

Monitoring molten steel by laser – steel experts' invention could save industry millions

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Dr Szymon Kubal pictured with a vessel of molten steel at the Tata Steel Port Talbot works. Credit: Tata Steel

Steelworkers will be able to monitor in real time the temperature and chemical composition in molten metal furnaces, saving each steel plant up to £4.5 million a year, thanks to a new laser technology developed by a Swansea University spin-out company.

The new [technology](#) has won the Materials Science Venture Prize awarded by The Worshipful Company of Armourers and Brasiers, and worth £25,000. Swansea University is the first institution to have won this prestigious award twice, both times for its pioneering work on steel.

Currently in steelmaking, production is halted while disposable probes are immersed into the molten metal to measure temperature and take samples. This is inefficient as it takes up time, requires expensive probes and reduces productivity.

In contrast, the new technology uses lasers projected into the molten furnace which monitor the contents continually. There is no need for disposable probes and – crucially – production does not need to be stopped.

The technology is being developed by Swansea University spin-out company Kubal-Wraith Ltd.

Dr Szymon Kubal of Tata Steel, research fellow at Swansea University, said:

"Our [new technology](#) allows a laser beam to be projected into a molten furnace through a channel called a tuyère in the furnace wall. We exploit the latest gas injection techniques to protect the data channel.

One difficulty was testing our innovations in an operational [steel plant](#) under production conditions. However, by working with Tata Steel UK we are able to undertake full-scale trials."

The technology is also applicable to other metals such as aluminium, copper and nickel. World Steel Association data indicates there are more than 1000 molten metal furnaces worldwide, which could see benefits in cost and productivity by using the new method of monitoring.

The team, led by Dr Szymon Kubal, includes Swansea University College of Engineering experts Dr Cameron Pleydell-Pearce and Dr Adrian Walters.

Professor Bill Bonfield, chairman of the Armourers and Brasiers Venture Prize judging panel, said:

"This project shows how research and innovation has the potential to transform long-established manufacturing processes. Our prize looks to encourage scientific entrepreneurship in the UK and provide funding to help innovative developments like this realise their potential."

Dr Adrian Walters, Royal Society Entrepreneur in Residence at Swansea University, said:

"Swansea University also won the Venture Prize in 2016 with a pioneering method of tackling corrosion, improving steel-based products, whereas this year's winner improves the first stage of the steel manufacturing process. It shows that Swansea University is delivering innovation right across the [steel](#) industry."

Dr Gerry Ronan, Head of Intellectual Property for Swansea University, said:

"This is a highly prestigious and competitive award and offers a great deal of credibility to an early stage start-up.

This second award in three years shows the strength of expertise in material science at Swansea and also the quality of the commercial

opportunities that the University creates. It is also a credit to Dr Adrian Walters, who has worked closely with both of these successful teams."

Provided by Swansea University

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