

Design & Development of Template Assembly & Modification in Center less Grinding Machine

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Abstract: - In almost every type of manufacturing process grinding operation is used. To produce high surface finish & to maintain close tolerances in the manufactured product grinding operation is used. Dressing & truing operations are carry out on the grinding wheel to make the grinding operation more useful & effective. The machining process used for the removal of material from a workpiece using abrasive cutting is called as centerless grinding. As in centered grinding machines we use spindle or fixture used to locate & secure the workpiece between grinding wheel & regulating wheel. The material removal rate of workpiece is depend upon relative speed of wheels. Almost every manufacturing industry prefers centerless grinding process over the other grinding process because in this process many parts produced in short interval of time.

Keywords: - Grinding, Dressing, Truing.

I. INTRODUCTION

The abrasive machining process in which grinding wheel is use as a cutting tool is called grinding. A wide variety of machines are used for grinding. Grinding wheel is made up of abrasive grains. The commonly abrasives are aluminum oxide, silica carbide, boron carbide, diamond, etc. There are various types of grinding use depending upon size, shape, features, & the desired production rate & are as follows

- Surface grinding
- Cylindrical grinding
- Creep feed grinding
- Form grinding
- Internal grinding
- Centre less grinding
- Pre grinding
- Electrolytic in process dressing grinding

Grinding wheels made from abrasive particles which are pressed & bonded together to form a solid, circular shape. Fluid is necessary in grinding operation as in others to cool & lubricate the workpiece & wheel as well as for the removal of chips produced in grinding process. Water soluble chemical fluids, water soluble oil & petroleum based oils are the commonly used grinding fluids. The sharp edges of abrasive grains acts as a cutting tool that remove material in the form of powder or extremely fine chips^[1]. To restore the cutting ability dressing operation is performed on grinding wheel. The basic purpose of this operation is generation of & exposure of new cutting edges & to restore

the shape of grinding wheel which is lose due to the wear & deformation truing operation is performed & it also imports the perfect form of the surface of the wheel.

II. LITERATURE REVIEW

UJJAWAL MAYANK SRIVASTAVA abs said that, by studying and analysing all the dressing procedures, comparisons can be done between any two processes based on a number of factors. The factors can be economics, efficiency, accuracy, effectiveness, productivity or complexity of the process. Comparison can also be in the terms of cutting forces, wear of wheel or tool, wear of wheel during grinding, MRR or rapidity (pace of working) of the dressing process. The selection of dressing procedure also depends upon the properties of the grinding wheel such as type of abrasive type, abrasive grain size, density of grit and type of binder^[1].

PIYUSHA P. JADHAV abs said that entire working of in feed centerless grinding machine is automatically controlled. Here the hydraulic system is used to control entire working of the machine. During manual operation of in feed centerless grinding machine, operator have to face many difficulties like unloading, to move the regulating wheel forward towards the job which rests on blade for appropriate cutting of the material and again move the wheel away from the job after grinding operation. This process reduces much of efficiency of operator and also consumes the more time. There is problem in the unloading of job that it becomes hazardous to the operator. This process increases the cycle time of the machine and labor cost require in three shift is also high which increases production cost^[2].

JOSEPH E. O'NEILL abs said that object of this invention to provide a dressing attachment which may be quickly and easily adjustable to generate any desired profile on a grinding wheel. It is another object of this invention to provide a dressing attachment which will generate convex and concave grinding wheel profiles with equal facility. It is a further object of this invention to provide a dressing attachment which will generate in one continuous operation a grinding wheel profile composed of both straight and arcuate portions without any break in the profile outline^[3].

WILBUR F. JESSUP abs discussed that, this invention relates to truing mechanisms for grinding machines and more particularly to an improved profile truing mechanism. One of the objects of this invention is to provide an improved template controlled truing mechanism which will automatically negotiate rises and falls in the shape of the template including right angle turns. Another object of this

invention is to provide an improved hydraulically operated template controlled truing mechanism^[4].

Pushpendra kuma abs discussed that ,In Cylindrical grinding, various input parameters such as the work piece speed, grinding wheel speed and feed rate has more significant effect for surface roughness and depth of cut has least effect on Material removal rate. In surface grinding the high temperatures encountered at the ground surface create residual stresses and a thin martensitic layer may form on the part surface; this decreases the fatigue strength^[5].

KRAJNIK abs said that ,An analytical 2D model was firstly developed for simulation of plunge centreless grinding .The model inputs the geometry of the grinding gap , the system mechanical properties ,as well as the process kinematics , & outputs the workpiece form along with its centre displacement .The model provides the basis for a new software tool , which a machine tool manufacturer will implement in a CNC controller . In this way all considered outputs will be available to an operator^[6].

III. METHODOLOGY

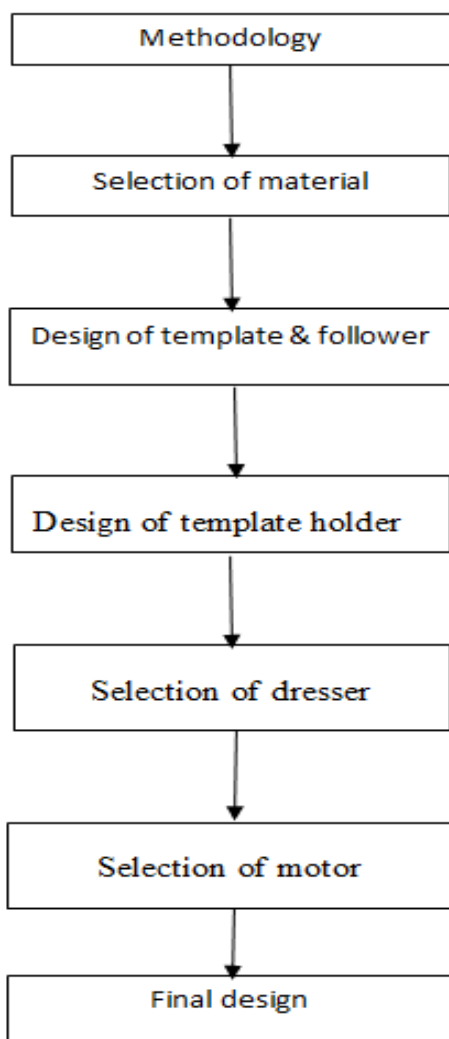


Fig 1

A. Modeling & Development of Template

- Template/ Profile Dressing Slide is an essential unit for grinding two or more diameters concurrently or as per the shape/profile of the job to be ground. This slide can be fixed with leaner guide ways .We have designed the template according to profile of the tap tool as shown in fig.2. Cutting, milling, grinding done as per drawing with the help of tool room department .With machine building department help mount template holder and template.
- Material of template-40C8 ,50-56 HRC hardened
- Material of tool-HSS M2 grade

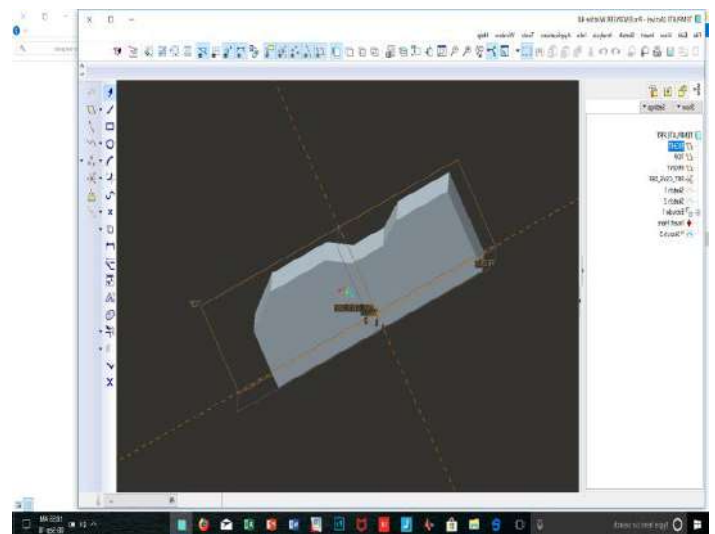


Fig 2:- Template

B. Modeling of Follower:

- We use follower as a primary dresser i.e. follower dresses the profile of the template
- We use 1:1 follower to dresser ratio. For example, if we need female 10mm step on job & if our follower width is 2mm then the template should be $(10-2)\text{mm}=8\text{mm}$ male step.



Fig 3:- Follower (Courtesy-Industry)

C. Diamond Dressers

As the name suggests, these dressers which is mounted and installed on a holder utilize a diamond. The two types of diamond dressers are shown in Fig. 3. The diamond is pointed (at one place only) in shape and the only point performs the dressing operation. The holder is inclined to the line passing through the center of grinding wheel at an angle (known as drag angle) of 10 to 15 degrees. The use of diamond dresser is depicted in Table 1.

Code no.	velocity	radius	length
2508*	60*	0.5	35
2509*	60*	0.5	44.5

Table 1:- Dresser Material Selection

- We use single point chisel type 1 carat diamond dressers of following specifications as we don't have other options for profile dressing.
- Selection of motor: We select motor of rpm 3800 rpm as per old machine.
- Design of machine: we copied the design of machine from existing centreless grinding machine.

IV. RESULT & DISCUSSION

Grinding wheels are not only used to give surface finish to work pieces but it is also used for manufacture very small component which can't be manufacture on lathe as they are difficult to hold in lathe spindle and difficult to work also. Work pieces which are very slim and soft components can be machine on grinding wheel. Grinding machine is very useful machine because it gives way to manufacture small work pieces which can't take large cutting forces and also which can't be mount on spindle. It uses abrasive wheel as a cutting tool. Grinding wheel is made up of abrasive particles in binding material. We are modifying the existing grinding machine by modifying the template which is required for dressing attachment . We have designed the template in a such way that the shape of tool which we want is the profile on template so that the three operations performed on three different machines at three different times operated by different workers, are complete in one stroke with less time.

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