

CONTACT INFORMATION



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UltraMAT – Power Ultrasound as a
Generic Tool for Micro/Nanoscale
Processing of Materials

www.ultramat.co.uk



Innovate UK
Technology Strategy Board

UltraMAT is an
Innovate UK Project
Ref: 102802

WHAT WE DO:

We are a limited company specialising in data and patent literature searches and provide confidential technical assistance to various industries using knowledge and experience gained in over 40 years working in industry before forming Cedar Metals Ltd in 2004. As well as working on various InnovateUK projects based on advanced ultrasonics, our main area of expertise the production, fabrication and uses of refractory metals and rare earths from mine to finished products for the Aerospace, Defence, Chemical, Electronic, Furnace, Nuclear and Glass Industries. Other areas of expertise are Powder Metallurgy Processes, furnace design and friction stir welding of steel and non-ferrous materials and thixotropic processing of aluminium and magnesium alloys. We carry out telephone, on-line and on-site consultations in the UK and overseas helping our clients solve their production problems.

Our Managing Director David Rowe is also an approved assessor for applicants applying for C.Eng., I.Eng. via IOM3 and TWI and for C.Sci and R.Sci on behalf of the Science Council and TOPRA.

QUALIFICATIONS:

David is:

[Chartered Engineer C.Eng. and European Engineer EUR.ING.](#)

[Chartered Scientist C.Sci.](#)

[Fellow of Institute of Materials, Minerals and Mining \(IOM3\) FIMMM](#)

[Fellow of the Welding Institute \(TWI\) FWeldI](#)

[Member of American Society of Metals ASM International](#)

[Member of The Minerals, Metals and Materials Society \(America\) TMS](#)

[Member of Particulate Engineering Committee \(IOM3\)](#)

[Member of Research Gate via University of Durham](#)

And thus, has access to a vast area of current and historic literature on his specialist subjects via online and large collection self-held literature obtained throughout his career to date. He has also published articles in a number of journals and regularly lectures to learned societies on a variety of specialist subjects. Texts of the latter are available as .pdf files on request.

PROJECTS WORKED ON:

Because of the confidential nature of our work we are not able to publish lists of clients and projects worked on but the following details of DTI/InnovateUK projects are in the public domain and extracted from the InnovateUK website:

CLEANMINE: Ultrasonic Cleaning of Valves in Mining TSB Project 101333

We aim to provide mine operators with a rapid method of detecting and removing calcium and similar deposits from in service check valves without stopping production, thus extending the life of expensive components, reducing the cost of maintenance by 50%pa and downtime by 5%pa. In the case of cyanidation, exposure of maintenance operatives to cyanide will be reduced to zero for certain tasks, presenting obvious health benefits. The system will reduce the risk of contamination from back-flow, and could be applied to other industries where check valves (or similar) are used, eg petrochem, nuclear or hydropower generation. A novel ultrasonic cleaning method will be developed: the components themselves act as a cleaning bath so are not removed from service. A device consisting of a wave generator, amplifiers and high-power ultrasonic transducers will be clamped to accessible surfaces of the valve to remove well adhered debris effectively without chemicals.

HITClean: High Temperature Inspection & Cleaning by Advanced Ultrasonics for Effective Maintenance and Management of Oil&Gas Offshore Production subsea & topside operating pipelines and vessels. InnovateUK Project 102491.

HiTClean addresses a number of related safety critical, security of energy supply, production economic and maintenance challenges in the life cycle of Oil&Gas offshore production installations (e.g. platforms and FPSOs) subsea assets including pipelines and production pressure components. The project will develop novel guided wave ultrasonic technology for subsea pipelines to be deployed by diver or a Remote Operating Vehicle (ROV): (A) Condition Monitoring (CM) for the early detection of in-service defects, e.g. corrosion - using Long Range Guided Wave Ultrasonic (LR-GWU) Pulse Echo (PE) technology, Teletest Focus electronic instrument, encircling ultrasonic sensors and signal processing for the on-line (in-production) innovative inspection of subsea pipes carrying hydrocarbons, (B) Innovative High Power - Continuous Wave (CW) LR-GWU electronic instrument and transmitters to dislodge and remove accumulated debris fouling in subsea & topside pipelines at temperatures of up to 400°C, (C) for pipe regions susceptible to fouling - innovative Moderate Power CW LR-GWU electronic instrumentation and transmitters for fouling prevention in subsea pipelines at temperatures of up to 400°C.

UltraMAT: Power ultrasound as a generic tool for micro/nanoscale processing of materials InnovateUK Project 102802

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, PM (HIP) and semi solid casting. 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 light weighting; 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 (ii) Ti/Al metal matrix composites with fibre/ particulate (ceramic TiC/SiC), Ti/Al laser welding and (iv) Al semi solid casting. 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.