- Sidharth Nair
- PES2201800620

MFP ASSIGNMENT

1)

BULK DEFORMATION	SHEET METAL FORMIN
-> Bulk deformation is the metal forming operation in which a significant change in shape occurs via plastic deformation in metallic parts.	-> Sheet metal forming is a metal forming operation in which the geometry of a piece of sheet metal is modification upon the addition of a force.
-> The area to volume ratio of workpiece is high	-> The area to volume ratio of workpiece is low
-> Permanent plastic deformation is lighter than elastic deformation	-> Permanent plastic deformation and elastic deformation are comparable.

2)

i) Singly curved parts.
ii) Contoured & flanged (parts with stretch flanges)
iii) Curved sections
iv) Deep recessed parts.
v) Shallow recessed parts.

3) 5 types of Sheet Metal Forming processes are:

i) Curling: It's a sheet metal forming process that is used to smooth out the otherwise sharp and rugged edges of sheet metal. Sheet metal often contains sharp edges with 'burrs' after it's initially produced. Curling is a forming process that involves de-burring sheet metal to produce smooth edges.

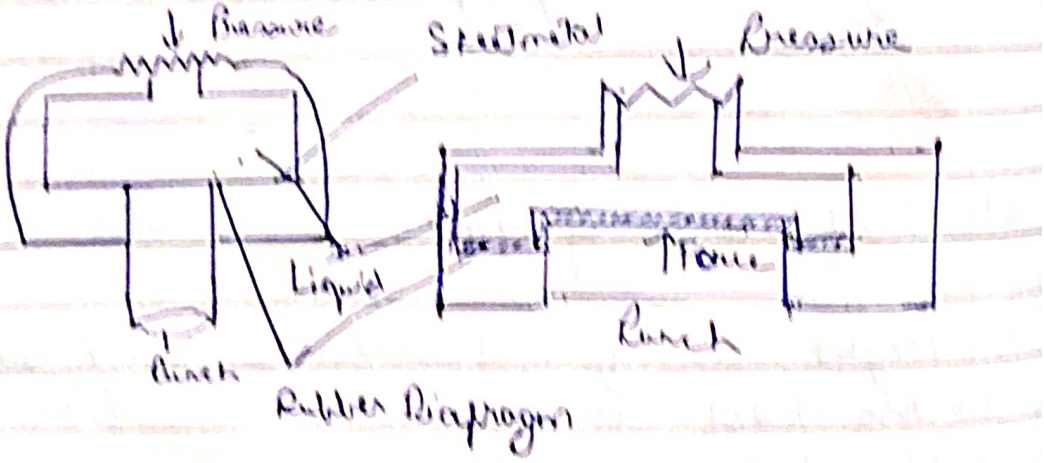
ii) Bending: Another common sheet metal forming process is bending: Companies typically perform bending on sheet metals using either a brake press, or similar machine press. The sheet metal is placed over a die block, at which point a punch presses down onto the sheet metal. Bending doesn't actually create holes in a sheet metal it bites up to its name by bending sheet metal in the shape of the die.

3) Ironing: Sheet metals may also be ironed to achieve a uniform thickness. Most aluminium cans, for instance, are made of ironed aluminium. In its raw state, the aluminium sheet metal is too thick for beverage cans. So its ironed to achieve a thinner, more uniform composition.

4) Laser cutting: This method has become increasingly common in sheet metal forming processes in recent

years. Unlike laser cutting, sheet metal is exposed to a high concentrated beam that burns a hole in the metal. It's a faster and more precise cutting method that can be performed automatically using a computer numerically controlled (CNC) laser cutting machine.

*) Punching: Punching is a steel metal forming process that involves the use of a punch and die set to create holes in steel metals. The sheet metal is placed between the punch and die. Next, the punch presses down and through the steel metal.



A)

This is a metalworking process where sheet metal is pressed between a die and rubber block, made of polyurethane. Under pressure, the rubber and sheet metal are driven into the die and conform to its shape, forming the part. The rubber pads can have a general shape.

5) Bend radius, which is measured to the inside curvature is the minimum radius one can bend a pipe, tube, sheet, cable or hose without kinking it or damaging it, or shortening its life. The smaller the bend radius, greater the material flexibility.

Bend allowance is defined as the material required to add to the overall length of the sheet metal in order to get cut in the right size. Density in metals can be measured in GPa. Higher the density, stiffer the material.

Bend Angle is the measurement between the sheet flange and its original position, or the included angle between perpendiculars drawn from sheet lines.

6) Importance of NTM

1) High accuracy and better surface finish
2) No Tool wear
3) No Lubrication required
4) Less working force required
5) Complex shapes can be machined.

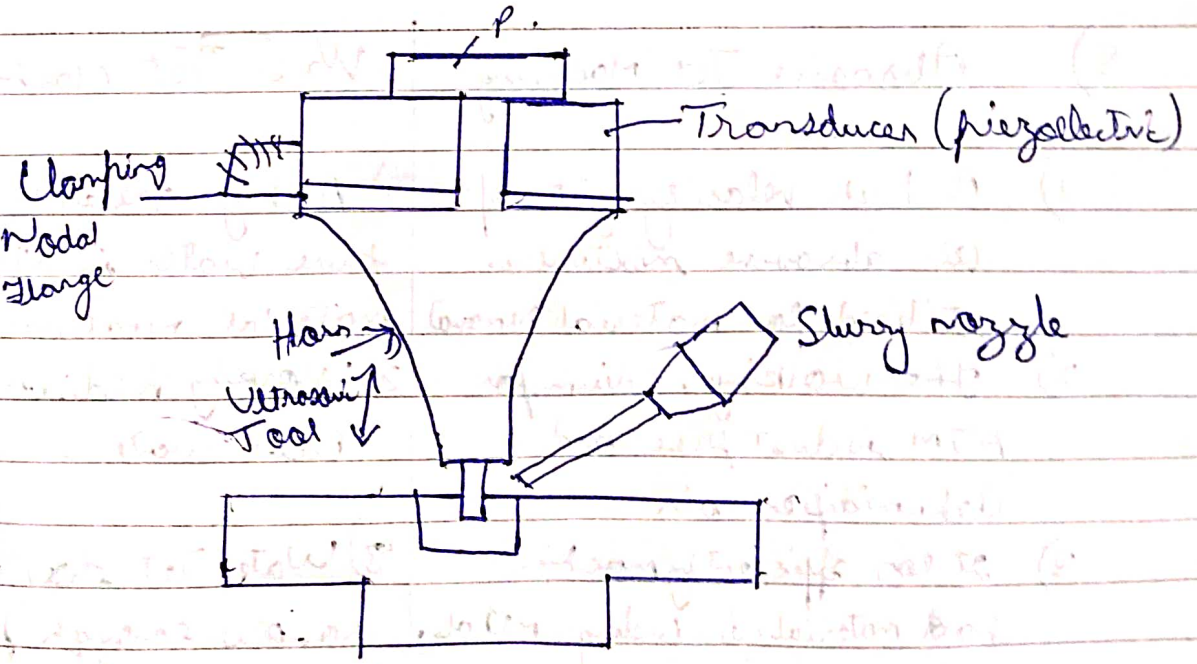
7)	Conventional	Non - Conventional
	i) Direct contact of tool and workpiece	i) Tools are non conventional like laser beam, electric arc.
	2) Cutting tool is always harder than workpiece	2) Tool may not be harder and need not require physical presence
	3) Tool life is less due to high wear	3) Tool life is higher.
	4) ~~Suitable~~ Suitable for all materials	4) Not Suitable for all materials.

8)	Abrasive Jet Machining	Water Jet Machining
	1) A high velocity jet of air abrasive mixture is utilised for material removal	1) A high velocity jet of pure water is utilised for material removal.
	2) The working medium for AJM is dust free and dehumidified air	2) Working medium is clean water.
	3) It can efficiently machine hard materials including metals. AJM is preferred for machining brittle materials.	3) Water Jet does not possess enough power for cutting metals or ceramics. It is suitable for cutting soft materials.

9) Water Jet Machining Applications :

1) It is used in drilling and cutting hardened metals.
2) It is used to manufacture electronic devices.
3) It is used in drilling small holes and some critical zones in machine parts.
4) It completely eliminates heat affected zones, toxic fumes, recast layers, work hardening and thermal stresses.
5) It is the most flexible and effective cleaning solution for a variety of industrial needs.

10 Short Note on USM :



Advantages

1) It can be used to drill circular or non circular holes on very hard materials like stone, carbides, ceramics and other brittle materials.
2) Non conducting materials like glass, ceramics, and semi precious stones can also be machined

Disadvantages

1) It can be slower than conventional machining processes
2) Creating deep holes is difficult because of the restricted movement of suspension.

Application

1) Wire drawing dies of Tungsten carbide can be drilled by this process.
2) Circular as well as non circular holes can be done with straight or curved axes.

Working Principles.

This machine uses ultrasonic waves to produce high frequency force of low amplitude which act as a driving force of abrasive. USM generates high frequency vibrating wave of frequency about 20 000 - 30 000 Hz and

amplitude about 25 - 30 micron

It is a subtracting machining process because it removes material from the surface in the fine abrasive particles.