



Fabrication of Grinding Attachment for 2-Super Lathe Machine

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Abstract:

Grinding is used to finish work pieces that must show high surface quality (e.g. low surface roughness) and high accuracy of shape and dimension. Operation on lathe machine is performed in order to machine a given work piece to desired dimensions. After machining a work piece, if needed, grinding operation is performed on it to provide a fine surface finish. The present research is about the fabrication of the proposed model. The work is focused on designing a grinding attachment for a lathe machine. This attachment was later fabricated and installed successfully on an existing model of 2-super lathe machine. The former model was carefully studied in terms of the design feature, specification, capacity, and with the help of new methodology an attempt was made to fabricate a new design that could produce greater efficiency within the economic range.

Keywords: Grinding, surface finish, lathe machine, attachment

1. INTRODUCTION

Lathe has always been the mother of all machines before the invention of CNC machines. Lathe is a machine tool which is used to provide shape to an article (metal/wood/other materials). In early times, lathe was the only machine which was used for most of the major operations. The turning operation on lathe is most frequently performed, and then it's transferred to grinding machine for fine surface finish. For providing fine surface finish, the required grinding wheel is selected depending upon work piece to be used. This machine consists of a grinding wheel made up of abrasive particles and bonding material. The grinding requires high surface finish thus proper motor is selected as required. The main aim of the present research is to obtain high and better surface finish. Since the motor runs at high rpm causing lot of vibrations, thus it will be necessary to damp these vibrations using damper. Also, appropriate rigidity should be provided to clamp the motor on lathe bed. Since the whole sequence of operation, i.e. machining a work piece on lathe and then surface finishing it on the grinder, takes a lot of time and causes human fatigue. Therefore, there comes a need of

creating an attachment of these two machines together to save power, money, labors and also good efficiency of machine. The attachment is designed specifically keeping in mind the use of attachment in workshops, for definite dimensions of the job and quality of surface finish. Every attempt is made to overcome the faults and make the m/c as precise as possible. Special attention was concentrated on the rigidity of the machine which would result in improper functioning of the attachment if not considered. Beside this the important thing which was kept in mind while designing and the manufacturing the unit was that it should be capable of taking sufficient load and forces which it would face while in operation. The attachment though small in size the appearance is really a unique piece of skill and hard work.

2. MATERIALS & METHODS:

The following methodology was adapted in order to execute the proposed objective of the research.

Details of the existing model of Lathe Machine:

Name: 2-SUPER LATHE MACHINE

Table.1. Specification of 2-SUPER Lathe Machine

S. No.	Particulars	Specification
1	Machine No.	5473
2	Size (mm)	155
3	Year	2004
4	Manufacturer	Anil Engineering Works






Figure.1. 2-Super Lathe Machine

Laboratory: Student Workshop, Department of Mechanical Engineering, SIET, SHUATS Allahabad, India. For the above lathe the grinding attachment was designed and fabricated as follows.

- **Grinding Wheel**

Grinding wheel is specified by its grit, grade and structure. Thus, it is important to select a proper grinding wheel. Following were some major specifications of grinding wheel.

Table .2. Specification of Grinding Wheel

S. No.	Particulars	Dimension/Unit
1	Abrasives	Aluminum oxide
2	Grit	60
3	Grade	P
4	Structure	5
5	Bond	V99



Figure.2. Grinding Wheel

Selected wheel specification was **A60P5V99**

- **Coupling**

Table .3. Specification of Coupling

S. No.	Particulars	Dimensions (mm)
1	Outer diameter	60
2	Inner diameter	50
3	Hole diameter	25

- **Bearings**

Bearing was made of mild steel.

Table.4. Specification of Bearing

S. No	Particulars	Dimensions(mm)
1	Outer diameter	40
2	Inner diameter	20



Figure.3. Bearing

- **Motor**

3phase AC motor with power of 1 HP and 2880 rpm



Figure.4. Motor



Figure. 5. Hollow Shaft with Bearing

- **Hollow Shaft**

Table.5. Specification of Hollow Shaft

S. No.	Particulars	Dimensions(mm)
1	Shaft outer diameter	50
2	Inner diameter	40
3	Length	114

Collar of diameter 30 mm and 5mm thickness was provided to hold the wheel firmly and restrict its motion. The other end of

shaft has threads of M19 cut on it using lathe machine, so as to hold the grinding wheel properly from another end.

- **Base Plate**

Base plate was made of mild steel.

Table.6. Specification of Base Plate

S. No.	Particulars	Dimensions (mm)
1	Length	255
2	Height	145
3	Thickness	10



Figure.6. Base Plate



Figure.7. Solid Shaft

- **Solid Shaft**

Solid shaft is made of mild steel.

Table.7. Specification of Solid Shaft

S. No.	Particulars	Dimensions(mm)
1	Diameter	20
2	Length	240

And the two ends having extension of 2mm, diameter of 15mm having thread on it.

- **Final Layout**

After fabrication, all the components are assembled.



Figure.8. Final Layout of Turnery Nexus (Grinding Attachment)



Figure.9. Installed Turnery Nexus on 2-Super Lathe Machine

3. RESULTS & DISCUSSION:

The fabrication and installation of “Turnery Nexus”, Grinding Attachment on was done and setup 2-SUPER Lathe Machine was run and tested. For this purpose, mild steel specimen was taken as a workpiece.

- **Cylindrical Work piece**

Firstly, the work piece was centered on the 2-SUPER Lathe followed by its facing, later turning operation was performed. The following table gives comparison of dimensions of cylindrical workpiece before turning and after turning operation was performed on 2- SUPER Lathe Machine.

Table .1. Specification of Cylindrical Workpiece

Before Turning Operation	After Turning Operation
Length - 170.5mm	Cutting length - 60mm
Original diameter - 24.5mm	Reduced diameter – 23mm
Radius - 12.25mm	Radius – 11.5mm



Figure.1. Cylindrical Workpiece

The following table gives comparison of surface roughness of the turned cylindrical workpiece (on 2- SUPER Lathe Machine) before grinding operation and after grinding operation.

Table .2. Comparison of Surface Roughness of Cylindrical Workpiece

No. of trials	After Turning Roughness (μm)	After Grinding Roughness (μm)
1	1.50	1.21
2	1.51	1.24
3	1.54	1.27
4	1.58	1.30
5	1.61	1.31
Average Surface Roughness	1.548	1.266



Figure.2. Cylindrical Workpiece after Grinding Operation Finishing

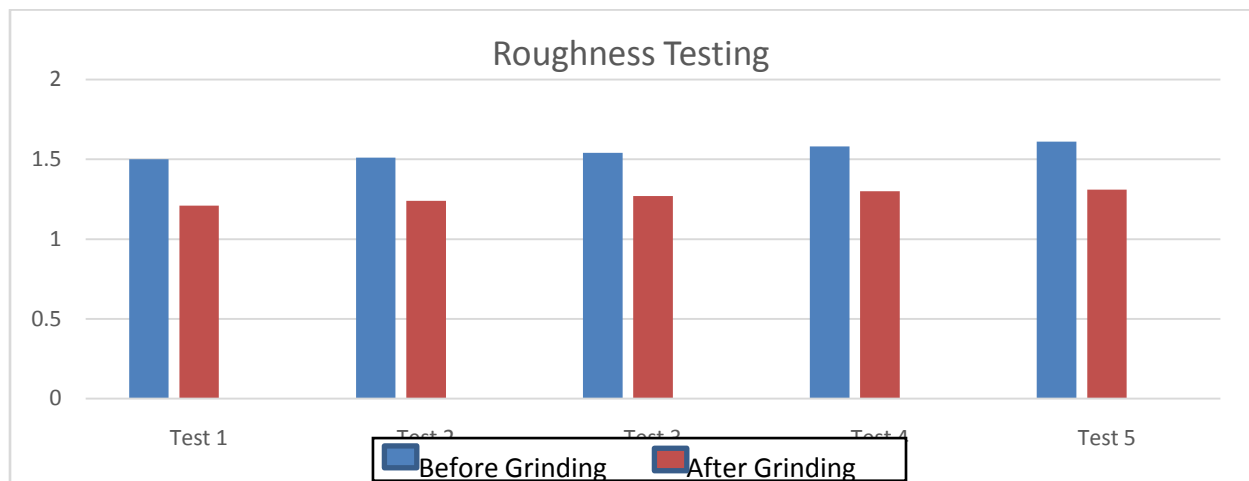


Figure.3. (a): Comparison of Surface Roughness of Cylindrical Workpiece

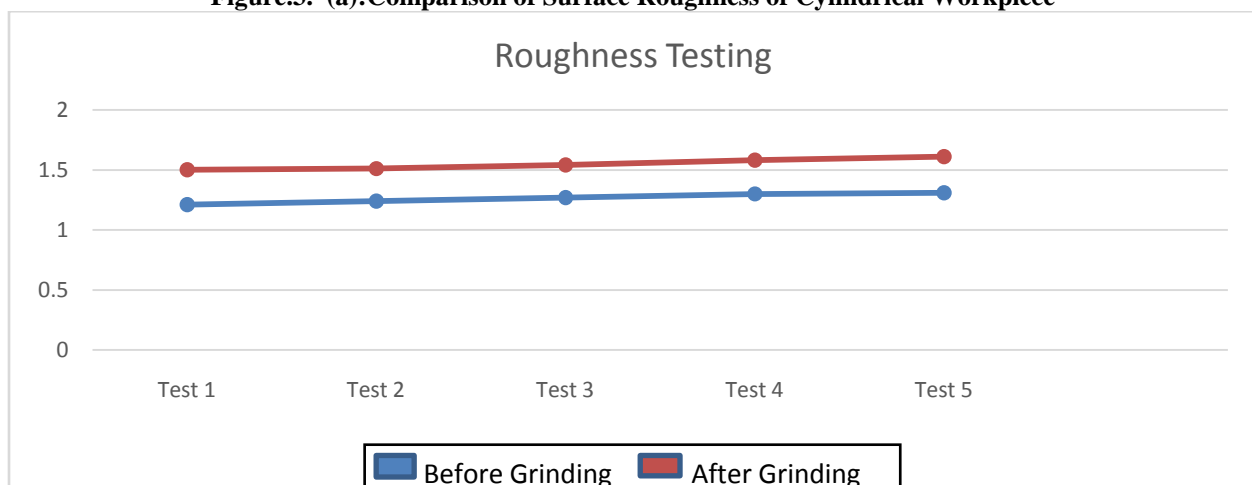


Figure.4. (b): Comparison of Surface Roughness of Cylindrical Workpiece

- **Rectangular Work piece:**

Table.3. Specification of Rectangular workpiece

Dimension (mm)	10x10x160
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Figure.5.Rectangular Workpiece

Table.4. Comparison of Surface Roughness of Rectangular Workpiece

No of Trials	Before Grinding Roughness (μm)	After Grinding Roughness (μm)
1	0.95	0.59
2	0.98	0.63
3	1.0	0.67
4	1.1	0.69
5	1.3	0.70
Average Surface Roughness	1.066	0.656



Figure.6. :Rectangular Workpiece after Grinding Operation

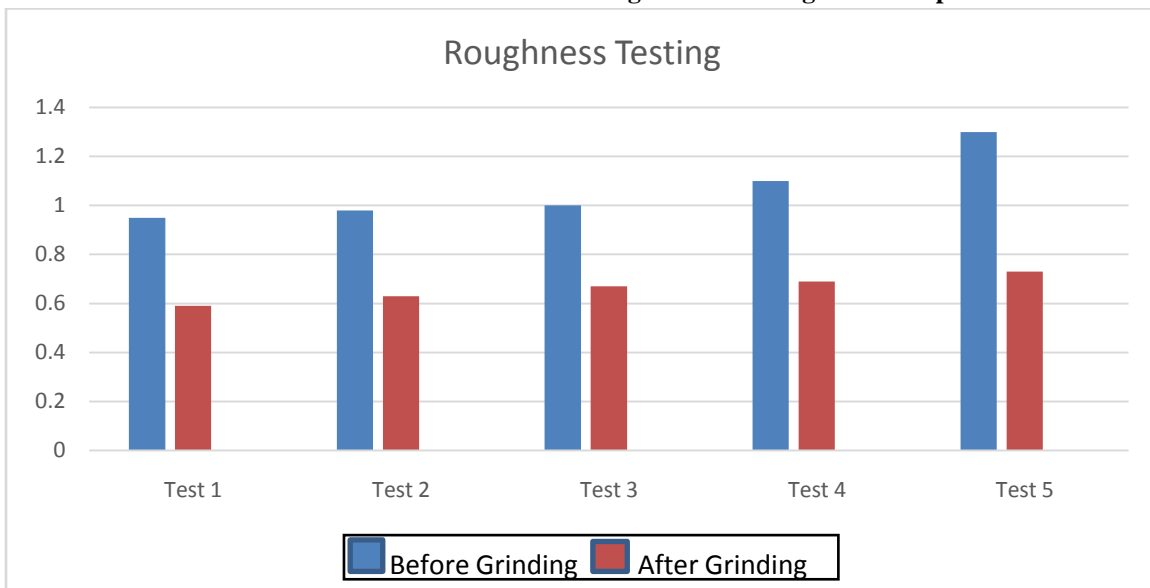


Figure. 7. a):Comparison of Surface Roughness of Rectangular Workpiece

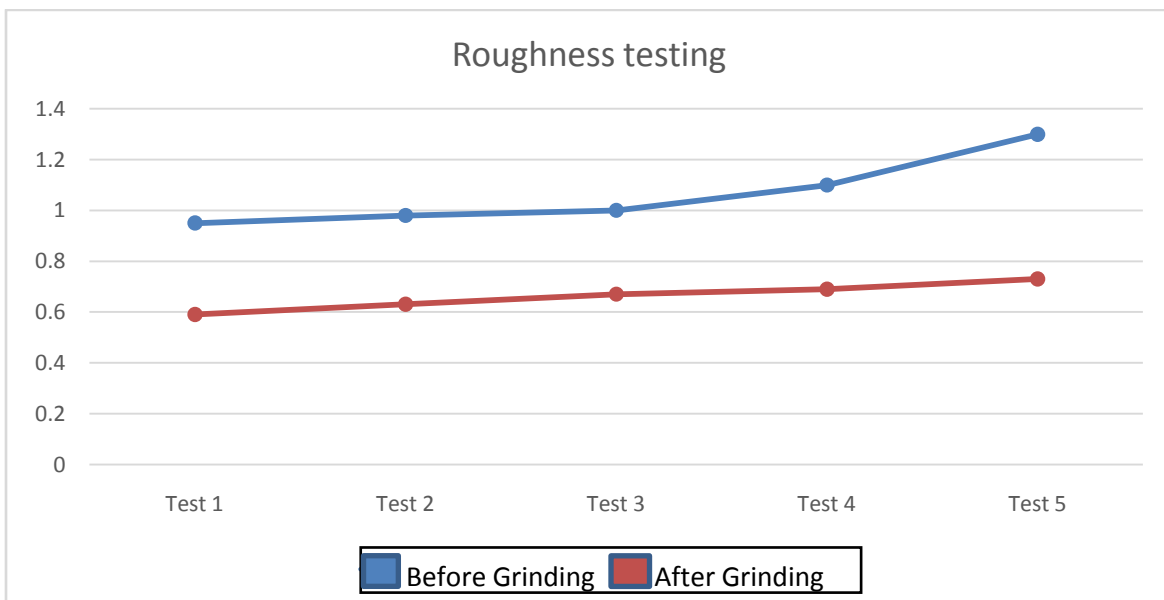


Figure.8. (b): Comparison of Surface Roughness of Rectangular Workpiece

4. SUMMARY & CONCLUSION

The present project work aimed to design and fabricate a Grinding Attachment for a specific model of Lathe Machine installed in **Student Workshop**, Department of Mechanical Engineering, SIET, SHUATS, Allahabad, India. In this relation the designing part was achieved using design software and later fabrication was performed and finally the assembly of designed product was obtained. The following conclusions can be summed up as follows:

- The setup was designed using AutoCAD and Solid Work software.
- The designed components were fabricated and later assembled and the final assembled product was named as **“Turnery Nexus”** (Grinding Attachment for Lathe Machine) and was installed in **Student Workshop**, Department of Mechanical Engineering, SIET, SHUATS, Allahabad, India.
- The setup was easily installed.
- The setup was running smoothly and met the desired expectation in terms of surface finish.
- The setup was economical in cost.
- The final size of the setup was compact and required less maintenance.

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