International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 06 | June-2016 www.irjet.net p-ISSN: 2395-0072

Enhancement in Conventional Lathe Machine

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Abstract - *This paper discusses the Enhancement in conventional lathe machine. Now a day, products can be produced by modern technology, which uses computer software, hardware and firm ware in industries. It is needed to use CNC or semi - automatic control lathe machine to increased speed at which parts are produced and producing the same quality for all work parts at better dimensional accuracy which gives exact and correct dimensions. So, these machines are becoming more and more important in modernized industrialization. To build a new modern developed country, it is required to convert these conventional lathe machines into semi-automatic control lathe machine by retrofitting. Developing and changing into semi-automatic control lathe machine, there are three required portions, namely, mechanical electronics and hydraulic. In this project we add an extra plates or structure for installation of motors. In mechanical side remove some unnecessary component like gears for providing space for motors. In electronic side we used a stepper motor for both Z and X axis and provide controller for the efficient operation.*

Key Words: Retrofitting, CNC, Machine tool, Stepper Motor, Encoder

1 INTRODUCTION

Retrofitting refers to the addition of new technology or features to older systems this definition gives an almost all information about the word retrofitting. When we say that retrofitting related to some component that mean we try to upgrade that component and improve their efficacy through a present technology. But here we only talks about the retrofitting in lathe machine at time Retrofitting is the process of replacing the CNC, servo and spindle systems on an otherwise mechanically sound machine tool to extend its useful life. Rebuilding and remanufacturing typically include a CNC retrofit. The anticipated benefits include a lower cost investment than purchasing a new machine and an improvement in uptime and availability. But there are often other unanticipated benefits to retrofitting including lower energy costs, higher performance and a new level of manufacturing data accessibility. Assuming the machine tool is generally in good shape mechanically, CNC retrofitting is typically the lowest cost solution to improve the overall performance of an older machine tool. Rebuilding typically includes the repair or replacement of some worn mechanical components such as ball screws, lubrication pumps, safety interlocks, guards, hoses, belts and electrical wiring.

1.1 Literature review

In 1984, Department of Mechanical Engineering, IIT, New Delhi [1], has taken a research topic named as "Machine tool failure data analysis for condition monitoring application". With the development of modern manufacturing technology, Flexible Manufacturing Systems have become key equipment in factory automation. Machine tool is heart of the Flexible Manufacturing Systems. Ex example Lathe machine is the general type of machine tool used by almost all the FMSs. During the operation of this machine tool, different kinds of failures are faced by the industry. A systematic study of such failures can help in identifying the critical sub-system of these machine tools. This will be useful for identifying the condition monitoring needs of the machine tools. This deals with the identification of critical sub-system based on the failure data analysis for different type of machine tools.

2. DESIGN PROCEDURE

2.1Determine the drive mechanism

i. First, determine the drive mechanism. Representative drive mechanisms include a simple body of rotation, a ball screw, a belt pulley, and a

rack-and-pinion. Along with the type of drive mechanism, you must also determine the dimensions, mass and friction coefficient etc., that are required for the load calculation. The general items are explained below.

ii. Dimensions and mass (or density) of load.
iii. Dimensions and mass (or density) of each part.
iv. Friction coefficient of the sliding surface of each moving part.

2.2 Check the required specifications

(Equipment specifications)

i. Check the equipment specifications. The general items are explained below.
ii. Operating speed and operating time
iii. positioning distance and positioning time
iv. Resolution
v. stopping accuracy
vi. Position holding
vii. Power supply voltage and frequency
viii. Operating environment

2.3 Calculate the load

Calculate the values for load torque and load inertia at the motor drive shaft.

2.4 Select a motor type

Select a motor type from standard AC motors, brushless motors or stepping motors based on the required specifications.

2.5 Selection calculation

Make a final determination of the motor after confirming that the specifications of the selected motor and gear head satisfy all of the requirements, such as mechanical strength, acceleration time and acceleration torque. Since the specific items that must be checked will vary depending on the motor model, refer to the selection calculations.

2.3 IMPLEMENTATION

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I. In mechanical side remove some unnecessary component like gears for providing space for motors.
II. We add an extra plates or structure for installation of motors.
III. In electronic side we used a stepper motor for both Z and X axis and provide controller for the efficient operation.

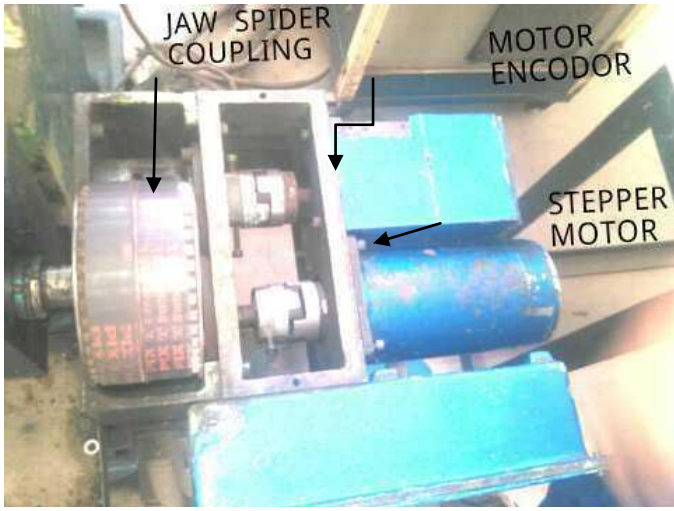

Fig A stepper motor for X axis and provide encoder for the efficient operation

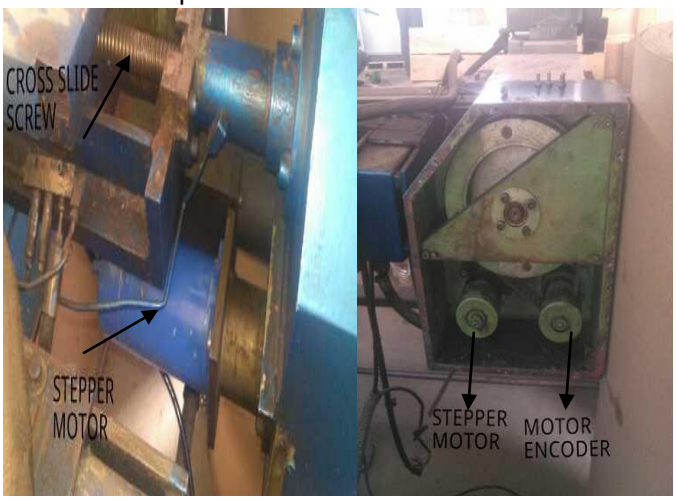

Fig -1:: A stepper motor for Z axis and provide encoder for the efficient operation

3 ADVANTAGES

1. Increased speed at which parts are produced (productivity).
2. Producing the same quality for all work parts.
3. Better dimensional accuracy which gives exact and correct dimensions.
4. Increased ability to produce difficult parts.
5. Less scrap.
6. High Repeatability and Precision.
7. Volume of production is very high.
8. Complex contours/surfaces need to be machined. Flexibility in job change ,automatic tool settings

3. CONCLUSIONS

Enhancement in conventional lathe machine is minimizes Cost of machine approximate 4 times below the original CNC. The accuracy of the job manufactured in Enhanced lathe machine is also high so repeatability and dimensional stability of manufactured part is achieved. Enhanced lathe machine is Reproducing the same quality for all work parts and Reduction in lead times. Working on Enhanced lathe machine is safer.

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