

A Review on Retrofitting of Conventional Milling Machine

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ABSTRACT

A design engineer has to improve existing manufacturing technique by inventing new ideas like Special Purpose Machine (SPM). To improve existing manufacturing processes which result into major advantages like, reduced manufacturing lead time, fool proofing methods of processing and consists results on a long run. Milling process is used for cutting of metal on a work piece surface by using a rotating multipoint cutter. It generates a surface by rotating edge of multipoint cutting tool known as Cutter on to the work piece clamped on its table. Retrofitting is the addition of new technology or features to older systems, when related to some component it means to upgrade that component and improve efficiency through a present technology. Retrofitting conventional mailing machine combining advantages of an SPM will provide advantages of both.

Keywords - *Retrofitting, Horizontal Machining Centre, Conventional Milling.*

1. Introduction –

As we know that technology has developed day by day and very rapidly. In some recent years features are changing in manufacturing environment rapidly. In machining activities, big improvement is possible and the role of machine operators is being replaced more by the new intelligent controllers with new advanced features. This is possible by upgrading the older machine tools to reconstruct exactness level, improving accessibility, enhancing output & facility. Retrofitting is the best potential answer to them. [1]

A design engineer has to improve existing manufacturing technique by introducing new ideas like Special Purpose Machine (SPM). The decision making will be based on the improving existing manufacturing processes to result in to major benefits like reduced manufacturing lead time, fool proofing methods of processing and consists results on a long run. Milling is a process of cutting metal on a work piece surfaces using a rotating multipoint cutter. To reduce manufacturing lead time efforts are significantly taken right at the stage of the product design and process design. Milling is one of the fundamental operations. Milling machines are found in almost every company. It generates a surface by rotating edge of multipoint cutting tool known as Cutter on to the work piece clamped on its table. [2]

Retrofitting is 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 efficiency through a present technology. [3]



Fig no. 1. Conventional Horizontal Milling Machine.

2. Literature Review –

Kaleem Khan, Vandana Somkuwar, Bhupendra Kumar Mishra[1] (2014) This paper is a review of research work of last few years on retrofitting. In this paper authors discuss the cost of retrofitting, monthly repairing and advantages of retrofitting. Machines cost and tooling cost create big effects in manufacturing industries. Repairs and up-gradations of machines and tools can help to reduce the overall cost of machines and there factors and can increase production rate.

Amol B. Rabade, Vijay V. Doijad, A.S. Todkar[2] (2014) Special purpose machines are widely used for special kind of operations, which are not easily performed on conventional machines and it is not economical operations on conventional machines. They are designed basically for achieving higher accuracy at desired condition. Face milling operation of industrial component is followed by a milling process. A Special Purpose Machine introduced generally for the purpose of operated manually or automatically, as per the condition and availability of the machining facility or a mechatronic based system can be developed that will work with different speed. SPM introduced in the various industries for the purpose of it is automatically start operation by sensing work piece on table; it helps in start and end of cycle.

Prakash N. Parmar, Vikas R. Gondalia, Niraj C. Mehta [3] (2014) 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 lathe machine to improve the accuracy of dimensions and irregular shape. So, CNC machines are becoming very important in the automation and the modernized industrialization. There are many conventional lathe machines in an India. To build a new advanced developed country, it is required to convert these all conventional lathe machines into semi-automatic lathe machine by retrofitting technique. By developing and changing into semi-automatic control lathe machine, there are three required changes of portions such as, mechanical, electronics and hydraulic. In mechanical portions they using instead of lead screw they are using ball screw for better accuracy and remove some unnecessary component like gears for providing space for motors. Also provides a hydraulic circuit for coolant. In electronic portions they used a servo/stepper motor for both Z and X axis and provide controller for the efficient operation on conventional lathe machine.

Yair Shneor [4] (2018) The main goal of a reconfigurable machine tool is to perform various changes in the product or parts to be machined. By the development of machine modules it is very easily and quickly can be assembled and disassembled, it is helpful to increase the efficiency of the machine tool. By designing different machining processes with same machine tool, which will helps to reduce the total energy consumption during the manufacturing process, and also to reduce the need for larger floor space area in the plant and the cost per

part. This paper helps to, the design and implementation of modular machine subsystems that enables various machining processes on the same CNC vertical milling machine, is reviewed.

S. V. Shekhar, H. G. Patil [5] (2017) This paper discusses the case study and comparison of productivity of machine and special purpose gang milling machine and special purpose machine (SPM) for manufacturing of conveyor chain bushes. In this case study the SPM is used for manufacturing component which requires two flat milling operations at both ends. In this paper the following studies are carried out 1. Reduction in cycle time due to automation. 2. Increase in productivity both qualitative and quantitative, 3. Less human involvement in to perform various operations indirectly reduction in operator fatigue. 4. Less rejection due to automatic controls. 5. Increase the profit of company.

A. H. Rasal, Dr. V. R. Naik & R. A. Mane [6] (2016) The growth of Indian manufacturing sector depends largely on its productivity & quality. Productivity depends on many factors, such as one of the major factors is improve the manufacturing efficiency with which the operation /activities are carried out in the organization. Productivity can be improved by reducing the overall machining time, combining the operations etc. In case of mass production, where variety of jobs is less and quantity to be produced is large scale basis, it is very essential to produce the job at a faster rate. This is not possible by using general purpose machines. The best way to improve the productivity along with by maintaining the quality is by using the special purpose machine. In this paper the existing manually operated band saw machine will be replaced with a special purpose machine by making suitable changes.

M. Nalbant , H. Gokkaya, G. Sur [7] (2006) In this study, the Taguchi method is used to find the optimal cutting parameters for surface roughness in machining. The orthogonal array, the S/N ratio, and ANOVA are employed to study the performance characteristics in various machining operations. The different cutting parameters are optimized with considerations of surface roughness. The experimental results are obtained to improve the effectiveness of this research.

3. Discussion -

Above are a few papers which discuss the requirement, investigate value addition in present machines. Repairs and up gradations of machine can help to reduce the overall cost of machining. The Special Purpose Machine (SPM) if introduced in various industries which are operated manually or automatically increase productivity but reduce flexibility. However a mechatronic system if fitted can work more flexibly. We are working for an application where a horizontal CNC machine center is used for machining a component. The component can be manufactured with an SPM. This requires initial cost, and has no flexibility. Low cost alternative is to partially machine on milling machine and finishing operation on CNC. A possible way to tackle the problem is to retrofit the milling machine, while adding flexibility using hydraulics and mechatronics. One can go for optimization of cutting parameters for the particular operation if the machine is retrofitted. Retrofitting technology will implement in our research proposed work.

4. Conclusion -

From above literature survey we have studied the basics of special purpose machine design and also retrofitting of existing milling machine, different machining operations associated with milling operations such as side-milling, face milling, end milling etc. Due to the increase in the idle time the rate of production is affected while loading and unloading the component. It is very easy to handle the existing machine with the help of PLC Circuit, which would be very useful to reduce the machining time, improve the productivity and reduce overall machining cost due to retrofitting conventional milling machine set-up.

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