Advance Automation Analysis of Modern Conventional Lathe Machine

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ABSTRACT: New technology, using computer, hardware and firmware in industries, can now be generated a day. CNC machine to achieve more accurate dimensions and irregular form needs to be used. In modernized industrialization, CNC machinery is therefore becoming increasingly important. In our country, there are numerous traditional machines. The conversion of these traditional machines to semi-automatic lathe control machines by upgrading involves the construction of a newly developed nation. Development and transformation to semiautomatic lathe control machine are three parts, namely, mechanical electronics. And hydraulic the advancement and introduction of new technology in software, hardware, and firmware into manufacturing lines have proven stronger and more effective production. In this plan, the traditional lathe machine has been tested with Digital Intelligence System (DIS) to accurately measure and shape high-end items more precisely. The process of retrofitting the traditional machinery into half-automatic control machines requires two main components, namely the parts of mechanical and electronics. A specification is made for feeding the step motor to the lead vent in the mechanical portion. An electronic circuit with a motor control circuit is, on the other hand, designed for control of motor movement in the electronics portion.

KEYWORDS: Tailstock Mechanism, Machine Tool, Intelligence System, Automation, Lathe Machine.

INTRODUCTION

For round and hollow, tapered and level surfaces, Lathe was utilized. The boring and exhausting box may likewise be utilized, regardless of whether barrel shaped or tapered. Mathematical machine control depends on the utilization of mathematical information to control straightforwardly the area of machine apparatus administrators. CNC is just an improved adaptation of the conventional NC technique utilizing a mechanized PC regulator to control the machine instrument. A computerized numerical system may be used. In a CNC board, computerized controls control the engines that drive the machine tool's every axis. This research has converted an existing CNC Rapid Prototype (RP) to a CNC Lathe. Required components were manufactured and the final system worked very well. It can be used to boil and dull cylindrical or conical holes [1]. One of the most commonly employed machine tools, the simple engine lathe, is very versatile for a professional machinist. However, when several similar parts have to be done as quickly as possible, it is not especially effective. The NC is dependent on the use of numerical data to test the location of the operating devices of equipment during machining.

The Computer Numerical Control or CNC is a more common modification of the basic process for NC today. The key benefit of the CNC machine is that it allows both great precision and productivity to increase in "lean output". It can deliver more protection and efficiency from other machinery in order to tackle environmental concerns in the manufacturing industry. The first guided mechanically operated lathe to cut the screws of the lathe machine and reduce them to about 1482 would greatly reduce the risk. Machines can manually or remotely execute the operation. The conventional manual machines are time-consuming and repetitive, with the manufacturer creating devices with digital control systems after World War II to create and introduce new methods for automating their machines. In 1961, the machines with process control versatility were complemented by computers that later used computer numerical control or CNC to name those devices [2]. It takes a long time before computers can be programmed using a digital computer or repeatedly reproduce a series of operations accurately and the most complex pieces of highly skilled professionals are made. For example, it can produce holes of different whole diameters by using a slot machine that contains a set of blades. The computer operator will either automatically adjust the cutting tool or be loaded into another machine to complete the work. The next logical move was to run the machines, all under computer control, to combine several machines. These tools, which are the way these goods are operational, have changed their status. Throughout the early 1961s there was dramatic development of lathes, where implementations of the numeric control created a high degree of precision and preciseness, as well as automation of the basic lathe. Moreover, the motor torches were used for the production of component portions of new machines [1]. Nevertheless, other innovations have also been introduced to improve the machine's output as it contributes a large part in industry lines. By the early 1961s, the CNC turning center was designed to sever the tool shaft, normally placed at the chuck end, and the back end of the tailstock core as shown in Figure 1.

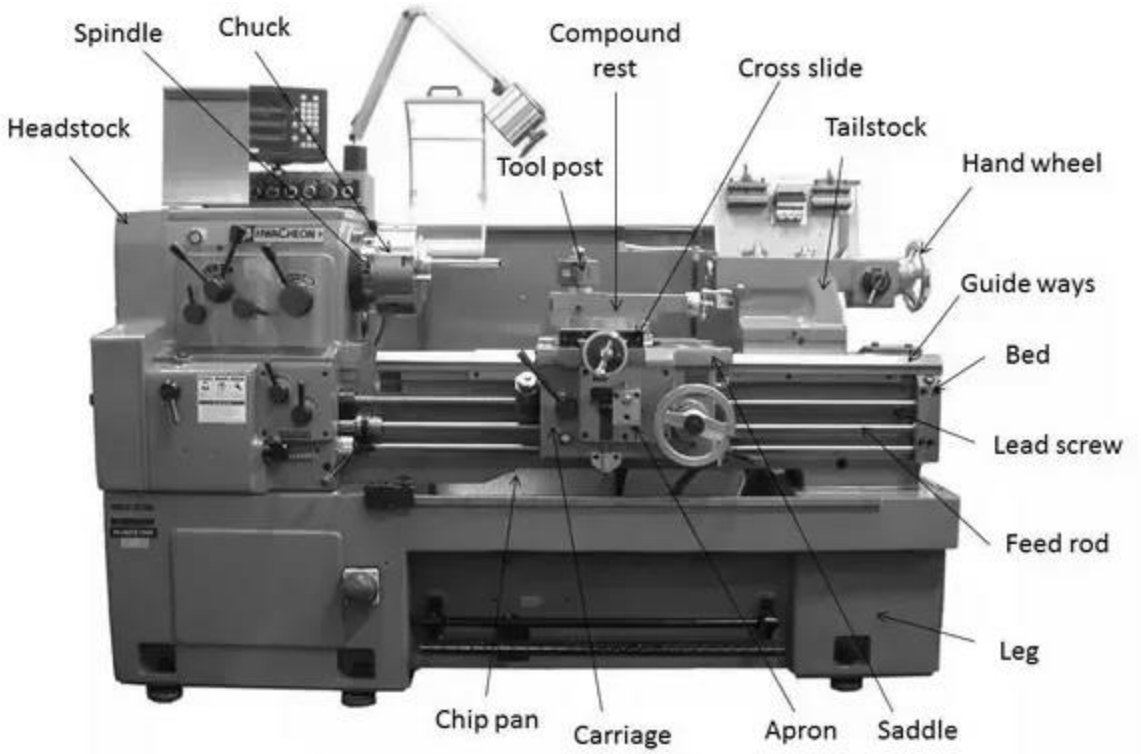

Fig. 1: Lathe Machine

Around the time of the Industrial Revolution John Wilkinson invented a cannon-boring machine in England. The production of these devices was accomplished by increased efficiency and precision via computer control. He adapted this machine immediately to boring the cylinders of the steam engines of Bolton & Watt. The only method of this boring was to produce the smooth and firm tolerance bores required by the steam engine cylinders.CNC machines and lathes today use microprocessors to read the Geodes program which users build and carry out the programmed operations. Personal computers are often used to design the components and to write programs using manual typing of G-codes or using CAM software, which generates G-codes from user inputs of cutters and machine paths. Refitting refers to the addition of new technology or enhancements to old systems. Almost all detail about the term refitting is provided by this description. When they say the retrofitting of a device, seek to upgrade it and increase its performance with current technology. However, here they are addressing the replacement of the CNC, servo and spindle systems on mechanically sound machine tools otherwise only; at a moment when refitted is the method to prolong its service life. Usually, repair and rehabilitation will require a CNC upgrade. The predicted advantages include lower costs than buying a new computer and better uptime and availability. Nevertheless, other unforeseen advantages also arise, for example, lower power costs, better efficiency and a new degree of access to production data.

OBJECTIVES AND AIMS

The research project aims to turn the traditional hobby machine into a CNC semi-automatic hobby. Thus, a conventional lathe machine will gradually increase its versatility, depending previously on the expertise of the operators. The research project therefore aims to incorporate, firstly by feed-in lead screw motion operated by a Step Motor by the computer, the necessary improvements to the traditional lathes for computer-driven operation and the separation of mechanical systems feeding the first position for a Step Motor to push the leading screw which can be operated by the machine. Secondly, the phase engine for the CNC lathe machine, the relative parts and the working principles of the system components are planned and evaluated [2].

LITERATURE REVIEW

A research subject called the "System failure data analysis for condition monitoring use" was taken from the Department of Mechanical Engineering, IIT, and New Delhi in 1984. Since the advancement of state-of-the-art manufacturing technology, Flexible manufacturing systems have become essential factory automation equipment (classification is shown in Figure 2). The general category of machine tool used by almost all FMSs for example is the Lathe machine. The industry faces numerous types of failures during the operation of this machine tool [6]. The vital subsystem of such machine tools can be established through a systemic analysis of these failures. It is helpful in the recognition of the machine tools ' condition monitoring needs. The aim of this is to classify the critical subsystem based on the fault data analysis of various machine tools. For the detection of the weakest subsystem, d failure modes were considered. The frequency of failure and downtimes were considered in the study when evaluating critical machine tool sub-systems. It is found that in headstock and carriage sub-systems, maximum failures occurred. Such sub-components as gears, plates, spindle bearings, clutch and cross-slide jib are met with failures. The bearing failures here can be observed to cause longer inactivity.

Various modes of failure have been grouped into four fault types, composite injury; fuse burnt, circuit faults and rigidity in a histogram and their relative failure frequencies. The key mode of failure is due to component damage. It can be observed that electrical, electronic and mechanical elements are the core features [3].

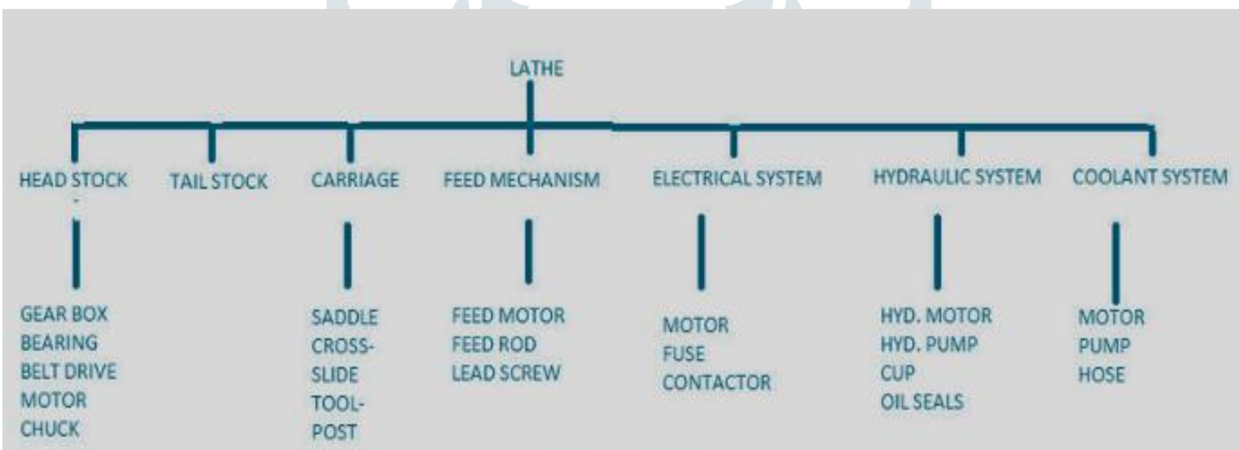

Fig. 2: Lathe Sub System Classification

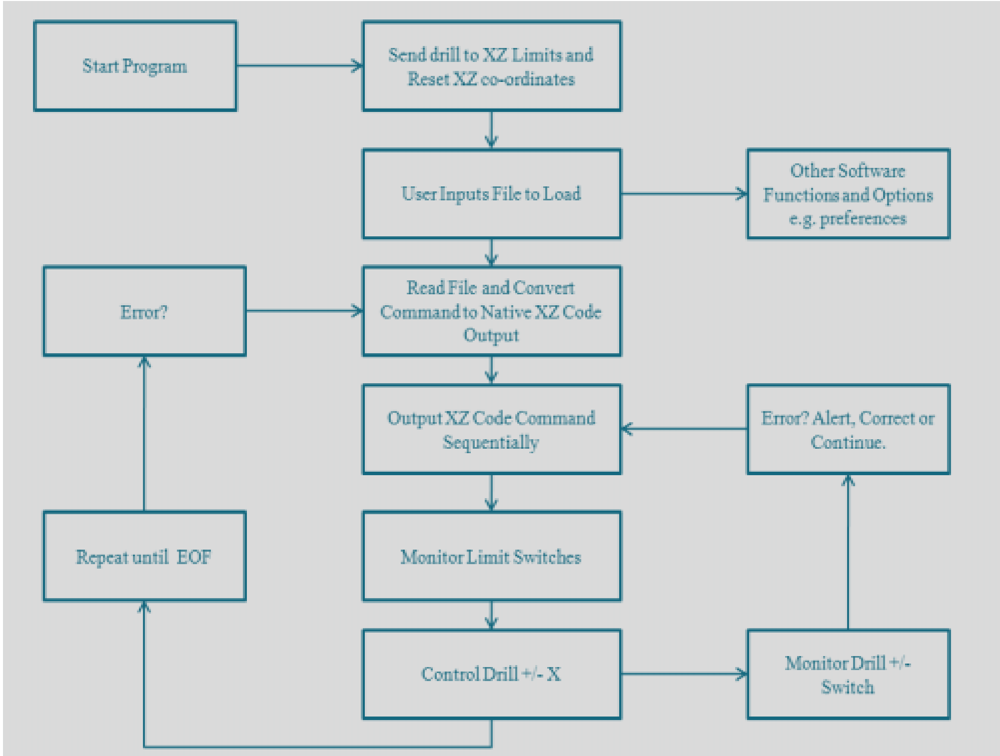

Fig. 3: Flow Chart of Data

EXPERIMENTAL PROCEDURE

When the user starts the software program, the program process begins. The software sends instructions to restore the exact coordinates and their limitations. The user then loads the design-carrying input script. The software then reads and converts the file to the native output of XZ code. After simulation for the entire code, the output command will be executed sequentially. The boundary changes are tracked and provide the user with input. The user can then control the engine speed and direction of the leading screw using the software tool. Figure 3 shows the flow chart of the program method implemented in this project [4]. When an error occurs, the program loops back to the beginning of the code path. This research is experimented with mechanical and electronic devices being independently tested. After the testing and evaluation of both prototypes, the final unit was developed by both systems. Within this chapter, however, we address the effects of the use of mechanical and electronic architecture. Besides, both mechanical and technological problems will also be addressed with a possible solution. By applying [5] the principles of mechanical engineering design, intuition, experiments and computer analysis, each component of this lathe is carefully analyzed and pre-production optimized to ensure a smooth manufacturing process and a successful operation. In addition, the lathe is designed to minimize the impact of environmental and operational disturbances.

CUTTING TOOL MATERIALS [6] [11] [7]

As the metal expulsion rates have expanded, the requirement for heat safe cutting devices has likewise expanded. The outcome was a movement from high velocity steel to carbide and pottery and other too hard materials. Created around 1900, HS tools were cut multiple times quicker than the carbon prepares they supplanted. The HS steel in three significant classes comprises of more than 30 levels: tungsten, molybdenum, and cobalt-based molybdenum. The creation of fast powdered metal steel has permitted close net shaped cutting devices, like cutters, drills, framing instruments to be created since the 1960s. The utilization of coatings, especially titanium nitride, permits devices made of rapid steel to cut quicker and last more. Titanium nitride is amazingly hard on a superficial level, forestalls erosion and limits rubbing. High velocity steel in many applications has been fill in for carbide gadgets in industry today. This carbide and covered carbide gadgets limit the hour of fast prepares by around 3 to multiple times. Solidified carbide is a powder metal substance comprising of little carbide particles and a cobalt cover.

Tantalum carbide, Tungsten carbide, Niobium carbide as well as titanium carbide are the fundamental sorts of hard carbide. Each sort of carbide distinctively affects the properties of the cutting device. Higher tungsten content, for instance, helps wear strength, yet diminishes apparatus strength. Lower cobalt folio power increments yet wear obstruction diminishes. Carbide is utilized as replaceable supplements in strong round gadgets. For different applications, every carbide tool manufacturer offers a variety. Double the life of an instrument or twice the cutting speed of the same tool may be used. For interrupted cutting, shock-resistant styles are used. For high speed steel finishing, harder, chemically stable types are required. For machining super alloys, like Inconel and Hastelloy, they need more heat tolerant instruments.

The carbide requirements cannot be chosen efficiently, hence the carbide suppliers are expected to propose classifications for some applications. ANSI code is used to define the carbide collection. The carbide materials are colored by two-thirds. In most uses, coated devices should be considered due to their longer longevity and faster workmanship. Coating refers to a particular carbide tool's applications. These coatings are applied in many layers below the thickness of.001 inch. Titanium carbon-nitride, Aluminum oxide Titanium carbide as well as titanium nitride are the primary carbide additives and tool cutting materials. Ceramic cutting materials, although more delicate, are harder and cooler than carbides. They are suitable for cast iron, rough steels and heavy alloys machining. The alumina-based and the silicone-based nitride ceramics are two types of ceramic cutting instruments available. Silicon -based silicon nitride ceramics are typically used to make cast iron and super alloys rougher and heavier. Ceramic instruments are made from materials that bind carbide types such as carbides of titanium and nitrides. For chemical reactive processing settings, they are particularly useful for the finishing and for some milling and turning operations.

CONCLUSION

Further changes are reducing the cost of the computer to about 4 times smaller than the original CNC. The accuracy and dimensional strength of the work produced in the Enhanced lathe machine can also be achieved. Improved lathe machine replicates the same efficiency and reduces lead times for all workpieces. It is safer to work on the machine Enhanced late. A lathe-mill RMT demonstrating the fundamental way for a design that meets the required requirements was added to the synthesized methodology submitted. To this end, extensive work has been recorded with RMTs, but few lathe-based RMTs have been researched and developed. Besides, a large range has become known as the RMTs. The development phase with a poor conceptual design leads to many iterations, raising design time and expense. The conceptual design of the RMT rotary mill has proven to be practical and budget-friendly. The flexible and highly reconfigurable design should be proved by the refined design and tested according to the technique by prototyping. This knowledge produced will be recorded in future research. The constructed tool provides a rigid framework for tool forces for rotation and framing.

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