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# Design and Analysis of Lathe Machine Chuck

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**ABSTRACT:** Design and analysis of lathe machine chucks is that the results of an excellent deal of labor and therefore the development of technical thought. Thanks to the progress and also the possibility of accelerating efficiency and at the identical time relieving people from work that needs plenty of effort, especially physical effort, the utilization of higher and more efficient production methods may be a target that ought to be pursued nowadays. In the manufacturing process, these objectives may be achieved with the utilization of dedicated equipment. The subsequent work will present an example of a lathe chuck. This could eliminate the requirement of time-consuming changeovers. Additionally, it's assumed that the handle must meet the conditions imposed by the limited number of tools and also the working dimensions of the machine. The machining process itself was also important, where the foremost advantageous solution was to perform most of the operations in one clamping.

**KEYWORDS:** Lathe chuck, Equipment.

## I. INTRODUCTION

### MODELLING:

Modeling is the process of turning 2D drawings, sketches, or conceptions into actual 3D models. India, the front runner in mechanical engineering services, can turn your goods or designs into 3D mechanical animations that are tailored to your particular needs aside from significant cost reductions, outsourcing 3D mechanical modeling to India may provide you with access to skilled 3D modelers, drafters, and engineers India mechanical engineers are not only skilled in 3D modeling but also have a broad understanding of how to use the software.

### TYPES OF MODELLING:

#### PRODUCT MODELLING

#### MACHINE MODELLING

The static analysis of mechanical parts is intended to calculate the effects of constant loads on the structure ignoring the effects of inertia and shock that are commonly found when the applied loads change rapidly. Nevertheless, a static analysis may include constant inertia loads such as gravity, as well as loads that vary with time but which can be approximated to a static equivalent, as is the case of loads resulting from the wind which are defined by construction codes.

Likewise, this analysis allows designers to verify the quality, performance and the safety of the mechanical part, in this case based on the geometrical changes that can be noticed when specific load conditions are established.

### ANALYSIS:

Analysis can solve a good range of development problems. Engineers can use design analysis to predict the physical behavior of almost any part or assembly under any loading conditions: from a straightforward beam under a bending load to car crash simulations and vibration analysis of aircraft. verity power of design analysis is that the ability to perform any of those kinds of studies accurately without building one thing. All that's needed may be a CAD model.

## FORMS OF ANALYSIS:

### QUALITATIVE ANALYSIS:

#### FORMS OF ANALYSIS:

It is concerned with which components are in an exceedingly given sample or compound.

Example: Precipitation reaction.

#### QUANTITATIVE ANALYSIS:

It is to see the number of individual component present in an exceedingly given sample or compound.

Example: to search out concentration by uv-spectrophotometer.

### THERMAL ANALYSIS:

In this analysis, the engineer is able to study how the part would react to the possible temperature variations it may experience during operation. In this case, the thermal expansion coefficient of the material plays an important role, as it will determine how much deformation, if any, will occur on the part due to temperature changes.

## II. LITERATURE SURVEY

In 1984, Department of science applied, IIT, New Delhi, has taken research on development of recent manufacturing technology, Flexible Manufacturing Systems became key equipment in factory automation. In 2013, V. Roy & S. Kumar from J institute Engineering, India published development of Lathe machine attachment for CNC machine. The CNC machine operates on mechatronic controls and a computer interface called CAMSOFT. In 2013, M. Moses & Dr. Denis Ashok research on Development of a brand new machining setup for energy efficient turning process. Design and Development of Conventional Lathe Machine. In 2014, Mr. Prakash N. Parmar et al published Review on Advance Automation of Conventional Lathe Machine. In 2009, R. Lizarralde et al research on New Developments in Lathes. In 2013, M. Minhat et al research on Retrofitting a traditional lathe to a digital intelligence system.[1]

**DeoreDhirajet.al** have studied the optimization and evaluation of cutting forces in turning operation of EN19 steel. In this optimization technique used is taguchi method and analysis of variance is done to find which parameters have important effect. It is found out that feed is the most integral factor followed by speed which influences the feed force. For tangential force Depth of cut followed by feed is the significant factor.[2]

**Sayak Mukherjee et.al** conducted experiments on SAE 1020 steel using taguchi method to perfect cutting parameters with respect to material removal rate. L25 orthogonal array was used in conducting experiments. The result shows that depth of cut had significant effect on Material Removal Rate followed by feed and speed.[3]

**Manjunatha Ret .al** investigated the maximum value of tangential force, feed force, and surface roughness for EN19 steel using confirmation test. They have used L27 orthogonal array. For Surface Roughness Annova result shows that, Feed is the most dominant factor. For Cutting forces (Feed and Tangential force) Depth of cut and Feed is the significant factor.[4]

**R. Suresh, et.al** developed a mathematical model correlating cutting parameters with Tool Wear and Surface Roughness. Turning operation was done hardened AISI H13 steel with PVT coated ceramic tool in dry condition. Experiments were conducted using the concept of Response Surface Methodology. For Surface roughness, Feed was the controlling factor followed by Depth of cut and speed. For Tool wear, Speed and feed were the dominating factor.[5]

**Vikas B. Magdum, et.al** used Taguchi method for optimization of cutting forces and process parameters on EN8 steel. For conducting experiments L9 orthogonal array was selected. For Cutting forces (Feed and Tangential force), Feed and Depth of cut were the controlling factor followed by speed and Tool material. Optimum value of process parameters is also determined.[6]

**S.R Das, et.al** determine the exact cutting parameters for low Tool wear and low Surface temperature. They performed turning operation on AISI D2 steel. The experiments were conducted using Taguchi's L9 Orthogonal technique and analysis of difference was used to identify the effect of cutting parameters. For Tool wear, Depth of



cut and speed has significant effect compare to feed. For Surface Temperature, Depth of cut is the dominant factor followed by speed and feed. Multiple regression equation are also developed to estimate the performance level for any parameters.[7]

**Krishnakantet.al** conducted experiments on EN24 steel to optimize the Material Removal Rate (MRR). Taguchi technique with L9 orthogonal array is used with 3 factors and 3 levels. Response variation is studied using S/N ratio for larger-the-better characteristic. Material Removal Rate multiply with increase in feed, speed and depth of cut.[8]

**U.D. Gulhane, et.al** investigated the surface roughness in turning operation of 316L stainless steel using Taguchi technique. L9 orthogonal array was selected for conducting experiments and the results were verified with ANNOVA. The most significant factor was feed followed by depth of cut and speed. Also the correct values for cutting parameters were found out.[9]

**L B Abhang, et.al** conducted turning operation on EN31 steel using tungsten carbide tool. Experiments were conducted using Taguchi method and verified by analysis of difference. The result shows that lubricant has significant effect on surface roughness compared to feed and depth of cut. The conclusion drawn was greater surface finish can be obtained by applying cooled lubricant.[10]

**M. Kaladhar, et.al** investigated optimization of process parameters of AISI202 stainless steel in turning operation. They studied the effect of process parameter i.e speed, depth of cut, feed, and nose radius on surface roughness. Experiments were conducted using Full Factorial design technique and to analyse the process parameter integral, ANNOVA was used. Feed and Nose radius were the dominant factor followed by speed and depth of cut.[11]

**W.H Yang, et.al** used Taguchi method to find the optimum cutting parameters. They investigated the cutting parameters of S45C steel using tungsten carbide tools by. For Tool Life, speed and feed were the significant factor followed by depth of cut. For Surface roughness, Feed and depth of cut were the significant factors followed by speed. Also the optimum values of cutting parameters were found out to increase tool life and surface roughness.[12]

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