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Parameter Optimization of Turning Process (Cast Iron) Using Taguchi Method

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Abstract -This paper focuses on the optimisation of turning parameters using Taguchi technique to obtain minimum cycle time & surface finish. A number of turning experiments were conducted using the L9 orthogonal array on a CNC machine. The experiments were performed on cast iron by using coated carbide insert. Minitab is employed to determined most significant control factor affecting cycle time & surface finish. The cutting speed ,Feed ,Depth of cut were selected as control factors . After the nine experimental trials, It is found that cutting speed is the most significant factor on the Cycle time. Result of the Validation test shows that Taguchi method was notably successful

***Keyword*- Optimization, Turning process parameters ,Taguchi method, orthogonal array, MINITAB-17.**

INTRODUCTION

There is a need for optimizing the process parameter both from technological and economic point of view, optimization of process parameter helps to finding out the correct adjustment of parameter which improve the quality and quantity of the product .This must be done in timely manner to avoid production delay and effectively

Design of experiments and procedure-

Design of experiments and procedure as follows:

Techniques of experimentation- There are different types of experimentation. The most widely used strategies for experimental analysis.

1. By guess approach-

In this approach an artificial combination of factors are selected and then tested end its effect on output response is observed. If guessing doesn't produce a desired result the research take another guess for correct combination of factor level. Thus may continue for long period of time without any proper prediction of the combination. It guess is found to be correct at correct at the initial level then it is well and good but still it may not be the best combination

2. Pilot experiment-

Pilot experiment is same as guess approach but the difference is that whatever combination is predicted is tested on the actual machine and result are observed if the result are satisfied then the combination to avoid defect. Therefore in the situation, it is important for the engineering or technician to use past experience to select parameters which willlikely yield a surface finish below that of a specified level and perhaps make some parameter adjustment as a time allows or quality control require.

Engineers and technicians establishing such and operation would ideally consider other implications of setup parameters such as production schedules, processing time and noise factors. A more methodical, or experimental approach to setting parameters should be used to ensure that the operation meets the desired level of quality with given noise condition and without sacrificing production time. As we are dealing with the cycle time and surface finish, low speed affect the cycle time and higher depth of cut damage the surface.

In order to optimize such an operation with such restrictions, a more efficient experiment method is needed An excellent solution to this issue is an approach known as Taguchi Parameter Design.

may be valid. Mostly pilot experiment depends upon the type of machine capacity and other important factors.

Taguchi based design of experiment-

Among the various method available, Taguchi method is one of the most powerful and best method in short simple but smart method for analysis. It is widely used in many fields. In application and development of new process and product in quality control.

The salient feature of method are:

(a) A simple, smart and efficient method optimise process to improve the performance and productivity or reduce cost.
(b) It gives best parameters for the optimal condition with least number of analytical invention.
(c) Therefore Taguchi method has great potential in area of low cost experiments.

Optimization Of Turning Parameters Using Taguchi Method

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Optimization Of Turning Parameters Using Taguchi Method:

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cases a technical necessity for mechanical products Thus the optimum selection of cutting parameters such as feed rate depth of cut cutting speed etc generates optimum conditions during machining and becomes the main exigency of manufacturing industry Surface roughness Tool life and machining time is an important criterion to find the quality of a surface It is an important response parameter In machining process various parameters are Input Parameters Cutting speed Feed rate Depth of cut Insert radius Cutting fluid etc Output Parameters surface roughness Tool life and machining time

Materials, Design, and Manufacturing for Sustainable Environment Santhakumar Mohan,S. Shankar,G. Rajeshkumar,2021-02-06 This book comprises the select proceedings of the International Conference on Materials Design and Manufacturing for Sustainable Environment ICMDMSE 2020 The primary focus is on emerging materials and cutting edge manufacturing technologies for sustainable environment The book covers a wide range of topics such as advanced materials vibration tribology finite element method FEM heat transfer fluid mechanics energy engineering additive manufacturing robotics and automation automobile engineering industry 4 0 MEMS and nanotechnology optimization techniques condition monitoring and new paradigms in technology management Contents of this book will be useful to students researchers and practitioners alike **Proceeding of 6th International Conference on Advances in Manufacturing and Materials Engineering** Md Abdul Maleque,2025 Zusammenfassung This book presents the proceeding of 6th International Conference on Advances in Manufacturing and Materials Engineering ICAMME 2024 August 13 14 Kuala Lumpur Malaysia It presents articles in topics that outline the state of the art information in manufacturing and materials engineering for academia and industries The topics represent the strong synergy between manufacturing materials design and management supporting the transition from product service systems to life cycle engineering services as a contributor to high value manufacturing The scope of this book also presents a set of new additive manufacturing 3D printing and advanced materials with new technology green technology for United Nations SDGs modeling and simulation of materials and manufacturing with some classical case examples It caters to academics and industrial practitioners who have research interests in the latest advances in manufacturing and materials engineering Frontiers of Mechanical Engineering and Materials Engineering Wen Pei Sung,Jimmy Chih Ming Kao,Ran Chen,2012-06-14 Selected peer reviewed papers from the 2012 International Conference on Frontiers of Mechanical Engineering and Materials Engineering MEME 2012 July 27 29 2012 HongKong *Precision Machining IX* Angelos P. Markopoulos,George Christopher Vosniakos,2017-08-21 ICPM 2017 Selected peer reviewed papers from the 9th International Congress on Precision Machining ICPM 2017 September 6 9 2017 Athens Greece *The 22nd International Conference on Recent Advances in Mechanical Engineering for Sustainable Development (ISME)* Amit Pal,Vijay Gautam,Pravin Kumar,Qasim Murtaza,Hee Chang Lim,K. A. Subramanian,2025-02-24 Selected peer reviewed extended articles based on abstracts presented at the 22nd International Conference on Recent Advances in Mechanical Engineering for Sustainable Development ISME RAMESD

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