



Grinding Machine: Definition, Types, Parts, Working & Operations (With PDF)

In Manufacturing Technology by Amrit Kumar October 1, 2018 Leave a Comment

Hello viewers, so today we are going to study the **Definition, Working, Types, and Operations of the grinding machine**. And at the end of the article, I will give you a **PDF downloadable link so that you can download the PDF of the grinding machine** as well.

In the manufacturing process **grinding operation** is also an important operation to make a finished product, so let's start the topic.

Grinding Machine Definition:

A **grinding machine** or grinder is an industrial power tool that uses an **abrasive wheel for cutting or removing the material**.

It is a process of metal cutting by using a **rotating abrasive wheel** from the surface of the workpiece.

Generally, the grinding is finishing operation to show the **high surface quality, accuracy of the shape and dimension**.

Grinding machine operation is also carried out for machining too **hard material**.



Working principle of Grinding Machine:

The **working principle of a grinding machine** is quite easier to understand.

In a **grinding machine**, there is an electric motor which supplies the motion power to the grinding wheel with the help of a belt and pulley.

So when we start the electric motor the motor rotates at a certain rpm (150-15000 RPM, it may change according to the types of grinding machine) with the help of **v-belt and cone pulley** the grinding wheel also starts rotating and we perform the operation.

Here below I mention the various types of grinding machines with their working.

Grinding Machine Types:

Rough Grinders:

- Floor or bench grinders
- Portable grinders
- Abrasive belt grinders
- SwingFrame grinders



Precision Grinders:

- Surface Grinders
- Cylindrical Grinders (Plain, Universal, and Centerless grinders)
- Tool and Cutter Grinders
- Internal Grinders (Chucking, Planetary, and Centerless grinders)
- Special Grinding machine

Floor or bench grinder

Floor or bench grinder is a small type of machine used in the labs where a small workpiece has to grind. For example, when we manufacture a single-point cutting tool for a lathe machine we use to manufacture by floor or bench grinder.



Bench Grinder (Source: IndiaMart)

Portable grinder:

As the name indicates Portable that means it is not fixed at one point. The portable grinder is used for cutting tiles.



Portable Grinder (Source: IndiaMart)

Abrasive grinder

The **abrasive grinder** is a similar type of these grinders but the main difference is here abrasive is used while cutting and finishing the job. This is more costly than the floor and portable grinder.



Abrasive Belt Grinder (Source: IndiaMart)

SwingFrame Grinder

The **swing frame grinder** is a complicated type grinder machine and it is used for the heavy workpiece.



SwingFrame Grinder (Source: IndiaMart)

Surface Grinder:

A **surface grinder** consists of an **abrasive wheel**, a **chuck (a workpiece holding device)**, and a **rotary table**. The chuck is used to hold the material in place while the wheel and object are rotated to produce a smooth finish.



Surface Grinder (Source: IndiaMart)



Cylindrical Grinders:

A **cylindrical grinder** is used for shaping the outside of a workpiece.

These machines accept workpieces in a variety of shapes as long as they can be rotated through a central axis.

In a cylindrical grinder, both the workpiece and grinding wheel are simultaneously rotated.

Outside diameter grinders, internal diameter grinders, and centerless grinders are all types of cylindrical grinders.



Cylindrical Grinders (Source: IndiaMart)

Centerless Grinders:

A **centerless grinder** is a type of cylindrical grinder which uses two rotary wheels to secure the workpiece in place.

Unlike a centered grinder, a centerless grinder does not make use of a spindle.

The speed of the rotation of the wheels determines at what rate the material is removed.

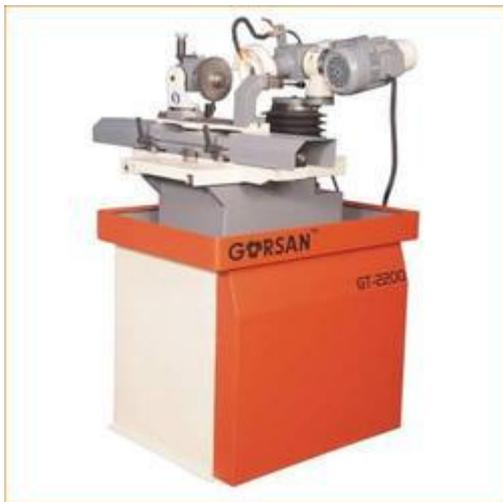


Centerless Grinders (Source: IndiaMart)

Tool & Cutter Grinders:

A tool and cutter grinder makes use of a CNC machine tool with up to 5 axes and multiple grinding wheels.

These devices are used for sharpening and producing milling cutters such as drills, endmills, and step tools. It is also widely used for producing the tools needed in the woodworking and metal cutting industries.



Tool & Cutter Grinder (Source: IndiaMart)

Parts of a Grinding Machine:

A grinding machine consists of the following parts:

- Base or Bed
- Tables
- Headstock
- Tailstock
- Wheel head
- Crossfeed



Base or Bed:

It is a cast-iron casting rests on the floor and supports the other parts which are mounted on it.

The base houses the table drive mechanism and on the top of the base accurately machined guideways are provided at right angles to the table to slide on it.

Table:

There are two tables, a lower table, and the upper table.

The lower table provides transverse movement to the work by sliding over the guideways on the bed, which can be moved by hand or power.

The upper table pivoted at its center over the sliding table and provided with headstock and tailstock and these can be positioned at any position along the table to hold the workpiece.

The upper table can be swiveled and clamped for grinding straight or tapered surface.

Head Stock:

The headstock fixed over the bed and supports the workpiece by means of a dead center and drives it by means of a dog or it may hold the workpiece in a chuck and drives it.



Tailstock:

The tailstock can be adjusted and fixed in any required position to accommodate different lengths of the workpiece.

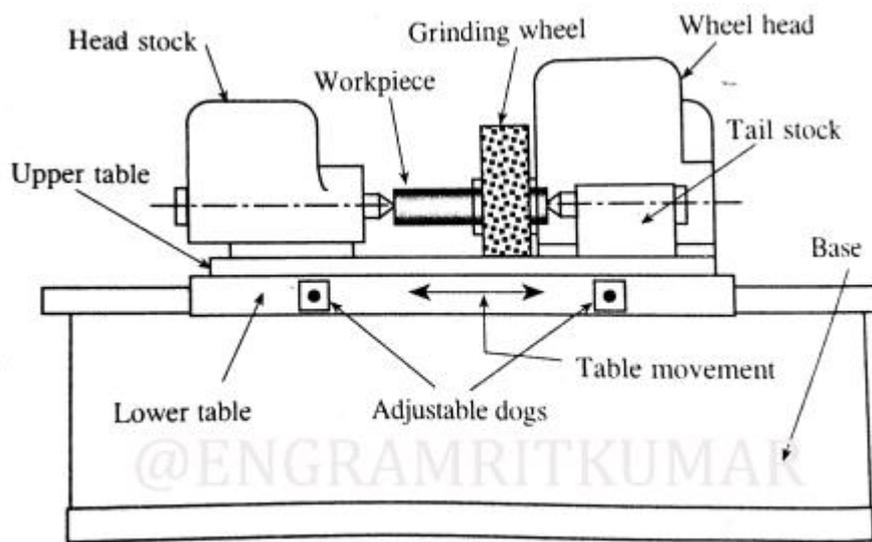
Wheel Head:

It consists of a grinding wheel and its driving motor.

The wheel head is mounted on a slide at the rear end of the base and moves perpendicularly to the table ways by hand or power to feed the grinding wheel to the work.

Crossfeed:

The grinding wheel can be fed to the work by engagement of the crossfeed control lever by hand or power.



Plain cylindrical grinding machine

Grinding

Machine Schematic Diagram

Grinding Machine Operations:

Surface grinding operation:

It is used to make a flat surface, the rotating grinding wheel removes the material from the top surface of the workpiece gives a flat look.

Cylindrical grinding operation:



This type of **grinding operation** is performed only for cylindrical jobs.

The cylindrical grinding operation is two types:

- External cylinder grinding
- Internal Cylinder grinding

External cylinder grinding operation:

When we need to remove the excess material from the outer surface of the workpiece then we performed an external grinding operation.

Internal cylinder grinding operation:

This operation is done for smoothing the internal surface of a hole or any cylindrical workpiece.

Centerless grinding operation:

In this type of grinding operation two grinding wheels are fitted parallel with a little 5-10 degree angle, this angle is provided to get a longitudinal motion of the workpiece.

A cylindrical rod is entered between the two grinding wheel due to the tilted angle the workpiece is automatically pass through the wheels, and we got a smooth surface.

Form grinding operation:



In this type of grinding process, the grinding wheel is maintained exactly the same shape as the final product.

When the job is passing through it automatically the pre-determined shape is formed on the workpiece.

Wet and Dry grinding operation:

Although there are two methods of doing a grinding operation, one is wet grinding and the second one is dry grinding.

Wet grinding:

In wet grinding, during the grinding operation, we sprayed coolant generally water or any coolant to cool the surface so that the longevity of the grinding wheel increases and also we get a fine surface finish.

Dry grinding:

In this type of grinding process coolant is not used.

Dry grinding is not preferable, in this process grinding wheel wear is more plus we get an uneven surface finish.



Conclusion

So today we have learned about the **definition, working, types, and operations of grinding machines**. I hope you understand all these and also I share some videos by NPTEL I highly recommend you to go through all these videos and clear your doubts. If you like this article, don't forget to share it on social networks.

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If you have any queries or doubts about the lathe machine tool, you can ask me in the comment section or we have a dedicated Q&A platform for you where you directly post your question: [Click here to post your question](#), and also you can [join our facebook group](#). I will love to hear from you and glad to help you. Till then enjoy rest your day. Cheers