to slip.

Short-run soldering

In parallel with these efforts, the consortium is to carry out a benchmarking exercise to establish authoritative measures of the yields that can be achieved in lead-free production processes and, for

comparison, traditional ones too. Soldering processes favoured by PCB-assembly SMEs, typically for short production runs, will attract most of the consortium's attention. SMEs in the nine Member States represented in the consortium will be surveyed, so the outcome promises to be a truly European benchmark and a big confidence booster. It will also establish a yardstick for judging improvements in product reliability also promised by the project. These will flow from the findings of research into production processes, product inspection and on-line monitoring later on.

Little research has been done on the implications of the switch-over for this particular kind of production, where manual soldering, for example, plays a much bigger part than in mass production. Rework, in which PCBs that fail inspection tests are corrected, has also received comparatively little attention. The consortium's four research institutes will be investigating both of these as well as other technical issues to fine-tune lead-free technologies most relevant to small producers.

The consortium is large and broad in scope. There is a core group of 16 SMEs from up and down the supply chain – PCB makers and assemblers, testing and design companies and solder-paste and equipment suppliers – and four research institutes. Wide dissemination will be aided enormously by the presence of 11 industrial associations (IAGs) which will own whatever intellectual property is generated by the project. Plans include e-learning packages, a website, newsletters, seminars and industrial-association events.



Chip capacitor joint with tin/silver/copper solder on an OSP surface finish.

*"The environmental aspect is innovative,
and is not well covered in
other similar work."*

Leadout's first priority is to help SMEs satisfy the legislation and reduce their environmental impact. Although only 0.5% of world lead production goes into PCBs, a large proportion ends up in land-fill sites, from which it can leach into groundwater. The consortium aims to limit environmental harm even further by identifying and evaluating the industry's main pollution sources. To this end, it will carry out a lead-free life-cycle assessment taking account of waste hazard levels and end-of-life product disposal in line with the Waste Electrical and Electronic Equipment Directive. This will be valuable to industry and its regulators in future efforts at controlling environmental impact and workplace health and safety. The partners hope, too, that it will encourage wider implementation of the international ISO-14000 and 18000 environmental-safety management standards in industry.

Project title

Low Cost Lead-Free Soldering Technology To Improve Competitiveness Of European SME (LEADOUT)

Contract number

CT-2004-500454

Duration

36 months

Global project cost

€ 4 613 332

EC contribution

€ 2 695 778

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*Surface mount gull-wing solder joint with
tin/silver/copper lead-free solder on an
immersion tin pcb finish.*



"Our new design of heat exchanger is a massive leap beyond the state of the art."

Every day we throw energy down the drain as warm waste water from dishwashers, showers and washing machines empties into sewers. The Low-Heat Collective Research project combines the expertise of several small European companies, research institutions and national heating and plumbing associations to develop a technology that can exploit this untapped energy source.

The idea is to incorporate innovative surface technology and smart controls into an entirely new design of heat exchanger that works efficiently under 'low flow, low heat' conditions and that meets all regulatory requirements. The partners estimate the system could cut domestic energy consumption by up to 7% and create a market worth more than €1.5 billion.

No one likes to throw money down the drain, but that is what happens every time we have a shower or bath, wash our clothes or run the dishwasher. The warm, dirty waste water drains away, taking with it a significant amount of energy – a staggering 26 500 terra joules each year, equivalent to the output of one large coal-fired power station generator.

The possibility of actually using this waste water as an energy source has been ignored until now. There are currently no heat exchangers available that work efficiently for low temperatures (25-80°C) and flow rates. Furthermore, existing heat exchange systems do not meet the regulatory standards in Europe for domestic heating and water systems.

Hot technology

But now an EU-funded Collective Research project is developing the first-ever system to recover heat energy from domestic waste water. The Low-Heat consortium comprises a number of small European businesses, research institutes and industry associations which have joined forces to design and develop an innovative, highly efficient and intelligently controlled heat exchanger technology. The aim is to design and manufacture a heat exchange system that will comply with all relevant EU legislation and be capable of recovering up to 50% of the wasted heat energy.

The bulk of the research is being carried out by the UK RTD consultancy Pera, the National Institute of Technology in Norway, and the Technological Institute of Plastics in Spain, in collaboration with the other project participants. A major part of the research is to understand how roughness on the surfaces of heat exchangers affects fluid flows, turbulence and heat transfer coefficients. This scientific knowledge can be exploited to develop surface-coating technologies to improve heat transfer efficiencies – not just in the Low-Heat system, but also in industrial heat recovery processes.

The project is also conducting studies to profile waste water discharge patterns in the home – sources, temperatures, flow rates, volumes and when waste water is generated during the day. This data will be used to develop smart controls for the Low-Heat system so that it can be run optimally in conjunction with standard domestic boilers.

Exchanging expertise

The six SMEs participating in the project will all play a vital part in the research activity. Metallisation, a metal spray specialist from the UK, is working on the surface-coating technology, while a German firm, AST, will help to develop the sense and control technologies. A K Industries in the UK lends its expertise to the development of injection moulded plastic enclosures, a vital component of the end product. All these companies are set to benefit from any commercial application of the project, especially by selling the envisaged domestic system or by acting as component suppliers. The intellectual property developed by the consortium could also be incorporated by these firms into other product lines.

Towards the end of the project, an Irish SME, Convex Electrical, will integrate the different components and act as the contract manufacturer for a complete heat-recovery system.

Two 'end-user' SMEs – plumbing and heating contractors – are also making important contributions to the research project. Robert Prettie & Co from the UK and K Lund from Norway are providing information and feedback on system specifications and potential applications. These companies, which will field test any prototype system, should become early adopters of the technology and therefore gain a competitive advantage.

However, the plumbing sector – comprising over 150 000 SMEs in Europe – is generally slow to innovate and embrace new



Waste energy is money down the drain.

"This is a really exciting project and the partners are extremely keen and motivated."

technologies. The three participating national associations of plumbing and heating engineers (from the UK, Poland and Hungary) have the responsibility as IAGs to spread the message about Low-Heat. The bodies will help to disseminate the work of project, communicating with their members and the wider public through technology presentations, roadshows, conference stands, newsletters, websites and training workshops.

Significant savings

The project partners estimate the market for this kind of innovative heat-recovery system could be worth as much as €1.67 billion. They calculate it could reduce the overall energy consumption of domestic dwellings by 7%, saving over 1 000 kWh per dwelling per year.

Furthermore, by lowering energy consumption, the project also makes a valuable contribution to Europe's environmental efforts. At a target market penetration of 6%, the envisaged Low-Heat system could save Europe a total of 10 billion kWh, or 4.8 million tonnes of CO₂ emissions. Not only could Low-Heat take the heat out of hot water, it could also help take the heat out of Europe's Kyoto commitments, too.

Project title

The Development of a new Domestic Heat Recovery Technology for Low Grade Heat in Waste Water (LOW-HEAT)

Contract number

CT-2004-500399

Duration

36 months

Global project cost

€ 2 141 397

EC contribution

€ 1 255 802

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"The partners' competence and skills cover all the expertise necessary for the project."

Small and medium-size enterprises (SMEs) in the European grain-milling industry face two major challenges today – stiffer safety regulations, and a much tougher market due to competition from big food companies. In addition, consumers frightened by recent food scares are becoming much more demanding when it comes to product safety. With 14 partners in four countries, the Collective Research Map-Milling project aims to design and develop measurement systems and strategies to allow SMEs to monitor the purity of the grains they mill. These new tools will give millers the ability to make treatment decisions on the spot, helping them cut costs and improve efficiency, and ultimately to produce safer flour.

In recent years, a rash of food scares in Europe – dioxin in Belgium, listeria in France, and mad cow disease in the United Kingdom – have shattered the public's confidence in the European Union's food supply. Government and public scrutiny of the agro-food industry heightened, and the industry, which employs some 2.6 million people, saw its revenues threatened. The Map-Milling (Measure and control of mycotoxins, pesticides and acrylamide in the grain-milling sector) project is the grain-processing sub-sector's effort to contend with an urgent legal and commercial need to ensure the integrity of its final product – flour – at a price that allows SMEs to compete with large European food companies.

Protecting food from farm to fork

In 2000, the European Commission's White Paper on food safety sketched a plan to introduce and coordinate new regulations and to revise older Member State legislation aimed at protecting food, throughout the supply chain, and to restore consumer confidence. As part of that plan, the EU created the European Food Safety Agency in 2002.

The new regulations, implementing rigorous inspections and sharper enforcement, including fines and criminal penalties, began to take effect this year. Among other things, they set maximum limits for residues and other impurities in food. Meanwhile, consumers have become more demanding as regards safe, high-quality food products.

Against this backdrop, a key challenge facing grain-milling companies is how to monitor and treat their raw materials so as to eliminate toxins that can end up in flour. For the most part, laboratory analyses for these contaminants currently have to be outsourced. They are time-consuming and expensive, especially for SMEs, and worse still, they disrupt production.

A measured response

This is where the Map-Milling project comes in, which aims to design and develop fast, reliable measurement systems and strategies to allow SMEs in the grain-milling sector to conduct safety checks in-house. These new tools will give millers the ability to make treatment decisions on the spot, thus cutting costs and improving efficiency as they produce food products able to meet stringent quality standards.

Coordinated by the Saragossa-based Confederación de Empresarios de Zaragoza (ES), the Map-Milling consortium lines up 14 industrial association/groupings (IAGs), SMEs, and research and technology developers (RTD), from four EU countries. Their areas of competence include food safety, grain milling and processing, measurement technologies, risk assessment, as well as expertise in software, electronics, and technology implementation.

The first step for the Collective Research project team is to identify the most common pollutants encountered both on the farm and in the milling plant. These are mycotoxins that can cause food poisoning (fungal toxins, such as ochratoxin A and aflatoxins), pesticides used in agriculture, and acrylamide. It was recently discovered that acrylamide can form during grain processing. One important project goal is to enhance current knowledge about this chemical, which has been linked to central nervous system afflictions and genetic damage.

The partners will produce a simple best-practice guide which will lay out strategies for decreasing pollutants in foodstuffs, including how to set up measurement and treatment systems. An easy-to-use, cost-effective software application will help with risk management – integrating results obtained from the measurement system, checking these data against regulatory requirements, and choosing appropriate treatment procedures. Apart from IT tools, the equipment developed will include immunoassay test kits for pesticides and infra-red devices to detect mycotoxins.

Map-Milling aims to design measurement systems and strategies to help SMEs monitor grain purity.



"This will help to re-establish EU consumers' confidence in food quality and safety."

Tools of the trade

This scientific approach to food product safety and quality should have a major impact in the agro-food industry, in which SMEs have tended to follow very traditional economic models that generate little technological improvement. The Map-Milling project will distribute the technologies and tools it develops to SMEs throughout the grain-milling sector, and will help them to incorporate and exploit the innovations. It will also look at ways to transfer the technologies to other agro-food sub-sectors and to develop different market applications.

Agro-food businesses are very important to the European economy as a whole, especially in rural regions where they make up the bedrock of business activity and society. They can also help to attract new subsidiary industries into the area, thereby contributing to economic survival and making inroads on stemming rural depopulation. Consequently, Map-Milling stands to have a significant effect on the economic viability of Europe's rural areas.

Project title

Measure and control of mycotoxins, pesticides and acrylamide in the grain-milling sector (MAP-MILLING)

Contract number

CT-2003-500450

Duration

36 months

Global project cost

€ 1 839 672

EC contribution

€ 1 012 495

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"Manufacturing nanotubes is quite easily – the challenge is to integrate them into bundles or arrays."

Nanotubes are long, thin cylinders of carbon whose atomic structure lends them some intriguing physical properties. They are light, strong and flexible, and when an electric charge is applied to them they move. It was not long after their discovery in 1991 that researchers noticed they shared many of the properties of human muscle fibres, and began to dream of using them to construct artificial muscle for prostheses. Several technical challenges still have to be overcome before that dream is realised – notably, persuading nanotubes to form orderly arrays or bundles. The goal of the Collective Research project Nanomed is to solve those technical issues and to make artificial muscle, among other novel applications, a reality.

First there were Buckyballs, distorted football-shaped molecules consisting of 60 carbon atoms in a three-dimensional lattice which turned out to be extremely resilient. Then came nanotubes, long strings or cylinders of carbon that had other remarkable properties, among them an ability to change shape when subjected to an electric charge.

Following the discovery of nanotubes in 1991, many companies were quick to see their potential for revolutionising applications such as the ultra-fine focusing of optical instruments, moving parts in automated industries, and medical devices. But they lacked the expertise to turn a mass of stringy molecules into the streamlined parts they needed. Nanomed was conceived to bring companies in the medical device sector together with two major research performers who, over a period of three years, will attempt to turn that potential into a reality.

Nanobundles

Imagine a rectangular sheet of graphite rolled into a cylinder, and you have an idea of what a nanotube looks like, although perhaps not of its dimensions. Nanotubes can be millimetres in length, with a diameter in the nanometre range, giving them an enormous length to width ratio, which partly explains their prodigious strength and flexibility. They also exhibit the piezoelectric effect, which means they flex or contract in response to an electric charge, the extent to which they move being directly proportional to the size of the voltage applied.

Fraunhofer-Gesellschaft in Germany, Europe's largest organisation for applied research and one of Nanomed's two research performers, is now able to mass produce nanotubes. But a single tube on its own is not much practical use, and researchers have not yet succeeded in persuading the tubes to form regular arrays or bundles – something they hope to achieve under the auspices of this project.

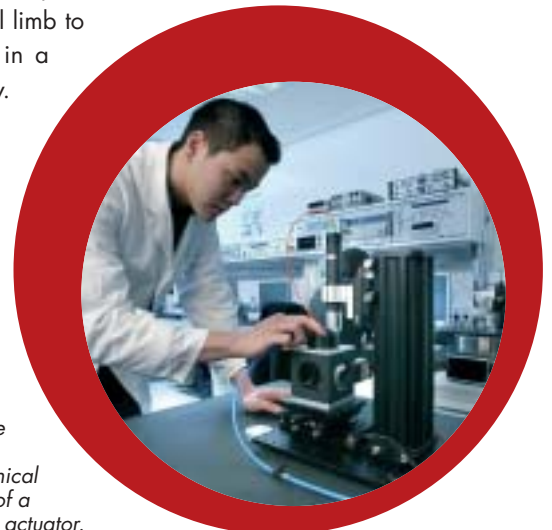
With arrays of nanotubes bathed in an electrolyte – or conducting medium – an electric charge could be evenly applied across all of them. It would then become possible to control the movement of those bundles in an orderly way by varying the voltage, providing the right electrolyte was found. Such a system would, in turn, form the platform technology for a range of actuators, or mechanisms for acting on the environment.

Muscular properties

The role of the British Healthcare Trades Association, which is the IAG coordinating Nanomed, is to ensure that this platform technology reaches all the companies in the consortium through a series of training workshops, conferences and scientific and trade articles. Some of those companies are interested in very basic applications, such as using nanotubes for building lighter crutches and wheelchairs. Others would like to develop smaller catheters and endoscopes for use in surgery.

But according to Nigel Lambert of the Pera Group, the other research performer involved in Nanomed, the eventual applications could go far wider than medical devices. He estimates that between 80 and 150 companies, beyond the core group of pilot SMEs (small and medium-sized enterprises) taking part in the project, will adopt the technology and benefit directly from it. And that among them will be companies from the aerospace and automotive industries.

In Lambert's mind, however, the Holy Grail of this research is to produce artificial muscle for use in reconstructive surgery and limb prostheses. This would involve taking the platform technology of a nanotube array bathed in an electrolyte and connected to a low voltage supply, and integrating it into a mechanical structure. Within that structure, the ends of the array would be linked up to artificial ligaments which, when the bundle contracted, would pull on a real or artificial limb to make it move in a naturalistic way.



Preparation of the experimental unit for electromechanical characterisation of a carbon nanotube actuator.

"The Holy Grail of this research is artificial muscle."

For now, these are only dreams. The researchers have yet to perfect a way of producing standardised batches of nanotubes, and they also have to find the ideal electrolyte – probably a fluid or polymer gel. To do so requires understanding a little more about the basic properties of nanotubes. Then there are the challenges of mass producing the platform they eventually design. Engineers, for instance, will have to be trained in the skills needed to precisely align nanotube arrays with an actuator, or moving part.

The partners in Nanomed believe that this is feasible, and that when this technology spreads through the European medical device industry, the effects on healthcare will be dramatic. Smarter endoscopes could make minimally invasive surgery less invasive still, and even open up the possibility of new forms of surgery. Smaller catheters could reduce the risk of infection in hospital patients, and hence reduce recovery times. The same could apply to amputees fitted with nanotube-based artificial limbs, who will also benefit from more freedom of movement and ultimately, greater independence.

Project title

Development and Demonstration of a Carbon Nanotube Actuator For Use in Medical Technology (NANOMED)

Contract number

CT-2004-500394

Duration

36 months

Global project cost

€ 2 855 210

EC contribution

€ 1 498 951

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Investigation of the surface structure of carbon nanotube paper by microscope.

"P2P will make possible traceability of foodstuffs from farm to fork."

The last decade has seen some major food scares – and a great deal of reactive legislation. For instance, all companies in the European agri-food sector are now obliged to keep records of stocks they buy and products they sell.

The P2P Collective Research project is developing a system that will automatically collect this data from companies (many of which are small with limited IT resources), and enable global traceability of foodstuffs, initially in the pork-processing sector.

Businesses will be able to verify the origins of their ingredients and allow regulators to trace contaminants quickly and issue highly specific product recalls – saving significant expense for the companies affected and protecting customer health.

The recent discovery of the illegal dye Sudan I in Worcestershire sauce in the UK serves to highlight the complexity of the European food industry. It took just one batch of contaminated chilli powder to trigger the recall of over 600 different food products across the country. And it took investigators several weeks to track down all the affected products and for consumers to be notified of possible contamination.

New European legislation, which came into force in January 2005, now requires all actors in the food industry to keep meticulous records. They must register every item they buy and the details of the supplier, and all products that they sell with details of their client. As each company is required to do this, the data creates an 'audit trail' – ingredients can be traced right through the food chain from the farm through to the consumer. When contamination is identified, food authorities use this traceability data to identify which products must be recalled.

Small independent companies are often the weak point in the audit trail, however. They do not have the financial resources or manpower to invest in a major data collection process or the latest software. Whilst they may comply with the law, small and medium-sized enterprises (SMEs) can hinder the tracking process.

Tracking technology

With this problem in mind, the P2P project aims to develop a system that will automatically collect the traceability data from companies – large and small alike – to produce a readily accessible audit trail and enable global tracking of foodstuffs. The project is focusing solely on the value chain for pork products, but the final P2P system should be applicable to other sub-sectors of the food industry.

To enable data collection it is important that the traceability information meets certain standards. One of the early tasks of the project, therefore, is the development of guidelines on what information companies should collect and the best way to do it. This 'P2P methodology' has SMEs in mind and will help them to implement robust traceability systems that meet their legal obligations and prepare them for likely legislative requirements in the future.

However, the project goes far beyond issuing guidelines. The partners will also produce a suite of IT tools (TraceSW) and a standard protocol (TraceXML protocol) that will automatically retrieve the traceability information from individual companies and present the data to give a global picture of the entire value chain. The amount of data made accessible will depend on users (consumers, customers, and food standards and safety agencies), but should make it possible to map the movement of food ingredients (or potential contamination) right through the value chain.

After the initial set up, companies will not have to do anything. The P2P tools are designed to be compatible with existing formats of traceability data found in firms. All that companies need to do is allow the P2P system access to their traceability databases: the P2P approach will allow easy implementation and the quick collection of information from different traceability systems via the TraceXML protocol.

Comply and compete

The P2P consortium includes nine partners that will conduct most of the R&D activity. Together they will combine their expertise in traceability regulations, traceability tools, SME business practices, internet standards and protocols, and software design and development.

The RTD performers are aided by seven SMEs from Italy, Spain, Germany and Hungary, representing every node of the pork value chain, including farms, slaughterhouses, and meat processors. These businesses will provide valuable recom-



The European pork-processing sector involves a large number of SMEs.

"The system will help small companies to comply with the law and contribute to safeguarding consumer health."

mendations and specifications to the research contractors and will test and validate the P2P traceability methodology and the global tracing tools. They will become the earliest adopters of the system and use it for competitive advantage. They could, for example, confirm that all their ingredients come from a particular country or region, or are certified organic farm. This information could then be incorporated into marketing, or used to convince customers of the quality of their products.

However, the P2P approach will only be really successful if enough companies allow their data to be collected and use the tools. CNA Modena (project coordinator) together with five industry associations (IAGs) representing pig farmers and agri-food businesses in Italy, Spain, Germany and Hungary are also partners in the Collective Research. They are working hard to convince their members that P2P has something to offer – legal compliance, competitive advantage and consumer confidence. Certainly, the recent spate of food scares and recalls will make their task a lot easier.

Project title

Traceability of the swine value chain (P2P)

Contract number

CT-2004-500352

Duration

24 months

Global project cost

€ 2 358 199

EC contribution

€ 1 379 183

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Traceability data from along the value chain will simplify food recalls.

"Prewind can help make wind power even more competitive."

With wind power making an increasing contribution to renewable energy supply in Europe, efficient and effective maintenance methods are becoming more important – especially for remote onshore and offshore wind farms. The Prewind Collective Research project will develop a novel non-destructive method for assessing maintenance requirements using thermography. This method is able to assess defects and stresses in wind turbine components more accurately than current technology and will reduce downtime for turbine operators. This will further boost the competitiveness of wind energy in relation to other energy sources. The method will also be applicable to quality assurance processes during wind turbine production.

The use of wind as a renewable energy source is playing an increasingly important role in Europe. Over the past five years the sector has seen an average annual global growth rate of 40% and the industry now has a €5 billion turnover worldwide. Today, European companies manufacture and sell 80% of all wind turbines. Clearly, wind power has made a significant economic and environmental impact in Europe. The European Union has the goal of doubling the share of electricity generated by renewable energy sources to 12% by the year 2010. This means that the amount of power generated using wind as a clean energy source in Europe will continue to increase in both onshore and offshore wind parks.

To operate efficiently and safely, wind turbines, like all mechanical devices, need to be maintained correctly. Wind turbines are often sited in relatively remote areas and the establishment of offshore wind farms will bring new maintenance challenges. This burgeoning market creates opportunities for innovative maintenance applications.

Thermal stress

The objective of the Prewind project is to develop a novel methodology for the early detection of failures in wind turbines in both onshore and offshore settings. The chosen technology is thermography: a technique that analyses the heat radiated by components using an infra-red camera that is able to reveal defects and stresses both within and outside components. The technique is already being applied in areas such as boat building.

Thermography is a non-destructive method that involves measurements and graphing of isothermal contours on the surface of an object, displaying the effects of temperature variations in its material. Many components in a wind turbine installation generate temperature differences during use. These components include the generator itself and braking discs that can be easily analysed using 'passive' thermography, simply by pointing an infra-red sensitive camera at the component in use.

For the other components, including the laminated glass reinforced plastic of the rotor blade and the rotor tower, an 'active' thermography technique is required. This means that the component must

be heated and its thermal response measured. Prewind will develop a suitable heat source to induce controlled thermal gradients in these vital components and therefore enable characterisation of any defects on a more qualitative basis.

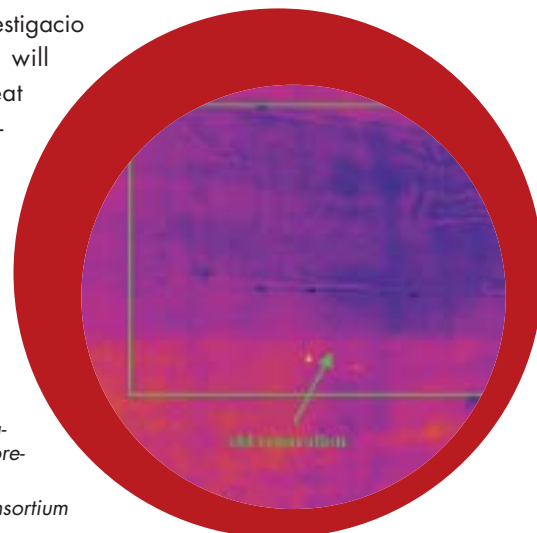
Powerful consortium

Coordinating the Collective Research project are six wind energy associations from Germany, Spain, Portugal, Italy and Ireland, with Fördergesellschaft Windenergie EV taking the lead. These industry associations have a large number of members able to define accurately the requirements for the system and allow swift dissemination of the results.

A core group of SMEs from Germany, Portugal, France and Italy are representative of the overall value-added chain for wind energy technology and include wind turbine component manufacturers, companies involved in maintenance activities and non-destructive testing (NDT) service providers. Alphatherm from Germany will act as the main coordinator of this group of small and medium-sized enterprises (SMEs), using their expertise in NDT technologies. The main research efforts will come from four complimentary R&D organisations coordinated by Technologie Transfer Zentrum in Bremerhaven. Automation Technology, also from Germany, will develop the thermographic NDT technology, Consultores de Ambiente e Qualidade from Portugal will create the quality process, whilst the Spanish Centre de Recerca i Investigació de Catalunya will look at the heat source and control systems.

EA thermographic image of a rotor blade (active thermography) showing a previous repair.

© PREWIND Consortium



"Defects inside the rotor can be revealed."

Quality controls

Currently, maintenance inspections for wind turbines involve manual examinations by experienced engineers and can involve considerable downtime and cost. Rotor blades are inspected visually *in situ* using an external cradle. The new method should be much quicker and more accurate and is not limited to maintenance applications. It can also be applied in quality assurance methods during the manufacturing of wind turbine components and after transport and assembly of the power unit on-site. At a future stage in the development of the process, heating mats could be routinely incorporated in turbine rotors during production to ease maintenance inspections further and reduce downtime.

During the project the methodology will be formulated so that it can be certified by an appropriate quality certification body (such as Lloyds). This will allow its use by insurance companies, wind-turbine operators and maintenance service providers as a warranty for quality operation.

The use of the Prewind thermographic process will reduce repair costs and downtime, thus increasing productivity from wind power. This will cut the unit cost of electricity produced and, in turn, encourage further investment in wind power thereby reducing fossil fuel use.

Project title

Development of a methodology for Preventive Maintenance of Wind turbines through the use of Thermography (PREWIND)

Contract number

CT-2004-500736

Duration

36 months

Global project cost

€ 1 957 513

EC contribution

€ 1 089 730

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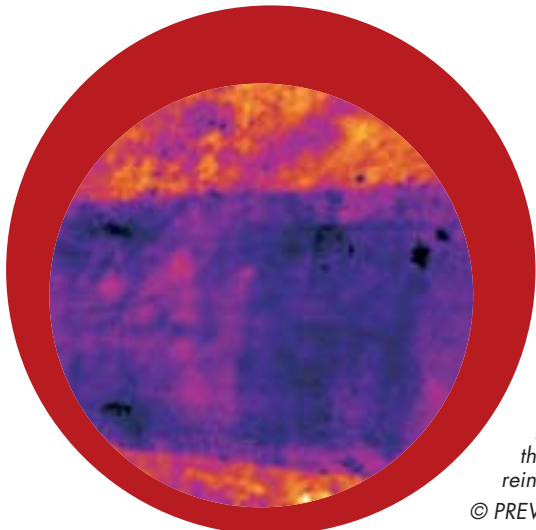
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A thermographic image of a rotor blade (active thermography) showing the central internal rotor reinforcement.

© PREWIND Consortium



"This clean process can turn a problem into an opportunity."

Every year, over 600 million tyres are scrapped in the US and Europe alone. This massive waste stream causes many social, health and environmental problems. By 2006, new regulations will outlaw landfill disposal both of whole tyres and of shredded rubber. New disposal options, other than temporary stockpiling, are required. The Pyrol-x-tyre project is developing ways to recover and reuse the major component of tyres – carbon black – using a novel microwave process technology. Success in the project will enable effective implementation of a number of EC Directives, reduce pollution and create a new environmental technology with potential for export throughout the world.

The disposal of waste car tyres has been a headache for society for many decades. Today, Europe must cope with some 360 million car tyres entering the waste stream every year. This represents an annual waste load of approximately 2.5 million tonnes. In 1999, a significant minority (39%) of scrap tyres were disposed of in landfill sites. Populations living next to stockpiles of scrap tyres can experience health problems, in particular if the sites are not well managed, and tyre fires result in the production of significant amounts of dangerous emissions with the threat of residual chemical pollution. Recent estimates indicate that up to 250 cases of cancer and 25 cases of birth defects in Europe every year are linked to living close to tyre stockpiles. The scrapped rubber material contains around 1.5% by weight of hazardous substances listed under the Basel Convention. In addition, many disease-carrying insects seem to find stockpiled tyres an amenable environment for breeding, and this also represents a threat to life and health as well as reduced quality of life for surrounding communities.

Clearly scrap tyres represent both a significant waste and a serious environmental problem, but they are also a potential resource opportunity, both for society and for the growing recycling trade community. This is where the Pyrol-x-tyre Collective Research project comes in.

Microwave marvel

The project's objective is to develop a novel microwave technology as the basis for a continuous scrap and feedback-controlled tyre-recycling process. The process will be based on innovative microwave reactor technology that pyrolyses tyre material to reclaim the carbon black filler.

Carbon black is a very finely divided form of carbon that is usually derived from the incomplete combustion of natural gas or petroleum oil. As well as being used to reinforce rubber in vehicle tyres, it is an ingredient in inks, toners, paints, crayons, and polishes, among many other uses. Around 85% of the global market for carbon black is accounted for by tyre production. The carbon black produced by the Pyrol-x-tyre process will comply with current industrial specifications for different types of carbon black qualities.

One key innovation necessary to achieve the process is the development of an innovative, patentable microwave reactor chamber that will include appropriate microwave wave guides and use continuous flow-through to enable optimisation of process parameters. In addition, a novel feedback control will be developed using an innovative sensor technology to adjust process parameters depending on the varying rubber quality in the feed. As well as carbon black, the process could recover other valuable and reusable tyre components and will produce minimal polluting emissions during use.

The project is led by Norsk Dekkretur, the industry association that collects and recycles waste tyres in Norway. The project also includes a sister organisation from Sweden and the European Association for Tyre Recycling. Within the consortium are five SMEs – Pattern Equipment Co. Ltd of the UK and Stavanger Installsjon Automasjon AS of Sweden are involved in foundry engineering and factory equipment/automation respectively. A third SME, Zakłady Przemysłu Gumowego Sandochemia Spółdzielnia Pracy in Poland, is a major user of carbon black and will be assessing the quality of the material produced by the new process. Three research performers (Stiftelsen Teknologisk Institutt of Norway, Pera Innovation of the UK and Fraunhofer Gesellschaft zur Foerderung der Angewandten Forschung of Germany) will contribute their expertise in microwaves and process development.



*"Environmental technology
is a growth area."*

EC Directives

The Pyrol-x-tyre project should help meet the demands of a number of EC Directives on integrated pollution prevention and end-of-life vehicle issues that aim to reduce waste from vehicles primarily through increased reuse and recycling of materials. It will also contribute to the objectives of a directive on landfill waste to provide measures, procedures and guidance to prevent or reduce as far as possible their negative effects on the environment. This directive has effectively prohibited the disposal of scrap tyres in landfill sites since 2003 and by 2006 the shredded rubber will also be prohibited in landfill. Pyrol-x-tyre therefore contributes directly to the Landfill Directive with respect to achieving recycling and recovery of materials and safeguarding natural resources.

Tyre waste and the recycling of rubber is a global issue, and represents a global opportunity – the United States produces a similar quantity of tyres for disposal as Europe, for example. The Pyrol-x-tyre process could be a valuable environmental technology with great export potential.

Project title

Remove scrap tyres from European waste system to recycle high quality Carbon Black and recover energy by fast and feedback controlled microwave pyrolysis (PYROL-X-TYRE)

Contract number

CT-2003-500233

Duration

36 months

Global project cost

€ 2 878 098

EC contribution

€ 1 262 436

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“The market potential for heat pumps is far from being reached.”

As greenhouse gas emissions remain high on Europe’s political agenda, new technologies providing renewable and more efficient energies are developing fast. But increasingly stringent environmental regulations are already forcing one industry – heat pump manufacture – to change its existing technology. With the aim of developing and testing new and environmentally benign heat pump components and systems, the Sherhpa Collective Research project combines industrial, scientific and training expertise from 13 EU countries to benefit several hundred small and medium-sized enterprises (SMEs) that manufacture and supply heat pumps throughout Europe.

Heat pump technology is one of several new technologies being developed to harness renewable energy sources and improve energy costs and efficiency. Using special heat-carrying liquids (known as refrigerants), the heat pumps are able to use ambient or waste heat from ground, air or water sources to provide heat energy elsewhere. For example, the liquids might pick up heat from hot industrial wastes or solar collectors before being transferred to provide heating and hot water for residential housing or commercial buildings. Alternatively, the liquids can be used to provide cooling, such as in car interiors or refrigeration and air-conditioning units. In fact, at the moment, heat pumps provide the only available option for combining heating and cooling activities in one device.

With their potential for exploiting renewable energies – including waste, geothermal and solar energy – and with energy efficiencies at around 40% better than conventional heating systems, heat pumps have great potential for growth. In Europe, Switzerland is already using heat pumps in 40% of its new housing and hopes to increase that to 50% by 2010; overall, the market is increasing by between 10-15% per year. But there is one big thorn in the industry’s side – the refrigerants they have traditionally relied on to transform heat have now come under EU scrutiny, and with two of these already fully or partly banned, there is now a question mark over the long-term availability of the remaining options.

Natural solutions

The problem for heat pumps is that the refrigerants they have relied on so far include key ozone-damaging compounds – the CFCs (chlorofluorocarbons) and HCFCs (hydrochlorofluorocarbons). With both of these now fully or partially banned, there are growing concerns that existing alternatives – the HFCs (hydrofluorocarbons) – could also be affected by future environmental legislation. With this in mind, the Sherhpa project is planning to develop new systems that rely solely on natural agents – such as carbon dioxide, hydrocarbons, ammonia, water and air. This will demand new components and systems, including heat exchangers, compressors and control systems.

Relying on input from 19 SMEs involved in heat pump manufacture and supply, and coordinated by two leading industry associations (IAGs), this Collective Research project brings together expertise from ten of Europe’s leading research institutes to provide cru-

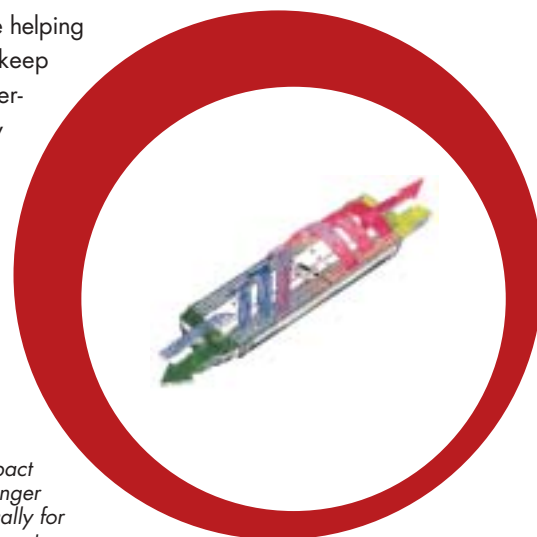
cial research expertise in heat pump and climate technologies, environmental design and construction. The project will also provide marketing surveys and intelligence on relevant EU legislation, together with technology transfer and training programmes for engineers and managers, and for technicians and workers.

The bulk of the Research and Technological Development (RTD) work will focus on developing and testing prototypes for heat pumps using ammonia, hydrocarbons and/or carbon dioxide. These will include new technologies aimed at heat recovery, energy conservation and integrating heat pumps with solar and other renewable sources. Additional work will involve improving market uptake through, for example, labelling and certification schemes, together with a range of awareness-raising initiatives. In addition to the training schemes aimed at SMEs themselves, these initiatives will include developing educational materials, networking with NGOs, industry partners, researchers and academics, and ensuring continued information exchange between different stakeholders throughout Europe.

Pumps, people and climate

The Sherhpa project team is anticipating two major benefits. First, with a market expansion of 10-15%, it is critical that European SMEs stay in the game, accessing new markets while being prepared for changes in legislation. Success in this sector will bol-

ster job creation and economic growth, while helping Europe to keep up with its ever-growing energy demands.



Developing new technology: compact spiral heat exchanger designed specifically for alternative refrigerants.

"Transnational collaboration will improve market access and efficiency while reducing environmental costs."

The project's second, more far-reaching effects centre around its potential impact on carbon dioxide (CO₂) emissions and climate change. As Europe struggles to meet its legal obligation to reduce emissions of CO₂ and other greenhouse gases (by 8% of 1990 levels by 2012) the need to develop alternative energy sources is becoming more and more urgent. It is estimated that if Europe's installed heat pump capacity can double by 2010, this would reduce CO₂ emissions by around 40 million tonnes per year. That represents more than twice the UK's record cut in emissions for 2002. With climate change already affecting tens of thousands of Europeans' homes, lives and industries every year, this could be very good news indeed.

Project title

Sustainable Heat and Energy research for Heat Pump Applications (SHERHPA)

Contract number

CT-2004-500229

Duration

36 months

Global project cost

€ 3 084 117

EC contribution

€ 2 102 709

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Prototypes of propane heat pump ready for testing.

"Legislation should be based on sound science and sound risk assessment."

Silicosis is now a rare disease thanks to abatement measures adopted by the ceramics industry, one of a number of industries using respirable crystalline silica (RCS), the cause of the disease. European legislators are considering the introduction of a new single lower limit for airborne RCS – despite the belief that various forms of RCS have different toxicities. In a Collective Research project, a 38-member consortium aims to show that the proportion of dust capable of penetrating deep into the lungs, and the inherent toxicity, varies for different forms of RCS. Therefore, concessions should be made to ceramics producers according to the types of materials used and manufacturing conditions.

RCS can cause the lung disease silicosis. The symptoms usually take many years to appear, and the disease can prove fatal. The widespread introduction of effective engineering abatement measures has meant that silicosis has become relatively rare. The current limits for RCS exposure vary across the EU Member States, but European legislators are now debating the introduction of a single limit.

Certain forms of RCS are highly toxic and warrant a very low limit, while others are much less toxic. If the legislators decide on one very low limit, companies using crystalline silica – especially small and medium-sized enterprises (SMEs) – may not be able to afford the additional costs involved to reach it. This could result in the new legislation being widely ignored, which would have the opposite effect of encouraging more cases of silicosis. The Siliceram project aims to provide legislators with useful data to define limits for RCS exposure. Then, when a single low limit comes into force, concessions can be considered based on the proven lower risk associated with some forms of RCS. The Collective Research will cover the main sectors of the ceramic industry – household and roofing tiles, tableware, sanitary ware, refractory materials, and bricks.

Multiple filters

There are eight research centres specialised in ceramics among the 38 project partners. They will carry out RCS sampling from the ceramics factories and test the samples. Extensive analysis is required to examine the surfaces of the different crystalline silica samples. Middlesex University (UK) is responsible for developing new sampling techniques to be employed in the project, whilst the other research providers are mostly concerned with factory monitoring/analytical testing or toxicity testing. Traditionally, testing workers for inhaled dust entails clipping a tiny sampling unit to their lapel. A pump draws air through a single filter in the unit so that any dust present is collected in it. The single sample is then weighed and chemically analysed to determine what proportion of quartz is present. But this gives no information on the particle size distribution. Equipment is being developed by Middlesex University that collects the dust deposited on a series of slides – rather than just one – with each slide featuring ever-finer deposited particles. The smaller the particle, the further it travels in the airflow before finally being deposited on a slide. There may be seven or more slides and samples which can be analysed for weight of RCS by particle size distribution.

The eight industrial association groups (IAGs), mostly ceramic trade associations, play a key role as the channel between the SMEs and the legislators. They already work with legislators at both a national and European level, communicating their members' needs. In any case, representatives from the IAGs are active in the different working groups at a European level, helping to shape legislation. As the results of the project emerge, their significance will be discussed with the legislators. The IAGs will also disseminate the data from the project to their members, many of them SMEs, through various media and in one-day workshops. Together with the toxicity data developed for different forms of RCS, the industry can work with the European Commission to develop effective regulation and control that takes account of the new learning.

Health check

Most of the 22 SME participants in Siliceram are ceramic producers from the principal sectors of the industry. They are offering their facilities for sampling and testing and, in return, will learn about the new sampling techniques. They will form the core of companies trained to understand and implement any new legislation, and will thus be in the best position to meet any new regulations that are introduced. The project will give them a thorough health check to see how their factories are performing against existing legislation. Each SME will be helped to adopt various kinds of abatement technology to improve its safety performance. One solution is to work with a much coarser quartz dust, while another is to find an alternative material to silica.



The WRAS dust particle sampler.

In this way, the legislators will be able to see how far levels of RCS can be reduced just by introducing reasonable abatement measures.

The project team will attempt to show that the probability of crystalline silica penetrating into the lung depends on the size of the particle. Large particles are exhaled anyway. Mathematical modelling should show that only a fraction of the particle size distribution at a certain exposure level of RCS actually reaches the inner lung. The results will enable a revision of the exposures experienced by workers. Together with the toxicity data developed for different forms of RCS, concessions can then be proposed according to the types of material used and the manufacturing conditions.

Project title

Studies aiming at assisting legislation and encouraging continual improvement strategies in the field of respirable crystalline silica (SILICERAM)

Contract number

CT-2004-500896

Duration

36 months

Global project cost

€ 2 213 305

EC contribution

€ 1 468 836

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"Industry and regulators must work together to find the best solution to each particular challenge."

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"This will improve capabilities of European foundries and toolmakers."

Foundry business represents a significant part of European manufacturing industry and is a sector dominated by SMEs. Efficient design and production of cast metal components and their tooling is critical to continued competitiveness in this area. Implementation of new technologies such as decision support software and other computer-aided management tools has yet to happen on a large-scale, but Smart Foundry aims to change this situation in a Collective Research effort that will pool knowledge, processes and machinery. Businesses will gain access to cutting-edge IT system solutions that will consolidate and enhance individual SME's expertise to give them a competitive boost.

The European foundry sector is traditionally one of the less research and development focused industries. The sector is dominated by SMEs (small and medium-sized enterprises) that form a significant part of Europe's manufacturing industry supplying automotive, aerospace, white goods and many other sectors. To ensure these areas remain competitive in the future, the efficient design and manufacturing of cast components and their corresponding tooling is critical.

IT is the solution

The Smart Foundry project aims to improve the overall competitiveness of European SME foundries and toolmakers by developing and implementing some collective e-technology solutions that can support decision-making, design and manufacturing. The collective knowledge of the industry, often held by individual 'artisan' experts within firms, will also be captured, organised and, where appropriate, made available to participating companies.

Essentially, the project will collect and process information and knowledge held by SMEs concerning the design, planning and manufacturing of cast components. This includes their knowledge on new materials, processes and equipment for the manufacture of castings. In contrast to other manufacturing sectors, the foundry business has not yet implemented e-manufacturing technology on a large scale. Such technology includes decision-support software, computer-aided process planning and networking. Systematic IT solutions will be developed based on the information and knowledge collected. The project will specifically provide a foundry-orientated decision-support system for tooling design, a casting technology database, and a foundry knowledge management catalogue. The tooling design system will cover applications in the four main casting technologies: gravity die casting, sand casting, pressure die casting and investment casting. The support system will be split according to the casting application with different software specific to the end product and production requirements.

Smart Foundry will take an integrated approach combining material sciences, production technologies and IT. In addition to the software tools developed, an overall knowledge database will serve multiple companies and enable them to optimise their processes. In some circumstances this will extend beyond virtual sharing of knowledge to the very real sharing of equipment between firms.

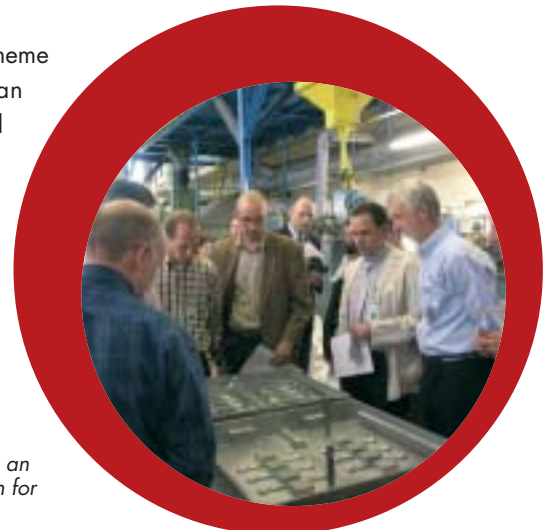
This will give a new flexible approach to business opportunities and the required investments in new processes and expensive machinery.

Collective solutions – individual protection

This integrated approach will be achieved through the quality of the collective partnership put together for the project. Four research institutions – BIBA from Bremen University and Actech GmbH from Germany, Castings Technology International from the UK, and Centre Technique des Industries de la Fonderie in France – will cover all aspects of materials, casting processes and information technology and will develop solutions on behalf of industrial associations from Spain, France, the UK and Germany. These IAGs represent the toolmaking and foundry business sectors in their respective EU Member States. The link to industry is made via a core group of ten 'pioneer' SMEs from the four different countries.

The technology databases and knowledge management catalogues will be held on the web servers for the respective industry associations and be available to all members of the association who register. This pooling of knowledge will increase the skills, flexibility and knowledge of all partners. Many SMEs are critically dependent on the skills and expertise of 'key' experienced workers – in particular, individual tool designers. This exposes the business to risk if the skill is lost through retirement, accident or other circumstances.

The project scheme does not mean that individual companies will need to give



Smart Foundry partners examine an aluminium pattern for sand casting.

"Within SMEs there is a substantial need to share and transfer knowledge."

up their proprietary knowledge to integrate it in the system. The system has two levels: an official level via which wider 'public' subscribers can access the tools and data they need to operate it, and a company specific level available to members of the project consortium in which proprietary knowledge can be 'ring-fenced' but remain available to be integrated into company specific requirements.

The project will create a valuable resource for the whole industry allowing companies to increase the quality of their design decisions and therefore the quality of their products. The tools will support faster decisions and reduce the lead times required for new tooling and productions. This increased flexibility and responsiveness will enable the companies to maintain and increase their competitiveness both now and in the future. Capturing the inherent knowledge and expertise currently held by SMEs also removes the significant threat of potential loss of expertise.

Project title

Knowledge based Manufacturing strategy and methods for foundries (SMART FOUNDRY)

Contract number

CT-2004-500279

Duration

30 months

Global project cost

€ 2 144 766

EC contribution

€ 1 431 559

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A permanent mould for manufacturing aluminium castings.

"A machine simulator offers much more than training manuals – it is like learning to drive a car."

Accidents and fatalities occur more frequently in construction than in any other sector of European industry. Many of the accidents are caused by improper use of heavy machinery. Trade associations, R&D performers and small and medium-sized enterprises (SMEs) are collaborating in a Collective Research project to develop computerised simulators as training tools for operating equipment. These tools will be highly versatile and specially adapted to the needs of SMEs. A single, real-time simulator will be configured to train workers on a range of machinery. It is hoped that the new tools will reduce the training times required, and produce more skilled and safer operators.

Building sites are dangerous places. The risks abound, whether from flying masonry, falls from elevated open areas including scaffolding, or from various kinds of heavy machinery. In fact, construction carries the greatest risk of accidents of any sector of industry in the EU. There are over 800 000 accidents each year, resulting in more than 1 300 deaths – about a quarter of all industry-related fatalities. The situation is worse in SMEs, where the accident rate is approximately 30% higher.

The versatile augmented reality Var-Trainer project aims to improve safety for construction workers through new types of training tools for operating equipment associated with a certain degree of risk. The project has already identified machinery that presents the greatest danger from a preliminary analysis of industry accident statistics in Europe. These machines include lifting equipment, such as goods lifts and aerial work platforms, and heavy operating machinery, including dumpers and retro-excavators. The main objective of the project is to develop a single, real-time simulator that can be adapted to train workers in the operation of a range of different kinds of equipment. This should result in a reduction in training time required on real machines, and help produce many more skilled and safe operators.

Levels of complexity

The idea behind Var-Trainer is to have a flexible simulation platform that is readily configurable for different types of construction machinery. To achieve the real-time simulation requires cutting-edge technology in machine modelling, so-called 'mixed reality' – a combination of virtual and augmented reality. There are three stages in the training programme. First, operators learn the rudiments from a computer-based programme available on CD-ROM. They then progress to a PC-based simulator where they select the machine type – for example, a dumper or a personnel elevator – and use the keyboard and mouse to simulate its operation, just like a video game. They finally progress to an 'integrated simulation platform' which has a real cabin for the operator to sit in, together with a joystick and pedals for hands and feet. Here they actually experience the physical sensations of working with the equipment on a construction site. The sophisticated computer software simulates the typical working environment – including the muddy trenches and bumpy terrain.

There are 14 partners from seven countries in the project consortium. The eight industrial association groups (IAGs) play a crucial role in providing researchers with base data about the different sectors of the industry and their needs for increased safety for machinery. They are responsible for validating and disseminating the results of the project, and for setting up training courses for companies. The three core SME participants, each from a different sector of the industry, are all users of construction equipment. They will be the first ones to make use of the results. By relating their own particular concerns for safety during the course of the project, they will keep its focus squarely on the needs of SMEs. The three R&D partners are responsible for designing and integrating the software and hardware from specs provided by the IAGs.

A first step

The intellectual property rights to the results of Var-Trainer will belong to the IAGs. Each research partner specialises in a different field of simulation applications – Ikerlan (Spain) in real-time dynamic models, Oktal (France) in the pedagogical aspects of simulation and simulation frameworks, and Fraunhofer (Germany) in virtual reality applications. These tools, with their very versatile software, can be used straightaway by the three core SMEs partners. But SMEs throughout the European construction industry will be informed of the outcome of Var-Trainer by the IAGs in their particular sector. They will benefit from having better trained and safer machinery operators. The IAGs will be able to upgrade the services they offer their members,

PC-based simulator of construction equipment.
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"These versatile training tools will be really useful for SMEs."

including SMEs, by providing these tools for training at main reference centres. In addition, it is expected that the expertise developed by the project will find applications outside the construction industry.

This is the first time that partners from different sectors in the construction industry have collaborated to address the problem of machine operator safety in such a coherent way. The project represents a first step towards a unified training methodology in the construction industry in Europe.

Project title

Versatile Augmented reality simulator for training in the safe use of construction machinery (VAR-TRAINER)

Contract number

CT-2004-500452

Duration

36 months

Global project cost

€ 2 446 526

EC contribution

€ 1 299 944

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'Integrated Simulation Platform' with real cabin, controls and motion system.

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"The project will introduce new innovation management techniques to Europe's textile industry which should help to improve competitiveness."

Europe's textile and clothing industry has an annual turnover of €190 billion and employs more than 2 million people. The sector is dominated by SMEs which generally specialise in one particular area of production, although together their work builds into one of the most complicated manufacturing chains in the European economy. While companies may concentrate on separate steps in the production process, joint working and networking is vital for the final garment, home or technical textile to get to market. To ensure textile SMEs retain their competitive edge, a research project embracing the entire industry has been set up to provide innovative management techniques and training methods that can be accessed via the web.

The Web-Textpert Collective Research project brings together a consortium of 46 partners from eight European countries, including 11 industrial associations, four research performers and 31 small and medium-sized enterprises. It aims to help all European textile and clothing SMEs by providing them with tools that will improve their management methods, and by devising and developing web-based training modules and best practice demonstrators. The objective is to make sure that these companies, wherever they are in Europe and whatever part of the production process they work in, can access, at the click of a mouse, on-line help that makes it easier for them to innovate.

Finding an edge

Web-Textpert will focus its research on areas that can make SMEs more competitive by helping them to develop and introduce new products more efficiently. Because textile SMEs work in a chain, it is vital that they network effectively when creating and marketing their goods. The consortium will therefore examine ways to improve networking methods as part of their research activities. The project will make its tools and services available on a web portal that can be accessed via industrial associations' websites. The portal will act as training platform where the firms can explore new methods and techniques that will help them manage innovation.

The project will provide information and support that will cover all aspects of the textile industry's work, not just the launch of products and services, but also new technical and organisational processes. That means the research results will be relevant to the entire production chain, from raw materials, through weaving and knitting, and on to processing the final product – including associated support activities such as management and consultancy services.

Harnessing innovation

The project partners began work in June 2004 and have split into several research groups to ensure that all relevant textile applications and geographic regions are covered. The research has been divided into three areas:

- Market-driven (pull) and technology-driven (push) innovations with a focus on technical textiles (including home textiles and non high-fashion clothing);

- Market-driven (pull) and technology-driven (push) innovations with a focus on market-driven fashion garment innovations;

- Technology transfer to and from other high value-added product sectors, with a focus on textile innovations produced by other sectors.

One area examines methods for the development and introduction of new products with a focus on technical textiles, and ways to improve networking within the industry to ensure market requirements are properly met. Another group will evaluate the methods involved in the production of an innovative garment. The results will hopefully be used as a model for SMEs which may, in future, be involved in creating new products. The third group will look at how new technologies from other sectors can be harnessed by the textile and clothing business – for example, the automobile industry which carries out research into products such as car seat materials.

Tough competition

The European textile industry faces tough competition, especially from Asian countries such as China. Their low labour costs mean that EU companies must find other ways to create a competitive edge. The help that Web-Textpert could bring to the industry will be extremely valuable in terms of providing training, web-based tools and best practice methods that could be harnessed by those European SMEs that are looking to innovate. Europe's firms could therefore be in pole position when it comes to exploiting the next generation of textiles that rely on innovation and technology as major selling points.



High-tech garments could benefit from the Web-Textpert approach.

Partners in the Web-Textpert Collective Research project hail from Belgium, Italy, Spain, France, Romania, Greece, Germany and the Czech Republic, reflecting the truly international nature of the textile business. Because the SMEs in this industrial sector also come from all corners of Europe, the project has had to think hard about how it will disseminate its results and ensure that as many businesses as possible get to use the web-based services it creates. Pilot training groups will be created from each of the project's pilot research teams. These groups will train up a core group of SMEs in what the Web-Textpert consortium describes as its 'train-the-trainer' concept. A number of Industrial Associations and Groupings (IAGs) will be trained to achieve a 'multiplier effect' that will ensure that these small and medium-sized companies from across Europe's regions understand exactly what the project has to offer them, and can capitalise on it accordingly.

Project title

Research for a new generation of integrated innovation and knowledge management and development of appropriate web-based training methods, tools, and best practice demonstrators (WEB-TEXTPERT)

Contract number

CT-2004-500223

Duration

36 months

Global project cost

€ 2 811 601

EC contribution

€ 2 039 319

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