FAST-forg for Low-Cost Titanium Parts

Researchers have developed a new concept in high value manufacturing which could lead to a more cost effective and sustainable production process in the aerospace and automotive industries.

Working with UK industry partners Metalysis, the UK’s Defence Science and Technology Laboratory (DSTL), Advanced Forming Research Centre (AFRC) and Safran Landing Systems, the group of researchers were able to transform rutile sand to novel titanium alloy aerospace components using field-assisted sintering technology (FAST) and a one-step forging process.

This process, dubbed FAST-forg, is a hybrid manufacturing processing technology which consolidates titanium powder, including machined swarf, into a bulk material in two solid-state steps, as opposed to the conventional forty or so processing steps. This consolidation process exploits Metalysis’ technology for the production of titanium powder directly from rutile, with traditional precision hot forging to give the benefit of being a near net shape process. The powder can be shaped close to the desired component without the need for numerous expensive and process-limiting thermomechanical steps.

The technology will provide engineers with more design flexibility, and potentially lead to improved buy-to-fly ratios: currently for some aerospace components, 90% of the forged titanium alloy is machined away to waste material. It may also increase the market share of titanium in other price-sensitive markets, widening the appeal of high-strength, low density titanium parts for sectors such as automotive, which needs to reduce the environmental impact and increase the fuel efficiency of its products.

royce@sheffield.ac.uk
0114 222 5961
sheffield.ac.uk/royce-institute