

UK steel production to benefit from efficiency innovation

December 12 2016

Steel production in the UK could be cheaper and more energy-efficient in the future, thanks to research at WMG, University of Warwick.

The ASSURE2 project, led by Professor Claire Davis, is looking to significantly cut steel production costs, and reduce energy consumption by over 300%, through exploring the use of belt casting technology.

Belt casting is a significantly lower energy production route compared to traditional continuous casting techniques, as belt casting is a near net shape casting process, producing strip that needs minimal hot deformation to achieve the required product thickness.

It is also very efficient because it can minimize or eliminate any reheating processes, which reduces overall costs.

Furthermore, there are certain advanced high strength strip (AHSS) steel grades which are commercially attractive but cannot be produced using conventional casting techniques - which could be manufactured using belt casting.

These include TWIP (twinning induced plasticity) and TRIP (transformation induced plasticity), which have twice the strength and three times the ductility of conventional steels - as well as high Al steels, which have a combination of good strength and lower density.

The new Advanced Steels Research Centre at WMG has allowed

Professor Davis and her colleagues to simulate belt cast microstructures, including dynamic direct observation of the solidifying steel at different cooling rates.

The team have demonstrated that the microstructures are altered by the higher cooling rate of belt casting, compared to conventional slab casting, and that further beneficial modifications (e.g. reduction in grain size in high Al steels) can be achieved by composition control.

In the ASSURE2 project, quantitative relationships between composition, process parameters and microstructure (and hence final product properties) are being established, taking into account the higher cooling rates of belt casting and the reduced hot deformation after casting to final thickness compared to conventional processing.

WMG will also be collaborating with Professor Rod Guthrie, from McGill University, who is a world-leading expert on belt casting. Trials using their pilot plant facilities will be carried out for steel grades developed in the project.

Professor Davies comments "There are a number of potential step change technologies available for steel processing and it is exciting to be working on one of these. We need to ensure we have a good scientific understanding to support any future take up and to maximize the opportunities available."

Steel continues to be the most used material in the world by value and play an essential role in all aspects of society, from construction to transport, energy generation to food production.

The long-term sustainability of UK steel making requires lower energy production - (energy constitutes 20-40% of the cost of [steel production](#)) - together with the development of high value steel products.

These factors combined will provide the UK [steel](#) industry with a competitive advantage in the international market.

Provided by University of Warwick

Citation: UK steel production to benefit from efficiency innovation (2016, December 12)
retrieved 24 April 2024 from

<https://phys.org/news/2016-12-uk-steel-production-benefit-efficiency.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.