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Optimization of machining process parameters in CNC turning process of IS2062 E250 Steel using coated carbide cutting tool

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ABSTRACT

This paper proposed the methodology of optimization technique in CNC turning process in IS2062 E250 Steel done by carbide coated cutting tool. Optimization experiment was conducted by the Taguchi L9 orthogonal array for CNC turning process. Carbide cutting tool is preferred to cutting process which has the less wear occurrence and maintains good strength during machining process. In experiment input parameters are speed feed and depth of cut and output parameters surface roughness and hardness. Finally analysis of variance which is used to determine the optimum level of parameters input parameters on the effective responses.

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1. Introduction

Turning process was the traditional method to convert the raw material in to desired product. In CNC machining process used to upgrade the efficiency and output parameters compare with the manual methods like manually and semi-automatic lathe. Product quality is mainly based on the surface roughness of the output product. Show the most of the industry is concentrated on quality inspection. Especially for the surface roughness the optimum parameters selection is played a very important role to achieve the good surface roughness. The surface quality can be measured by using Minitab software.

AISI 1030 steel carried out work piece and the TiN coated cutting tool used for the turning process. L9 orthogonal array used to analyse the characterization in turning process [1]. AISI 4140 steel carried out as the work piece material which is machined in cylindrical grinding at various cutting speed, Feed rate and depth of cut. The surface roughness optimized by the response surface methodology. The end results conclude with depth of cut is major depend for desired surface roughness level [2]. In Which software consist with Taguchi method and response surface methodology. Gilbert 1950 the paper deal with the optimisation of machining

parameters in turning process which is used to increase the production rate and minimise the production cost [4].

Brewer and Rueda 1963 investor key the simplified Optimisation analysis especially for non-ferrous materials. This paper used to most economical machining condition which standard input machine parameters [5]. The cemented carbide coating tool used to cut the EN 24 alloy Steel in turning process. Then the MRR and optimum surface roughness value predicted for produce the large variety of products in lesser time [6].

2. Experimental methodology

The optimization technique applied for CNC Turning machining process. IS2062 E250 Steel preferred as the work material. Mathematical model developed by Design of Experiment through Analysis of variance (ANOVA). Gear and shaft component quality decide by their surface roughness and strength characteristics. Many of the gear and shaft manufacturing industries select the IS2062 E250 Steel as the source material because of the IS2062 E250 Steel has good Surface roughness quality. The information of mechanical properties and chemical properties of the steel is gathering from the Article "Analysis of the Surface Defects in a Hot-Rolled Low-Carbon" [3].

Table 1 shows the mechanical properties and chemical composition of IS2062 E250 Steel.

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