

## Application of Powder Metallurgy Technologies for Gas Turbine Engine Wheel Production

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**Abstract :** A detailed analysis has been performed for several schemes of Gas Turbine Wheels production based on additive and powder technologies including metal, ceramic, and stereolithography 3-D printing. During the process of development and debugging of gas turbine engine components, different versions of these components must be manufactured and tested. Cooled blades of the turbine are among of these components. They are usually produced by traditional casting methods. This method requires long and costly design and manufacture of casting molds. Moreover, traditional manufacturing methods limit the design possibilities of complex critical parts of engine, so capabilities of Powder Metallurgy Techniques (PMT) were analyzed to manufacture the turbine wheel with air-cooled blades. PMT dramatically reduce time needed for such production and allow creating new complex design solutions aimed at improving the technical characteristics of the engine: improving fuel efficiency and environmental performance, increasing reliability, and reducing weight. To accelerate and simplify the blades manufacturing process, several options based on additive technologies were used. The options were implemented in the form of various casting equipment for the manufacturing of blades. Methods of powder metallurgy were applied for connecting the blades with the disc. The optimal production scheme and a set of technologies for the manufacturing of blades and turbine wheel and other parts of the engine can be selected on the basis of the options considered.

**Keywords :** additive technologies, gas turbine engine, powder technology, turbine wheel

**Conference Title :** ICIRAM 2017 : International Conference on Remanufacturing and Additive Manufacturing

**Conference Location :** San Francisco, United States

**Conference Dates :** September 28-29, 2017