

Laser beam machining offers a good solution that is indeed more associated with material properties such as thermal conductivity and specific heat as well as melting and boiling temperature.

• High power density are then obtained. A large variety of laser are available in the market including solid state, Ion and Molecular type in either continuous wave (CW)

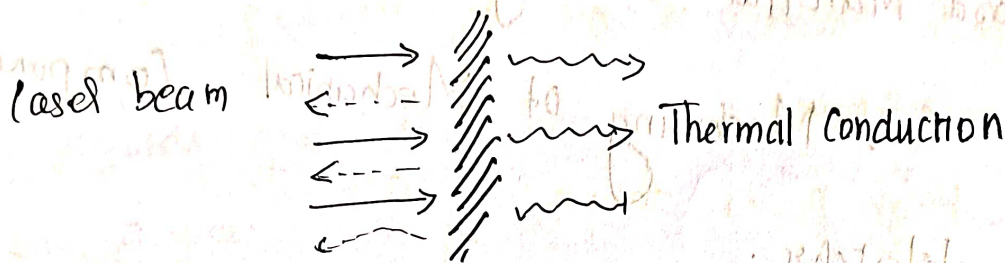
Material Removal Mechanism :-

• The physics of laser machining is very complex due mainly to scattering and reflection losses at the machined surface

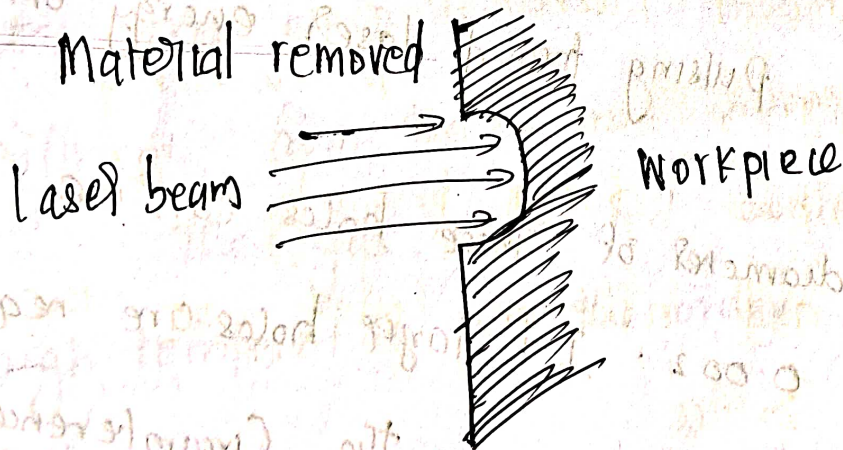
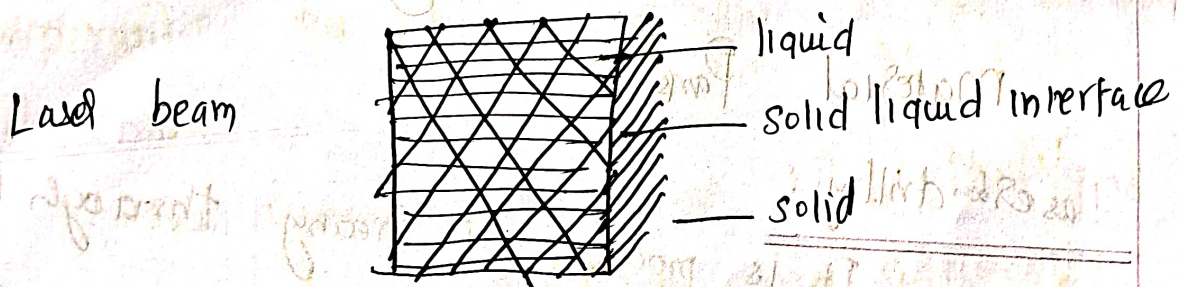
• heat diffusion into the bulk material causes phase changes, melting

• High intensity laser beam are not recommended since they form a plasma plume at or near the surface

Material with a consequent reduction in the process efficiency due to absorption and scattering losses.



(a) Absorption and heating



(c) Vaporization

## Application:

• Making complex profiles in thin and hard material like Integrated Circuits and PCBs

• Machining of Mechanical Component of Watcher.

• Smaller machining of Very hard material Parts.

## Laser Drilling:

• It is process of creating through holes by repeatedly pulsing focused laser energy on a material.

The diameter of these holes can be as small as  $0.002$ . If larger holes are required the laser is moved around the circumference of the "popped" hole until the desired diameter is created this technique called Trepanning.

# plasma Arc machining (PAM)

Liquids, solids and gases are the three familiar state of matter.

• In general when solid is heated, it turns to liquids and the liquids eventually become gases.

• When gas is heated sufficiently high temperature, the atoms are split into free electrons and ions.

• The dynamic properties of this gas of free electrons and ions are sufficiently different from the normal unionized gas.

• The gas is heated sufficiently high temperature of the order of  $11000^{\circ}\text{C}$  to  $28000^{\circ}\text{C}$ .

It become partially ionized and it is known as PLASMA.