

PUBLISHABLE SUMMARY

The INMA project aims at developing an intelligent knowledge-based (KB) flexible manufacturing technology for shaping titanium and other difficult-to-deform materials that will lead to drastically reduce current aircraft development costs incurred by the fabrication of complex sheet metal components with a minimal environmental impact.

In the aircraft, there are high costs and long lead times associated to the production of titanium sheet metal parts such as after pylon fairings, fan blades, exhaust ducts or air collectors because of forming technologies used today (cold/hot stamping, SPF) are based on dedicated tooling. The INMA project aims to lead to cost reduction and increased flexibility when manufacturing titanium and other difficult-to-deform materials sheet metal parts by introducing the asymmetric incremental sheet forming technology (AISF) into the production chain. The AISF technology shows the potential to produce complex sheet metal parts without dedicated tooling. Thus, the development costs will be reduced and agility and flexibility will be gained during the design phase for prototyping or the production of spare parts and low volume series.

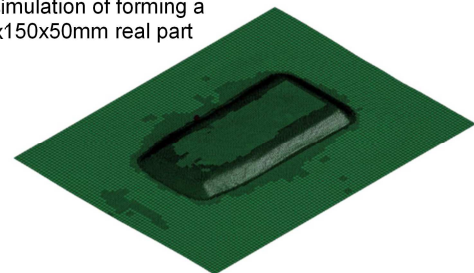


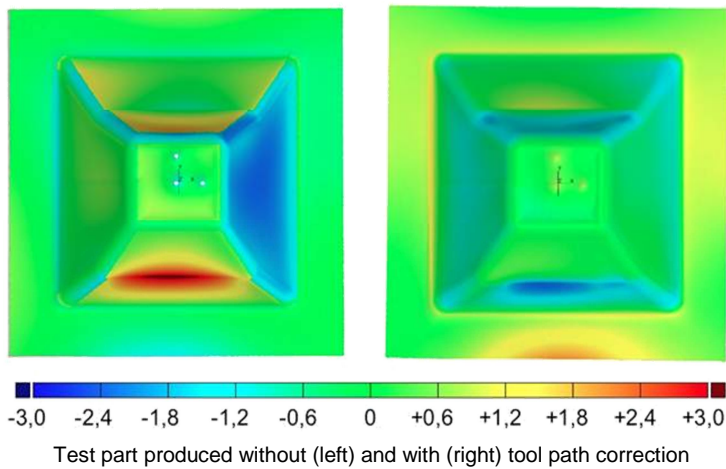
Since the project started on 1st September 2010 significant progresses have been achieved towards the project objectives. Thus, process parameters and forming practises have been identified to shape titanium alloys using the AISF technology. In this sense, means and methods to hot form alloys of interest, basically Ti 6Al-4V, concentrated a significant effort. The experimental activities oriented to develop the technology have been supported by FE modelling of forming with a particular emphasis in up-scaling the models to realistic (large/complex) shapes and in simulation of hot forming operations. Testing and analysis of the deformed alloys has also been done to generate material characterization data. Increasing the geometric accuracy of parts produced with no supporting die focused a particular attention to ensure the cost-effectiveness and flexibility of the proposed solution. By using data mining and knowledge discovery in data techniques it has been possible to correct the tool path leading to a reduced distortion of the part.



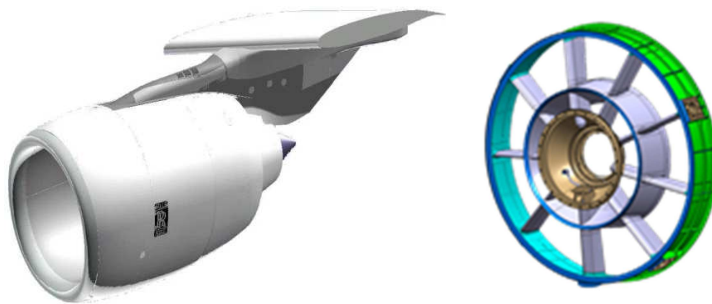
Hot formed Ti 6Al-4V shape shows low distortion after trimming

FE simulation of forming a 650x150x50mm real part





The project end is due by 28th February 2014. During the final stage main efforts will be put in the fabrication of the two technology demonstrators.



The INMA Consortium is integrated by 2 end-users, 1 OEM, 4 research organisations, 3 universities and the EASN association.

For more information, visit the project web site: www.inmaproject.eu