Surface Treatment

Surface finishing processes

Surface finishing processes:

- Lapping
- Honing
- Buffing
- Burnishing
- Super finishing

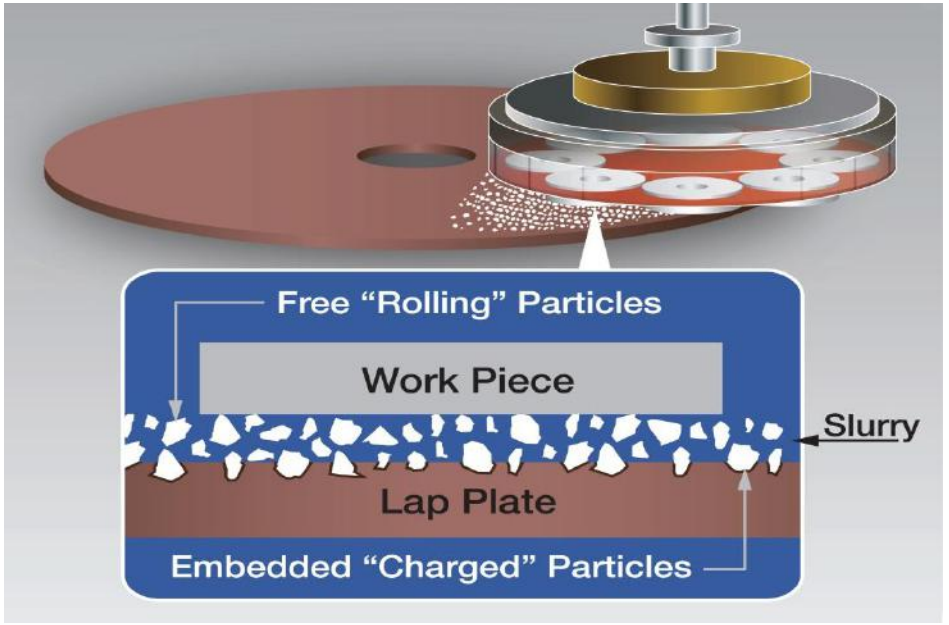
1) Lapping

- **It is a surface finishing process used for a flat or cylindrical surfaces(mainly external).**
- **It means rubbing a surface by means of a lap(which is made of a material softer than a lap)**
- **Lapping is done to produce:**

1)To produce geometrically true surface.

2)To correct minor imperfections in shape.

3)To obtain fine dimensional accuracy to provide a very close fit between contact surfaces.


Free “Rolling” Particles
Work Piece
Slurry
Lap Plate
Embedded “Charged” Particles

4) To secure a fine surface finish.

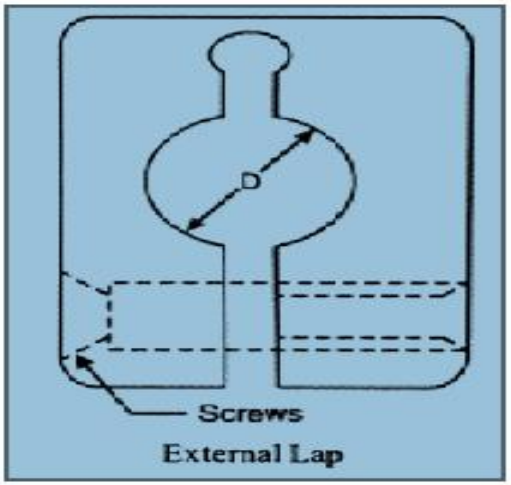
Lapping methods:

1)Hand lapping for flat work

Applications-press work dies, dies & metallic moulds for castings, surface plates, engine valves & valves seats, piston rings

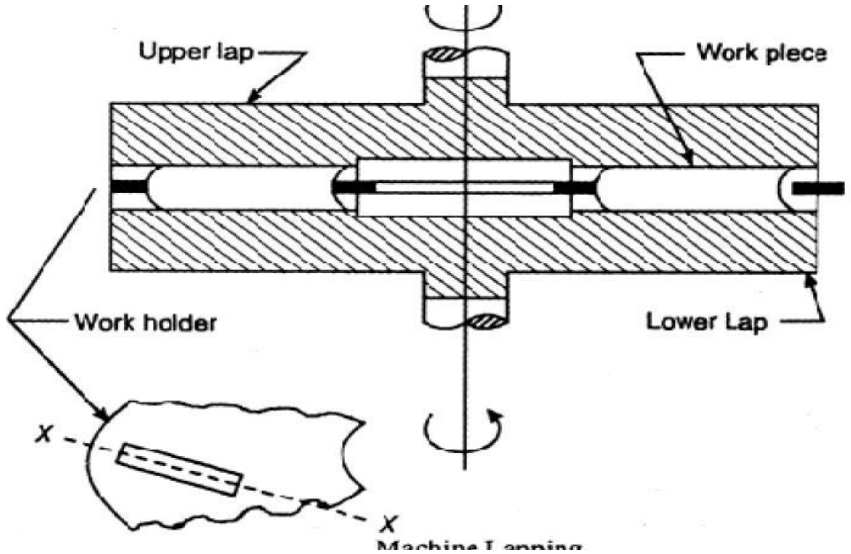
2)Hand Lapping for external cylindrical work(Ring lapping)

Applications: stepped plug gauges & gauges made in small quantities.



Machine Lapping: Mechanical lapping machines are of vertical construction with the work holder mounted on the lower table which is given an oscillating motion. The upper lap is stationary and floating, while the lower one revolves at about 60 rev/min. Several types of lapping machines are available for lapping round surfaces. A special type of centreless lapping machine is made for lapping small parts such as piston pins, ball bearing races etc.

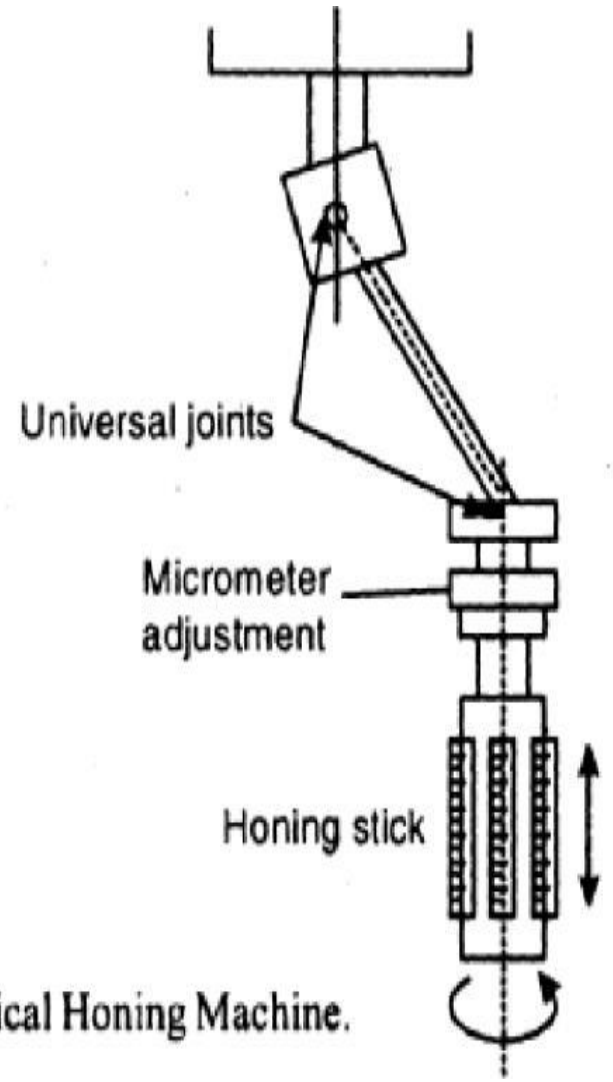
Applications: aircraft piston pins, automotive wrist pins, diesel engine injector-pump parts and spray nozzles, certain dies and moulds, refrigerator-compressor parts, oil-burner parts, micro-meter spindles, roller bearings, crankshafts, camshafts, ball bearing race-ways etc.



Machine Lapping

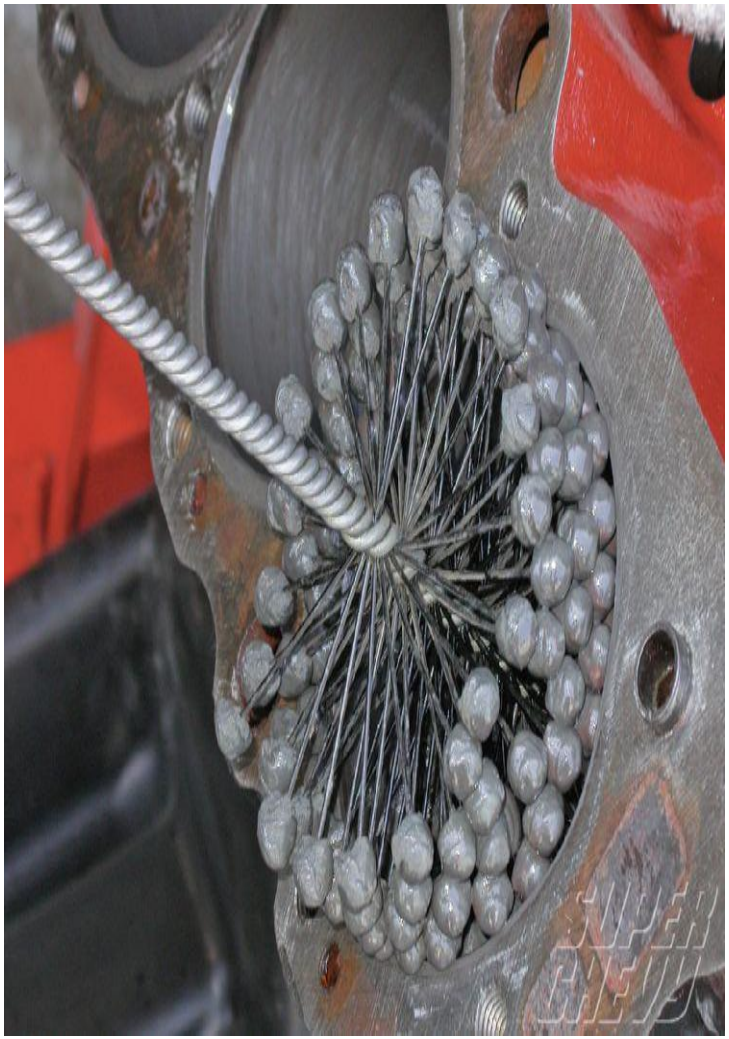
2. Honing

Honing is a grinding or abrading process. In it, a very little material is removed. This process is used primarily to remove the grinding or tool marks left on the surface by previous operations. The cutting action is obtained from abrasive sticks (aluminium oxide or silicon carbide) mounted in a mandrel or fixture. A floating action between the work and the tool prevails so that any pressure exerted on the tool is exerted and transmitted equally on all sides.



Vertical Honing Machine.


ROTTLER
HP6A

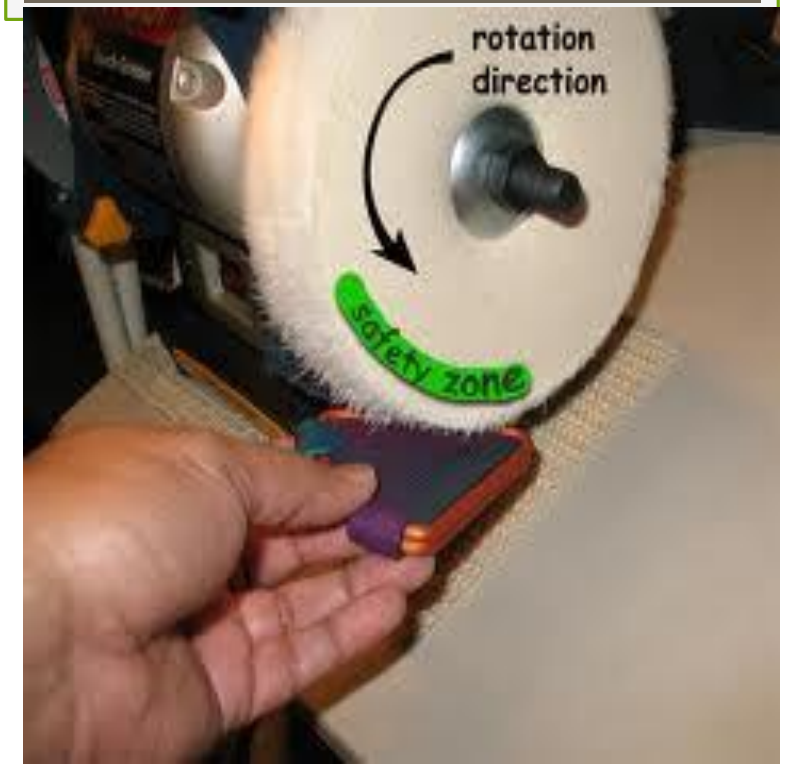


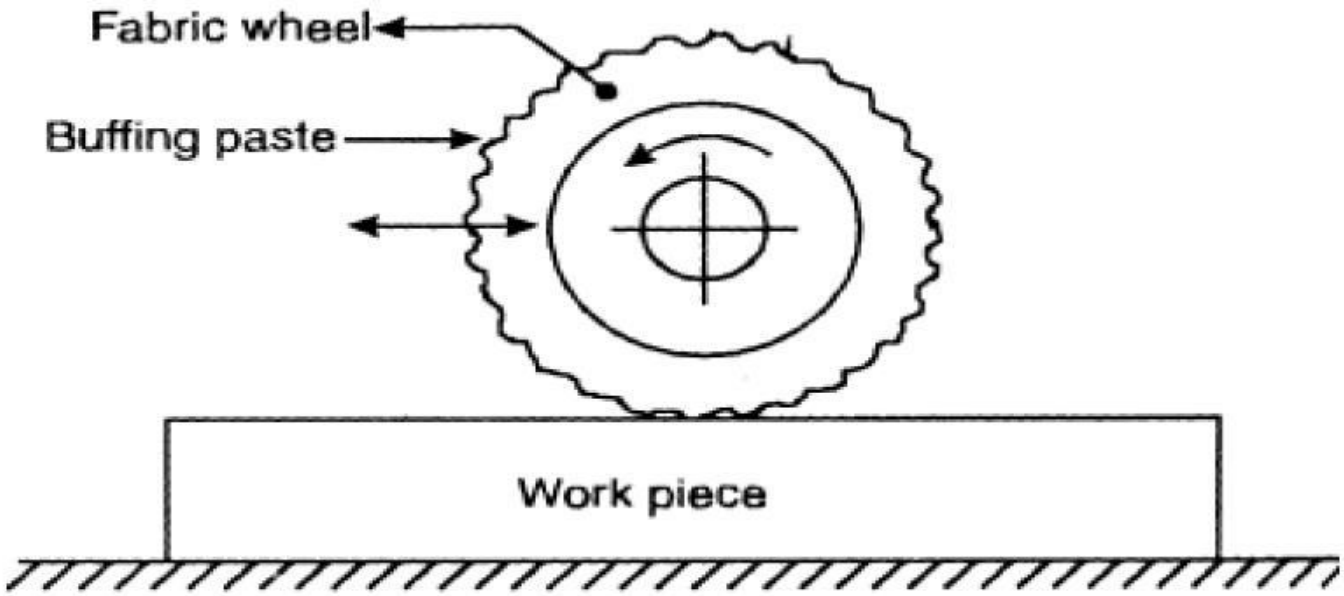
Defects such as slight eccentricity, a wavy surface, or a slight taper caused by previous operations can be corrected by this process

Applications: automobile engine cylinders, bearings, gun barrels, ring gauges, piston pins. Shafts and flange faces.

3. Buffing

Buffing is a polishing operation in which the workpiece is brought in contact with a revolving cloth buffing wheel that usually has been charged with a very fine abrasive. The polishing action in buffing is very closely related to lapping in that when a polishing medium such as 'rouge' is used, the cloth buffing wheel becomes a carrying vehicle for the fine abrasives. In this action the abrasive removes amounts of metal from the workpieces, thus eliminating the scratch marks and producing a very smooth surface.


rotation
direction
safety zone

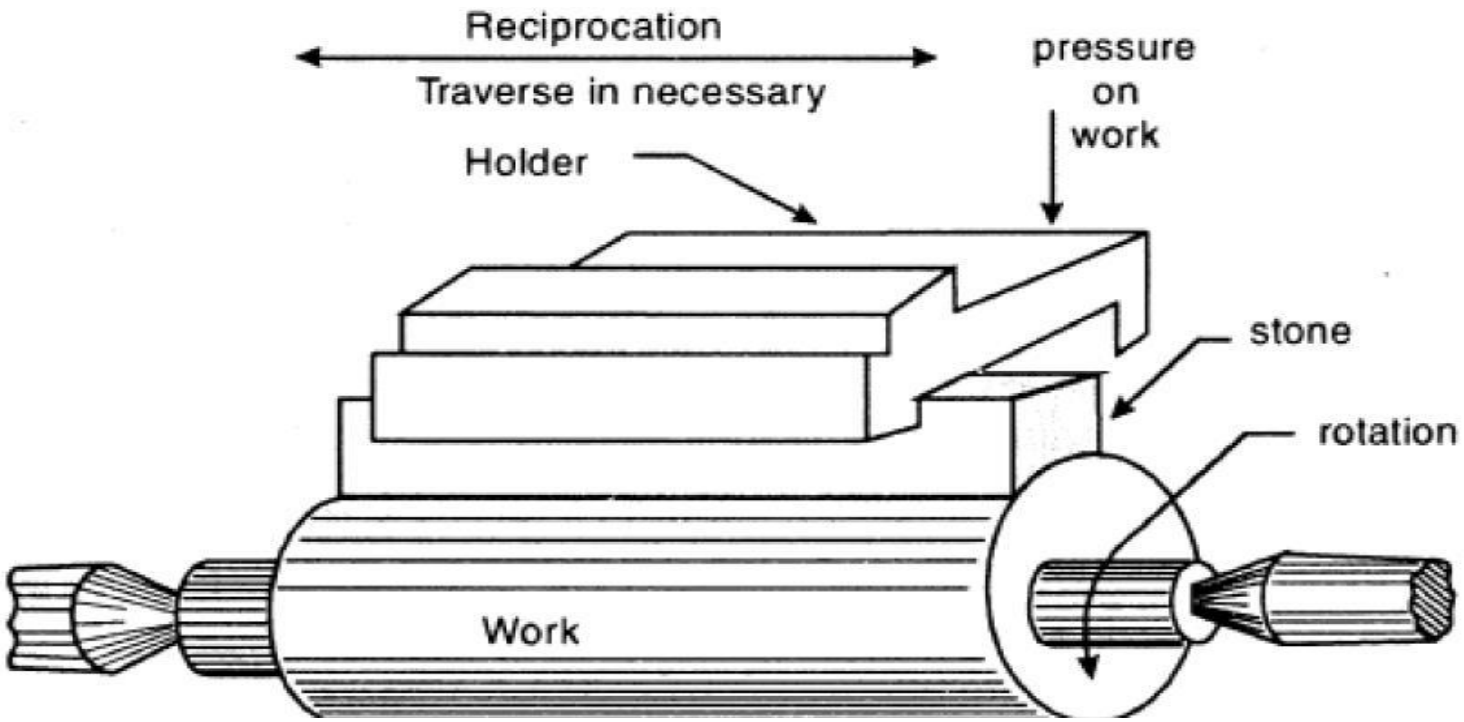


Buffing.

Applications: Automobiles, motor-cycles, boats, bicycles, sporting items, tools, store fixtures, commercial and residential hardware and household utensils and appliances.

4. Super finishing

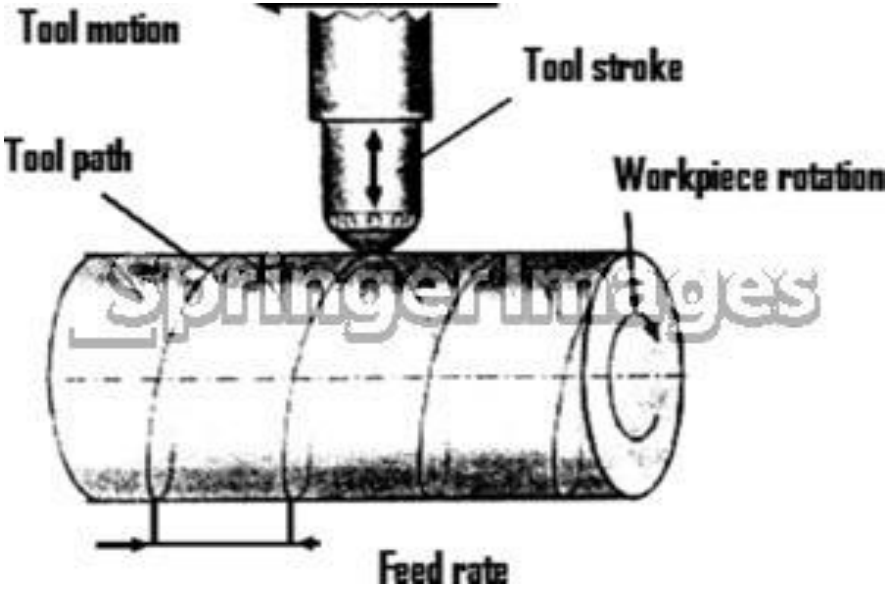
Super-finishing is a micro finishing process that produces a controlled surface condition on parts which is not obtainable by any other method. The operation which is also called 'microstoning' consists of scrubbing a stone against a surface to produce a fine quality metal finish. The process consists of removing chatter marks and fragmented or smears metal from the surface of dimensionally finished parts. The method is performed by rapidly reciprocating a fine grit stone with a soft bond and pressing it against a revolving round work-piece. The stone quickly wears to conform to the contour of the work-piece.

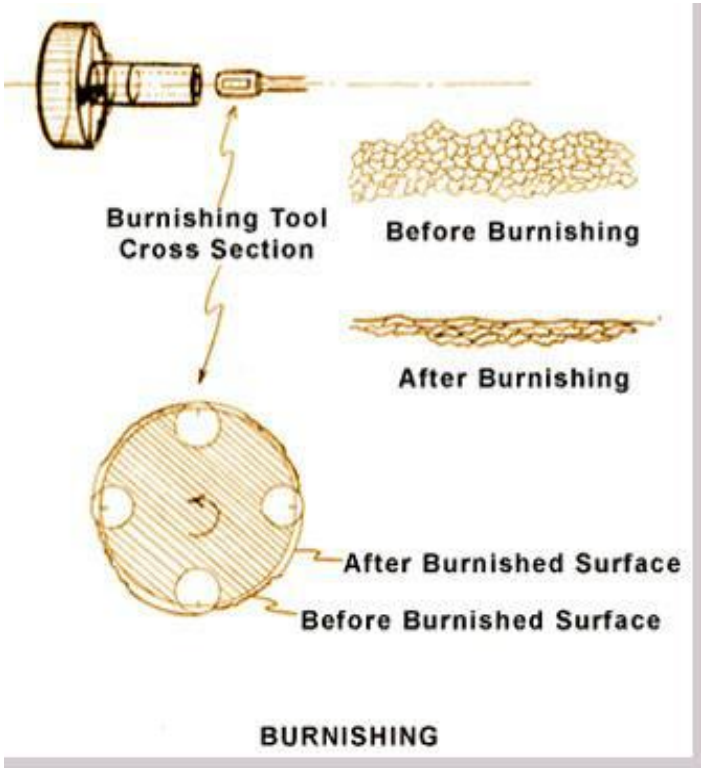


Applications: Computer memory drums, sewing machine parts, automotive cylinders, brake drums, bearings, pistons, piston rods and pins, axles, shafts, clutch plates, tappet bodies, guide pins etc.

5. Burnishing

Burnishing operation is the process of getting a smooth and shiny surface by contact and rubbing of the surface against the walls of a hard tool (punch and/or die, rollers and balls etc.). It is a finishing and strengthening process.


Tool motion
Tool stroke
Tool path
Workpiece rotation
Feed rate


Burnishing Tool
Cross Section
Before Burnishing
After Burnishing
After Burnished Surface
Before Burnished Surface
BURNISHING

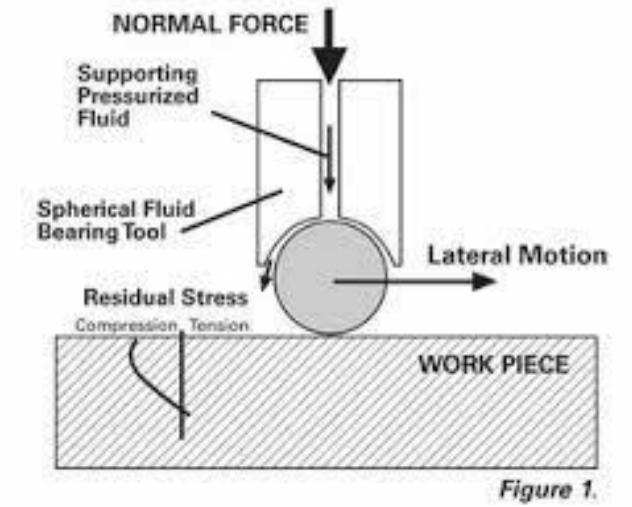

NORMAL FORCE
Supporting
Pressurized
Fluid
Spherical Fluid
Bearing Tool
Lateral Motion
Residual Stress
Compression Tension
WORK PIECE

Figure 1.