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INSTITUTE OF SCIENCE AND TECHNOLOGY

3rd Mile,Bombay Highway,Gangavaram(V),Kovur(Md),S.P.S.R Nellore(Dt)

www.gist.edu.in

Editorial Message

Hailed as the first draft of creativity and innovation, a magazine presents a social and tasteful conversation of a powerful organization, where the refined imaginative sensibilities and abilities of its young personalities go to the front. It holds mirror to the bunch exercises and activities embraced by the foundation to etch the multifaceted characters of adolescents besides being a media platform. On this earth shattering event of drawing out the magazine, we, the publication group, appreciatively recognize the unmistakable assortment of commitments made by the students and the staff.

“All progress comes beyond comfort zone”

Editorial Board

VISION-MISSION

Vision

To evolve as a prospective learnig centre for producing quality human resourses.

Mission

DM_1: Impart Technical knowledge through effective teaching-learning practices

DM_2: Provide congenial academic environment for honing technical skills

DM_3: Develop professional and entrepreneurial skills through collaborations

DM_4: Promote leadership skills along with social and ethical values

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

Graduates of B.Tech in Mechanical Engineering program shall able to

PEO1: Analyze Mechanical Engineering problems and provide sustainable solutions.

PEO2: Pursue successful professional career in industry, academia or research.

PEO3: Engage in continuous learning to keep abreast with emerging technologies with the sense of professional ethics.

PEO4: Contribute in multi-disciplinary teams through effective inter personal skills.

POEMS

STAY HUMBLE

When the sun rises
And the waves crumble
They never show off
And always stay humble

When animals develop
And the silver linings bend
They respect each other
And never dare to offend

When the roots need water
Then the heavens pour
They don't abandon each other
When they are needed more

Just like the sun
We are natures gifts too
What gives us the right
To behave as we do

K. MUNINDRA(172U1A0311), II ME

MAGICAL SHOES

Everybody has a pair of shoes
That makes anger disappear
They turn hate into love
Make you brave, not to fear

They lead your feet to the homeless
So that you can make their day
Make the world a nicer place
To live in and to stay

With them, you are not selfish
But all you try to do is give
Make you realize that life is short

So we should all simply live

Everyone has these shoes
No bodies have ever gone
So why do some thoughtless people
Not put their shoes on?

C. SUMANTH(162U1A0305) , III ME

MAGLEV

Maglev (from magnetic levitation) is a system of train transportation that uses two sets of magnets: one set to repel and push the train up off the track, and another set to move the elevated train ahead, taking advantage of the lack of friction. Along certain "medium-range" routes (usually 320 to 640 km (200 to 400 mi)), maglev can compete favourably with high-speed rail and airplanes.

With maglev technology, the train travels along a guideway of magnets which control the train's stability and speed. While the propulsion and levitation require no moving parts, the bogies can move in relation to the main body of the vehicle and some technologies require support by retractable wheels at speeds under 150 kilometres per hour (93 mph). This compares with electric multiple units that may have several dozen parts per bogie. Maglev trains can therefore in some cases be quieter and smoother than conventional trains and have the potential for much higher speeds.

Technology

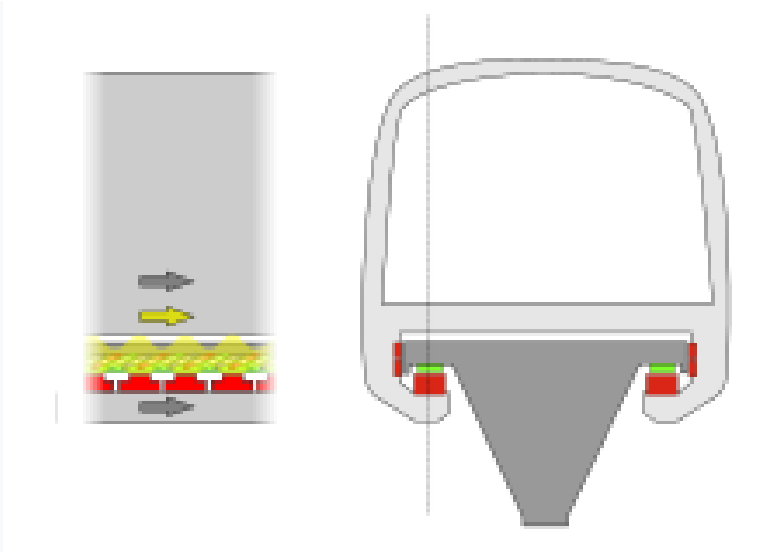
In the public imagination, "maglev" often evokes the concept of an elevated monorail track with a linear motor. Maglev systems may be monorail or dual rail—the SCMaglev MLX01 for instance uses a trench-like track—and not all monorail trains are maglevs. Some railway transport systems incorporate linear motors but use electromagnetism only for propulsion, without levitating the vehicle. Such trains have wheels and are not maglevs. Maglev tracks, monorail or not, can also be constructed at grade or underground in tunnels. Conversely, non-maglev tracks, monorail or not, can be elevated or underground too. Some maglev trains do incorporate wheels and function like linear motor-propelled wheeled vehicles at slower speeds but levitate at higher speeds. This is typically the case with electrodynamic suspension maglev trains. Aerodynamic factors may also play a role in the levitation of such trains.

MLX01 Maglev train Superconducting magnet bogie

The two main types of maglev technology are:

- **Electromagnetic suspension (EMS) :** Electronically controlled electromagnets in the train attract it to a magnetically conductive (usually steel) track.
- **Electrodynamic suspension (EDS) :** Uses superconducting electromagnets or strong permanent magnets that create a magnetic field, which induces currents in nearby metallic conductors when there is relative movement, which pushes and pulls the train towards the designed levitation position on the guide way.

Electromagnetic suspension (EMS)

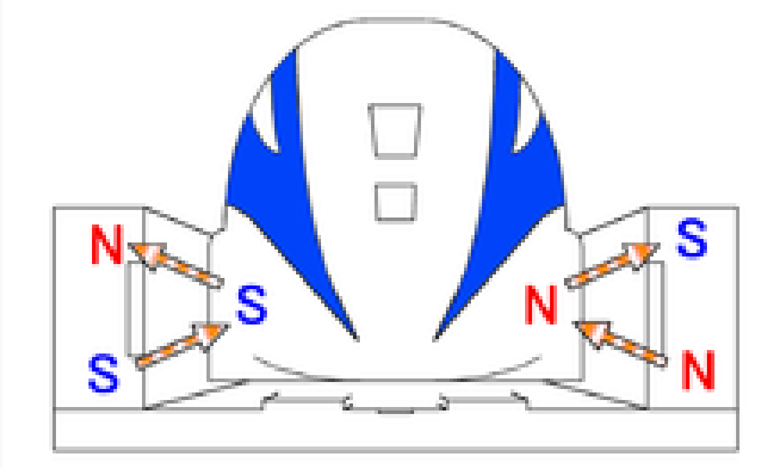


Electromagnetic suspension (EMS) is used to levitate the Transrapid on the track, so that the train can be faster than wheeled mass transit systems

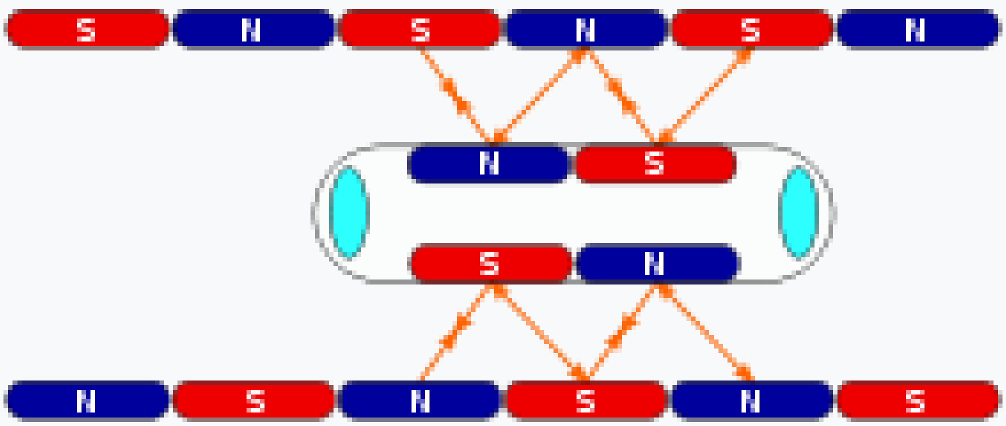
In electromagnetic suspension (EMS) systems, the train levitates above a steel rail while electromagnets, attached to the train, are oriented toward the rail from below. The system is typically arranged on a series of C-shaped arms, with the upper portion of the arm attached to the vehicle, and the lower inside edge containing the magnets. The rail is situated inside the C, between the upper and lower edges.

Magnetic attraction varies inversely with the square of distance, so minor changes in distance between the magnets and the rail produce greatly varying forces. These changes in force are dynamically unstable—a slight divergence from the optimum position tends to grow, requiring sophisticated feedback systems to maintain a constant distance from the track, (approximately 15 mm [0.59 in]).

Electrodynamic suspension (EDS)



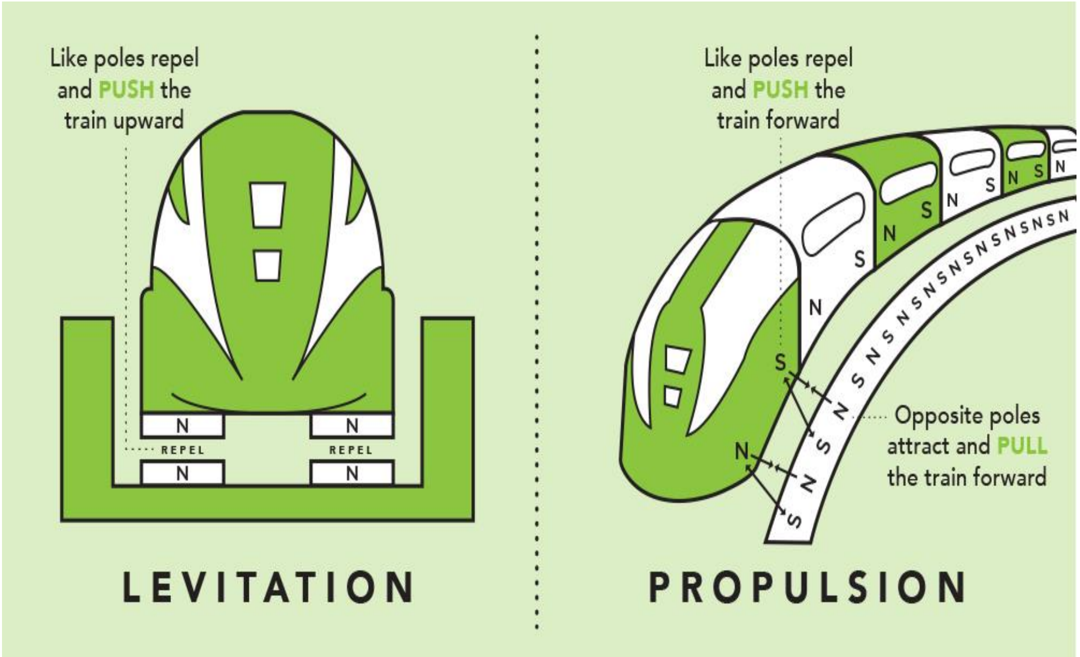
The Japanese SCMaglev's EDS suspension is powered by the magnetic fields induced either side of the vehicle by the passage of the vehicle's superconducting magnets.



EDS Maglev propulsion via propulsion coils

In electrodynamic suspension (EDS), both the guideway and the train exert a magnetic field, and the train is levitated by the repulsive and attractive force between these magnetic fields. In some configurations, the train can be levitated only by repulsive force. In the early stages of maglev development at the Miyazaki test track, a purely repulsive system was used instead of the later repulsive and attractive EDS system. The magnetic field is produced either by superconducting magnets (as in JR–Maglev) or by an array of permanent magnets (as in Inductrack). The repulsive and attractive force in the track is created by an induced magnetic field in wires or other conducting strips in the track.

A major advantage of EDS maglev systems is that they are dynamically stable—changes in distance between the track and the magnets creates strong forces to return the system to its original position. In addition, the attractive force varies in the opposite manner, providing the same adjustment effects. No active feedback control is needed.



However, at slow speeds, the current induced in these coils and the resultant magnetic flux is not large enough to levitate the train. For this reason, the train must have wheels or some other form of landing gear to support the train until it reaches take-off speed. Since a train may stop at any location, due to equipment problems for instance, the entire track must be able to support both low- and high-speed operation.

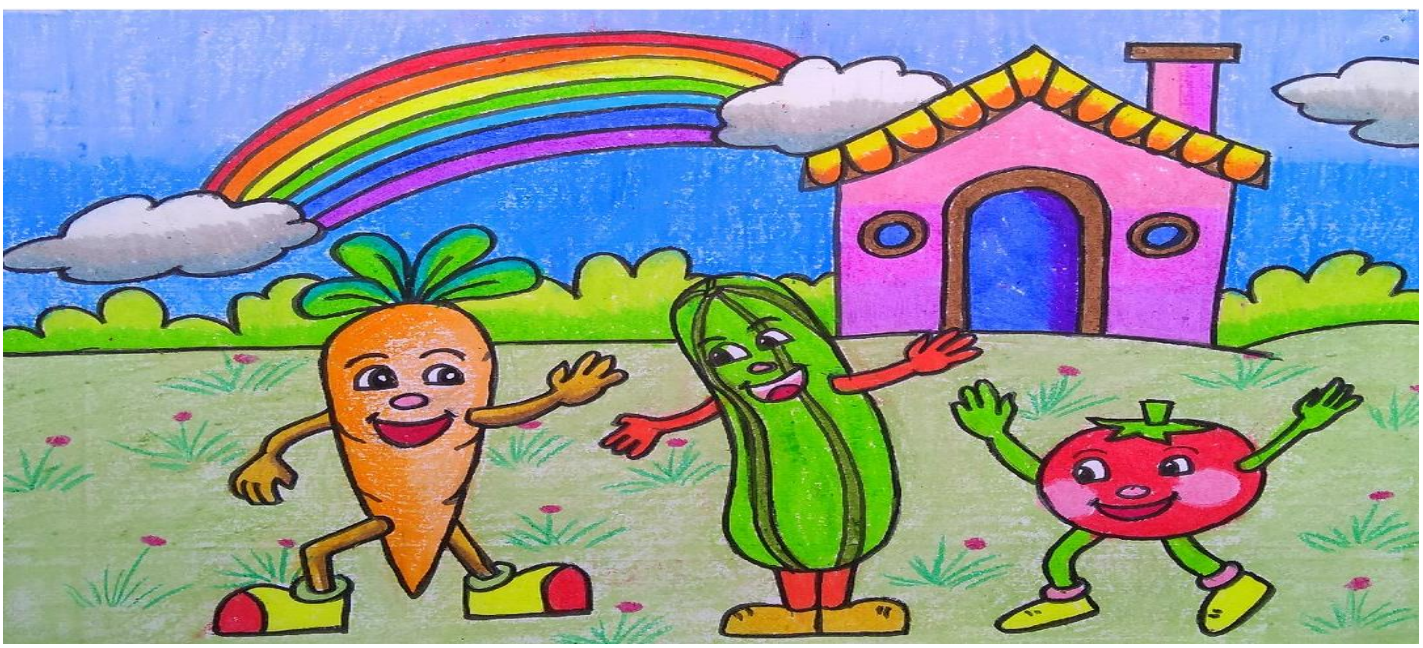
Another downside is that the EDS system naturally creates a field in the track in front and to the rear of the lift magnets, which acts against the magnets and creates magnetic drag. This is generally only a concern at low speeds, and is one of the reasons why JR abandoned a purely repulsive system and adopted the sidewall levitation system. At higher speeds other modes of drag dominate.

The drag force can be used to the electrodynamic system's advantage, however, as it creates a varying force in the rails that can be used as a reactionary system to drive the train, without the need for a separate reaction plate, as in most linear motor systems. Laithwaite led development of such "traverse-flux" systems at his Imperial College laboratory.[1] Alternatively, propulsion coils on the guideway are used to exert a force on the magnets in the train and make the train move forward. The propulsion coils that exert a force on the train are effectively a linear motor: an alternating current through the coils generates a continuously varying magnetic field that moves forward along the track. The frequency of the alternating current is synchronized to match the speed of the train. The offset between the field exerted by magnets on the train and the applied field creates a force moving the train forward.

SD. YUNUS AHAMED(162U1A0352) , III ME

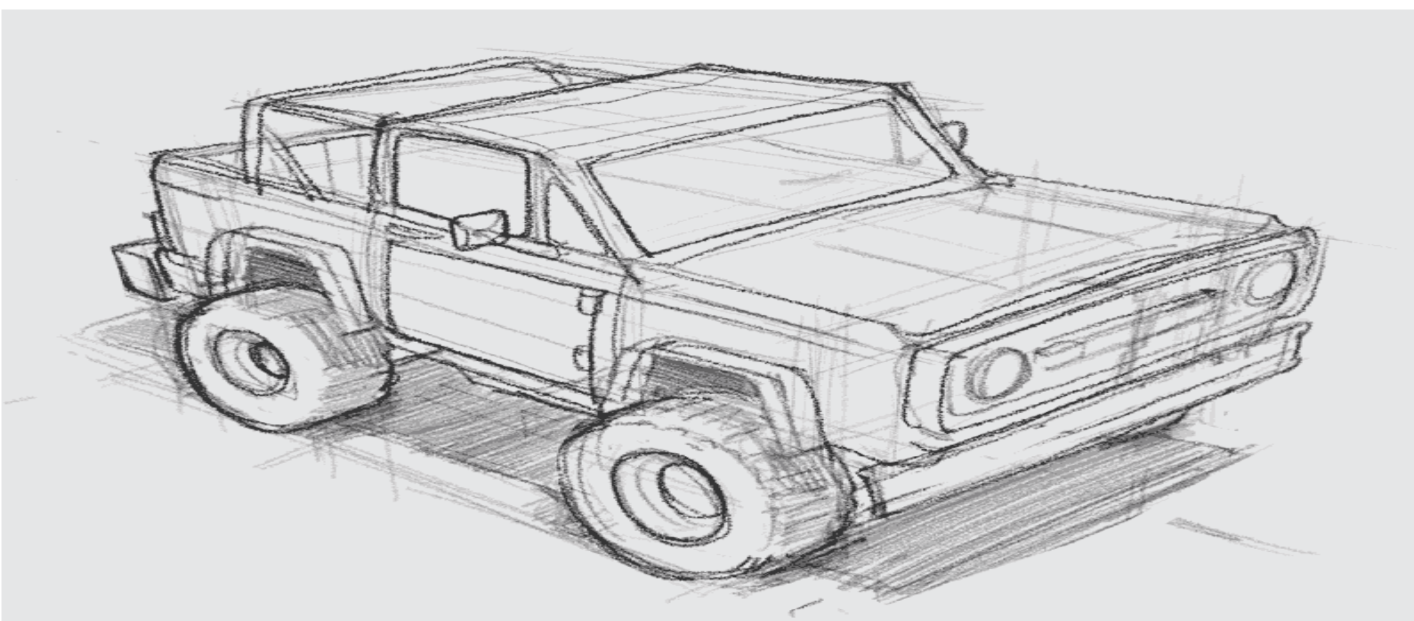
P.GIRIVIKAS (172U1A0307), II ME **K. HARISH(152U1A0312) , IV ME**



P. SURESH(162U1A0333), III ME

G. UDAY KUMAR(182U1A0317) , I ME

D. SASI KUMAR(182U1A0313) , I ME



M. PREM KUMAR(172U1A0318), II ME

S. SUDHEER(162U1A0340) , III ME

MOGAL. ATHIK BAIG(152U1A0323), IV ME

Laser Beam Machining

Introduction: Laser Beam Machining or more broadly laser material processing deals with machining and material processing like heat treatment, alloying, cladding, sheet metal bending etc. Such processing is carried out utilizing the energy of coherent photons or laser beam, which is mostly converted into thermal energy upon interaction with most of the materials. Nowadays, laser is also finding application in regenerative machining or rapid prototyping as in processes like stereo-lithography, selective laser sintering etc.

Laser stands for light amplification by stimulated emission of radiation. The underline working principle of laser was first put forward by Albert Einstein in 1917 through the first industrial laser for experimentation was developed around1960s.

Laser beam can very easily be focused using optical lenses as their wavelength ranges from half micron to around 70 microns. Focused laser beam as indicated earlier can have power density in excess of 1 MW/mm2 . As laser interacts with the material, the energy of the photon is absorbed by the work material leading to rapid substantial rise in local temperature. This in turn results in melting and vaporisation of the work material and finally material removal.

Laser Beam Machining – the lasing process Lasing process describes the basic operation of laser, i.e. generation of coherent (both temporal and spatial) beam of light by "light amplification" using "stimulated emission".

In the model of atom, negatively charged electrons rotate around the positively charged nucleus in some specified orbital paths. The geometry and radii of such orbital paths depend on a variety of parameters like number of electrons, presence of neighboring atoms and their electron structure, presence of electromagnetic field etc. Each of the orbital electrons is associated with unique energy levels. At absolute zero temperature an atom is considered to be at ground level, when all the electrons occupy their respective lowest potential energy. The electrons at ground state can be excited to higher state of energy by absorbing energy form external sources like increase in electronic vibration at elevated temperature, through chemical reaction as well as via absorbing energy of the photon. Fig depicts schematically the absorption of a photon by an electron. The electron moves from a lower energy level to a higher energy level.

On reaching the higher energy level, the electron reaches an unstable energy band. And it comes back to its ground state within a very small time by releasing a photon. This is called spontaneous emission. Schematically the same is shown in Fig.. The spontaneously emitted photon would have the same frequency as that of the "exciting" photon.

Sometimes such change of energy state puts the electrons in a meta-stable energy band. Instead of coming back to its ground state immediately (within tens of ns) it stays at the elevated energy state for micro to milliseconds. In a material, if more number of electrons can be somehow pumped to the higher meta-stable energy state as compared to number of atoms at ground state, then it is called "population inversion". Such electrons,

Laser-beam machining is a thermal material-removal process that utilizes a high-energy, coherent light beam to melt and vaporize particles on the surface of metallic and non-metallic workpieces. Lasers can be used to cut, drill, weld and mark. LBM is particularly suitable for making accurately placed holes. A schematic of laser beam machining is shown in Figure .

Different types of lasers are available for manufacturing operations which are as follows:

• CO_2 (pulsed or continuous wave): It is a gas laser that emits light in the infrared region. It can provide up to 25 kW in continuous-wave mode.

• Nd:YAG: Neodymium-doped Yttrium-Aluminum-Garnet ($Y_3Al_5O_{12}$) laser is a solidstate laser which can deliver light through a fibre-optic cable. It can provide up to50kW power in pulsed mode and 1 kW in continuous-wave mode.

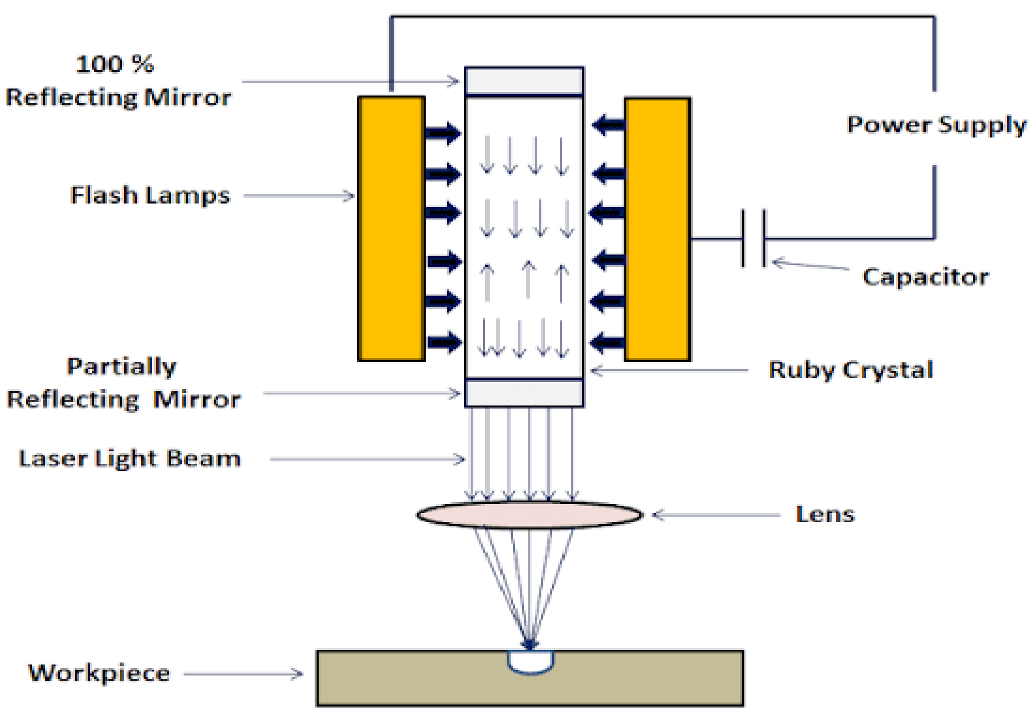


Figure : Laser beam machining schematic

Applications: LBM can make very accurate holes as small as 0.005 mm in refractory metals ceramics, and composite material without warping the workpieces. This process is used widely for drilling.

K.JAYARAM (152U1A0313) , IV ME

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

PO1. **Engineering Knowledge :** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions

PO11 **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12 **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

At the time of graduation student of B. Tech in Mechanical Engineering will be able to

PSO1: Professional Skills: Utilize the knowledge of materials and manufacturing principles to plan, design and monitor the production operations of an Industry.

PSO2: Design Skills: Employ the governing laws of thermodynamics, heat transfer and refrigeration & air-conditioning to design and develop thermo-fluid system.