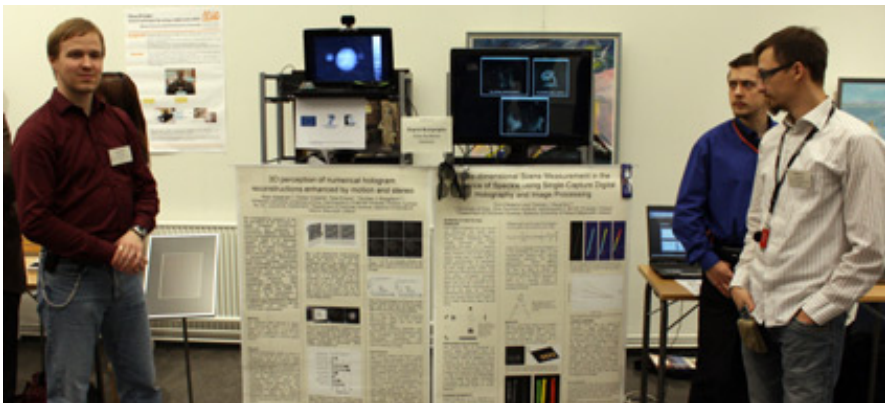
Oulu South Higher Education Network Invests in Research and Development

Oulu South Higher Education Network (OEK) is an effective network of co-operation of the region's educational institutions. The region's secondary-level vocational colleges, academic universities, and universities of applied sciences have common educational, research, and development environments with joint staffs, facilities, and research equipment. These environments, led by research directors in different fields, are OEK's main instrument for supporting the developmental and innovational operation of the region's companies and organizations, enabling them to respond to worldwide structural changes.



Research in the fields of metal technology, stonework, and bioenergy

The Educational Municipal Federation of the Kalajokilaakso Region (KAM), as a secondary-level educational organization, places considerable emphasis on cooperation by investing in expensive equipment used in research and development activity.

According to Managing Director Heikki Yli-Olli, KAM is a strong operator in regional development and the best of northern Finland's large organizers of education in terms of outcome.

KAM is developing innovative production technologies in the metal industry in cooperation with the regional unit of the University of Oulu and the Ylivieska unit of Central Ostrobothnia University of Applied Sciences in the ELME Studio, an electromechanical development environment in Nivala's industrial park.

The goal is to promote companies' success by means of new solutions in production technology. Significant development results have been achieved in the ELME Studio, which has become the hub of a considerable center of expertise.

Available tools include modern measurement, 3D laser welding and laser cladding equipment, a robot welding environment, a 10-axis multipurpose machining lathe, a sheet metalwork training plant, and a versatile environment for tool manufacturing.

The educational municipal federation has also invested in a stone research and development laboratory, KIVI Studio, in Pyhäjärvi. It promotes the competitiveness of stonework companies. KIVI Studio also has water cutting technology that can also be used to cut stone. Some of KIVI Studio's machines are also suitable for metal cutting and machining.

In Haapajärvi the educational municipal federation has built the only bioenergy-producing power plant that operates in an educational environment. It uses biogas produced, for example, from manure obtained from an adjoining modern educational barn. The goal of the Renewable Energy Forms Research Leader project is to accumulate the region's know-how in bioenergy and the environment to the top level internationally.

Students use CAD software to design products for manufacture. In the photo are products water-cut from various types of stone up to 100 mm thick.

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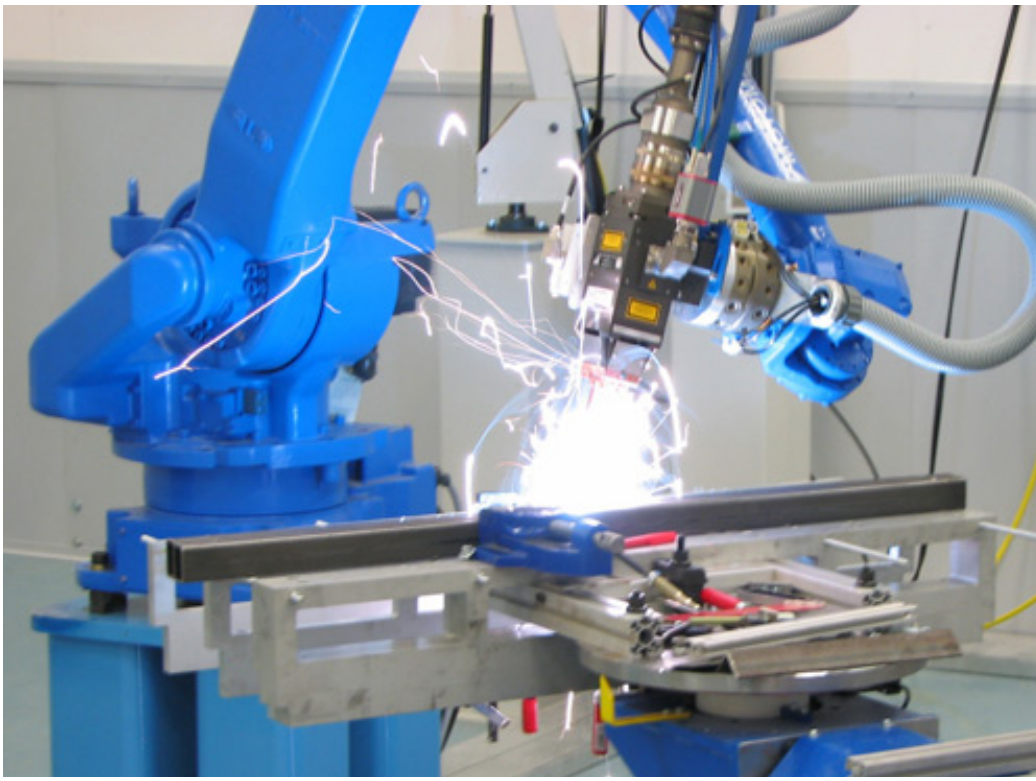
Production technologies of the future under study



Laser welding of high reflective material

Oulu Southern Institute (OEI), the regional unit of the University of Oulu, is responsible for research related to metal production technologies, RF and microwave technology, digital media, technological education, and underground particle physics, to name a few. The quality of the institute's operation is evidenced by its management of top international research projects (Real 3D digital holography research project) and partnership in the LAGUNA Design Study, funded from the EU's 7th framework program for research.

The special expertise of the Future Manufacturing Technologies Research Group operating in the ELME Studio includes the newest technology used to refine ultra-high-strength sheet metal into products.

The research areas are sheet metal product manufacturing and production technologies, laser welding of color-coated sheet metal, problems associated with forming of ultra-high-strength steels and wear-resistant steels, laser-assisted bending, and laser welding of ultra-high-strength steels.

"The roots of the research group go back to the end of the 1990s. By that time sheet metal industry production had developed strongly in the region, and we wanted to speed up its development further with the help of university-level research," explains Research Director Kari Mäntyjärvi.

"First we wanted to create a base for research activity and invest in research that is quickly exploitable from the standpoint of regional business operation."

"The strategy of the research group was completely renewed in 2008-2009. At that time studies on the usability of ultra-high-strength steels, for one, entered the picture."

The research group has focused especially on studying laser technology and its use in various production processes, such as cutting, forming, and welding sheet material, and laser-assisted processes. The work of the research group has been furthered by a laser device with a very-high-quality laser beam, the first of its kind in Scandinavia.

"The research group collaborates with companies in the design and production of prototypes, and instructs them in the development and selection of production methods and products that are suitable for high cost level conditions."

Collaboration with companies has been fruitful. The research group is currently comprised of 15 researchers.

The research group has made a cooperation agreement with Luleå University of Technology, for one. The group also conducts research in laser technology together with Erlangen University in Germany, where one of the group's researchers is an exchange researcher. The research group also participates actively in national ProMetal network cooperation.

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International collaboration

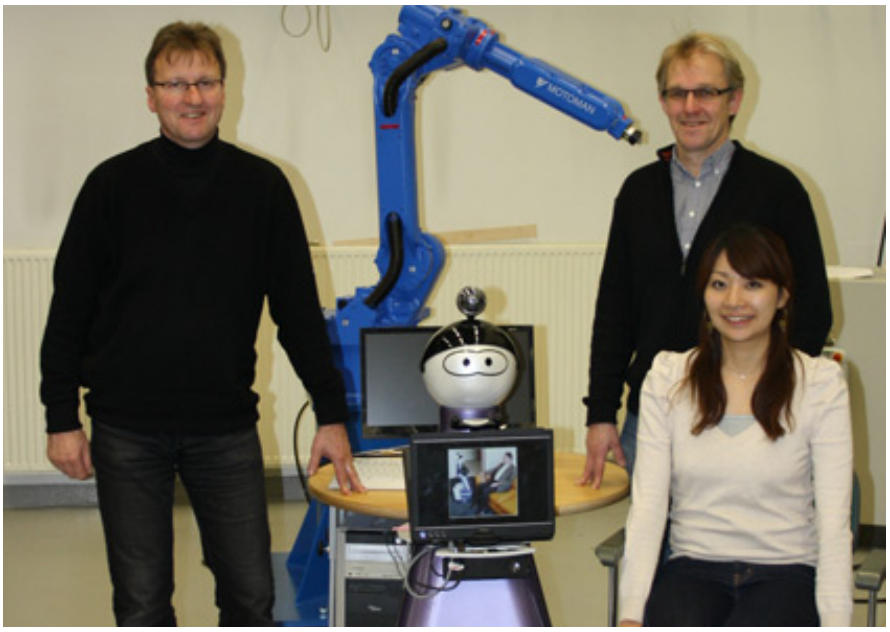
Central Ostrobothnia University of Applied Sciences' research and development unit CENTRIA in Ylivieska conducts research and development in the RFMedia laboratory in collaboration with international universities.

CENTRIA has collaborated with Aachen and Gelsenkirchen Universities of Applied Sciences for nearly 20 years. Collaboration, for example in antenna technology, with St. Petersburg University of Technology in Russia has continued over 10 years, already. The newest partners are the University of California in Berkeley, USA, and Ochanomizu Women's University in Japan. Collaboration has begun with researcher exchanges with both universities.

"We are working together with the University of California in Berkeley in the application of SmartDust technology to monitor the environment," says Senior Research Scientist Mika Luimula.

CENTRIA's researchers predict that different types of monitoring systems will be a significant new business area in the future. Construction of these systems requires solid know-how in fourth-generation telecommunication networks. CENTRIA has experience in this area, as one of the first LTE test networks in Finland has been constructed in the Ylivieska campus area.

CENTRIA's researcher Joni Jämsä with SmartDust radio.



Japanese exchange researcher Mizuho Komatsuzaki together with CENTRIA's Kompai service robot and Senior Research Scientist Sakari Pieskä and Laboratory Engineer Jari Mäkelä.

"Ochanomizu Women's University in Tokyo has offered CENTRIA's researchers the possibility to learn to understand Japanese research philosophy in which searching for innovations from women's perspective is most important. One of the main areas of cooperation has been in research related to mobile robotics," says Senior Research Scientist Sakari Pieskä.

A new dimension was recently added to the unit's research activity when CENTRIA acquired a Robosoft Kompai service robot.

The newest area of research at CENTRIA is comprised of various service robot in which consideration has been give to the robot's humanness. One of the applications is promotion of elderly people's well-being.

A large area of research and development at CENTRIA that concerns all of northern Finland is wood technology, which focuses on surface treatment, wood composites, and manufacturing of shaped components.

CENTRIA RESEARCH AND DEVELOPMENT / CENTRAL OSTROBOTHNIA UNIVERSITY OF APPLIED SCIENCES

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