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Opinion Article

Laser Beam Machining and its Applications

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DESCRIPTION

Laser Beam Machining (LBM) is a type of processing that utilizes the heat from laser processing. This process uses thermal energy to remove material from metallic or non-metallic surfaces. When high-frequency monochromatic light hits the surface, the impact of photons heats, melts, and vaporizes the material. Laser machining is ideal for brittle materials with low conductivity, but can be used for most materials.

Laser processing is an unconventional processing method that uses laser light. The laser beam causes the workpiece to reach its maximum temperature, causing the workpiece to melt at high speed. This process used thermal energy to remove material from the metal surface. Laser machining is a type of machining process that uses laser machining to machine metallic and non-metallic materials.

Laser beam processing can be done on glass without melting the surface. For photosensitive glass, the laser changes the chemical structure of the glass, allowing it to be selectively etched. The glass is also referred to as photomachinable glass. The advantage of photomachinable glass is that it can produce precisely vertical walls and the native glass is suitable for many biological applications such as substrates for genetic analysis.

WORKING PRINCIPLE

- Laser machines produce very high energy laser beams.
- Focuses on the workpiece to mechanize this laser beam produced.
- When the laser beam hits the surfaces of the W/ P, the thermal energy of the laser beam is transferred to the surfaces of the W/P.
- It heats, melts, evaporates, and ultimately makes the material a workpiece.
- This is how laser beam machining works.
- It works on the principles that when a high- energy laser beam strikes the surfaces of the workpiece.
- The heat energy contained by the laser beams is transferred to the surface of the W/P.
- This heat energy absorbed by surface heat melts and evaporates the material W/P. Machining of materials in this way is done using laser beams.

Advantages

- It can be focused on very small diameters. It produces a huge amount of energy, about 100 MW per square mm area.
- It's capable of producing a very accurately placed hole.
- Laser beam machining have the capability to cut or engrave almost all types of materials when conventional machining processes fail to cut or engrave any material.
- There's no physical contact between the equipment and the workpiece.
- The wear and tear in this machining process is very low and thus requires a low maintenance cost. This machining process produces an object of very high perfection.
- And most items don't require additional finishing; they can be combined with gases that help make the cutting process more effective.
- This helps reduce oxidation of the W/ P surface and keep it free of melting of the vaporized material.
- It has the capability to cut almost all types of material. But it's best suited for brittle materials with low conductivity.

Disadvantages

- High initial cost. This is because it requires many accessories that are important to the machining process by Laser.
- Laser beam machining requires a highly trained worker to operate the machine.
- Low production rate because it is not designed for mass production.

APPLICATIONS

- Laser beam machining is primarily used in the machine, aerospace, shipbuilding, electronics, steel, and medical industries for precision machining complex parts.
- In heavy manufacturing industries, it's used or used for drillings and claddings, seam and spot welding, among others.

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- In light manufacturing industries, it's used for engravings and drilling other metals.
- In the electronics industry, it's used for circuiting and line stripping (for connecting the two ends).
- In the medical industry, it's used for hair removal and cosmetic surgery.