

# Design and fabrication of multipurpose wood machining device: A Review

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**Abstract:** There are many ways to fabricate wood, but all these ways take more time. Our aim is to reduce the time by “DESIGN AND FABRICATION OF A MULTI PURPOSE WOOD MACHINING DEVICE” and increase the productivity. By this method four operations can be performed in a sequence. They are drilling, angle drilling, slotting and boring by using spindle motor. All these methods are time consuming and have to be performed on different machines which increase the production time. This method reduces human effort and saves the production time. Apart from other methods this method can be used in places where production cost has to be minimized.

**Keywords:** *Multipurpose, drilling, slotting.*

## 1.Introduction

Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Today in this world every task have been made quicker and fast due to technology advancement but this advancement also demands huge

Investments and expenditure, every industry desires to make high productivity rate maintaining the quality and standard of the product at low average cost In an industry a considerable portion of investment is being made for machinery installation. So in this project we have a proposed a machine which can perform operations like drilling, sawing, shaping, some lathe operations at different working centres simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously. According to some economists, manufacturing is a wealth-producing sector of an economy, whereas a service sector tends to be wealth-consuming. Emerging technologies have provided some new growth in advanced manufacturing employment opportunities in the Manufacturing Belt in India.

A multipurpose wood machining is a machine to carry out multiple machining

operations under single machine. This can be done by using a motor which can drive various tool bits that are used and designed to perform operations of drilling, slotting, sawing, chamfering and countersinking. This will not only compact in size. The tediousness of using separate machines for various operations can be swapped by a user-friendly multipurpose machine which can perform all operations mentioned above under a single unit. The cost associated in buying the individual machines which can perform only one operation per will be no more. Apart from these most machines cannot perform the mentioned operation simultaneously. This makes our project better since it can help achieving the aim mentioned above at low price

## **2.1 Literature Survey of machining processes:**

M.Prathyusha, et, al [1] analysed the type of tooling and machining parameters and process performance measure, which include cutting speed, depth of cut, material removal rate with different type of equipments which can be run simultaneously and fabricate the work piece in multipurpose machine. Ravi Teggin, et, al [2] this paper discuss about Design and

Fabrication of Multi-Purpose Wood Working Machine. Wood working is anything that performing any operation on wood in any way for some useful work. This multipurpose working machine has ability to perform four operation such as Planning, Edge forming, Cutting and Drilling on single machine. All the four tools are driven by single motor. The machine is highly efficient and economically feasible for wood workers. The power consumption is also less and works with all kinds of wood. Sharad Srivastava, et, al [3] this paper presents the concept of Multi-functional Operating Machine mainly carried out for production based industries. Industries are basically meant for Production of useful goods and services at low production cost, machinery cost and low inventory cost. All the production based industries wanted low production cost and high work rate which is possible through the utilization of multi-function operating machine which will less power as well as less time, since this machine provides working at different centre it really reduced the time consumption up to appreciable limit. Rakesh Ambade, et, al [4] this paper presents the concept of Human Powered Multi-Purpose Machine. This machine can be used in remote places where electricity is irregular

or insufficient. It is a design portable one which can be used for cutting various places. It can be used for operating on materials like thin metals, wood and pvc . it requires less power as well as less time, since this machine provides working at different center it really reduced the time consumption up to appreciable limit. Its working can be done in less floor space. Unskilled labour can also handle it efficiently because of this the cost of production is reduced which is the most factor in production industry. Pratik P Bargode, et, al [5] this paper, the preliminary design, valuation of design requirements and the design results are described. The machine designed and manufactured can perform multiple operation at the same time on wood with required speed and controlled or operated by motor. It can perform cutting, grinding and buffing operation. Multipurpose machine having wood cutting, grinding and buffing wheels on single base is described. The practical measurement result have shown that the performance of this machine is better than the existing one.it requires less power for its operation. Heinrich Arnold [6] said rather long re-investment cycles of about 15 years have created the notion that innovation in the machine tool industry happens incrementally. But looking at its

recent history, the integration of digital controls technology and computers into machine tools have hit the industry in three waves of technology shocks. Most companies underestimated the impact of this new technology. This article gives an overview of the history of the machine tool industry since numerical controls were invented and introduced and analyzes the disruptive character of this new technology on the market. About 100 interviews were conducted with decision-makers and industry experts who witnessed the development of the industry over the last forty years. The study establishes a connection between radical technological change, industry structure, and competitive environment. It reveals a number of important occurrences and interrelations that have so far gone unnoticed. R.Robert Henty, et, al [7] this paper the method of wood machining is discussed and By this method six operation can be performing. This method reduce human effort and saves the metal cutting time. Apart from other methods this method can be used in places where to cut more work at low cost. here cost of machining is reduced and work rate has been increased. this machine provides working at different center it really reduced the time consumption up to appreciable limit. it can perform

operations like drilling, sawing, grinding at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously. Dr. Saif Imam [8] according to him a machine tool is a mechanical instrument used for shaping and machining metals or other materials, usually by cutting, boring, grinding or shearing. With the objective of solving this commonly encountered problem, a synchronous operation machine tool design is proposed which will offer an appropriate substitute to the magnanimous collection of machines thereby reducing the time and complication involved in order to complete a task at hand. This project offers a simple low capital machine tool for the machine shop producing a job that follows a particular sequence of operation. The capital cost involved in the construction of a machine tool is much lower to that of a commercially available other single unit machine tool. Tushar B. Malode , et, al [9] this paper deals with design and development of Multi-spindle head for cycle time optimization of the component. One of the major factors being manufacturing efficiency with which the operation activities are carried out in the organization. Productivity can be improved by reducing

the total machining time, combining the operations etc. In today's market the customer demands the product of right quality, right quantity, right cost, & at right time. Therefore it is necessary to improve productivity as well as quality. One way to achieve this is by using multi spindle machine. Using Multi-tool Drilling Attachment, increase productivity at low cost and in less time. this machine provides working at different center it really reduced the time consumption up to appreciable limit. This machine can be used in remote places where electricity is irregular or insufficient. Krishnappa R, et, al [10] in this paper the concept of Multi-Function Operating Machine mainly carried out for production based industries for Production of useful goods and services at low production cost, machinery cost and low inventory cost. Here conceptual model of a machine is developed which would be capable of performing different operation simultaneously, and it should be economically efficient. Objective of this model are conservation of electricity(power supply), reduction in cost associated with power usage, increase in productivity, reduced floor space. this machine provides working at different center it really reduced the time consumption up to appreciable limit, So in this paper a machine which can

perform operations like drilling, sawing, grinding at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously. Kumar Penumuru, et, al [11] here the aim is designing and developing a multipurpose machine tool which is capable of performing multiple tasks simultaneously. This model facilitates to complete three operations simultaneously with a single power source. The objectives of the model developed are conservation of electricity (power supply), reduction in cost of manufacturing, increase in productivity and reduced floor space requirement. The machine is useful particularly for small scale industries, Workers movements can be minimized, Number of operations can be carried out on the single machine, Three different operations viz. drilling, grinding and cutting, Power consumption is reduced, Floor area required is reduced, Cost of manufacturing is also reduced. Luis Cristovao [12] in this paper Cutting processes, in general, and wood cutting processes is explained. the machining properties of some wood species, focusing on tool wear, cutting forces and the tensioning of circular saw blades. The studied wood species were five Mozambican

tropical species, namely: *Swartzia Madagascariensis* (ironwood); *Pseudolachnostylis maprounaefolia* (ntholo) etc. Power consumption using double arbor circular saw machines was investigated. experimental and theoretical models to improve circular sawblade dynamic lateral stability were developed. When processing tropical species, the highest possible chip thickness with respect to surface quality, edge strength and available power should be used, The power consumption was higher in sawmill B than in sawmill A, owing to the large saw kerf width, large cant height and small overlap between sawblades. Dharwa Chaitanya Kirtikumar, et, al [13] Power required for pedalling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedalling will act as a health exercise, the system is also used in electric power. A electro-friendly machine to rural area which no need of electric power and for urban areas for time consuming and multi task machine for their fast track life-style. S.G.Bahaley, et, al [14] In this paper the system of energy utilization is shown, Energy is the most vital aspect in the development of modern technological civilization human powered multipurpose machine is developed which lifts water to a height 10 meter and generates 14 Volt,

4 ampere of electricity in most effective way. Power required for pedalling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedalling will act as a health exercise and also doing a useful work. The working of human powered multipurpose machine is quite satisfactory for long duration of time. Power required for pedalling is well below the capacity of an average healthy human being. The system is also useful for the work out purpose because pedalling will act as a health exercise and also doing a useful work. this might be the future of devices used for pumping water and electricity i.e. for domestic and other purposes. Nirmal Yogesh, et, al [15] By this method five operations can be performing. There are four cutting. One drilling and one grinding at the same time by using the bevel gear attachment. Apart from other methods this method can be used in places were to cut more work at low cost. If we want to drilling or surface finishing work it is also possible. The sewing machine is faster and easier than hand sawing and is used principally to produce an accurate square or mitered cut on the work piece. it requires very less labor, reduce human efforts, multiple operation can be performed, cost of machine is minimum. but at the same time Difficult to control at

higher depth, Buckling of wire is problem, Holding work piece is difficult. Linxu, et, al [16] this paper has explained the working principle of multipurpose pedal operated bicycle takes place with help of jigs and fixtures. It is a multiple functioning workshop its use in grinding, drilling & millingIt requires less power as well as less time. Ozkan, S.Ayan, et al [17] this paper has explained the use of circular saw for cutting process,pocket,canal, system is powered by an electric motor controlled under plc. According to the measurements results,the correct and expected production is directly connected to human operator's performance. Kevin Patel, et, al [18] This paper presents a development of a portable workshop which will be available for the small work. It is a multipurpose machine which can be used to perform various operation like drilling, milling, grinding of small work pieces very prisely. here a shaft of 40C carbon steel and a dc motor of 100rpm 12v is used.it can be useful for the industries and also at home for repairing purposes, and in the industries small job preparation can be done without using the heavy machines. it can be used for domestic purposes and also for the small commercial jobs. R.G. Landers [19] In this paper the Reconfigurable Manufacturing Systems (RMSs)is shown, A major

component of RMSs is the reconfigurable machine tool (RMT). By contrast to conventional CNCs that are general-purpose machines, RMTs are designed for a specific, customized range of operation requirements and may be cost-effectively converted when the requirements change. The effect of production and operation requirements on the design of RMTs was explored. Reconfigurable machine tools provide a viable solution for manufacturing situations where operation requirements change within prescribed bounds over the life-time of the machine tool. Like DMTs, RMTs. The examples provided in this paper have also illustrated the dramatic effect that production and operation requirements have on the design of RMTs and on the different types of RMT conversions (e.g., adding an additional axis reorienting an axis, integrating new control and diagnostic algorithms) that are needed. J.Kovac, et, al [20] this paper has explained the the feeding part provides work piece clamping and feeding wood in cut. The cutting action is provided by 1.2 KW Motor The cutting power is very important factor of power consumption. There are many factors which influence its power consumption E.g. Tool, Geometry, Size. Mikles.M, et, al [21] this paper has explained the the Motor is Mounted with help of Jigs and

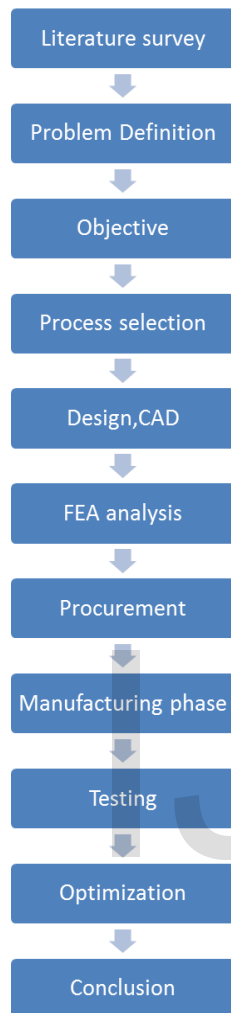
Fixtures..Proper Clamping of Cutting tools should be provided in order to avoid vibrations & increase accuracy. Duong Xuan-Troung [22] this paper has explained the realization of some cross-section cutting across cutting edges. In this method Cutting Edge of tool is Destroyed. It is necessary to select perfect scaled of tool in order to cut the workpiece to accurate dimension. Frankfurt-am Main [23] in this crisis is over, but selling machinery remains a tough business. Machine tools nowadays have to be veritable “jack of all trades”, able to handle all kinds of materials, to manage without any process materials as far as possible, and be capable of adapting to new job profiles with maximized flexibility. Two highly respected experts on machining and forming from Dortmund and Chemnitz report on what’s in store for machine tool manufacturers and users. Multi-purpose machines are the declarations of independence. The trend towards the kind of multipurpose machining centers that are able to cost efficiently handle a broad portfolio of products with small batch sizes accelerated significantly during the crisis. “With a multi-purpose machine, you’re less dependent on particular products and sectors”, explains Biermann Dr. Toshimichi Moriwaki [24] this paper has Scotch-Yoke mechanism through gears. It has concluded

that Scotch-Yoke mechanism is a good choice to convert rotating motion into reciprocating motion because of fewer moving parts and smoother operation. T Moriwaki [25] in this the recent trends in the machine tool technologies are surveyed from the view points of high speed and high performance machine tools, combined multifunctional machine tools, ultra precision machine tools and advanced and intelligent control technologies. Andrew Naylor [26] in this paper the cutting tests were performed in a controlled experimental rig machining both along and across the wood grain Only an un-bevelled tooth was used to perform the cutting action. This was done to maintain focus on the work-piece properties rather than the tooth geometry. Philips S. Ogun [27] in this different techniques that can be used to improve the performance of industrial wood planning machines. The spindle is equipped with a rotary encoder for measuring its angular position so that its displacements can be synchronised with its rotational angle. Regita Bendikiene [28] in this medium density fibreboard (MDF) was chosen for wear test because it is quite abrasive, ease blunts edges of cutters, is inhomogeneous material contains glue and different mineral particles. The milling was conducted according longitudinal milling. Sandak

Jakub [29] in this paper the first evaluations of surface smoothness were made using human senses, touch by hand and observation by eye. Sometimes the surface has been “conditioned” by rubbing the surface across with a carbon paper or covered with a layer of wax. An alternative to the stylus could be measurement with laser displacement sensor (LDS). Vitthal Bangar [30] in this paper the multipurpose machine makes the machining operations like grinding, and wooden cutting operations etc very easy without electricity. Basically this machine is operated on pedaling which is done manually. For performing these operations we required rotational speed of shaft around 700rpm, but considering the human effort we reach up to 250rpm Torque produced by the pedaling motion and it is transmitted to the flywheel with the help of chain and sprocket arrangement. Sarawade S.S[31] in this when operator starts pedaling, the driver wheel (bigger wheel) start rotating. As driver wheel rotate the driven wheel also rotate with the help of rope. The horizontal shaft is connected to driven wheel because of this shaft will rotate. By this rotating shaft the cutter will attached to another small shaft at the bottom of the machine for cutter holding.



## Methodology:



## Conclusion:

We can see that all the production based industries want low production cost and high work rate which is possible through the utilization of multi-function operating machine which works at less power as well as takes less time. In an industry a considerable portion of investment is being made for machinery installation. So in

this paper we have proposed a machine which can perform operations sequentially which implies that industrialist do not have to buy different machines for these operations.

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