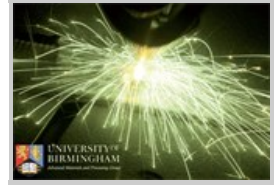


Net Shape Manufacture of Ni Superalloy Engine Casing (Nesmonic)

Posted on Friday 26th July 2013

Raja Khan, Advanced Materials & Processing Laboratory, School of Metallurgy and Materials

The Advanced Materials and Processing laboratory (AMPLab) is based in the interdisciplinary research centre (IRC) within the School of Metallurgy and Materials. The group consists of 29 members (3 academics, 10 researchers, and 15 PhD/EngD students, in addition to 8 PhD students jointly supervised with other academics). The research programme carried out in AMPLab is aimed at improving current materials, developing new materials and simultaneously to develop their processing and the influence of processing on microstructure and properties.



Aero engine static components made of Inconel (IN) 718 material are currently manufactured following a casting-forging route. This technology results in a very poor material usage i.e. buy-to-fly ratios, which typically range from 3 up to 10. Current technology is thus inefficient and results in high costs together with a large environmental footprint. The development and validation of a powder metallurgy based manufacturing route offers a clear potential in this, so the aim of this project is to develop and validate a cost-effective net shape hot isostatic pressing (NSHIP) manufacturing route for IN718 parts. The project will establish the HIP processing window for IN718 powder and explore new low-cost canning manufacturing methods developed. Then, using optimised parameters, components will be produced and assessed to see if they meet the original equipment maker (OEM) requirements in terms of accuracy, integrity and mechanical properties. The end-users of this technology include ITP (Industria de Turbopropulsores) in Spain, and Rolls Royce plc.

The duration of this project is 24 months, with a total grant of €1.6m available for three different partners, while the University will get around €400,000.

The research team working on this project include Dr Raja Khan, Dr Khamis Essa, Professor Mike Loretto, and Dr Moataz Attallah.

Amazing project for AMPLab

Nick Adkins, Advanced Materials & Processing Laboratory, School of Metallurgy and Materials

The Advanced Materials & Processing Laboratory (AMPLab) has for some time been focussed on the development of the Additive Manufacturing processing, widely known as 3D printing. In January the group will start a new project funded by the EU FP7 Framework Program called AMAZE, Additive Manufacturing Aiming Towards Zero Waste and Efficient Production of High-Tech Metal Products.

The overarching goal of AMAZE is to rapidly produce large defect-free additively-manufactured (AM) metallic components up to 2 metres in size, ideally with close to zero waste, for use in the following high-tech sectors: aeronautics, space, automotive, nuclear fusion, and tooling. Four pilot-scale industrial AM factories will be established and enhanced, thereby giving EU manufacturers and end users a world-dominant position with respect to AM production of high-value metallic parts, by 2016. A further aim is to achieve 50% cost reduction for finished parts, compared to traditional processing. AMAZE will dramatically increase the commercial use of adaptronics, in-situ sensing, process feedback, novel post-processing and clean-rooms in AM, so that overall quality levels are improved, dimensional accuracy is increased by 25%, build rates are increased by a factor of 10, and industrial scrap rates are slashed to <5%.

Scientifically, the critical links between alloy composition, powder/wire production, additive processing, microstructural evolution, defect formation and the final properties of metallic AM parts will be examined and understood. This knowledge will be used to validate multi-level process models that can predict AM processes, part quality and performance. The team comprises 31 partners: 21 from industry, eight from academia and two from intergovernmental agencies. This represents the largest and most ambitious team ever assembled on this topic. The project is a large scale DEMO targeted project with a total budget of €18.8m and a duration of 54 months, the University grant is €475,000 split between the AMPLab and the Mathematics Department.

[Privacy](#) | [Legal](#) | [Cookies and cookie policy](#) | [Accessibility](#) | [Site map](#) | [Website feedback](#) | [Charitable information](#)

© University of Birmingham 2015

