

Optimization of Slider Crank Mechanism Using Design of Experiments and Multi-Linear Regression

Authors : Galal Elkobrosy, Amr M. Abdelrazek, Bassuny M. Elsouhily, Mohamed E. Khidr

Abstract : Crank shaft length, connecting rod length, crank angle, engine rpm, cylinder bore, mass of piston and compression ratio are the inputs that can control the performance of the slider crank mechanism and then its efficiency. Several combinations of these seven inputs are used and compared. The throughput engine torque predicted by the simulation is analyzed through two different regression models, with and without interaction terms, developed according to multi-linear regression using LU decomposition to solve system of algebraic equations. These models are validated. A regression model in seven inputs including their interaction terms lowered the polynomial degree from 3rd degree to 1st degree and suggested valid predictions and stable explanations.

Keywords : design of experiments, regression analysis, SI engine, statistical modeling

Conference Title : ICAEM 2018 : International Conference on Applied and Engineering Mathematics

Conference Location : Lisbon, Portugal

Conference Dates : April 16-17, 2018