

ABSTRACT

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STRUCTURAL STRENGTH SIMULATION AND FLUID PRESSURE FLOW SUPERCHARGER MACHINE USING SOLIDWORKS SOFTWARE

A Scientific Research. Mechanical Engineering. Faculty of Technology Industry,
Gunadarma University, 2023

Keywords: Supercharger, Solidworks, Fluid Analysis, Structural Strength and
Thermal Simulation

(xiv + 71 + Appendices)

In the automotive industry, superchargers are used to improve engine performance. With the help of SolidWorks software, careful analysis is carried out to understand fluid flow, structural strength and component thermal simulations. The goal is to save product development time and costs by improving initial designs, improving quality, and deep understanding of supercharger performance. The supercharger increases the air pressure entering the engine to optimize combustion. It is common in the automotive industry to increase vehicle performance. SolidWorks, a CAD software, enables the creation of 3D models and engineering analysis of components. SolidWorks helps designers design, develop virtual prototypes, and analyze performance and power before production. The SolidWorks simulation depicts airflow in a supercharger, with air entering through the inlet and being compressed by the compressor. The mass flow rate reaches 0.846 Kg/s, a pressure increase of about 9.5% of atmospheric pressure. Thermal analysis shows an increase in intake air temperature of 56%, according to the ideal gas law. Structural analysis shows a maximum stress of 50,911,203,328 N/m² at the casing and the largest deformation of 184 mm at the supercharger outlet. A safety factor of 2.9 indicates a robust design. SolidWorks analysis of the supercharger reveals the importance of structural, fluid and thermal analysis. The maximum casing stress is 50,911,203,328 N/m². Analysis of air flow through the inlet, compression by the compressor, and outlet shows a mass flow rate of 0.846 Kg/s and a pressure rise of 9.5% of atmospheric pressure. Thermal analysis indicates a 56% increase in air temperature.