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Straddle Drilling For Blank of Planetary Gearbox

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ABSTRACT
In the current global landscape, there is a notable shift towards advanced machining capabilities. This innovative machine excels in simultaneous chamfering without relying on extensive automation. Industries are prioritizing the elimination of jerky movements and reducing vibrations to enhance productivity. This cutting-edge model surpasses manual labor through its mechanical prowess in specific fields. Unlike conventional chamfering machines limited to one hole at a time, this technology can efficiently chamfer multiple holes simultaneously, catering to the demands of mass production and ensuring high efficiency and productivity levels across industrial sectors.

Keywords: Automation, Chamfering, Chamfer tool, SPM

I. INTRODUCTION

This project centres on the development of a straddle drilling and die grinding machine for planetary gearbox blanks. Chamfering, an operation crucial for blending sharp corners into smooth edges or eliminating burrs post-drilling, is traditionally carried out manually on lathe machines, consuming significant time and effort. Our college workshop identified the challenge of sequential chamfering, where one side of holes is chamfered first, followed by the other side, leading to time inefficiencies. The straddle drilling machine tackles this issue by simultaneously chamfering opposite sides of the blank with two die grinder machines, ensuring a streamlined process. This machine combines wire cutting and straddle drilling operations to remove burrs from planetary gearbox blanks efficiently. The V-Block, a hardened steel workpiece holder with a 120-degree channel forming a V shape, rotates 45 degrees to create automatic grooves, enhancing chamfer accuracy and saving time. This project optimizes chamfering for planetary gearbox blanks, enhancing productivity and precision in manufacturing operations.

Figure1:V-Block

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A toggle clamp is a tool that used to locate component accurately or parts in position. Typically but not exclusively as part of production process. The primary feature of toggle clamp is to provide grip or hold the workpiece between two different components. In our project, this toggle clamp used to hold the gear blank tightly from top side during the chamfering operation.

Figure2:Toggle Clamp

Chamfering tools are used for grinding centre holes, positioning holes, grinding holes, or deburring and rounding the edges after side surface machining. This chamfering tool is attached to machine such as drill press, lathe, machining centre, etc. This chamfering tool is made up of carbide which is very hard. In our project we have used two chamfering tools which are attached at the end of the die grinding machines. This tool removes the burrs from blank of planetary gear box.

Figure3:Chamfering Tool

Die grinding machine is simple but powerful tool that is traditionally used to grind the metal. This tool is very versatile and can be used to grind almost any material. It is used to polish or smooth rough edges and it has lot of power as well as speed. This die grinding tool is used to remove the rust, auto work, polishing stainless steel, wood carving, finish nonmetal surface.

Figure4:Die Grinding Machine

In this project the metal plate is used to support the whole assembly. It is M.S. metal sheet. All the components are mounted on it such as v-block, die grinder machine, toggle clamp, gear blank, etc. It is base plate which also reduces the vibrations generated during the chamfering operation.

II. METHODOLOGY

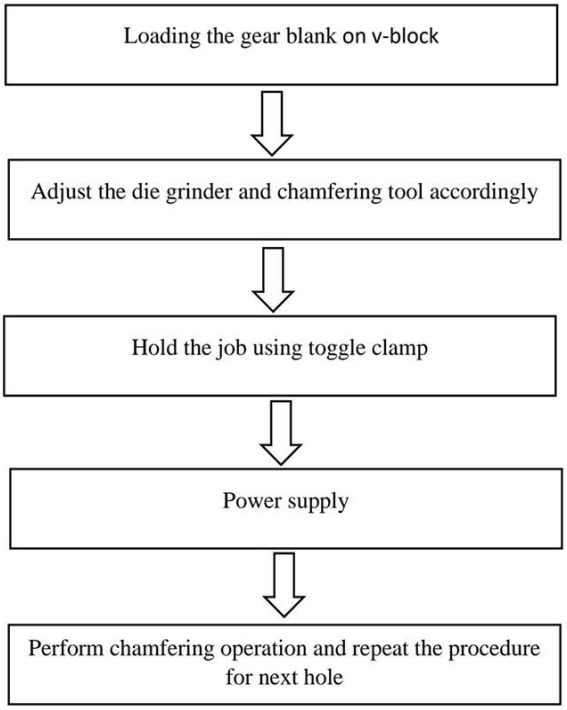

Figure5:Block Diagram

III.WORKING STEPS

The working steps used in this project are discussed below:

- Accurately load the job on v-block and then fix it with the help of toggle clamp.
- Once position of gear blank is fixed then adjust the position of die grinders so that tool accurately chamfer the hole.
- Switch on power supply.
- After giving power supply to die grinder it starts rotating. As the chamfering tool attached at the end of die grinder they also starts rotating.
- This chamfering tool removes the burrs around the holes on gear blank.
- The gear blank has 82 PCD, hence this machine is specifically designed to perform the chamfering operation at 82 PCD.
- When the gear blank gets chamfered unload it and repeat the procedure for next one.

IV. MODEL DRAWING

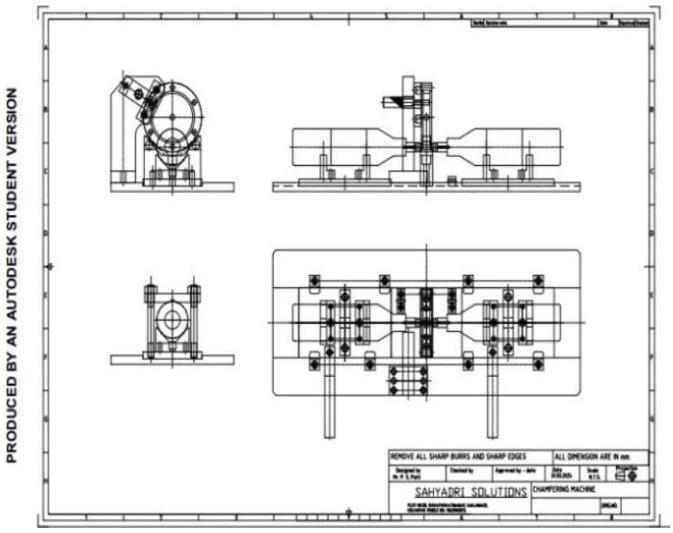

Figure6:Model Drawing by Using AutoCAD Software.

V. BENEFITS

- Automatic chamfering:This machine creates automatic chamfering at 82 PCD.
- Save Time: Simultaneously holes get chamfered from both sides hence it consumes less time than conventional machines.
- Quality: As accuracy of chamfer increases it automatically increases the quality of product.
- Productivity: From mass production point of view this machine is beneficial. Reduce.
- Fatigue: As it performs the operation automatically it reduce the fatigue of labours which occurred due to repeated action.
- Accuracy: During chamfering operation there is no human involvement hence it reduces the human errors and increases accuracy.

VI. FUTURE SCOPE

- Current machine is specifically designed for blank of 82 PCD, in future it can be modified for performing chamfering operation on different PCD of gear blank.
- The chamfering machine can be redesigned as per requirement of industry or customer.
- By adding control panels it can make as fully automatic machine.
- Job feeding mechanism can be added as well as job carryout mechanism.

VII. CONCLUSION

This model of straddle drilling machine used to remove the burrs on gear blank from both sides simultaneously. This project can conclude that the operation performing this machine will overcome the disadvantages of conventional machine and will provide us high rate manufacturing with less time consumption and less consumption of man power.

VIII. ACKNOWLEDGEMENT

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