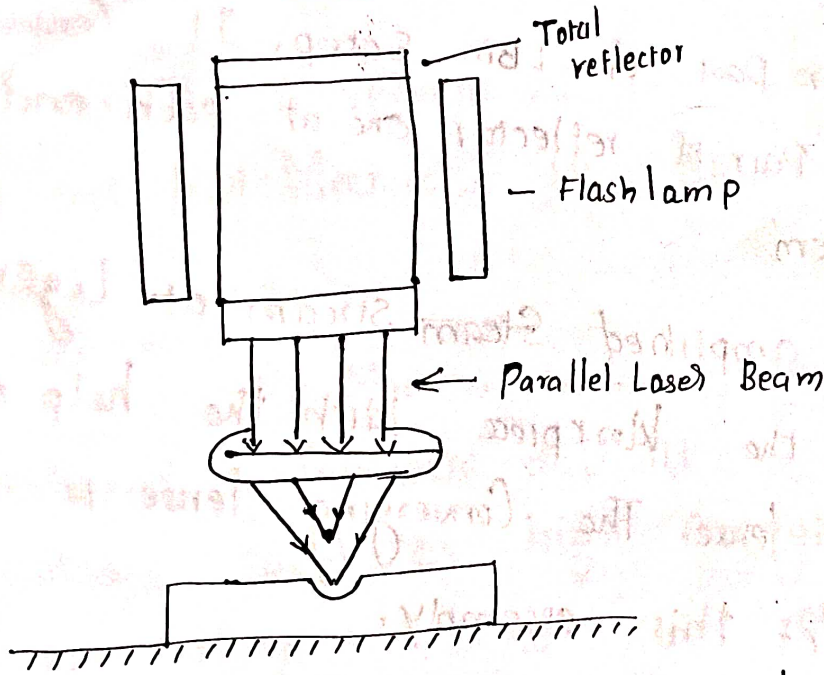


Laser Beam machining :-

- It is wide Industrial application including some of the machining process.
- It is an optical transducer that converts electrical energy into a highly coherent light beam.

Principle of LBM



- LBM uses the light energy of a laser beam to remove material by vapourization and ablation.
- The energy of coherent light beam is focused optically for predecided longer period of time.

Here the way of metal removal is same as that of EDM process. Method of generation of heat is different.

• The application of heat is very different. Closed focused in case of LBM as compared to EDM.

Construction of LBM

(1) Laser tube and lamp assembly :-

• It is main part of LBM setup. It consists of laser tube, pair of reflector, one at each end of laser tube, and cooling system.

• highly amplified stream of light is focused on the workpiece with the help of converging lens. The converging lens is also the part of this assembly.

(2) Work piece :-

The range of work piece material that can be machined by LBM include high hardness and strength of material like ceramic, glass to soft materials like plastic, rubber, wood, etc...

Cooling Mechanism:-

A Cooling Mechanism Circulate Coolant

In laser tube assembly to avoid its over heating in long continuous operation.

Tool feed Mechanism :-

There is no tool used in the LBM process. Focusing laser beam at a pre-decided point in the work piece serve the purpose of tool.

The movement of Coveraging lense is the tool feed Mechanism in LBM process.

Working of LBM :-

Modern machining methods are established to fabricate difficult to machine materials such as high strength thermal resistant alloys; Various kinds of Carbide, fiber reinforced Composite Material, stainless and Ceramics.

Conventional machining of such materials produces high cutting forces that, in some particular cases, may not be sustained by the work piece

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 one 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
the process
scattering

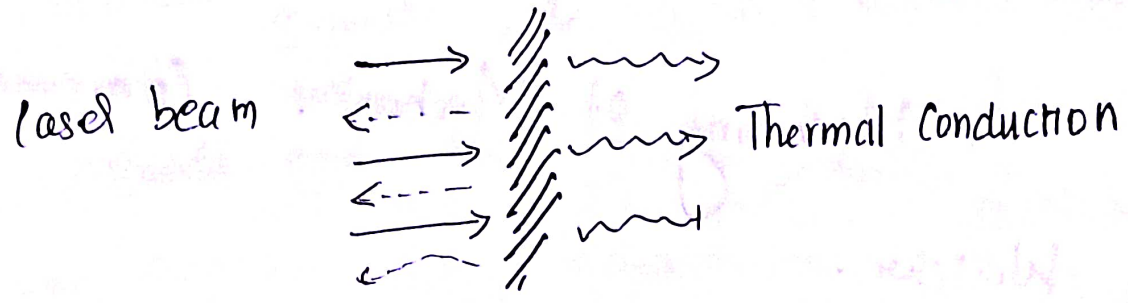
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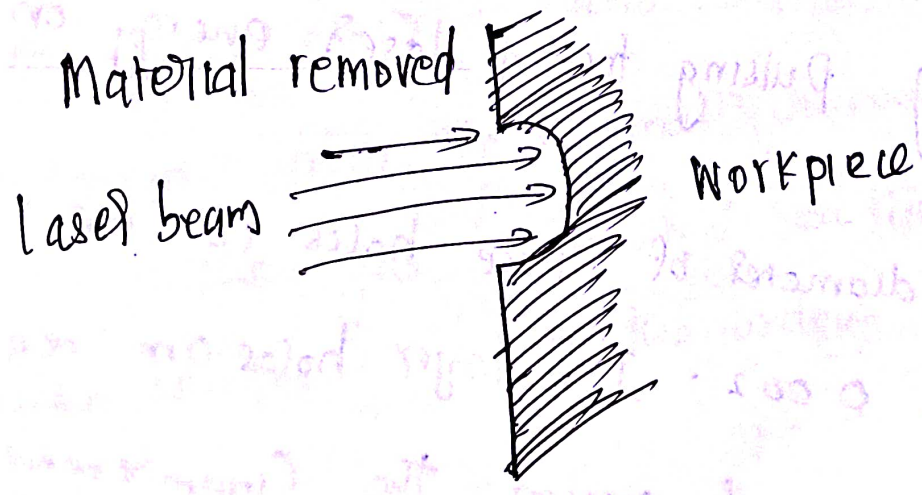
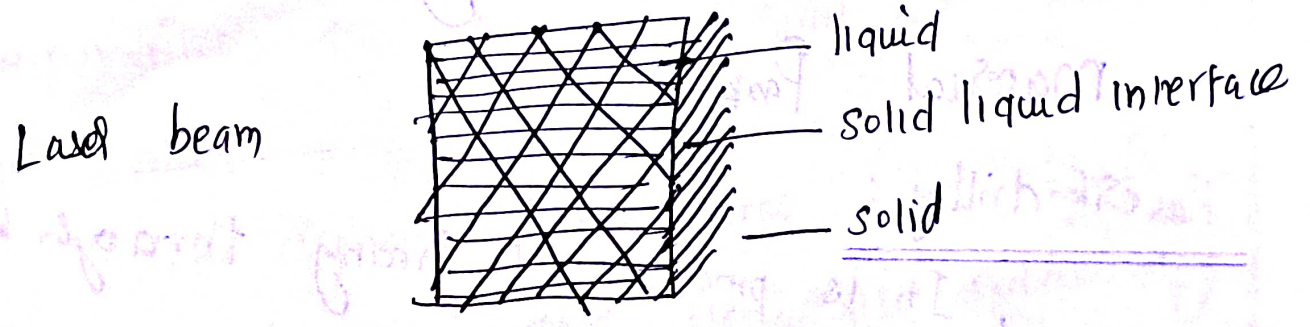
Material

Laser beam

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 PCB
- Machining of Mechanical Components like clutch.
- Smaller machining of very hard material parts.

Laser Drilling:

It is process of creating through hole by repeatedly pulsing focused laser energy on 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.