

Design and simulation on compressor metal matrix composite by investment casting

ABSTRACT

Compressor is a part of turbocharger approaches that utilize the exhaust gas of an automobile to drive the compression device. The purpose of turbocharging is to increase the intake pressure and the amount of air into the combustion chamber to improve the efficiency of the engine. Compressor impeller determines the service life of the turbocharger. This paper proposes the new methodology of producing the compressor impeller using Metal Matrix Composite (MMC) material by investment casting. In general, this study presents the tasks pertaining to metal matrix composites and their interactions in designing of compressor impeller. This study presents the use of genetic algorithm (GA) and computer programs for designing a new compressor and determined the wax pattern dimensions based on three-dimensional finite-element simulations as a preliminary study by using investment casting method. The model of thermal and mechanical analysis was developed by ANSYS. As the results, the simulation model was generated and it could be used for improving the design of turbine-compressor assembly through the bottom geometry changes of the compressor.

Keyword: Design; Simulation; Compressor; Metal matrix composite; Investment casting