NOVATEUR PUBLICATIONS
INTERNATIONAL JOURNAL OF INNOVATIONS IN ENGINEERING RESEARCH AND TECHNOLOGY [IJIERT]
ISSN: 2394-3696
VOLUME 6, ISSUE 5, May-2019

OVERVIEW OF THE PERFORMANCE ENHANCEMENT OF THE CNC HOBBING MACHINE

KETKI UDAY MOKASHI
Department of Electronics and Telecommunication Engineering, Deogiri Institute of Engineering and Management Studies, Aurangabad, M.S., India
PROF. ABHIJEET CHAVAN
Assistant Professor, Department of Electronics and Telecommunication Engineering, Deogiri Institute of Engineering and Management Studies, Aurangabad, M.S., India

ABSTRACT
The manufacturing is always the most crucial industry and the research in improving the product is appreciable in last few decades. The gear needs to be very accurate as the performance of the system may vary with the accuracy of the gears. The hobbing machines with the CNC and PLC control can change the accuracy remarkably. This configuration may improve upon the factors like cost, quality, accuracy and ease of production. Authors have proposed the controlled motors implementation in the process of the gear production.
KEYWORDS: Hobbing machine, CNC, numerical control, gear production, etc.

I. INTRODUCTION

The control methods implemented with CNC machines have improved a lot in last two decades. The operation has become more effective from point of view of efficiency and the accuracy of the production. The simulation has overcome the problems associated with modelling of the product with accuracy. [1]
The production industry is always trying to reduce the production cost without compromising with the quality of the product. The motors used in the production process to complete the particular task play an important role in improving the operations and the efficiency. [2]
PLC system fulfils the requirement of the control operations with high accuracy. The automation has opened the doors of opportunities to produce the product at required accuracy. Another important system apart from the motors is the hydraulic system from the point of view of controlling the operations. The control of the belt and the conveyor system can be accurately done by PLC. [3-4]
Another approach is to control the operations by the distributed automation system. With the ease of the programming language, one can develop the automation system controlled from the personal PC's, off course with the required infrastructure. [5]
The cost of the manufacturing a product can be optimized in several ways. The total economics of the production mostly lies within how effectively the available resources are used by the industry. The speed of the operations like cutting can be one of the important solutions over the conventional method. [6-7]
The performance of the equipment's involved in the manufacturing are the most important when we are thinking to improve the systems performance. The concept of retrofitting is very important when we are willing to improve the performance at lower cost without completely replacing the existing system.

II. EXISTING SYSTEM

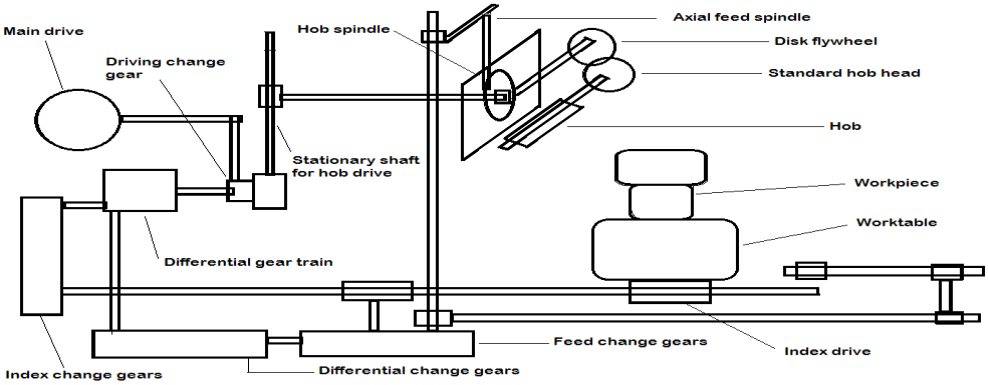

Fig.1: Basics of transmission principle

The transmission machine is nothing but the basic hobbing machine as shown above. Generally the induction motor is used in the conventional operation. The conventional method to control the system is mechanical in this system and hence it is not so accurate.

III. PROPOSED SYSTEM

Authors have proposed the system with software and hardware interface for the operations to be performed during the process of manufacturing the gears.

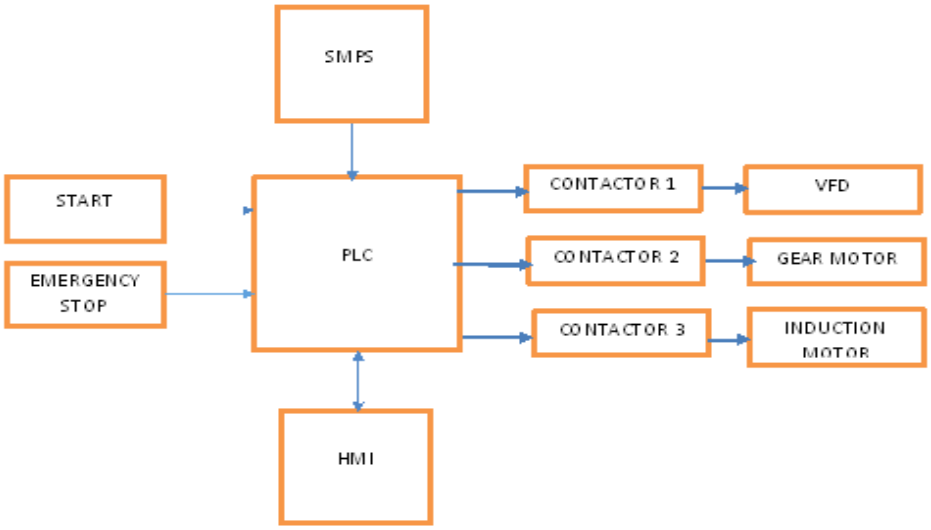

Fig.2: Proposed System for the gear hobbing

The above system shows the complete operation with the control from the PLC unit. Generally the system can be divided in to two parts like hardware and the software structure. The servomotors can be used to control the motion. These are mainly used to control the hob and depth. The PLC and the programming software are needed to control the servomotor operations. The program must be adequate to perform the operations as expected. The major parts of the system are as follows:

a. HMI:

The human machine interface is one of the important part of the system.

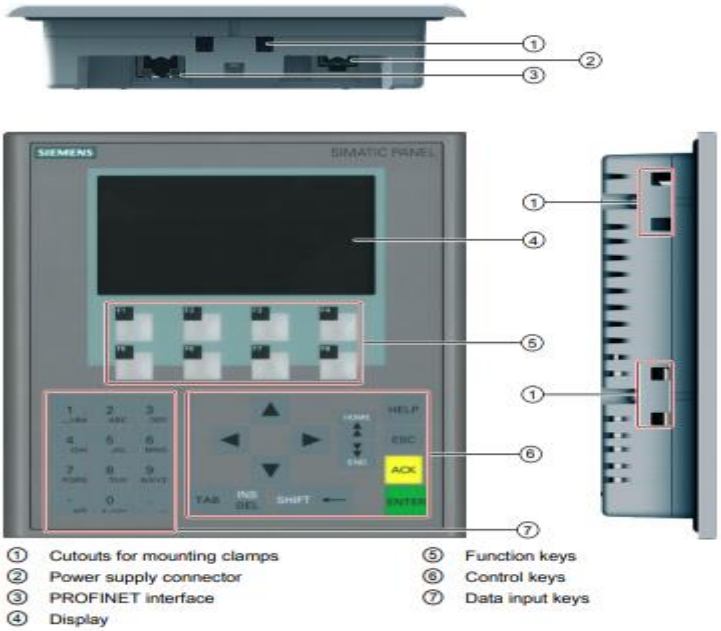

Fig.3: Human machine interface for the proposed system.

It is useful for real time data acquisition, display and providing the commands to control the operation.

b. PLC

The heart of the control system in the proposed system is PLC. It controls the operations very accurately. The can sense, control, store, process the data for performing the operation.

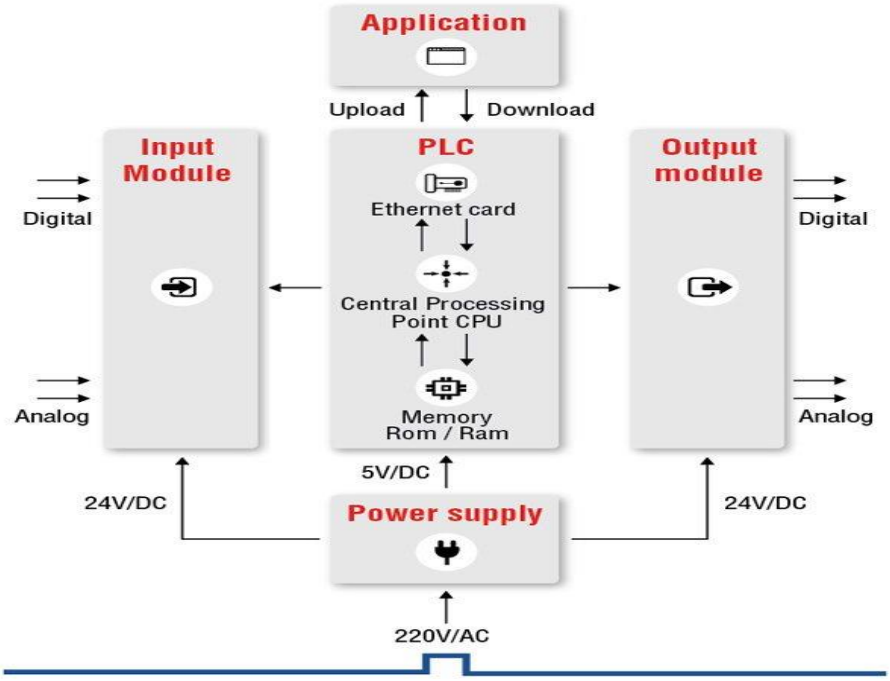

Fig.4: PLC for the proposed system

a. VFD

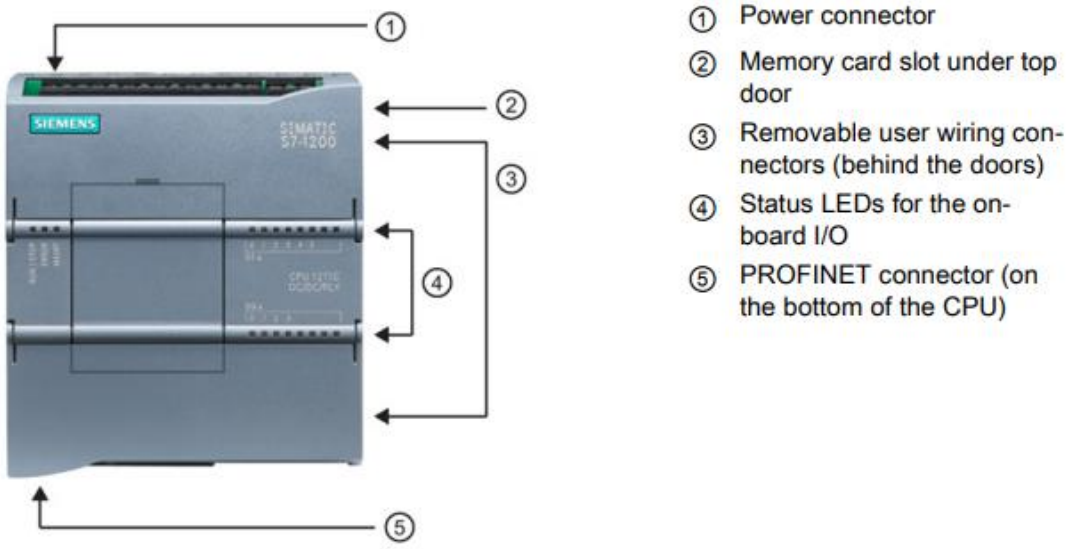

Fig.5: VFD for the proposed system

It operates on the principle of the variable frequency control for the motors. By varying the frequency of the supply connected to the motor, the speed of the motor can be varied. This is one of the conventional methods of controlling the speed of ac motor.

b. MOTORS

The geared and the ungeared induction motors are used for the various operations in gear production. The requirement of the gear motor is to produce the heavy torque for the operation. On the other hand the induction motors also used in controlling the movements in the operations.

CONCLUSION

The complete production cycle of the product is controlled by the processes included in the system. The efficiency of the operations can be improved by adding or removing some stages. The control is going to play a vital role in improvement of the system performance. Authors have presented the overview of the implementation of the gear hobbing process with the accurate control by PLC and numerical control. The system not only useful for the performance improvement but also improves upon the several factors like the life span, efficiency, accuracy and ease of operation.

REFERENCES

1) Safavi, S. Mohsen, et al. "Use of PLC module to control a rotary table to cut spiral bevel gear with three-axis CNC milling." *The International Journal of Advanced Manufacturing Technology* 49.9-12 (2010): 1069-1077.
2) Mingzhu, Zhang, Li Hongtao, and Wei Dongzhi. "Numerical Control Innovation for Double Cradle Straight Bevel Gear Milling Machine." *Procedia Engineering* 15 (2011): 1149-1153.
3) Hong, W. A. N. G. "Design of PLC-based hydraulic system for workpiece turnover." *Procedia Engineering* 15 (2011): 122-126.
4) Mircea Dobriceanu, "The Implementation of a Programmable Logic Controller for The Automation of The Belt Conveyor", university of craiova, romania.
5) Vitturi, Stefano. "PC-based automation systems: an example of application for the real-time control of blowing machines." *Computer Standards & Interfaces* 26.2 (2004): 145-155.
6) Gichan, V., Kastytis Slivinskas, and V. K. Augustaitis. "Research of force drives of the production gear hobbing machine with CNC." *Mechanics* 70.2 (2008): 43-47.
7) Dr. G.Sulzer, "Economics of CNC gear hobbing*", Liebherr machine tools*, kempton, west germany. Catalogue