



Robust and Lightweight Structures

The goal of the project was to develop energy-efficient, lightweight and robust metal structures and their cost-efficient manufacturing processes. New knowledge and technological proficiency provide low-carbon solutions for increasing industrial competitiveness. The competitiveness of the metal and machinery manufacture industry in the Oulu Region can be improved by transferring new research-based expertise and production methods to businesses. In addition to creating considerable research value, the project also produced instruction manuals, such as a laser welding handbook, which businesses can take advantage of in their production and manufacturing processes.



European Union
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Leverage from
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2014–2020



Strong co-operation between research and business forms the foundation for international success

The metal and machine manufacture industry has been the flagship of Finnish exports for a long time. The industry as a is particularly significant role in the Oulu Region. Growth, innovation and specialisation of businesses are necessary to ensure the prominence of the industry in the long term. This project was initiated to respond to this challenge. The project puts the smart specialisation strategy of the Oulu Region into practice.

Steel producers and research centres in the Oulu South region are highly competent in special-purpose steel manufacturing, but the local machine workshops are not at the same level. Expertise in material use forms the base for developing competitive and material-efficient products. The project aims to enable the cost-efficient production of innovative robust and lightweight structures by combining expertise in special-purpose steels and production technologies in the region.

This project has combined the cost analysis methods of material, planning and production engineering in a new way. The goal was to produce cost-efficient manufacturing methods for robust and lightweight structures, which local machine workshops could utilise. As a result of the project, the region will have a robust, competitive and specialised machinery manufacture industry in the near future. Growth potential in international markets arises from specialised expertise, which generates market interest in the region's goals and thus creates new business.

Efficient dissemination of new knowledge is the key to growth

The ELME production studio in Nivala is an internationally significant R&D&I environment. It is the result of long-term development work. A Future Material Technologies (FMT) research group works within the studio and disseminates new research knowledge and expertise to businesses and educational institutions in the region.

Co-operation with businesses was an important part of the project. 16 businesses participated in the project, which surpassed clearly the set goal of 10 businesses. In addition to contributing to long-term growth, the participation of businesses enables an immediate impact to the level of expertise in the region. The results of the project have received a lot of positive feedback from the local businesses.

– The businesses participated actively and provided lots of new ideas and continuous feedback during the project, describes Development Manager Kari Mäntyjärvi.

From immediate benefits to long-term success

The project also produced immediate and concrete results in the form of model structures and design instructions. A central achievement was the publication of a laser welding handbook, which businesses can utilise in their development work and product design. Laser welding is an important new method, which can be used to create lightweight structures that have proven to be competitive alternatives to traditionally designed structures. In some situations, laser welding can enable significant lightening of structures. Lightweight structures can, for example, help create sustainable transport chains by providing improvements in energy efficiency and decreases in emissions.

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Project code: **A70148**

University of Oulu

1.11.2014–31.5.2018

Budget: **900 000 €**

ERDF funding from the Council of Oulu Region: **630 000 €**

The project created a foundation for local businesses to specialise in the production of laser-welded, robust and lightweight structures. The new knowledge provided by the project will induce the growth of special-purpose steels expertise in the region. With new competences, the local businesses will be able to manufacture products with energy- and material-efficient, low-carbon structures. Expertise in future manufacturing technologies is a vital part of strengthening the competitiveness of the metal and machinery manufacture industry in the Oulu Region.



Goals

- Enabling the profitable manufacturing of lightweight metal structures, which promotes the EU strategy for achieving an energy-efficient, low-emission and carbon-neutral society.
- Developing robust and lightweight structures and their manufacturing methods towards being competitive alternatives in current energy prices.
- Bolstering and creating new export-oriented business based on specialisation.
- Advancing the capacity of the FMT research group to service local businesses by increasing the competence level of actors engaging with the ELME production studio.

Results

- Local businesses can specialise in the manufacturing of laser-welded robust and lightweight structures.
- A laser welding handbook containing the newest research knowledge on ultra-strong special-purpose steel laser welds.
- An increase in special-purpose steels expertise in the region.
- Model structures, which help local businesses adopt more energy- and material-efficient low-carbon structures in their production processes.

Oulu Regional Council allocates funding for regional development from the ERDF

Oulu Regional Council is a Managing Authority for the Sustainable growth and jobs 2014–2020 – Finland’s Structural Funds Programme in Northern Ostrobothnia.

European Regional Development Fund’s (ERDF) main objectives are to improve the competitiveness of SMEs and produce and use the latest information and knowledge.

‘Sustainable growth and jobs 2014–2020 – Finland’s structural funds programme’ has two priority axes and seven specific objectives for ERDF. Each project must deliver at least one of these specific objectives.

ERDF priority axes and specific objectives:

1. Competitiveness of SMEs
 - Generating new business
 - Improving transport and logistic connections that are important to SMEs (Eastern and Northern Finland)
 - Promoting growth and internationalisation of enterprises
 - Promoting energy efficiency in SMEs
2. Producing and using the latest information and knowledge
 - Development of the centres of research, expertise and innovation on the basis of regional strengths
 - Strengthening innovation in enterprises
 - Developing solutions based on renewable energy and energy-efficient solutions

More information on Structural Funds in Finland from the dedicated website www.rakennerahastot.fi



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Council of Oulu Region

