



# SUCCESS STORIES



Ultrasound to process brittle materials

Healthy body dyes

Wood for all types of weather



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# ULTRASOUND TO PROCESS BRITTLE MATERIALS

Using ultrasound makes it easier to process brittle materials. The UAG CORNET project is investigating the rapid, commercial application of this method for surface treatment of hardened steel, glass and ceramics.

If the terms zirconium dioxide and tungsten carbide do not mean much to you, there is no reason to start doubting your general knowledge. These are brittle ceramic materials that produce tough, long lasting products when combined with quartz glass and hardened steel. These materials have only one disadvantage: although they are extremely durable and resistant to wear and tear, they cannot as yet be processed satisfactorily, nor is processing economically viable. "We are looking for the right parameters for manufacturing milling components quickly and accurately, even when complex materials are involved," was how

*"We are expecting revolutionary results from this CORNET project."*

UAG coordinator Harald Bleier (left) and university professor Friedrich Bleicher.



Wolfgang Wittner described the everyday problems of a highly specialised machine construction business. His Vienna business, with its 15 employees, is typical of the kind of firm that forms the backbone of the European national economies, with its high levels of production know how and its flexible manufacturing techniques. "However, we don't have the resources to carry out huge series of tests and materials research," said the managing director of Ernst Wittner GmbH. Wolfgang Wittner is satisfying his need for innovation by participating in collective research projects. His business is a partner in the CORNET 'UAG – Ultrasonic assisted grinding' project, in which a cross border consortium of research institutes, professional and technical associations and small and medium sized companies are working together on research objectives. Friedrich Bleicher, a professor at the Institute for Production Engineering at the Vienna University of Technology, described the project as "a step into unexplored territory for technical procedures. We are expecting revolutionary results from this CORNET project".

The key objectives for UAG were summed up in a catalogue:

Developing analyses of the use of ultrasound for processing materials. Studying the effects on machines, tools and materials.

This involves determining how

- high levels of processing precision and
- cost efficient high performance processing of extremely hard materials can be achieved in a small or medium sized business environment.

The principle of the hammer drill was combined with the principle of ultrasonic treatment. This technique was applied using frequencies in the ultrasonic range and amplitudes of only a few micrometres in order to be able to treat brittle, hard materials like glass, ceramics or hard metals efficiently and economically.

In order to achieve these aims, new and improved

machine components need to be developed such as shafts activated by ultrasound and machinery sockets as well as tool systems optimised for the materials to be cut, grain geometry and cooling options. These insights will be turned into tangible applications by the SME partners in the follow up. Using the knowledge acquired in the UAG Project, the firms will get a lot closer to being able to process glass, brittle steel and ceramic materials with high precision.

## INTERNATIONAL INTEGRATION

Harald Bleier is the manager of the plastics cluster in the Lower Austrian economic agency, ecoplus. "Fundamental knowledge is being acquired throughout Europe in the UAG Project. This could provide an entire sector with a completely new area of operations." As project coordinator, he and his team are responsible for knowledge management within an international and diverse consortium, something which requires precise alignment. Research in Belgium is carried out by the Production Engineering, Machine Design and Automation Section (PMA) of the University of Leuven together with the Belgian Research Centre of the Technological Industry. In their national focus, the Belgians are concentrating on the treatment of ceramic materials. In Germany the experts at the Laboratory for Optical Engineering at the Deggendorf Higher Vocational College are testing and developing the characteristics of brittle glass under defined conditions. And in Austria, Friedrich Bleicher is working with his colleagues at the Vienna University of Technology on the properties of hardened steel and special ceramic materials. The CORNET Ultrasonic Assisted Grinding Project is a very ambitious scientific project. However, the coordinator Mr Bleier can already show his partners many results with practical relevance that have found their way into tangible manufacturing activities. Businessman Wolfgang Wittner: "We are experiencing the gains in manufacturing know how in dealing with brittle materials at first hand. Without CORNET it would be impossible for a small business like ours to cooperate with university institutes and international partners".

## CONTACT

### Project title

Ultrasonic assisted grinding of brittle hard materials

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### Involved countries

Austria, Belgium and Germany

# HEALTHY BODY DYES

The Austrian spokesman of the tattoo sector and owner of a cosmetics studio, Hermann Talowski: "The tattoo sector needs uniform quality criteria and international standards".



A CORNET project for the tattoo sector developed international minimum standards for hygiene and carried out a study of the body dyes being used.

When David Beckham got his wife Victoria's name tattooed in Hindi script, it was headline material throughout Europe. After all, introducing artificial skin pigments to your left forearm is a permanent decision, even for a style icon. And it's not much fun when a mistake is made in the transliteration ("Vihctoria"). Tattoo corrections are still a job for dermatologists.

Despite the orthographic shortcomings, Beckham's penchant for tattoos marks a widespread boom in what used to be a subculture. Tattoos are chic and in demand - as is "permanent make-up", which also draws on the technique of subcutaneous injections of dye.

## GETTING OUT OF THE GREY AREA

As demand for tattoos has risen across Europe, so has the supply of services in that area - and with it the need for quality. "This activity is really demanding when it comes to hygiene and yet there are no international standards

regulating it to a satisfactory level,” complained Hermann Talowski, the proprietor of a beauty salon in Graz (with 6 employees) and with a federal guild master qualification as a beautician, pedicurist and masseur. The newly grown tattoo sector not only lacks common hygiene standards, it also lacks reliable knowledge about the composition of its main operating materials, the dyes. In the past, when tattoo studios and their operators had to work in a socially grey area, there was no dependable scientific research into the health effects and active ingredients of the dyes used. The skin coloration was sometimes induced using products that were originally developed as car paints or writing ink. “The profession of tattoo artist needs to come out of the murky depths. And that is only possible with uniform quality criteria and international standards,” said Mr Talowski, putting the case for the cross-border concept.

## INTERNATIONAL SOLUTIONS

Those requirements were on the table. And a European solution was found for the answers: a project for the entire tattoo sector was initiated within ERA-NET CORNET, called “Health Safety in Connection with the Use of Tattoo and Permanent Make-up”. The tattoo project was one of the first, in 2006, to make scientific innovation available to the small and medium sized businesses sector in Europe on the basis of CORNET. No individual tattoo studio could bring about that development on its own. However, an international project was set up by bundling resources. The project combined national subsidies for innovation in the SME sector. Groups from Germany, Belgium and Austria were represented in the CORNET project, bringing with them the expertise of a highly diverse range of research institutes. The Belgian Hygiene Quality Label BHQL in Ghent was represented on the Belgian side. Germany’s participant in the programme was the German Research Association for the Cosmetic Industry (FKI) in Holzminden, Lower Saxony. The Austrian Research Institute for Chemistry and Technology in Vienna (ofi, a member of Austrian Cooperative Research) and the Hygienicum in Graz took part in the research work in Austria. The research assignment to draw up hygiene regulations and reduce the side effects of the inks was divided up carefully among the three institutes. Erwin Czesany, the general manager of the federal guild group for Health, Textiles and Chemicals, took on the role of coordinator in the CORNET project. “The research organisations worked out a plan that gave an exact depiction of the strengths and remits

*“The CORNET project has produced standards for the entire sector that will feed into EU wide regulations.”*

of each of the partners in the project.” So called ‘user committees’ ensured the requisite input at least twice a year from businesses. As the administrative focal point in the project, Mr Czesany organised regular conferences, established regular exchanges of information and arranged a final report at the end of 2008.

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## RESULTS

The project has already produced the first legislative results. In Austria, a decree by the Ministry of Economic Affairs in January 2009 laid down the characteristics of safe tattoo dyes, while minimum hygiene standards were defined in Belgium, Germany and Austria for tattoo studios and beauty salons. What is more, the dye manufacturers have already responded and are improving labelling on their products in reaction to the research findings. “The CORNET project has produced standards for the entire sector that will feed into EU wide regulations,” said businessman Hermann Talowski with satisfaction. Quality requires regulations. However, others will still remain responsible for the rules of correct spelling. David Beckham has learnt that lesson.

## CONTACT

### Project title

Health Safety in Connection with the Use of Tattoo and Permanent Make-up

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## WOOD FOR ALL TYPES OF WEATHER

The Wood Composites Project studies the resistance to weathering of wood plastic composites used outdoors. A Mediterranean climate requires different characteristics from the rainy weather typical of the Atlantic.

Wood has character. It cannot just be bent any way you choose. And it seldom bonds with other materials. "The combination of wood with plastic coatings has numerous aspects. It responds in very diverse ways in different circumstances," said Robert Putz, explaining his professional challenge. He is the divisional manager of the 'Wood, Polymer and Composites' research division of the Austrian Kompetenzzentrum Holz GmbH (Wood Competence Centre), which deals with the research and development of wood as a material. Increasing the resistance of wood to weathering is a permanent theme, as is using it as decking for terraces and patios outdoors. Composite materials made of wood and plastics are seen as a possible solution here. The complicating factor is the poor tolerance that each material has for the other. "We are carrying out research and tests to find out the conditions under which wood and plastics are most compatible," explained Mr Putz. While on the one hand there is a considerable need for research, on the other hand the furniture, wood

construction and carpentry sectors everywhere in Europe is small scale, with few major leading companies. "It is not easy for small and medium companies to make major investments in R&D," explained Jürgen Müller, the manager of the furniture and wood construction cluster in Upper Austria. His task is to give small companies access to the key developments in the wood and furniture sector through networking.

### RESEARCH FOR THE FUTURE

Innovation is one of the crucial factors driving growth in the economy. The European Research Area Net's CORNET Programme was started up to close the gap between small and medium companies and their unsatisfied desire for knowledge. A priority is the method of cross border collective research, organised by professional and technical associations. The problems in using wood plastic composites (WPC) were tackled using the resources of the CORNET Programme. Three national innovation agencies from Cyprus, Germany and Austria developed the 'Wood Composite Project' in 2006. As lead manager, the Austrian furniture and wood construction cluster formulated narrowly defined research objectives together with the German Society for Wood Research and the Cyprus Union of Furniture Makers and Carpenters. These objectives were to be implemented in the two year project period. They involved searching for surfacing technologies that make outdoor flooring tougher. A further objective was the design, construction and evaluation of the potential of wood-plastic composites in the Mediterranean area. The problem: high humidity, large temperature fluctuations and salty sea breezes make different demands on wood based materials than the central European climate; until now, this has severely limited the use of WPC in the Mediterranean regions. "These assignments were divided up among the participating institutes according to their core areas of expertise and their individual focal points of interest," said the project coordinator Jürgen Müller, describing the operational approach.

The Austrian project coordinator Jürgen Müller and scientist Robert Putz from the Kompetenzzentrum Holz (Wood Competence Centre) in Linz.



The Wood Composites Project linked up five research institutes:

- Kompetenzzentrum Holz GmbH (Linz, Austria)
- INNOVENT e.V. (Jena, Germany)
- Institut für Holztechnologie (institute for wood technology) Dresden GmbH (Germany)
- Technological & Educational Institute of Larissa (Greece)
- Timber Training and Research (TTR) Centre (Nicosia, Cyprus)

The principle of collective research is being applied intensively. "In addition to the regular annual conferences, there are ongoing informal exchanges of information between the institutes," said the wood researcher Mr Robert Putz. The international division of the work has sowed the seeds for future cooperative efforts. Mr Putz was sure that "the networking between the participating research partners won't end with the project".

## RESULTS

The involvement of the small and medium companies in the R&D process is guaranteed at the national level by 'user committees' where the partner businesses can make their interests known and profit immediately from the research findings. In return - depending on their national regulations - they participate by making a financial contribution to the total project costs of EUR 753,000 and/or by contributing to the research work as far as they are able. Many SMEs have test and analysis facilities that are not available in the research organisations. This kind of cooperation between the companies and the research partners in the CORNET project enables individual processing or manufacturing problems to be dealt with. Furthermore, the involved SMEs profit from preferential access to the research findings, which are published at the annual conferences and in written final reports. Innovation gives the edge.

## CONTACT

### Project title

Wood composites with improved properties for application in furniture and timber construction fields

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## CORNET

CORNET stands for Collective Research Networking. It is a network for information exchange and collaboration between national and regional programmes and schemes for collective research across Europe. The objective is to promote close cooperation between the responsible national/regional ministries and agencies and to create opportunities to set up transnational collective research with national/regional funding. This means that CORNET partners in the participating countries and regions are working together to align programme conditions and procedures. All CORNET coordination activities are financially supported by the European Commission through the ERA-NET scheme.

Up to date information on CORNET, calls for proposals, rules for participation, and participating countries and regions is available on the CORNET website: [www.cornet-era.net](http://www.cornet-era.net). For specific questions please contact your national or regional funding organisation; the contact details are also on the CORNET website.

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