DESIGN AND FABRICATION OF MOTORIZED MULTI PURPOSE MACHINE

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Abstract **--Today in this world every task has been made quicker and fast due to technology. In every industry desire to make high productivity rate and maintain the standard of the product at low average cost. This dissertation deals with the design and fabrication of motorized multipurpose machine which perform three operations are namely drilling, boring and milling. The motorized multi-operation machine contains three operation which is performed under single machine. It can be used in small scale industries and rural workshops to work upon thin metallic and on wood in carpentry shop**

I. INTRODUCTION

Drilling is the operation of producing circular hole in the work-piece by using a rotating cutter called DRILL. The machine used for drilling is called drilling machine. The drilling operation can also be accomplished in lathe, in which the drill is held in tailstock and the work is held by the chuck. The most common drill used is the twist drill.

II. OBJECTIVE

1. By developing the motorized multi-operation machine, we can overcome discomfort of workers from performing three operation from single machine instead of different machines.
2. It can be used in rural areas workshops and small-scale industries.
3. With these types of machine, we can fulfill our demands of machine shops.

III. METHODOLOGY

This work was mainly carried for manufacturing and fabrication industries. The machine which is used to produce the product with high accuracy and quality and produce the goods in an economical manner. It makes the inventory cost less. The multipurpose machine has performed different operations simultaneously with high possibility. Number of operations has been performed by a single drive system. The main focus of the work is to reduce power usage and increase the productivity reduced floor space. Portability is an important quality in any machine in today's world; every field of science and engineering has got portability as one of its most important advancements. Therefore, the machine we have designed satisfies this principle with respect to the manufacturing industry.

IV. LITERATURE REVIEW

1. Kevin Patel, Niraj Kumar Shrivastav, Prof. Surendra Agrawal. 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 operations like drilling, milling, grinding of small work pieces very precisely. The purpose of developing and designing the portable workshop is to make aware the student about the basic operations at very minimum cost in the Institute, beside that 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 machine

2. V. Senthilraja, P. Sathiyamoorthiand P. Saravanakumar. This paper deals with Design and Development of Multi-Purpose Mechanical Machine. This machine is based on the mechanism of scotch yoke. The various machining process in manufacturing industries are carried out by separate machining machine. But the fabrication of multi operation machine, which contains four operations in a single machine. The operations are namely drilling, shaping, cutting and grinding. It is a new concept specially meant to reduce the work time and save the cost.

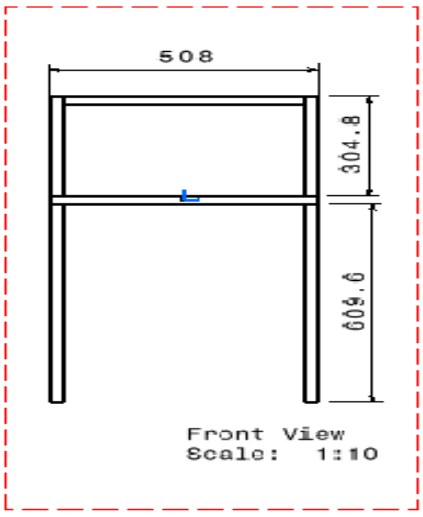
3. M. Prathyusha "Multiple operating machines (drilling, sawing, shaping)", the concept of Multi-Function Operating Machine mainly carried out for production-

based industries. We have developed a conceptual model of a machine which would be capable of performing different operations simultaneously and is also economically efficient.

4. Dr. Toshimichi Moriwaki "Trends in Recent Machine Tool Technologies" Professor Department f Mechanical Engineering Kobe University, NTN Technical Review intend to report on current topics about recent machine tools and trends in the research and development commitments of the Japanese machine tool industry highlighting the efforts of The International Academy for Production Engineering (CIRP).

V. DESIGN ANALYSIS AND DEVELOPMENT

A. *Design*



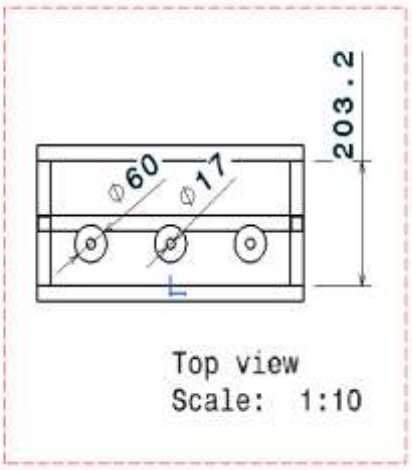


Fig.1 Dimensional Design

B. *Computer analysis*

Finite element analysis in using Solid works Simulation addon is used. Upon Analysis of the model, there was some amount of weight is added to simulate. The maximum deformation to be attained be 1451.7mm at the joints due to sufficient amount of desired load.

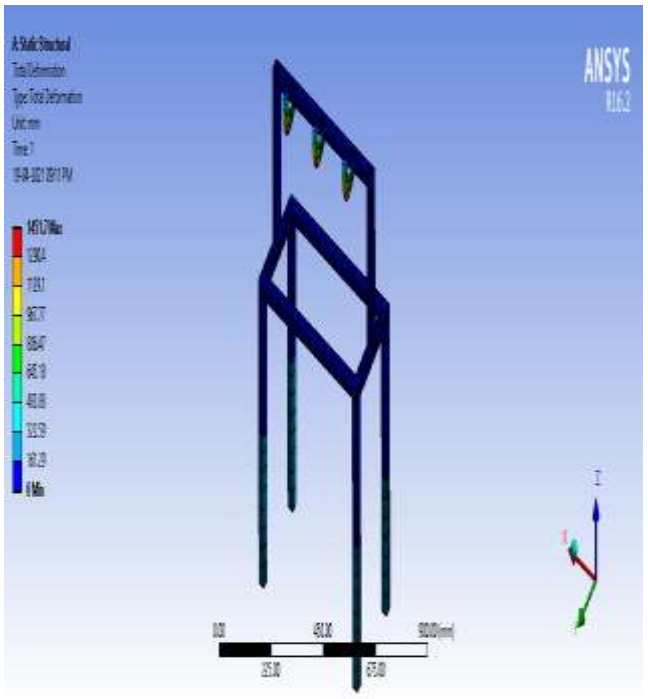


Fig.2 Total deformation

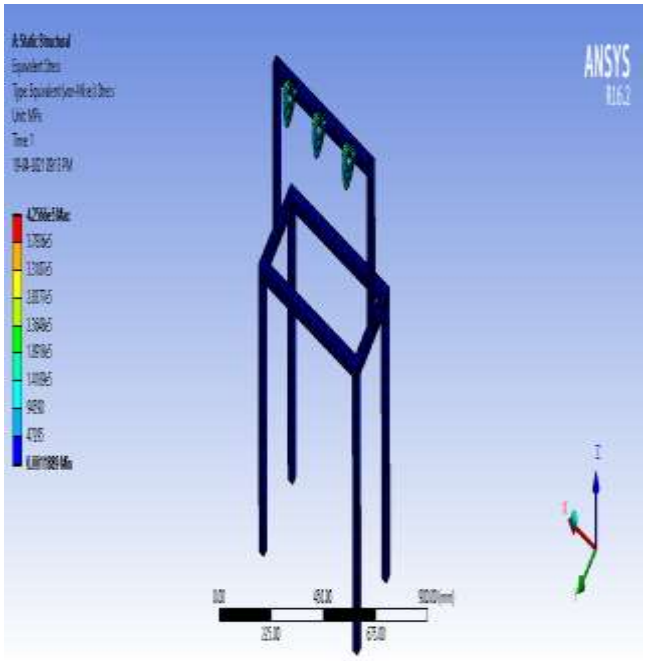


Fig.3 von-Mises stress

The von-Mises diagram shows that the maximum stress 4.256 * 10^6 Mpa are obtained but we assure that disc loads stress to be our consolidations stress.

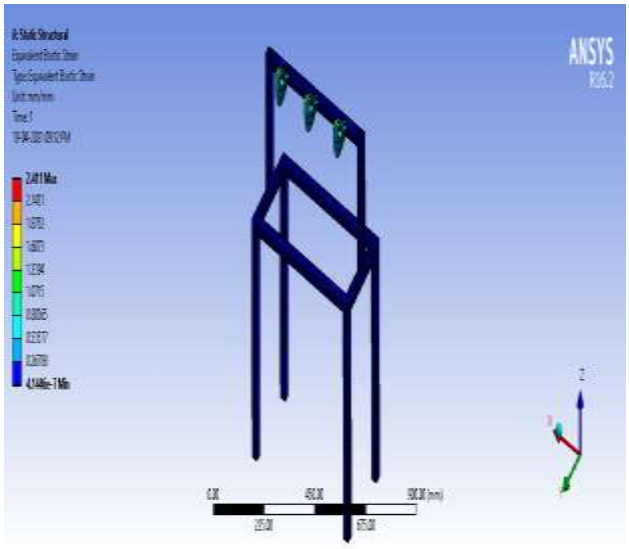


Fig.4 Equivalent Elastic Strain

The equivalent elastic strain to be obtained is maximum limit of 2.41 * 10^-7. However most of the strain occurs at central region.

VI. COMPONENTS

A. Battery

An electric battery is a collection of one or more electrochemical cells in which stored chemical energy is converted into electrical energy. The principles of operation haven't changed much since the time of Volta. Each cell consists of two half cells connected in series through an electrolytic solution. One half cell houses the Anode to which the positive ions migrate from the Electrolyte and the other houses the Cathode to which the negative ones drift. The two cells are may be connected via a semi permeable membranous structure allowing ions to flow but not the mixing of electrolytes as in the case of most primary cells or in the same solution as in secondary cells.

Fig.5 Battery

B. DC Motor

Electrical motors are everywhere around us. Almost all the electro-mechanical movements we see around us are caused either by an A.C. or a DC motor. Here we will be exploring this kind of motors. This is a device that converts DC electrical energy to a mechanical energy.

Fig.6 dc motor

C. Drill bit

Drill bits are cutting tools used to remove material to create holes, almost always of circular cross-section. Drill bits come in many sizes and shapes and can create different kinds of holes in many different materials. In order to create holes drill bits are usually attached to a drill, which powers them to cut through the workpiece, typically by rotation.

Fig.7 drill bit

D. Boring

boring is the process of enlarging a hole that has already been drilled (or cast) by means of a single-point cutting tool (or of a boring head containing several such tools), such as in boring a gun barrel or an engine cylinder. Boring is used to achieve greater accuracy of the diameter of a hole, and can be used to cut a tapered hole. Boring can be viewed as the internal-diameter counterpart to turning, which cuts external diameters

Fig.8 boring tool

E. End mill

An end mill is a type of milling cutter, a cutting tool used in industrial milling applications. It is distinguished from the drill bit in its application, geometry, and manufacture. While a drill bit can only cut in the axial direction, most milling bits can cut in the radial direction. Not all mills can cut axially; those designed to cut axially are known as end mills.

Fig.9 End mill tool

F. Frame

Mild steel is a type of carbon steel that contains a low level of carbon. Otherwise known as low carbon steel, mild steel contains roughly between 0.05% and 0.25% of carbon by weight. It is not an alloy steel; therefore, it does not contain large amounts of anything other than iron and ferrite.

- Affordable – using mild steel is relatively cost-effective in comparison to some other steels.
- Very little carbon – this makes cold-forming mild steel easier, and they are easier to handle as a whole.

Fig.10 Frame

VII. FINAL DEVELOPMENT

Fig. 11 Final project development

VIII. Advantages

Size is compact therefore it requires less space. Time consumption should be low. Less man power is required. Low manufacturing and maintenance cost. High efficient and increase in production.

IX. Applications

Multipurpose machine used in mini workshop. This is also used for thin metallic material. Machine is used for drill the metal or wooden. For workers it was helpful to consolidates their basic level of works and also, they rectify their basic needs and demands.

X. FUTURE SCOPE

In future we can develop machine on various ways likewise,

- We can perform various operations like reaming grooving and some of a surface finishing process also.
- We can also change the motor for various speed of particular manufacturing process or else we can use regulator for varying a desired Spread.
- Some of the other process can also be incorporated in to the machine.
- Cost can also be reduced to some extent by manufacturing it on a mass scale
- In future machine can be made to be portable.

XI. CONCLUSION

The project has been designed to perform different task in a single machine. Hence this project has made an impact in the field of manufacturing among the small-scale industries. It is very useful for the micro small and medium industries new to have only minimum space to accommodate this machine. Also, this project will reduce the cost involve in the manufacturing of small-scale industries. Further we can also meet our basic needs and demand to be fulfilled on single machine of a manufacturing industries. Future work will be focus on making the machine with additional of tools to manufacturing process and to make machine portable.

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