Attachment on Lathe Machine to Perform Gear Cutting Operation

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Abstract— Gear is most used drive for power transmission in mechanical engineering. Gear cutting is done on milling machine. We know the cost of milling machine is high which is not probably use for small scale industry and workshop so we have make a new attachment on lathe machine for gear cutting operation. The main aim of proper fabrication attachment and working on lathe to perform gear cutting operation. It will reduce the investment as well as space for small scale industry. We used indexing mechanism as same on milling machine. The attachment is mounted on carriage of lathe. We fixed work piece and tool is rotating perpendicular to work piece mounted on carriage and the mandrel is design to hold the cutting tool. The attachment was carefully designed after studying the proper mechanism, power requirement, force analysis on work material and a cutting tool of lathe machine and milling machine.

Key words: Gear, Milling, Lathe, Attachment, Indexing Mechanism, Mandrel & Gear Cutting

I. INTRODUCTION

Lathe is one of the oldest machine tool and is to remove metal from a workpiece to give it the required shape and size. The lathe consist of a bed, a head stock, a carriage with cross slide, and tool post mounted on the cross slide. The spindle which carries the work holding device is driven by motor usually through a gear box for obtaining various speeds. The carriage moves on the bed guide ways, parallel to the axis of the work spindle, and cross slide provides transverse motion the require power for movements is obtained a feed shaft geared to the spindle drive.

Lathes are design in a variety of versions to suit different applications. They are also produce in different precision classes and in different sizes. The cutting speed, feed, and depth of cut is adjusted accordingly lathe machine. Depth of cut can be adjusted by on tool post.

Gear: A gear is rotating machine part having cut teeth, which mesh with another toothed part in order to transmit torque. Gear cutting is the process of creating gear. The most common processes include hobbing, casting, shaping, milling, extruding. Gear is commonly made from metal, plastic and wood.

Gears are toothed wheel use to transmit power for small distances. It is positive type of drive and mostly preferred in machines. The important use of various type of gear is as follow

- Spur gear – sliding mesh gear box, machine tool gear box
- Helical Gear – automobile gear box
- Rack & Pinion – lathe carriage, steering gear box
- Worm & Worm wheel – wiper mechanism, material handling equipments gear box
- Bevel gear – automobile differential gear box
- Spiral Gear – device in textile industry.

II. ATTACHMENT TO LATHE

Base plate: A base plate serves as a base or support. Number of bolts is provided on it so that can be fixed to the lathe by making use of bolts. A base plate should have enough strength and stiffness to bear the weight of the whole equipment. Other properties of base plate include sharp finish, high rigidity, quick functionality and compact size.

Indexing plate: The main purpose of this indexing plate it gives distance between teeth to teeth of gear by the rotation of index pin on indexing plate. The operations involved in manufacturing process are cutting, milling, and drilling, surface grinding.

Mandrel: The purpose of a mandrel is a device for holding and rotating a hollow piece. The processes involved in this manufacturing process are turning, facing, drilling.

Cutter: The main purpose of cutter is to cutting the gear or gear blank. The cutter is rotate perpendicular to work piece.

Mechanism of Gear cutting Attachment to lathe: First remove the compound slide from lathe and the attachment is fixed on the cross slide with nuts and bolts. The cutter is tightened to the mandrel with nut. Now the mandrel is placed in the head stock of the lathe. The work piece is placed on carriage. The operation is started by switch on lathe. The mandrel is rounded around itself and its cuts the work piece.

III. LITERATURE VIEW

This paper investigates the gear cutting operation on lathe machine by giving a milling attachment on lathe carriage. We analysis on material and cutting tool. The lathe machine is use for various purposes i.e. finishing, threading, tapering, knurling, drilling etc. but for gear cutting we use sliding machine hobbing machine and various method also i.e. extrusion.

Our project group members visited number of workshops and small scale industry. In mechanical workshop and small scale industry do not perform gear cutting operation due cost of milling machine. By the view of problems of small scale industry and workshops we introduce new attachment on lathe machine for performing a gear cutting operation on lathe machine for developing purpose of gears.
This attachment is work on indexing as same as milling machine. In this mechanism indexing is used for proper angle to tooth and here work piece is stationary and cutter is rotates. The cutter is perpendicular to the gear blank. We give the rotating motion by using the motion of headstock of lathe. The cutter is fixed between headstock and tailstock and the cutter is fitted in the three jaw chuck and work and gear cutting operation were performed.

IV. PROBLEM FORMULATION

The scope of project is limited to gear cutting, rack and cutting and key way cutting operation. Due to lack of investment in workshop and cannot be affordable. So gear cutting is absence in small scale industry and workshop and also in collage workshops for as mechanical practical

V. RESEARCH METHODOLOGY

By conducting visit to various small scale industry, workshops and discussing with technical person i.e. lathe operator of industry and workshops it has been observed that the industry is in need of milling machine. But milling space is very large occupied and very costly in setup and space also. So according to this problem we introduced new attachment on lathe machine for gear cutting operation.

VI. CONCLUSION

1) The completion of project will benefited to small scale and workshops industry.
2) Hence from this project we make gears on lathe machine.
3) Reduce the space of workshops and small scale industry.
4) This project reduced the cost of milling machine.
5) The manufacturing cost of gear may be reduced by these methods which will helpful to small scale and medium scale industries.

REFERENCE

[1] M. Sagar kumar "Design and fabrication of gear cutting attachment on lathe for machining a spur gear.,” International Journal of Innovation in Engineering and Technology (IJIET), ISSN: 2319-1058.