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## Exploring Serial Additive Production of Automotive Parts

# Fiat-Chrysler Working on Validation of New Materials for AM of Automotive End-use Parts

In 2015 Fiat Chrysler Auto (FCA) Group went public with the Alfa Giulia 3D printed front grid project, revealing how intensive its use of AM has been for prototyping applications. Over the past two years the company has been working to address the challenges of implementing both metal and polymer AM in the production of actual automotive end-use parts.

This is achieved primarily through the Design for Additive program, led by Roberta Sampieri, Additive Manufacturing & Innovation Manager, and by Nunzio Di Bartolo, Head of Prototypes, Materials & proving Ground of EMEA Product Development Dept., who has been working on the global analysis and development of AM technology in terms of business, competences and validation of new materials to use for AM in automotive part production.

The challenges in implementing AM for end-use parts at FCA are tied to the very large number of vehicles produced. AM machines, processes and the cost of materials all need to be optimized and industrialized in order to meet these intensive production requirements. *"In the aerospace industry, they began this process earlier. They were motivated by much the economic benefits due much higher costs of the aircraft,"* says Roberta Sampieri, explaining that *"a 3D printed turbine blade can cost a few thousand dollars and that is very little compared to the cost of an airplane, which is in the order of several millions of dollars. When you are working to serially produce cars that cost just a few thousand dollars, integrating additively manufactured parts is much more complex."*

FCA will be participating at the IN(3D)USTRY congress to share some of its recent accomplishments in both the design of AM parts and the validation of materials for AM in automotive part production. *"We were invited and we are happy to participate because we feel that there is a lot of work to be done in this segment. We need to share solutions among all operators in this segment and across other segments in order to drive real innovation"* she says.

While the use of 3D printing technologies for prototyping is a consolidated practice, at FCA the goal is to continue to evolve the way automotive parts are designed to be additively manufactured. These parts include mainly heavy structural parts, as they are the ones where AM would offer the most benefits in terms of weight reduction. These might one day even include engine components, if the size of build volumes afforded it.

*"System OEM's – especially in metal AM - are working on solutions to improve process speed and automation but we are still far. Loading a single print job today takes a worker as long as two hours. These processes need to become leaner otherwise AM will remain just a fascinating prospect. At FCA we may need to manufacture as many as 1,000 parts in one day and we cannot fill a factory with 1,000 3D printers to do it,"* she says.

Part size and process speed are not the only issues. When you are working on mass production, one key element is the cost of materials. Today a kilogram of ABS filament for FDM can cost upwards of €250 while the same material for use in traditional molding processes cost as little as €15. The expertise that the company has acquired by working on this internally provides a competitive advantage.

*"We are working toward building up an internal certification on both the AM materials, AM process and the additively manufactured parts in order to guarantee the quality and durability of the parts that we are going to produce," di Bartolo reveals, explaining that this is happening both for metal and polymer powders, as well as on resins and filaments. "The system manufacturers have generally been implementing a closed and rigid approach to materials but this is changing now. Our experience working with new materials and validating them is going to be of fundamental importance in implementing AM for final part production in the automotive sector, to the benefit of the entire industry."*

#### **About IN(3D)USTRY**

Organized by Fira de Barcelona, IN(3D)USTRY From Needs to Solutions is the global hub that brings together every year all the players shaping the advanced and additive manufacturing ecosystem to foster the technological improvement of these innovative systems. It will be held from October 3 to 5 at Fira de Barcelona's Gran Via venue.

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