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The objective of the **UltraMAT** project is to develop a novel generic technology for materials processing of fluid and semi fluid phases that are widespread in manufacturing e.g. in the welding and adhesive joining of components, the manufacture of bulk composite components, in traditional and PM (HIP).

The **UltraMAT** is a three-year project which started in March 2017
This project is supported by Innovate UK (Project Ref. 102802).

Innovate UK

UltraMAT Project Ref. 102802
Innovate UK is the UK's innovation agency

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UltraMAT

Power ultrasound as a generic tool for micro/nanoscale processing of metals



www.ultramat.co.uk

Innovate UK

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Power ultrasound as a generic tool for micro/nanoscale processing of metals

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The principal mission of BIC is to establish a world-class research centre offering high quality research in an innovative environment.

www.brunel.ac.uk/bic

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<http://carrswelding.co.uk>

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<http://nquiringminds.com>

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UltraMAT

Power ultrasound as a generic tool for micro/nanoscale processing of metals

The project goal is a novel generic technology (**UltraMAT**) for materials processing of fluid and semi fluid phases that are widespread in manufacturing, e.g. in the welding and adhesive joining of components, the manufacture of bulk composite components and in traditional and PM (HIP).

The key purpose of **UltraMAT** is to enable production of manufactured components with step improvements in specific strength (yield/ fatigue/ impact) and modulus, fatigue life and thus lightweighting; driven by economic and environmental needs to reduce energy consumption and emissions in manufacture and transport. The enabling tool is power ultrasound with purpose shaped force fields for controlled movement and size creation of uniform nano structures to enable:

- (1) Production of homogeneously distributed and shaped nanoscale particulates, fibres or grains).
- (2) Enhancement of interlayer and filler-matrix adhesion bonds.

UltraMAT will be validated through the fabrication and testing of samples of a number of key structure/joint types of growing importance especially in aerospace or automotive bodies/engines: (i) Ti/Al fibre laminates, Ti/Al and laser welding. Homogenisation performance will be studied using graphene (G) and carbon nanotubes (CNT) because the strong agglomeration tendencies of G and NT is impeding their ability to realise commercially, components of ultra-high specific strength. In short pulse echo mode, **UltraMAT** will self-evaluate its performance on line aided by predictive big analytics.