

# DESIGN AND FABRICATION OF MULTIPURPOSE MACHINE

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**Abstract** - This project deals with design and fabrication of “multipurpose machine”. This machine is designed for the purpose of multi-operations i.e., cutting, shaping and grinding. The machining operations can be performed by simultaneously. This machine is based on the mechanism of scotch yoke mechanism. The machine is operated by giving drive to the main shaft to which scotch yoke mechanism is directly attached, scotch yoke mechanism is used for shaping and cutting operation. Through belt drive rotary motion is transmitted to the scotch yoke mechanism. And the mechanism converts rotary motion to reciprocating motion. Ram is used to transmit motion in horizontal direction to do shaping operation. And tool grinding tool is fixed in extended shaft for grinding operation. This multi operational machine can be use in domestic operations.

**IndexTerms** -: Scotch yoke mechanism, belt drive, ram, cutting, grinding, shaping.

## I. INTRODUCTION

Now a days there is more demand for compact designs, because compact design can more floor area, so that the space utilization is more. Considering of those issues the multipurpose machine has fabricated. This machine can perform three operations simultaneously. The three operations are grinding, shaping, cutting. A scotch yoke mechanism is used to perform the shaping and cutting operations. And an extended shaft is performed the grinding operation. By using belt drive motor is connected to the shaft. The operations are shaping, grinding, hacksaw cutting, wood cutting.

**Grinding**- grinding is an operation of sharpening and surface finishing of a material by using the abrasive wheels, which are made up of abrasive material like calcite, emery, diamond dust etc.

**Shaping**- shaping is an operation of groove cutting and keyway cutting by using a single point cutting tool.

**Cutting**- cutting is an operation of parting off a material with help of the hacksaw blade for metals or wood cutting blade for wood.

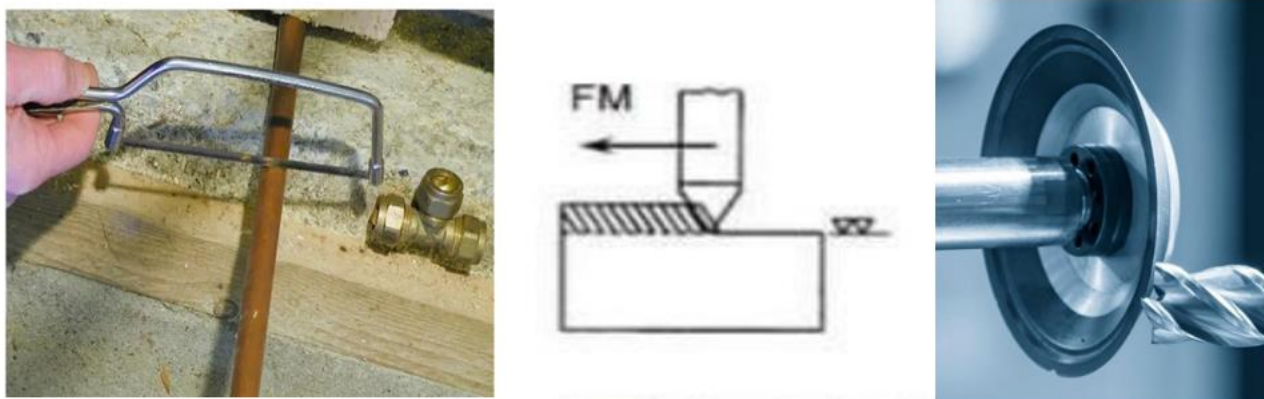


Fig.1: different operations performed by the multipurpose machine

## II. LITERATURE SURVEY

**Ajay Bonde et.al [1]** Proposed this paper focuses on designing of Multi-Purpose Mechanical Machine. The research specializes in diamond and minutiae of multi-purpose machine tool which is worldly-wise to perform multiple operations like drilling, wearing and grinding simultaneously and can moreover performs one operation at a time as per the requirement. The functions of machine tools are to transform the raw substances with the help of machining operation to finished part with precise geometry, dimensions and surface quality.

**Mohammad Akbar et.al [2]** Proposed 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. So, in this project we have a proposed a machine which can perform operations like drilling, cutting, shaping some lathe operations at different working centers simultaneously which implies that industrialist have not to pay for machine performing above tasks individually for operating operation simultaneously. In this machine we are actually giving drive to the main shaft to which scotch yoke mechanism is directly attached, scotch yoke mechanism is used for cutting operation.

**Prof. Dipak U. Adhasure et.al [3]** Proposed this paper presents the concept of Design and Fabrication of Multi-purpose Sieving Machine mainly carried out for production-based industries. Today in this world every task has been made quicker and fast due to technological advancement, every industry desires to make an upper productivity rate maintaining the quality and standard of the product at a low stereotype cost. We have ripened a conceptual model of a machine capable of performing variegated operations simultaneously and easily. In this machine, we momentum to the main shaft using a motor to which the slider-crank mechanism is directly attached; the slider-crank mechanism is used for sawing operation. The table is stock-still with the zombie which moves the tray to vibrate it and act as a separator with the help of a DC motor. And motor shaft (main/driven shaft) is mounted to pulley type

mechanism. Thus, the Design and fabricating of the Sieving Machine is to help the industrial people and farmers on the global market. Shun Jia et.al [4] Say's Energy monitoring, modeling, and management issues of grinding, milling, and turning processes have been widely studied. However, special research on drilling power and energy consumption needs to be strengthened. The existing drilling power and energy models have the problems of high computational complexity and low practicability. To address this issue, an improved rapid power and energy prediction method of drilling process is proposed in this study. The motivation of the proposed method is to reduce the computational complexity and improve the practicability without losing the predictive accuracy for drilling power and energy.

**B. Pranav et.al [5]** Discuss In the era of rapid production field in industries there were number of machines in which some are dependently and some independently work together to fulfill the needs of the consumer, there were many reciprocating machines which are under the performance of removing the glut material or to diamond the required shape of the material.

**Rahul Khadtare et.al [6]** Say's The abrasive belt grinding can reduce the surface roughness of work pieces and accuracy meanwhile Aluminum oxide belt with high stock removal cleaning and polishing is effectual. The abrasive belt grinding as compared to wheel grinding have more efficient with efficiency and parameter range. It is concluded that Aluminum oxide belt hardness makes it suitable for use as an abrasive and as a component in cutting tools with significant proportion. We have designed such Abrasive Belt vertical Grinding Machine having better advantages over wheel grinding machine.

**Rahul Kajabe et.al [7]** Proposed This project deal with design, minutiae and fabrication of "Development of multipurpose machine". This machine is designed for the purpose of multi- operations i.e., drilling, wearing and grinding. This machine perform multipurpose operation at same lime with required speed & this machine is will- less which is controlled or operated which is run with the help of current. This machine is based on the mechanism of scotch yoke. The project aims at designing and developing a multipurpose machine tool which is capable of performing multiple tasks simultaneously.

**Ranjith Kumar et.al [8]** Discuss In this paper presents the concept of Multi-Purpose Machine which is mainly carried out for production-based industries. We have ripened a conceptual model of a machine which would be capable of performing variegated operations simultaneously like drilling, cutting and grinding and it should be economically efficient. This machine performs multiple operations at the same time with desired speed. Multi-Purpose machine is will-less which is operated by motor and it is running with the help of current. It is based on the method of power transmission through gears and pulleys on the same shaft. It is designed as a portable one which can be used for wearing in various places.

**B. Kareem et.al [9]** Say's The major thrust of this paper is the minutiae of an improved domestic grinding machine operated and mostly used in kitchen for the grinding of vegetables, spices and grains of any form. The challenges facing the separation of grinded ferrous metallic particles from the products grinded have been solved through the introduction of magnetic substance at the exit compartment tabbed extractor. The testing of the machine was extensively carried out on zestless (cayenne) pepper with 97% efficiency of the operation. The construction of the work is simple and it employs the maximum utilization of locally sourced materials, which are readily misogynist hence, a reduction in its total cost.

**Yashraj V. Patil et.al [10]** Discuss This paper deals with fabrication of multipurpose tooling machine. This machine is based on the mechanism of whup drive with pulleys, bevel gears, and scotch yoke. The various machining process in manufacturing industries are carried out by separate machining machine. It requires increasingly space requirement and time with upper expenses. But the fabrication of multi-purpose tooling machine, which contains five operations in a single machine. The operations are namely drilling, shaping, cutting, buffing and grinding. It is a new concept specially meant to reduce the work time and save the cost. This machine can perform multi-purpose operation at the same time with required speed and this machine is will-less which is operated by motor which is run with the help of electric power supply.

**J. Dixon Jim Joseph et.al [11]** Discuss The motorized multi-operation machine contains three operations in a single machine. The three operations are drilling, grinding and cutting. The purpose of the machine is to reduce the manufacturing time and forfeit reduction. The same machine is used for doing all these three operations, instead of using separate machines such as drilling machine, grinding machine and hacksaw wearing machine. The machine operates through motor momentum with bevel gear mechanism, which paves the ways to siphon out all these three operations exactly at the same time.

**Shailesh Padmakar Bhujade et.al [12]** Proposed The main objective of this project is to diamond and fabricate an undermining grinding which can be used as versatile grinding machine; the work zone can be rotated from 0 stratum to 180 degrees. The 0-stratum work zone can be used for marrow grinding of component, the 90-stratum work zone can be used for vertical grinding of component and The180 stratum work zone can be used for top grinding of component. low production cost, machinery forfeit and low inventory cost. The conceptual model of a machine which would be capable of performing variegated operation simultaneously and it should be economically efficient.

**R. Saravana kumar. et.al [13]** Discuss This work was mainly carried for manufacturing and fabrication industries. The machine which is used to produce the product with upper verism and quality and produce the goods in an economical manner. It makes the inventory forfeit less. The multipurpose machine has performed variegated operations simultaneously with upper possibility. The scotch yoke mechanism which is trying with the main momentum shaft directly tying then it is used for variegated operation. Number of operations has been performed by a single momentum system.

**Mr. R. Ragavendiran et.al [14]** Say's This paper explains well- nigh dual side shaper machine and grinding wheel attachment using scotch yoke mechanism. The shaper machine is used to remove metal fries in the Zippo of upper speed steel to get a definite structure. The ordinary shaper machine will remove the metal in Zippo only in the forward stroke, while in the wrong- side- up stroke the tool will not remove the chips. Whereas the dual side shaper machine will remove the fries during both forward and wrong-side-up strokes.

**Aquib Ahmad et.al [15]** Discuss Today in this world every task have been made quicker and easier by making use of technology urging but this urging moreover demands huge investment and expenditure. Every industry tries to unzip upper productivity maintaining the quality and standard of the product at low stereotype cost. We have ripened a conceptual model of a machine which would be capable of performing variegated operations simultaneously at upper efficiency.

**Barbara Linke et.al [16]** Say's Given the growing popularity of the maker movement, it is proposed that affordable machine tools may be desirable for both teaching purposes in universities and upper schools and use at home by Do It Yourself enthusiasts. In this paper the concept and initial minutiae of such a desktop multipurpose machine tool is reported. Through the use of modular robot modules, it is demonstrated that a machine can be converted from an outer diameter grinding to freeform grinding configuration in approximately 15 minutes. The initial prototype machine will be used to demonstrate concepts such as miniaturization, multi-

functionality, and re-configurability for machine tools to undergraduate and upper school students.

**Adarsh Kr.Yadav et.al [17]** Discuss This paper deals with the diamond minutiae and fabrication of “Multi-Purpose Machine Tool”. This machine is designed for performing multioperation which are, Drilling, Cutting, Facing, and Turning. The initial drawings were made with the help of CATIA software. The operations are controlled by gear and pulley transmission system, BLDC motor and a hall effect sensor controller. The rotating mechanism can be rotated manually or automatically. A stepper motor could be used to rotate the table on a particular angle. The objectives of the model developed are conservation of electricity (power supply), reduction in forfeit of manufacturing, increase in productivity and reduced floor space requirement. This machine tool will prove profitable and economical for small scale application.

**Awez Inamdard et.al [18]** Says Sheet metal is basically a thin sheet of metal by using several operations. Nowadays it has wilt one of the most important and fundamental forms in metalworking. the wholesomeness of sheet metal is that it can be wilting into variety of desired shapes. Lots of everyday objects are stuff manufactured using sheet metal. Sheet metal is mainly used for various aerodynamically shaped car bodies, airplane wings, tracery and many other applications. wafer removing/rolling, wearing and v-grooving are the most widely used operations in the fabrication industry. The conventional machines could only siphon out any of the whilom operations simultaneously. If these operations can be washed- up on a single machine, it would not only make work quite easy and less tedious but moreover increases profitability.

**A. Madesh et.al [19]** Discuss India is an agricultural country cultivating increasingly number of ground nuts, corns, etc., in the village sides of the country. The misogynist sowing machines are imported from foreign countries. The imported machines are not only zillion in size but moreover costing virtually rupees one lakh. In this project an attempt has been made for the diamond and fabrication of maintenance self-ruling multipurpose sowing machine exclusively for small farmers at forfeit not exceeding rupees 6000 per unit.

**Sharad Srivastava et.al [20]** Discuss This paper presents the concept of Multi-Function 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 forfeit and low inventory cost. Today in this world every task has been made quicker and fast due to technology urging but this urging moreover demands huge investments and expenditure, every industry desires to make upper productivity rate maintaining the quality and standard of the product at low average cost. We have ripened a conceptual model of a machine which would be capable of performing different operation simultaneously.

### III. METHODOLOGY

The main purpose of this machine is to perform the multiple operations on a single machine. By using the metal square tube to construct the body frame, through arc welding. The scotch yoke mechanism is supported by the shaft which is placed in between two bearings. Shaft consists of a pulley to drive the mechanism and also it contains the tool grinder. The methodology of a multipurpose machine.

Wormhole attack can be achieved with the help of several techniques such as packet encapsulation, high transmission power and high-quality communication links etc.

#### WORKING PRINCIPL

By means of shaft and pulley scotch yoke mechanism has operated, the connected two rectangular shafts on both sides of the scotch yoke mechanism were performed the reciprocating action. One of the rectangular shafts is fixed by the single point cutting tool and other is fixed by the hack saw. By sequence of operations, three different operations are performed. The three operations are shaping, cutting and grinding. The multipurpose machine is show in fig 2.

#### List of components

1. Frames
2. Motor
3. Scotch yoke mechanism
4. Bearings
5. Shaft
6. Pulley
7. Belt

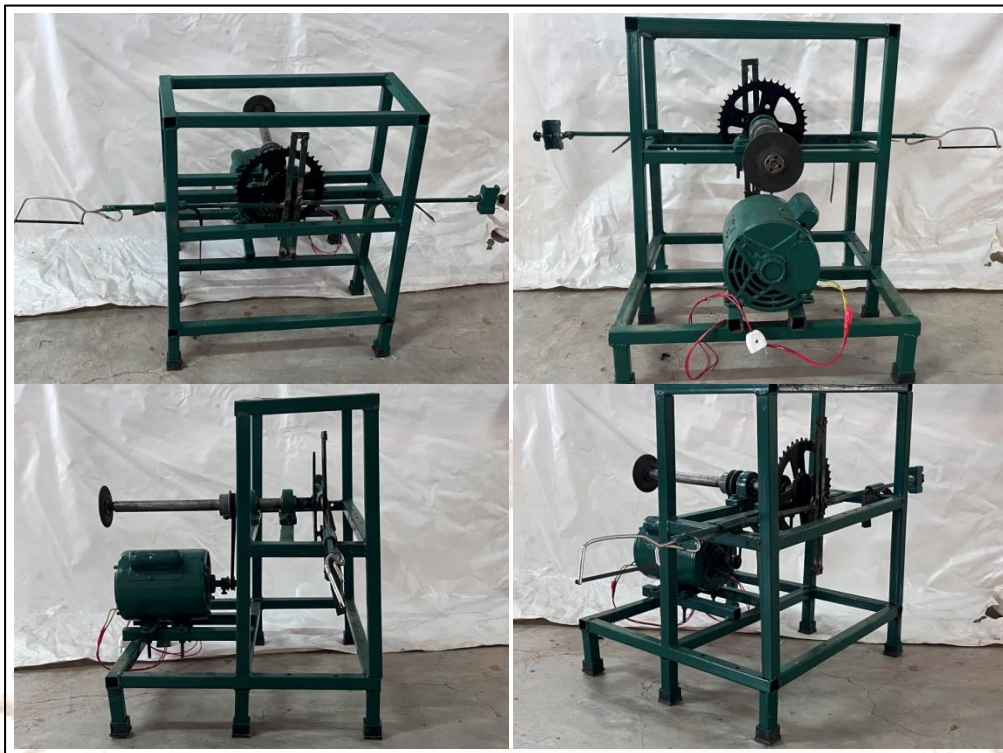


Fig.2: Multipurpose machine

#### IV. CONCLUSIONS

We see that all the industries, which are production based, want low production cost and high work rate which is only possible through the utilization of multi- function operating machine which will use less power as well as less time and less labour. Since this machine provides working at different centre so it reduces the time consumption up to an appreciable limit. In an industry a considerable portion of investment is being made for machinery installation which is very costly. The mini project has been designed to perform the multiple operations i.e., drilling, shaping and grinding at a time, with less floor area and less power and economical. It reduces the worker and workers time in industry. The maintenance of the machine is easier.

#### V. REFERENCES

1. Ajay Bonde, N.K. Mandavgade , S.R. Jachak “DESIGN OF MULTIPURPOSE MECHANICAL MACHINE” Journal of Thermal Science, pg.no: 1 to 5, 10 June 2021.
2. Mohammad Akbar Mohd.Afsar Javed Mohammad Himanshu Garg “MULTI-PURPOSE MECHANICAL MACHINE” Journal of Emerging Technologies and Innovative Research, Volume 8, Issue 8, ISSN-2349-5162, pg.no: a5 to a6, august 2021.
3. Prof. Dipak U. Adhapure , Swapnil S. Bhoite, Vivek J. Deshpande, Umesh P. Chavan, Somnath B. More “Design and Fabrication of Multi-purpose Sieving Machine” International Journal of Research in Engineering and Science, ISSN: 2320-9356, Volume 9 Issue 7, pg.no: 44 to 49, 2021.
4. Shun Jia , Na Zhang , Jingxiang Lv, Wei Cai , Shuwei Bai , Zhongwei Zhang , Luo ke Hu , And Zhaojun Li, “An IMPROVED RAPID POWER AND ENERGY PREDICTION METHOD OF DRILLING PROCESS FOR SUSTAINABLE MANUFACTURING” IEEE, VOLUME 9, pg.no: 105270 to 105285, august 2021.
5. B. Pranav is proposed “A DUAL CUTTING EDGE FOR A SINGLE TOOL SHAPER MACHINE” IJERT, ISSN: 2278-0181, Vol. 9 Issue 07,pg.no: 362 to 364 July-2020.
6. Rahul Khadtare, Pravin Chavan, Govind Wagh, Shubham Atkale, Avinash K. Parkhe “Design of Mini Abrasive Vertical Belt Grinding Machine” AEGAEUM JOURNAL, ISSN NO: 0776-3808, Volume 8, Issue 4, pg.no. 1939 to 1943, September 2020.
7. Rahul Kajabe, Omkar Gunjal, Vishal Gupta, Swapnil Godase, Manish Gorde “Design and Development of Multipurpose Machine” JETIR, , Volume 6, Issue 2, ISSN-2349-5162,pg.no: 130 to 132, February 2019.
8. Bala arun, Micheal abhilash, Ranjith kumar and Mahesh v “DESIGN & FABRICATION OF MULTI-PURPOSE MACHINE” IJRAR, Volume 6, Issue 2, (E-ISSN 2348-1269, P- ISSN 2349- 5138,pg.no: 115 to 120, June 2019.
9. B. Kareem and R.A. Akinode “DEVELOPMENT OF AN IMPROVED DOMESTIC GRINDING MACHINE” IJCET Volume 8, No. E-ISSN 2277 – 4106, P-ISSN 2347 – 5161, pg.no: 379 to 381, 19` 30 April 2018.
10. Yashraj V. Patil, Kamlesh M. Patil, Vipul J. Shimpi, Shubham C. Jadhav “STUDY OF FABRICATION OF MULTIPURPOSE TOOLING MACHINE” IJERT, Volume: 05; Issue: 03, e- ISSN: 2395-0056, pg.no:100 to 103, Mar-2018.
11. J. Dixon Jim Joseph, J. Mathiazhagan, P. Mohan Bose, M. Mukesh. “DESIGN AND FABRICATION OF MOTORIZED MULTI PURPOSE MACHINE (DRILLING, GRINDING, CUTTING)” Volume 6, Issue 04, IJERT ISSN: 2278-0181, pg.no: 1 to 3, 2018. 12. Shailesh Padmakar Bhujade, Professor Ravindra R Gandhe “ AND FABRICATION OF MULTI JOB SURFACE GRINDING MACH INE” IJR, eISSN: 2348-6848 & pISSN: 2348-795X Vol-5 Special Issue-13,pg.no: 649 to 651, 2018.
13. Saravanakumar R \*, Nishanth M Govindarajan, Chaitanya Vattikuti, Sampathkumar S, Rajendrakumar S “FABRICATION AND USAGE OF MULTIPURPOSE MECHANICAL MACHINE USING SCOTCH YOKE MECHANISM” ICAME, pg. no: 1 to 13, 2018.

14. Mr.R.Ragavendiran, M.Akash, D.Aravind, S.Dinesh Kumar “DUAL SIDE SHAPER MACHINE AND GRINDING WHEEL ATTACHMENT USING SCOTCH YOKE MECHANISM” IJRCS, Volume - 2, Issue -1, ISSN: 2456-6683, pg.no: 183 to 187, Feb-2018.
15. Aquib Ahmad, Aniket Parasher, N ikhil Tyagi, Pramudit Sahni. “MULTI OPERATIONAL MECHANICAL MACHINE” IRJET, Volume: 05 Issue: 04, e-ISSN: 2395-0056, pg.no: 4435 to 4438 2018.
16. Adarsh Kr.Yadav, Anirudh Dhall, Vishal Pandey, Vishal Yogi, Harsha B.P. “FABRICATION OF ROTATABLE, MULTI PURPOSE MACHINE TOOL FOR SMALL SCALE APPLICATIONS.” Volume 3, Issue 5, ISSN No:-2456-2165, pg.no: 632 to 637, 2018.
17. Awez Inamdar1 , Rahul Gupta2 , Prasad Kawli3 , Rohan Malekar “DESIGN AND FABRICATION OF PROTOTYPE OF MULTIPURPOSE MACHINE FOR SHEET METAL OPERATIONS” Volume: 05 Issue: 03, eISSN: 2319-1163, pg.no: 94 to 96, 2016.
18. V.M. Martin Vimal, A. Madesh, S.Karthick, A.Kannan “DESIGN AND FABRICATION OF MULTIPURPOSE SOWING MACHINE” IJSEAS, Volume-1, Issue-5, ISSN: 2395-3470, pg.no: 27 to ` 31 34, 2015.
19. Barbara Linke, Paul Harris, Michael Zhang “Development of Desktop Multipurpose Grindngn Machine for Educational Purposes” Elsevier, Volume 1, Pages 740–746, 2015.
20. Sharad Srivastava, Shivam Srivastava, C.B.Khatri “MULTI-FUNCTION OPERATING MACHINE: A CONCEPTUAL MODEL” Journal of Mechanical and Civil Engineering, Volume 11, Issue 3 Ver. III, e-ISSN: 2278- 1684, pg.no: 65 to 75, May-June 2014

