

# DESIGN AND MANUFACTURING OF XYZ CO-ORDINATE MINI MILLING MACHINE

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**Abstract** - This review paper shows various papers related to Portable Milling Machine. Modification in portable milling machine is required to easy machining of large as well as small parts. The modification in the portable milling machine can also save the machining time and enhance the production rate. Sometime the large parts are difficult to transport from one place to another place, so in this situation Portable Milling Machine is helpful to machining in simple manner. So, first we carry the literature survey on same topic to understand work done so far in the same topic. This review paper included different types of portable milling machine, their parts and modifications.

**Key Words:** Milling Machine, XYZ Co-ordinate Machine.

## 1. INTRODUCTION

In recent years, the requirements of modern and modified machine tools have expanded considerably, generally fabrication, repair and maintenance machining has been carried out using large conventional machine tools. Which is necessarily installed in dedicated machine shops. This type of machine is helpless in the situations like either repair and maintenance/machining of large parts or fabrication of small/micro parts due to the machine tool size constraint and limitation of work table flexibility. For the repair work on large parts and considerably complex systems such as aircraft, ships, power stations, metal fabrication mills, heavy machinery, etc. the conventional type of machining is not suitable. Here "Portable machines" are used during assembly and operation due to mobility, flexibility, time and energy constraints.

The scaled down components which require machining work must be dismantled from the system and shipped to a machine shop for processing before they are returned and re-assembled into the system.

This process is very time-consuming, complex, dangerous and expensive. For very large systems, this type of maintenance is impossible at all. Further, this conventional maintenance process can result in prolonged downtime of the system. For these reasons, in situ machine tools which can be shipped and attached to the component to be machined, while that component is still installed in the system, can offer great advantage. An approach to solve the

problem is to discard the belief "work piece inside machine" instead replace it by the principle "small machines on large work pieces".

Another recent area of research and development is that of specialized miniaturized or micro machine tools, which have overall dimensions measuring in hundreds of millimetres or less and use compact low-power spindles. These systems can be considered as special purpose machines as they mainly address high-precision machining of micro scale products.

## 2. LITERATURE SURVEY

**Yash Soni, "Mini CNC Plotter using Spare Parts"**, In this work the investigation was carried on designing a low cost three axis. Mini CNC Plotter with a stepper motor, Arduino microcontroller and motor control software. Their objective was to develop a low-cost automatic mini-CNC machine for PCB drawing and drilling. This system reduces the cost of machine and increases the flexibility.

The G code is interfaced with ATMEGA 328 CNC based controller by FTDI module which is used to convert the code in convenient controller code i.e. serial to USB converter. Hence it acts like interfacing module between PC to Controller. This code is further passed to stepper the motor by easy drivers which converts the code and as per instructions the stepper motor moves. We need three axis's X, Y, Z which operates as

follows X stepper motor move left and right Y stepper motor moves front and back and Z stepper motor up and down as per given dimensions these axes will move on.

**Sanjay Kumar Mishra, Shabana Naz Siddique, "Study of Performance of milling machine for optimum surface Roughness"**, this work was focused on to get optimum surface roughness, which identify the parameter of machine. Surface roughness is one of the most specific consumer requirements in a machining process. So, from optimization point of view, the three-process parameter (feed, cutting depth and speed of cutting) should be selected. A suitable method of optimization is needed to find optimum value of parameters for cutting and minimizing roughness of surface.

**Piotr Boral, "The design of the CNC milling machine"**, the work focused on design of the milling machine. It is based on steel closed sections of a large cross-section and a big wall thickness. This has allowed a rigid frame structure to be obtained. To obtain high displacement accuracy, high-accuracy profiled rail slideways have been used, along which pre-stressed linear ball bearings move. The machine tool has been furnished with a fourth numerically controlled axis, which is demountable.

The proposed 4-axis CNC milling machine with sufficiently high rigidity and accuracy. The fourth axis enables the machining of surfaces of revolution and toothing (for example, helical surfaces) by milling.

**Prof. A.N. Shyani, Krishna Dave, Marnish Modi, "A Review of Usability of Portable Milling Machine from Micro to Macro Parts"**, their work included different types of portable milling machine, their parts and modifications. As well as construction, structural design, working setup, functioning and machining tests are observed in this survey of Portable Milling Machine. The possibility of designing the portable, versatile, in situ milling machine for macro parts is considered in this.

From the study it is observed that With five axis micro milling machine, 2D thin wall, 3D curved surface and a mini impeller is machined with precision.

With three-axis desktop milling machine, micro gears, up to 20-micron thin wall, and a microelectrode is machined with accuracy and precision. With the hybrid five face milling machine in one set up have precisely made a work piece with flat surfaces and free form surfaces with cavity contour milling and variable contour milling operations.

**Dilshad, Ashfaq, Ashick, Mohammed Shaheem, Alfaz, Muhammed Sarbas M, "Fabrication of Three Axis CNC Milling Machine"**, in this a fabrication of 3-axis CNC milling machines based on A4988 driver board which combined with spindle drill is being discussed through this paper. Cutting, Engraving and Marking on wood, acrylic and PCB objects can be done using this CNC machine.

The 3 Axis CNC Milling Machine is fabricated successfully using A4988 microcontroller along with 3 Nema 17 stepper motor and spindle drill. Later, real time test was conducted on different materials using various G codes by using Universal G code Sender and satisfactory results were obtained. The CNC milling can be used for cutting, engraving and marking on plywood, foam board to form 2D and 3D objects. The process of synchronizing the 3 stepper motors was controlled using Universal G code Sender Software.

### 3. CONCLUSION

After reviewing above papers, we can say that, CNC machine tools must be better designed and constructed, and must be more accurate than conventional machine tools.

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