cutting speed, feed and Depth of cut.

cutting speed.

- The cutting speed is defined as surface Rate of travel of cutting edge Relative to WP.
- It is expressed in meter per second or meter per minute
- The speed selected for any operation depends on the work material, tool material, cutting fluid and types of cut.
- lower speed : use used Harder mat and softer mat. can be taken Higher speed.

Lathe feed :→

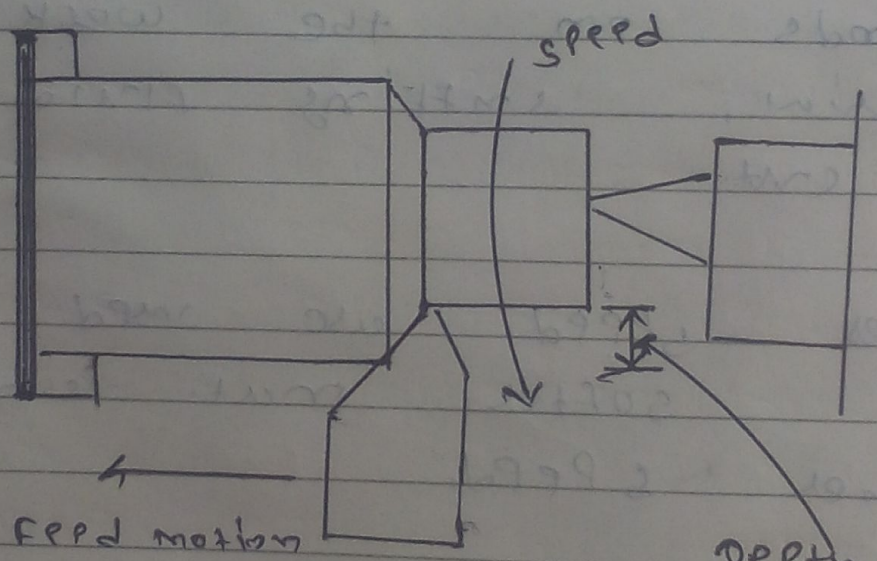
Distan cutting tool advance along length of work for every Revolution of the spindle.

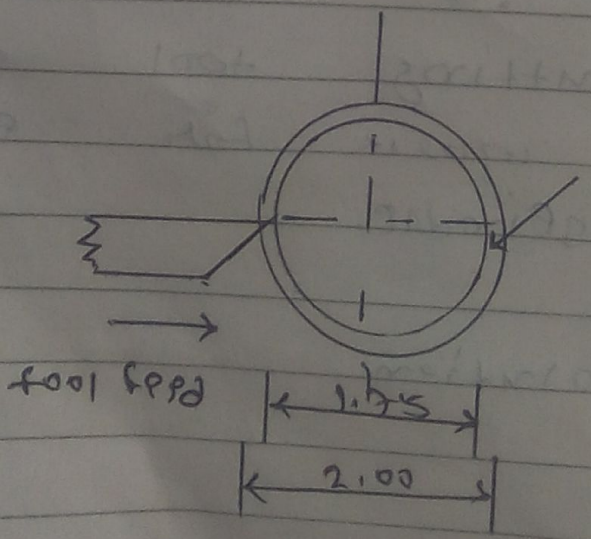
- mm / Revolution

Normal dist^{n} from the surface being removed to the surface exposed by the cutting tool.

measured in mm

only one roughing and one finishing cut.





Thrust :→ The force acting on an object perpendicular to the surface is called thrust.

cutting force } cutting force, Radial force and } 3
Thrust force Thrust force (feed force)

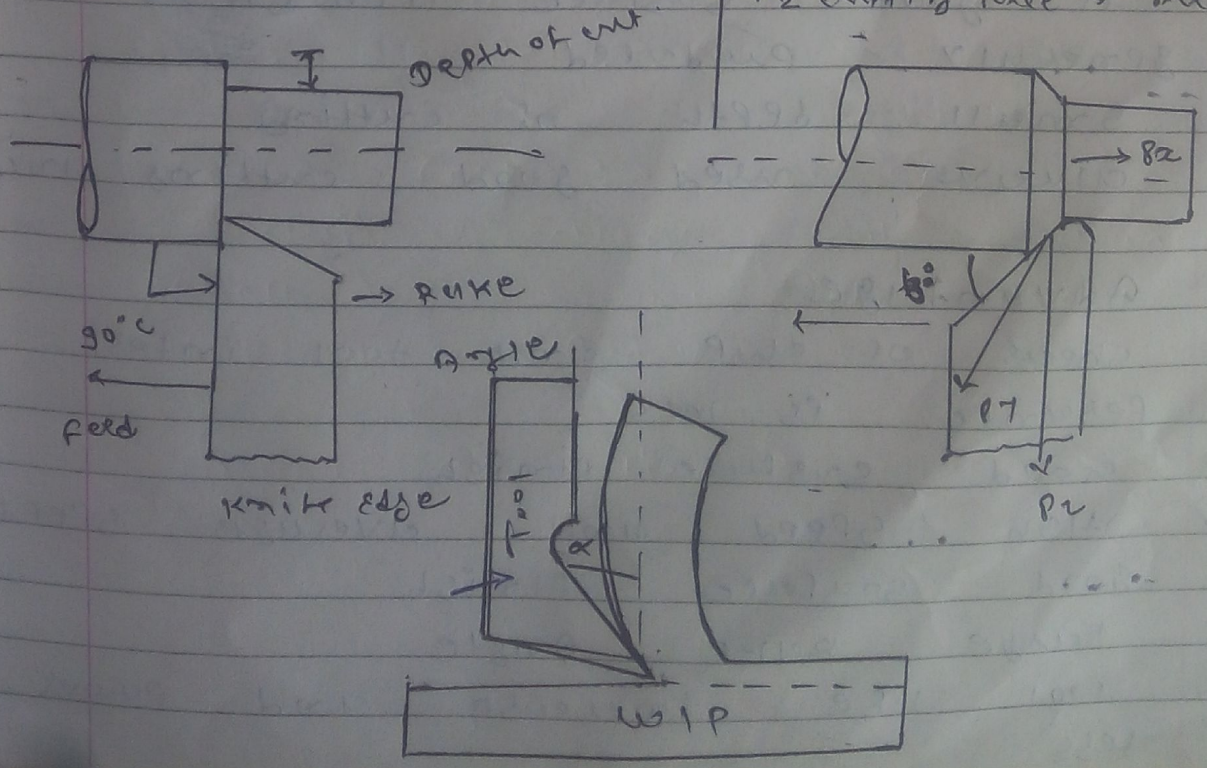
ORTHOGONAL CUTTING

- Single point cutting tools called O.C
- called two dimension
- cutting angle 90° to parallel
- cutting Area less on WIP
- Tool life friction Angle more
- Metal Remove less
- chip flow coil light and flow spiral
- Turning, Broaching, slotting etc

OBLIQUE CUTTING

- Multi point cutting tool
- three dimension
- cutting Angel less than 90°
- cutting area more on WIP
- Tool life longer friction Angle less
- metal Remove more
- chip flow side ways and long curl.

Turning
P_3 Feed force → opposite direction
P_2 cutting force → feed direction



describing the Angle of the work

* chip formation and types of chips :-

↝ chips :→ in cutting process removed metal on the work piece, like as small coil or Rig types is called chips. Ribbon

↝ Types of chips :→
(1) continuous chip
(2) Built - up edge chips.
(3) Dis continuous chip.

(i) continuous chip. (Ductile met)
↝ continuous chip use usually. formed at high Rake angles and at high cutting speed
↝ A good surface finish is generally produced
↝ small depth of cutting.
↝ always used good cutting fluid

↝ Advantage
↝ sheer of chip and tool interference is less
↝ good surface finish
↝ High speed and average speed good surface finish
↝ large Rake Angle
↝ tool life increase and power less

The Angle of the cutting edge relative to the work. There we two types Angles, Namely the back Rake Angle & side Rake Angle (both of which help to guide flow)

- Disadvantage
- Always used High Level cutting fluid used so cost increased
- Edge must be sharp like knife
- continous chip use not always desirable particulars in Auto mated machine
- operation has to be stopped to clear chips.

(2) Built - up edges chips. (Ductile mat)

- Bue consists of layers of mat. from the WP that are gradually deposited on the tool.
- Bue them become unstable and eventually break up.
- Rank Angle less.
- Bue mat. is carried away on the tool side of the chip.
- The rest is deposited Randomly on the WP surface
- Bue Result in poor surface finish.
- Decreasing the Depth of cut.

- Advantage
- Less - Rake Angle
- cutting speed is less.

~ Disadvantage
~ surface finish not good
~ tool life decreased due to sheer on WP.

(3) Discontinous chip. (Brittel mat.

~ Discontinous chips consists of segments that may be firmly or loosely attached to each other.

~ These chips occurs when mic hard, Brittel mat. such as cast iron

~ Small Rake Angle
~ low cutting speed
~ High Depth of cutting cut may be not Provided cutting fluid

* Advantage
~ Average surface finish
~ low Power used
~ average tools life

Disadvantage :→

- surface finishing is not good
- tool life decreased to due wear

Functions and types of chip Breakers. :→

- Functions of chip Breakers.
- During machining operation, diff" types and sizes of chip are produced from diff" WP mat.
- The chips obtained by machining Brittle mat. like cast Iron and majority of nonferrous metal are small and discontinous and their disposal do not pose any problem with the operator.
- on the other hand while machining ductile material long homogenous, continous chips are obtained. even continous chip with Built-up edge are also obtained
- This chips create many difficulties and problems
- will produce scratches on finished surface
- they will not permit machining process on interfere with the process.

~ It is therefore desirable that these continuous chips must be broken down into small segments so that disposal becomes easy. for this purpose chip breakers are used

~ main function on chip breaker
(1) To control the sliding chips on tool face and also to direct the chip in proper direction
(2) To break the chip

~ The chip flow and its control is made possible by selecting proper Rake Angle and cutting Angle.

~ To control the chip flow a groove is cut on tool face or a small piece of steel is fited on the tool face

~ These Arrangement of providing groove or Block is mounting a steel called chip breaker

~> The chip Breaker will offer Resistance to chip flow by creating obstruction. This will force the chip to curl and ultimately break into small pieces which can be easily disposed.

Types of chip Breakers.

(1) Groove type
(2) obstruction type

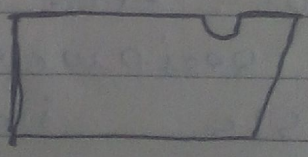
(1) Groove type

~> Shallow grooves are cut by the side of the cutting edge of the tool which will the continous chip obtained from the WP.

~> Groove types chip Breakers the width of the groove or step depend upon the feed rate

~> The groove depth of 0.01 inch is kept.

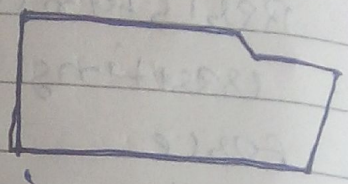
~> may be width is equal to feed or 1.5 time feed



Groove type

2. Obstruction type.

⇝ Mechanical obstruction type chip Breaker



⇝ These type of chip Breakers provide obstruction in the chip flow and force them to curl and Break into pieces.

⇝ The path of chip can be estimated considering the width and thickness of the chip Breaker.

⇝ On carbide tipped tools inserts use Mechanically clamped and they use adjustable According to the WP tool-combination. Thus they use more flexible in use.

(13)

⇝ Kinematic chip Breaking.

This arrangement is used some transfer machines. The feeding tool is held in the holder and is connected with spring and pusher.

⇝ The pusher is driven by the cam because of this the tool feed receives additional reciprocating motion which assists in breaking

the chips into small pieces. In this arrangement chips of diff^{n} thickness are obtained

Advantage of chip Breakers

- Helps in getting desired Results.
- By proper selection of speed, feed and depth of cut combinat, desired metal Removal Rate can be obtained
- Restricts the wear Rate as well as power consumption
- Helps in maintaining almost constr production Rate
- Provided safety for operators and machine tool.

Disadvantages

- Groove types chip Breakers weakens the tools.
- To provided the groove special types of grinding wheel is necessary
- When cutting conditions alters, the groove type Breakers will have to be Replaced
- It offers Restriction in chip flow
- increase cutting force
- Power consumption increase

cutting fluid.

~ Need of cutting fluid.

~ cutting fluid improve machinability.
~ Increase tool life
~ provided Better WP surface finish
~ Reduce in tool forces.
~ eliminate chip interference
~ A fluid improves machinability through cooling and friction Reduction of chip flushing
~ Dimensional Accuracy
~

* Properties of cutting fluid.
(i) no ill effect on the normal interaction of the mic element
(2) ease of handling, preparation and concentration control
(3) Normal flushing of of detergent action on the mic sump and the fluid system.

(5) optimum service and min. cost
(6) Rusting and corrosion of WP and m/c
(7) Foaming, smoking, fogging or misting.
(8) Development of odors.
(9) toxic or other effects on person nnel
(10) deterioration of paint or finish on m/c.

* Merchant's force circle diagram

→ Merchant's force circle is a method for calculating the various force involved in the cutting process.
→ This will first be explained with vector diagrams these in turn will be followed by a few formulas.

(1) Set up x-y axis labeled with forces and the origin in the centre of the page. the scale should be enough to include both the measured forces. The cutting force (Fc) is drawn horizontally and the thrust force (Ft) is drawn vertically.

(forces) and Angle