POLITECNICO DI TORINO

COMUNICATO STAMPA

NEW MATERIALS FOR NEAR FUTURE AERONAUTIC ENGINES

European Project coordinated by a research team of Politecnico di Torino is awarded with the 3rd prize in the Reducing the Emissions and Enhancing Performances of Aeronautic Engines contest promoted by the JTI Clean Sky 1 European Framework.

Torino, 19 April 2017 – "The reduction of CO_2 and NO_x emissions and of the noise in the aeronautic sector", this is the target of the Clean Sky 1 European Research Program. Dealing with this purpose the JTI Clean Sky project GETREADY *"High speed turbine casing produced by powder HIP technology"*, coordinated by the Consorzio Interuniversitario Nazionale per la Scienza e Tecnologia dei Materiali (INSTM) through a research unit of Politecnico di Torino, was awarded with the 3rd prize within the **Award for the Best Project from Partners and Consortia.**

During the Clean Sky 1 Closing Event (*21-22 March 2017* - 'Europe, Innovation and Aviation – Are we keeping up?') Prof. **Sara Biamino** and Prof. **Daniele Ugues**, coordinators of the project and working in the Department of Applied Science and Technology (DISAT), received the prize in Brussels, on behalf of the whole Consortium including also the French company Aubert&Duval, the research unit of Politecnico di Milano coordinated by Prof. Stefano Beretta and the company Avio Aero of Rivalta Torinese, acting as Topic Manager.

The project demonstrated how, through the engineering of materials, of their manufacturing processes and their heat treatment, it is possible to design and produce components with increased efficiency, capable to operate in extreme conditions (higher than in the current working mode) and, at the same time, safeguarding the waste of valuable raw materials.

In the framework of the project, the **Net Shape Hot Isostatic Pressing (NSHIP)** technology was applied to manufacture an aeronautic turbine casing using a Nickel superalloy. Due to its poor forgeability, this specific material cannot be used to fabricate the same component via traditional manufacturing routes. Actually, the NSHIP process starts from powders of the selected material, inserts them into a capsule and achieves the final component densification through the application of 1200°C and ca. 1000 bar. The pressure application mode allows to achieve the full densification of the component respecting the designed profile. Within the GETREADY project, two real scale demonstrator casings were fabricated via such technology. Furthermore, the optimization of the heat treatment cycle for this particular material and specific forming process resulted in hot mechanical properties higher than those of the current reference used for this application. This allowed to overcome so far untackled technical problems. Moreover, dealing with the raw materials savings, the proposed solution allowed to fabricate a 90 kg casing with a raw material usage rate of 75% versus the only 13% rate typical of the traditional manufacturing route. Nickel superalloys are expensive raw materials characterized also by critical supplying, since further to Ni they also contain a high amount of several other valuable elements. Therefore such a high raw material usage rate results in a huge environmental benefit!

As a further confirmation of the technical importance of the achieved results, in October 2016 in Hamburg (Germany), the demonstrator casing developed within the project was already awarded by the European Association of Powder Metallurgy (EPMA) with the 1st prize for the best "Hot Isostatic Pressing Part of the Year".

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