EMPOWERMET

Electric & Mechanical Power for Metal Manufacturing

FROM AEROSPACE WASTE TO TITANIUM WIRE

Newsletter 1

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A new open-access study demonstrates how titanium machining swarf and out-of-specification additive-manufacturing powder can be consolidated into wire through solid-state continuous extrusion, while recycled nickel-based superalloy powder can be consolidated through FAST and used to produce the process tooling [1].

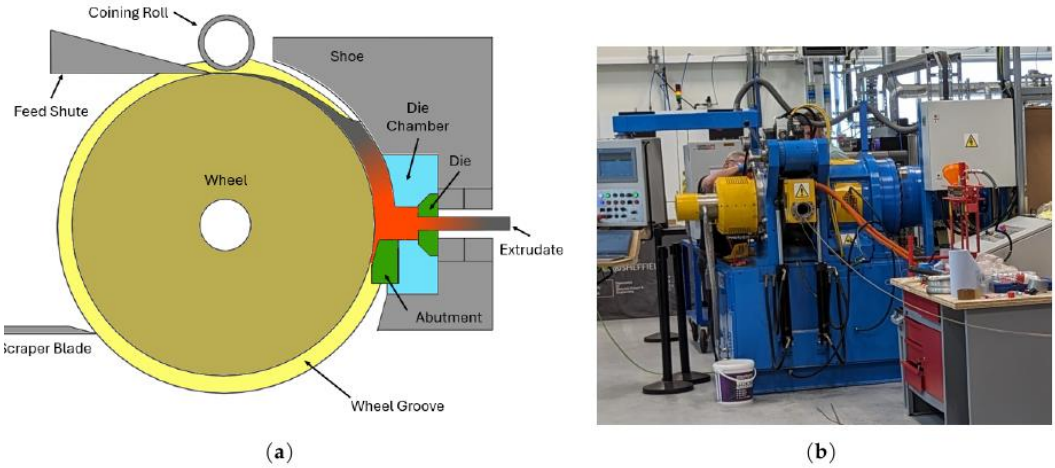


Figure 1. (**a**) Schematic of the feed mechanism and extrusion areas of the CONFORM™ machine. (**b**) Photograph of the CONFORM™ machine as it is extruding 5 mm CP-Ti Gr2 wire.

Why it matters

The research provides a tangible proof point for a circular titanium route: waste is retained at higher value, remelting is avoided, and wire feedstock can support downstream additive manufacturing and welding.

The published work is not an EMPowerMet project result, but it directly validates the technical logic that EMPowerMet will optimise, scale and demonstrate at an industrially relevant level:

- Both centre on solid-state processing with FAST and CONFORM™, avoiding energy-intensive remelting.
- Titanium machining swarf and out-of-specification powder become valuable material inputs rather than downgraded waste.
- The article establishes feasibility. EMPowerMet targets process optimisation, reliable tooling, industrial scale-up and the potential to reach TRL7 validation through the project.

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- In the future, such wire could be used for drawing, additive manufacturing and welding. EMPowerMet will draw CONFORM™ preforms into wire for waDED demonstrators.

The Study in Brief

- 3 titanium feedstocks were compared: bar, powder and swarf
- 90 min continuous processing was achieved with only about 1–2 mm tooling wear

Scientific evidence is already showing the processing route works. EMPowerMet will turn that evidence into a robust European process chain.

[1] Cook, L., Lister, S., Pulfrey, W., Goodall, E., & Jackson, M. (2026). Towards Closed-Loop Aerospace Waste Recycling: FAST Nickel Superalloy Tooling for Direct Titanium Waste-to-Wire Continuous Extrusion. *Recycling, 11*, 192. https://doi.org/10.3390/recycling11110192

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