X-Y Axis Profile Cutting Machine 2D Profile Cutting Machine

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Abstract— In engineering many process is required and different parts require different processes. But the properties of materials and other things change with the processes. Project is a mission of creating something new, which is innovative i.e. manufacturing of new product. This machine uses a high speed cutter that can be fed up or down to give depth of cut whereas the x-y axes table is given motion using a pantograph mechanism that copy or scale the template or shape that is to be produced on the job, this is an accurate method so also the first job will be same as the last job, i.e. it is repeatable.

Key words: X-Y Axis Profile Cutting Machine

I. INTRODUCTION

In engineering many process are required and different parts require different processes. But the properties of materials and other things change with the processes. Project is a mission of creating something new, which is innovative i.e. Manufacturing of new product. The prime requirements of an effective project organization therefore are:

1) Flexibility
2) Autonomy
3) Group functional integration
4) Small group size
5) Common work location for all project members

Factors in consideration of projects:

- Compatibility with the objective plan.
- Availability of needed scientific and engineering skills in R & D.
- Critical technical problems likely to emerge.

This pantograph mechanism used for feed as output in X and Y directions. The similar feed mechanism we used in this machine for 2D profile cutting. This machine uses a high speed cutter that can be fed up or down to give depth of cut whereas the x-y axes table is given motion using a pantograph mechanism that copy or scale the template or shape that is to be produced on the job, this is an accurate method so also the first job will be same; as the last job, i.e. it is repeatable.

II. LITERATURE SURVEY

A great number of publications were found during this literature review that was specifically devoted to Kaizen. This publication generally discussed the overall methodology of kaizen and how to implement kaizen programs. However the little information was found on the cost and benefits of kaizen at companies. In doing this review, it was evident that this research would be important in contributing studies on this project.

A. Haverford Township, Delaware County, Pa.John P. Glass, Jr

The present invention relates to reproducing devices or copying devices and particularly to pantographs other like. An object of the present invention is to provide pantograph for use with a heavy-duty metal-working or wood-working machine such as a milling machine other like.

The different object present invention is to provide a pantograph or similar reproducing device wherein the ratio of reproduction is the ratio of

- Now measure the center of rotation of a rotatable pattern-supporting member moves relative to a tracing point.
- The distance the center of rotation of a rotatable Work-supporting member moves relative to a duplicating member.[2]

1) K. zwick

His invention relates to engraving and copying machine of type in which a pantograph system is used, a cutting tool and tracing point or stylus being mounted on the pantograph system.

An object of the invention is to provide a generally improved and more satisfactory machine of this character, and particularly one in which heavy cutting may be accomplished with little or no exertion on the part of the operator, irrespective of the direction of the cut.[3]

III. ARCHITECTURE OF MACHINE

A. Router (Wood Working)

A router is a tool used to router out (hollow out) an area in the face of a relatively hard work-piece, typically of wood or plastic. The main application of routers is in woodworking, especially cabinetry. The hand tool form of router is the original form. It is an important type of hand plane with a broad base. Today the power tool form of directs, with an electrical-motor-driven spindle, and the hand tool is now often called a router plane. Although the hand tool has a few advantages over the power tool and retains favor with some workers, it changed by the modern spindle router. Some workers consider it to be the one of the most versatile woodworking power tool. Becoming more popular is the use of a CNC wood router, which gives the advantages of Computer Numerical Control. Related to the router is a smaller, this version designed for trimming laminates. It is used for smaller general routing work.

Routing and milling appear similar, but are applied to different materials and so require tools that are significantly different in detail. According to the materials the mechanisms of chip formation for both tools are different.

Routing is applied to relatively weak and brittle materials, generally wood. As these materials are brittle in

small sections, routers run at very high speeds and so even a small router may cut rapidly. Type I chips cannot take place because of the normal wood cutting mechanism. The cutter edge is blunt, approaching 90°, therefore Type III chip is formed, using waste material being produced as super fine dust. This dust is a respiratory hazardous, even in benign materials. The forces against the cutter are miner Wight, therefore routers are hand-held.

The material is relatively ductile, when milling metals, although remaining highly strong even at a little scale. The cutters are thus run very slowly, it is used in multi-horsepower milling machines. The cutters are sharpen with acute edge angles; forming a Type II chip and waste may be produced as continuous swarf. Milling machines must be robust and rigid, usually substantial constructions of cast iron, due to Cutter forces are high. [1]

B. Molding

The spindle router is positioned at the finer end of the scale of work done by a moulding spindle. That is to say it is able to cut different types of grooves, and chamfer or radius the edge of a piece of wood. It is possible for cutting some joints. The shape of cut determined by the size and shape of the bit (cutter) held in the collet and the depth by the depth adjustment of the sole plate

A jigsaw is a versatile power tool useful in cutting shapes in a variety of materials. This article help to choose the jigsaw and blade best suited for your project, and help you use it more safely and efficiently.

There are several different features you should be aware of, since not all jigsaws are created equally.

- Power source. Battery operated jigsaws are more portable than saws with power cords, but they are also heavier, and likely will not have the motor torque heavy cutting requires.
- A knob is present on top of Scrolling saws that allows the blade to be rotated without having to rotate the whole saw assembly, making it useful in tight working areas.
- Orbital action saws can provide thrust to the blade while it moves in its normal up and down motion, greatly increasing its cutting speed.
- A jigsaw can be used to cut almost any material from plywood to stainless steel sheet metal if the proper blade is used. Here a few blade characteristics to be familiar with blade composition.
- Jigsaw blades are made from high speed steel, hardened steel, and bimetal composite metals for cutting metal.
- Teeth per inch. The TPI of a blade should be matched to the thickness of the material you are cutting. Thr to five teeth should engage the material you are cutting at all times. An example of this would be, when cutting 1/4 inch material, you will want a blade with 12 to 16 teeth per inch, where cutting 1/8 inch material will be easier and smoother using a blade with 24 teeth per inch.

Once you have selected the blade/saw combination you will use for your project. [4]

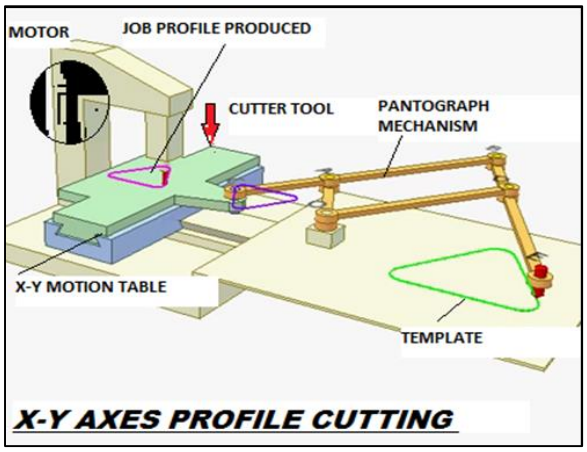

Fig. 1: x-y axes profile cutting

IV. DESIGN

Design consists of application of technical information, imagination, scientific principles for development of new or improvised machine or mechanism to perform a specific function with maximum economy & efficiency.

Hence a careful design approach has to be adopted. The total design work has been split up into two parts.

- System design
- Mechanical Design.

A. System Design

In design we use the following parameters:

1) System Selection Based on Physical Constraints

While selecting any machine it must be checked whether it is going to be used in a large-scale industry or a small-scale industry. The system is very compact therefore that it can be adjusted to corner of a room.

2) Arrangement of Various Components

Keeping into view the space restrictions the components should be laid such that their easy removal or servicing is possible. The every component can be easily hidden. Each possible space is utilized in component arrangements.

3) Components of System

As already stated the system should be compact enough so that it can be accommodated at a corner of a room. All the moving parts should be well closed & compact.

4) Man Machine Interaction

The friendliness of a machine with the operator that is operating is an important criterion of design. It is the application of anatomical & psychological principles to solve problems arising from Man – Machine relationship. Following topics included in this section.

- Design of foot lever.
- Energy expenditure in hand &foot operation.
- Lighting condition of machine.

5) Chances of Failure

The losses incurred by owner in case of any failure are important criteria of design. Factor safety while doing mechanical design is kept high so that there are less chances of failure. Moreover periodic maintenance is required to keep unit healthy.

6) Servicing Facility

The layout of components should be such that easy servicing is possible. Especially those components which require frequents servicing can be easily disassembled.

7) Scope of Future Improvement

Arrangement should be provided to expand the scope of work in future. The system can be easily configured to require one. For our requirement we change the die &punch shapes of notches etc.

8) Height of Machine from Ground

For ease and comfort of operator the height of machine should be properly decided so that he may not get tired during operation.

B. Mechanical Design

Mechanical design phase is very important from the view of designer .as whole success of the project depends on the correct deign analysis of the problem.

Many preliminary alternatives are eliminated during this phase. Theories and wear analysis, He should identify the external and internal forces acting on the machine parts. These forces may be classified as;

1) Dead weight forces.
2) Friction forces.
3) Inertia forces.
4) Centrifugal forces.
5) Forces generated during power transmission etc.

Designer should estimate these forces very accurately by using design equations .If he does not have sufficient information to estimate them he should make certain practical assumptions based on similar conditions

In, mechanical design the components are listed down & stored on the basis of their procurement in two categories

For design parts a detailed design is done & designation thus obtain are compared Design to the next highest dimension which is ready available in market

The parts to be purchased directly are selected from various catalogues & specification so that anybody can purchase the same from the retail shop with the given specifications.

V. CONCLUSION

1) In This Project We Learnt Different Design Software For 2D And 3D Drawing Software Like, AutoCAD And CREO Etc.
2) We Understood Concepts Of Establish Cost Estimation in Our Project.
3) In This Project We Learnt Different Parts Of Machine In Industry.

VI. FUTURE SCOPE

In future we will make product's design and working model in next six Months then our project will complete.

1) In industry future scope.
2) To reduce the number of gear.
3) Less power motor can be used. Machine can be make Automatic.
4) Large machine can be obtained.

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