Laser cutting

Description

Process schematic

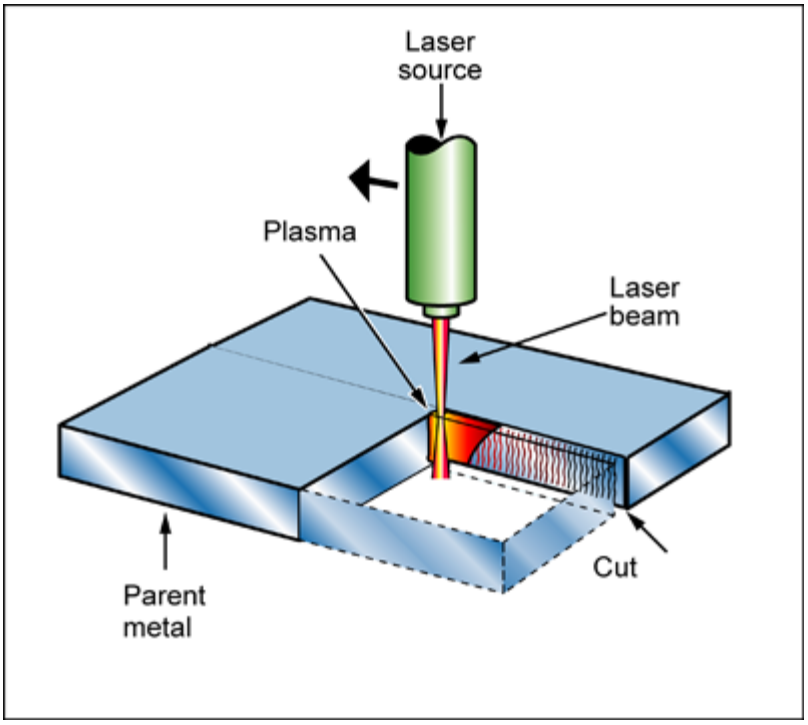

Figure caption

Laser cutting

The process

In LASER CUTTING a focused beam of monochromatic light (the laser beam) is focused on the workpiece, creating a plasma and local melting. Shielding gas can be blown through a nozzle in the laser unit to protect the surface, though in cutting thick metal plate use is made of the exothermic oxidation of the material in the cut. The equipment is expensive, though not quite as costly as that for electron-beam processing. High volume or critical welding conditions are required to justify the necessary investment. Because laser cutting does not require a vacuum chamber, it has taken over many applications from e-beam cutting, particularly in the micro-electronics field.

Material compatibility

Ceramics	✓
Composites	✓
Foams	✓
Glasses	✓
Metals - ferrous	✓
Metals - non-ferrous	✓
Natural materials	✓
Polymers - thermoplastics	✓
Polymers - thermosets	✓

Shape

Flat sheet	✓

Dished sheet	✓

Economic compatibility

Relative tooling cost	medium
Relative equipment cost	very high
Labor intensity	low

Physical and quality attributes

Mass range	0.001	-	100	kg
Range of section thickness	0.1	-	50	mm
Tolerance	0.05	-	1	mm
Roughness	1	-	10	µm
Surface roughness (A=v. smooth)	B			
Cutting speed	1	-	100	mm/s
Minimum cut width	0.025	-	1	mm

Process characteristics

Machining processes	✓
Cutting processes	✓
Discrete	✓

Supporting information

Design guidelines

Laser cutting is fast and clean. It allows cutting of heterogeneous materials such as composites, circuit boards, fabrics and textiles.

Typical uses

Precision cutting of metal, ceramic, composite and polymer sheet.

The economics

The equipment is expensive, but the process is fast and allows

The environment

The use of lasers requires appropriate safety precautions. Laser cutting generates fumes, requiring

Links

MaterialUniverse

Reference