

## MINIMUM WEIGHT OPTIMIZATION OF MATERIALS AND HIGH STRENGTH FOR SPUR GEAR DESIGN

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### ABSTRACT

*The purpose of this research was to select the optimal materials for various spur gear designs. Three gears were designed using three variables: the number of teeth, the material weight constant, and the Lewis factor form. The objective function was set to minimize mass based on the restriction of bending fatigue failure criteria and bending strength. A variety of gear designs were carried out with different types of materials by using MATLAB to demonstrate the variations between the weights of the parts. To verify the data from the spur gear design, numerical simulation was carried out by finite element analysis (FEA) using ANSYS R17. Lightweight and high-strength materials have been particularly recommended for the design of spur gears.*

**KEYWORDS:** *Lightweight Design, Spur Gear Design, Lewis Equation*

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