

# GRINDING FIXTURE FOR SINGLE POINT CUTTING TOOL

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**Abstract:** Lathe machine is a mechanical device which is used to do many jobs in which the tool used is single point tool while doing the job the single point tool lose its sharpness and to sharp the tool the grinder is used. Basically the workers or students sharp the tool manually in which they face many problems or they may face a serious accident So we made an structure which is easily fit to any normal grinder in which the rigid frame is attached to grinder an a oscillating liver is attached to frame where tool is attached to liver which come in contact of grinding wheel by oscillating motion to grind the tool which is more efficient than manually grinding.

## INTRODUCTION

Lathe machine is an important machine in mechanical life which is used to do many mechanical jobs the lathe machine consist many parts in which the most important parts is tool which is used to complete the job in lathe machine normally most of tally the tool used in single point tool which is made up of high speed cutting material

It is necessary that the single point tool should have good sharpness for good quality while doing the job on lathe machine a single point cutting tool lose is sharpness

Grander is an another important machine which is used to grind the parts or tools the single point cutting tool is also part of tool which is used to grind on grinding machine.

Normally the workers or the students grind the single point cutting tool by manually in which the face many problems or they also can face a series accident to overcome this the made a structure it can be easily fit to any normal grinder

Our structure consist of a rigid frame which is easily fit to grander an oscillating liver which give oscillating motion is attached to frame and tool holder which is attached to oscillating liver which holds the tool and bring the tool in contact of grinding wheel by oscillating motion and calibrated angular scale is attached to tool holder for give a certain angle.

Basically our structure is more efficient and less effort than manually grinding.

## DESIGN OF COMPONENTS

- i. **Frame:-** It is a rigid body made up of cast iron which gives the strong base to the structure which is fitted to the grinder where the whole mechanism is attached to it. It also provide a certain height to the structure.
- ii. **Oscillating liver:-** It is the simple link which is made up of cast iron where the one end of the link is attached to the frame with nut and bolt. Due to one end is attached and another end is free the link give oscillating motion where the tool holder is attached to it. It is an important part of a structure where the whole mechanism based on it.
- iii. **Spring:-** It is a simple spring which is made up of iron wire in form of coil which can regains its original shape and size after the removal of external force which helps to regain the oscillating link to come its original place.
- iv. **Calibrated angular scale:-** It is an angular scale which fitted to oscillating link by this scale we can give a certain angle to the tool which is used to grind on grinder on which a 360 degree angle is provide.
- v. **Angle setting nut :-** It has a simple mechanism which is used in two wheeler automobile to tighten the side mirror in which two nuts are tight inversely on a single bolt where one nut is fixed and another one can rotted by this simple mechanism tool holder can get angular motion as well as steady motion too. Normally this type of nut are made up of stainless steel
- vi. **Tool holder:-** It has a simple mechanism in which rectangle hollow bar is used where tool can be fitted. Then on the one face of the rectangular bar two hole is drilled where bolts can be insert. In which a nut can be weld on the drilled hole where the bolt pass in the hole to the hollow rectangular bar through the nut. Then tool can be insert in rectangular hollow bar by tighten the bolt the tool get fixed
- vii. **Handle:-** It is a hollow bar which is attached to oscillating liver which give the proper grip to oscillate the tool to the operator

## CONSTRUCTION AND WORKING:-

A rigid frame which is attached to the bench grander where the oscillating link in which the one end of link is attached with the frame with nut and bolt which give the oscillating motion where the tool holder is attached to oscillating link which is use to hold the tool where the tool is insert in the rectangle hollow bar and by tighten the bolt the tool get fixed. In which the calibrated angular scale is provided to tool holder for setting a certain angle to the tool in between the calibrated angular scale and tool holder the angle setting nut is given which is use to set the angle at a certain degree as well as fixed the tool holder at a certain degree which avoid the revered motion which happen due to impact of grinding wheel when the tool comes in contact to it. And the handle which

is attached to the oscillating liver is used for well gripe where the operator can handle this mechanism easily and also coil spring is provide to regain the steady position where the tool does not come in contact with grinding wheel which is fixed in between oscillating liver and frame.

**DESINE AND CALCULATION:-**

- **Permissible tensile stress for material**

$$\begin{aligned} \sigma_t &= 60 \text{ mpa} \\ &= 60 \text{ N/mm}^2 \end{aligned}$$

- **Permissible shear stress for material**

$$\begin{aligned} \tau &= 40 \text{ mpa} \\ &= 40 \text{ N/mm}^2 \end{aligned}$$

- **If the tool holder is once tighten then it does not change its angle until the load is applied above the load 100 N and the load of the impact of the grinding wheel to the tool by the operator is normally below 100 N that means the strength of the angular nut is safe for operation**

- **The angular nut can sustain the load**

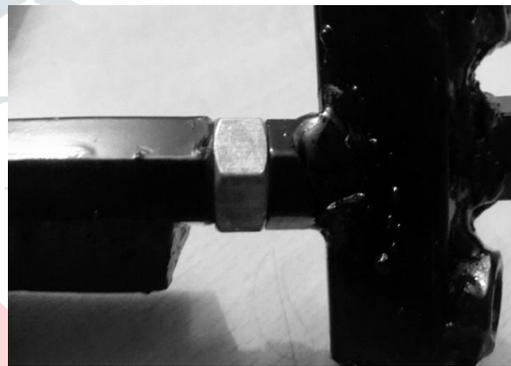
W=?  
We know

$$\begin{aligned} \sigma_t &= W/A \\ 60 &= W/(\pi/4)*d^2 \\ 60 &= W/(\pi/4)*6^2 \\ W &= 1696\text{N} \\ &= 172\text{kg} \end{aligned}$$

Also

$$\begin{aligned} \tau &= W/A \\ 40 &= W/(\pi/4)*d^2 \\ 40 &= W/(\pi/4)*6^2 \\ W &= 1130\text{N} \\ &= 115\text{kg} \end{aligned}$$

Therefore the max load can applied by the operator is 10kg  
Therefore the design is safe



❖ **Design of liver**

- **The liver can sustain load up to**

W=?  
We know

$$\begin{aligned} \tau &= W/A \\ 40 &= W/(1*b) \\ 40 &= W/(3*25) \\ W &= 3000\text{N} \\ &= 305\text{kg} \end{aligned}$$

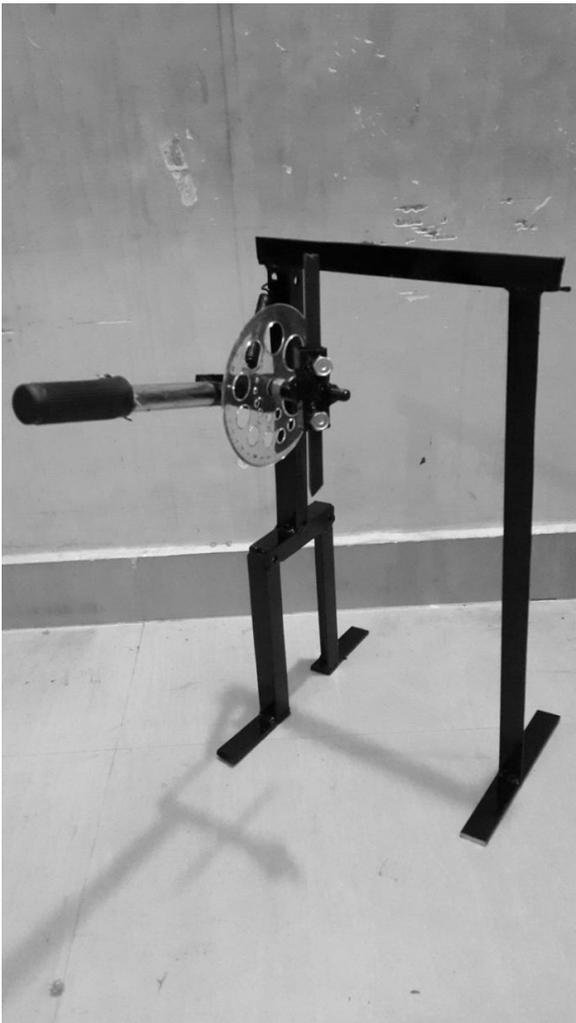
Also

$$\begin{aligned} \sigma_t &= W/A \\ 70 &= W/A \\ 70 &= W/(1*b) \\ 60 &= W/(3*25) \\ W &= 4500\text{N} \\ &= 458\text{kg} \end{aligned}$$



Therefore the design of liver is also safe

❖ Figure of structure



**ADVANTAGE:-**

- ▶ Easy to use
- ▶ Low risk of accident
- ▶ Unskilled person can handle this machine
- ▶ Easily adopted to any normal grinder machine

**APPLICATION:-**

- ▶ This structure can be used in collage at lathe machine where the grinder is used
- ▶ This structure can be used in industries where the grinding machine is used
- ▶ This structure can be used in single point tool testing lab

**REFERENCES:-**

UNITED STATES PATENT

[1] US 2,730,846 R.K HEINEMAN JAN- 17 -1956 (**Cutting tool grinding fixture**)

[2] US2, 365,759 LOUIS H. HOWE DEC-23-1942 (**lathe and shaper tool bit grinding gauge**)

[3] US2, 887,823 A. PASSAROTTI APRIL-3-1958 (**Tool grinding jig**)

