

Casting of large Ti structures (COLTS)

The aim of this research proposal on Casting of Large Ti structures (COLTS) is to build on recent work on casting of Ti-based alloys to further develop centrifugal and gravity casting, so that large components of Ti alloys can be manufactured cost-effectively.

This proposal is in response to call AAT.2010.4.1-8 which aims to enhance strategic international co-operation between China and Europe in the field of casting of large titanium aerostructure components. The background to the project is the very significant weight saving and thus to improved fuel economy and reduced emissions which can come about through the use of Ti alloy components in some airframes and spacecraft and in aeroengines.

The potentially most cost-efficient method of production of such components is casting, and the focus of this proposal is casting of Ti alloys using clean-melting technology, skull melting, which limits the superheat of the molten alloy to about 40°C above its melting point.

Because of this limited superheat, it is necessary to use centrifugal casting or very sophisticated gravity casting, so that mould-filling can be achieved. There is considerable experience in China in centrifugal casting and gravity casting of components up to 1.5m in length and larger casting tables up to 2 and 4m in length are now in development. This proposal is thus an excellent fit for an FP7 collaborative project with China.

Two demonstrator components have been identified which will be cast from Ti6Al4V. A comprehensive data-base of the mechanical properties specified by endusers for the cast components will be obtained and an important part of the work is to further improve the properties of welded Ti structures in order to allow large components to be built up via welding if that is necessary.

Underpinning all of the experimental work there will be a comprehensive process-modelling activity.