



Llywodraeth Cymru  
Welsh Government

Innovation

## COMET

# COMET collaboration set to accelerate sustainable Welsh steel alloy manufacturing and exports, thanks to SMART Expertise funding

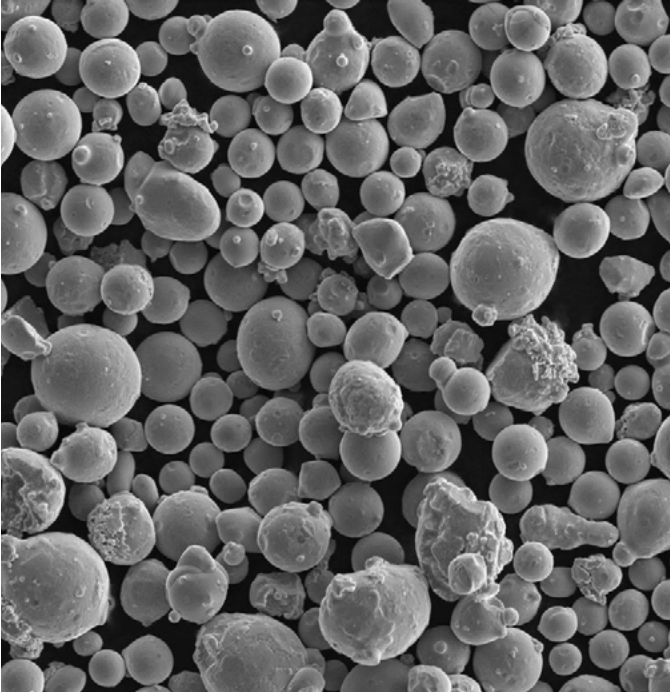


A university and industry partnership project which aims to accelerate the discovery of materials from research in the laboratory to their deployment in industry, has received Welsh Government innovation funding of £1,138,000 over five years to help develop the discovery of new alloys for ultimate commercial use, as well as 3D printing and new computer-driven techniques for sustainable manufacturing materials.

The MACH1 COMET (Combinatorial Metallurgy) project is a collaboration between Swansea University researchers and globally important partners in Welsh industry. The project looks at how manufacturing, engineered products and new alloys can be developed in a smarter way, with a stronger focus on accelerated research, development and innovation. The partnership with industry supports the values of the Economic Action

### Project Timeline:

- **December 2016:** Submission of COMET project to SMARTExpertise round 1.
- **November 2017:** £715K (Total £1.4M) COMET project approved for funding to investigate combinatorial metallurgy using rapid alloy prototyping techniques.
- **April 2018:** COMET Start Date.
- **April – September 2018:** 4 new jobs created.
- **September 2018:** MACH1 move to permanent laboratory facilities in IMPACT building Bay campus.
- **April 2020:** Full industrial trial with COGENT producing electrical steels based on research performed on COMET Project.
- **February 2021:** Proposal submitted for COMET expansion.
- **June 2021:** COMET expansion approved, taking total project to £2.2M.



Plan in Wales, helping Welsh businesses to continue to export products and contributing to a knowledge-based and smartly specialised economy.

The funding received has allowed the COMET partnership to move its centre from a one-room base at Swansea University to its own purpose-built facility on the Bay campus, growing its capabilities and expertise and developing new projects, as well as employing six new members of staff and attracting more than £2m in spin-off projects and new equipment in Swansea University labs.

The COMET team has also been able to accelerate commercialisation through pilot and industrial trials to ensure the new products are manufacturable and more efficient. New steel alloy products are also in development, with outstanding hardness and strength, temperature and corrosion resistance to be used in aerospace, defence, and power generation. These alloys will be designed to have a higher specific strength than traditional alloys – resulting in wide-ranging environmental benefits as well as using cheaper and more readily available elements. When used in combination with 3D printing, complex

engineering components can be made with much less waste – revolutionising manufacturing in the future and contributing to one of the essential elements of Wales’ Wellbeing of Future Generations Act.

Speaking in more detail about some of the sustainability and environmental benefits that the SMARTExpertise funding has allowed the project to implement, Prof Nicholas Lavery, Director of the Materials Advanced Characterisation Centre (MACH1), and the lead academic of the Swansea Additive Manufacturing Research (SAMR) group said: “One of the research strands in COMET has used laboratory methods to synthesise steels with chemistries that mimic increased use of scrap steel to explore how more could potentially be used in the future, without affecting the mechanical properties. Being able to use more scrap steel on a larger scale would have a hugely positive impact on the whole steel industry, but businesses need to have that knowledge about its use and effects before scaling up the use of recycled material. That’s the expertise that COMET can provide. For example, Tata Steel, one of the project partners, would like to increase the proportion of recycled material used in some steels, as it is one of the routes for reducing emissions from blast furnace production.





“Steel is one of Wales’ biggest exports, but also has one of the highest emissions rates, so increasing the use of recycled materials would be a crucial step in reducing that imbalance between economic benefits and environmental impact.”

The methods being developed on the COMET project are also being applied to explore new chemistries for electrical steels which are crucial to the electrification of transport. The links between composition, processing and electro-magnetic properties using rapid alloy prototyping could lead to a new generation of high efficiency, lightweight and robust electrical motors and transformers, also contributing to the reduction of emissions.

Speaking about one specific area of the product development and commercialisation benefits of the COMET project, Dr Shahin Mehraban, COMET Senior Project Officer, said: “At our centre we also have the capabilities to test out powders used by one of the major additive manufacturing supply companies. They can then use this knowledge to give their customers more information and ultimately sell more of their product, so the economic benefits of the knowledge capabilities are clear”.

He continued: “Ultimately, we are making things again in this area, which has a long and proud history of manufacturing and the SMARTExpertise funding and support has enabled us to do this, as well as expanding our operation and work with more projects and more collaborations.”

**The MACH1 COMET project is a collaboration between partners in Welsh industry including Tata Steel Strip Products UK, Cogent Power, Sandvik-Osprey Ltd, Renishaw plc, Lase Ltd, ESI Group, Defence Science Technology Laboratory, Reaction Engines Ltd and Vanitec Ltd.**

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To find out more about funding and support from the Welsh Government:

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