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DESIGN AND ANALYSIS OF CONECTING ROD USING FEM

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Abstract

The prime objective of the proposed work is to investigate the effects of different materials of connecting rod over the performance. Hence the current research approached a simulation-based design using Solid works and Ansys workbench 20. The automotive sectors are concentrating on weight reduction strategies, which can be achieved by incorporating new designs, cost-effective production processes, or employing alternative materials. Researchers have been attempting to optimize engine parts including the piston, crankshaft, and connecting rod for a number of years. An essential component of an external combustion engine, the connecting rod is subjected to extreme pressures from forces coming from the piston. It has been noted that the engine's efficiency actually increases as its weight is reduced. The main goal of this research is to introduce new and superior replacement materials for the connecting rod's existing material in order to mass-reduce opportunities for general-purpose connecting rods. The connecting rod in the proposed study was created utilizing silicon carbide, titanium alloy, and aluminium alloy components. The connecting rods made of the new materials were created using the FEM method.

Keywords: FEM, Connecting Road, Automobile Engineering, Distortion, Alternative Materials and Optimum Condition.

1. Introduction

For production engines in modern automobiles with internal combustion, the connecting rods are almost always made of steel. However, for high performance engines, they can be made of aluminum (for its lightness and its ability to absorb high impact at the expense of its durability) or titanium (for its combination of strength and lightness at the expense of its affordability). Due to the fact that they are not held in place firmly at either end, the angle that exists between the connecting rod and the piston shifts as the rod goes up and down and revolves around the crankshaft. The process of forging is used during the production of connecting rods. Because it is one of the components that is essential to the overall design of an engine, the connecting rod has to be able to endure enormous loads and convey an incredible amount of power. In an internal combustion engine that uses reciprocating pistons, the piston is connected to the crank or crankshaft by a connecting rod. They come together to create a straightforward mechanism, which, together with the crank, allows reciprocating motion to be converted into rotational motion. Because the connecting rod is stiff, it is able to transmit either a push or a pull, and as a result, it is able to spin the crank through both half of a revolution, also known as the pushing of the piston and the pulling of the piston. The larger end connects to the bearing journal on the crank, while the smaller end is attached to the pin that holds the piston in place. To lubricate the trip of the pistons and piston rings, there is often a pinhole punched between the bearing and the large end of the connecting rod. This allows pressurized lubricating motor oil to spray out onto the thrust side of the cylinder wall.

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