IOP Conference Series: Materials Science and Engineering, vol.114 (1), 2016

Grey Relational Analyses for Multi-Objective Optimization of Turning S45C Carbon Steel

Abstract

The optimization of performance characteristics in turning process can be achieved through selection of proper machining parameters. It is well known that many researchers have successfully reported the optimization of single performance characteristic. Nevertheless, the multi-objective optimization can be difficult and challenging to be studied due to its complexity in analysis. This is because an improvement of one performance characteristic may lead to degradation of other performance characteristic. As a result, the study of multi-objective optimization in CNC turning of S45C carbon steel has been attempted in this paper through Taguchi and Grey Relational Analysis (GRA) method. Through this methodology, the multiple performance characteristics, namely; surface roughness, material removal rate (MRR), tool wear, and power consumption; can be optimized simultaneously. It appears from the experimental results that the multiple performance characteristics in CNC turning was achieved and improved through the methodology employed.

Keywords; Grey Relational Analyses; Multi-Objective Optimization; Turning S45C; Carbon steel