

# Improving productivity of welding by reducing groove angle

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LUT has been developing materials and technology suitable for Arctic conditions. Principles for safe and ecological design and manufacturing of structures and devices used for energy production in the Arctic have been defined in the Arctic Materials Technologies Development project.

The LUT research focuses on the properties of new high-strength steel grades suitable for Arctic construction and the welding methods they require. As a result, the productivity of welding has been significantly improved through reducing the groove angle essential to welding from 45 degrees to 30 degrees without compromising quality. The new narrow groove welding means faster welding, fewer additives and fewer mistakes due to a reduced welding need.

"Strength, endurance and lightness of structures are essential in steel construction in the Arctic. In sub-zero temperatures, steel becomes fragile. You have to master steel construction. This narrower groove angle, for example, is a big step towards more sustainable and ecological production in Arctic steel construction", says Project Manager Markku Pirinen from LUT.

## **New methods to protect the environment**

A great deal is required from [materials](#) used in the Arctic. The structures must withstand temperatures as low as -60 °C. The materials must ensure production that is both safe and economical.

The use of new high-strength steels examined at LUT in structures improves the environmental friendliness and energy and materials efficiency of Arctic steel construction. The structures developed are lighter, thinner and more durable than before, therefore reducing time, energy and raw materials consumed in manufacturing, transporting and welding materials.

"The quality and safety of products and production improve through increasing automation, because [welding](#) is more rigorously controlled", Pirinen says.

As a result of the project, a comprehensive database of steel grades used in Arctic steel construction and their manufacturers was created, which will be very useful for companies. Knowledge of different countries' approaches, cultural differences and business infrastructure also improves the competitiveness of companies operating in the region.

Provided by Lappeenranta University of Technology

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