

LASER BEAM HARDENING

Increased wear resistance, longer life



Laser hardening a folding tool using double beam optics



Laser melting of cast iron

Laser beam hardening is employed to locally improve the surface properties of components. Use of this treatment can increase wear and fatigue resistance in parts of steel and cast iron. Through a locally restricted heat treatment arises a minimum heat input, thereby minimised distortion. The associated high heating and cooling rates result in fine microstructures with good mechanical properties.

The targets

Optimisation of surfaces through:

- ▶ Increasing wear resistance
- ▶ Improvement of the mechanical-dynamic properties

The process

As in conventional hardening, a hardness increase arises through martensitic transformation of the microstructure. The localised absorption of the laser beam creates a rapid increase in surface temperature to above the austenitisation temperature. A rapid cooling by conduction of heat into the relatively cool substrate generates the necessary transformation in appropriate steels. In addition, compressive stresses are generated in the hardened layer.

Applications

Laser beam hardening can be applied wherever localised improvement of hardness and fatigue life are required. Examples of successfully hardened components are found in general engineering (cutting knives, shafts, pump parts, guideways, gears), power generation (turbine blades, pistons), tool industry (press, forming and injection tools) etc. Laser beam hardening can offer distinct advantages in terms of hardness, distortion, treatment speed and accuracy in comparison to many conventional processes.



Hardening with Laser: let the experts take over!

Facts about laser beam hardening



Laser hardened sealing edge
of a plastic injection mould



Folding Tool

Advantages

- ▶ Fine microstructure with optimum mechanical properties
- ▶ Increased wear resistance
- ▶ Improved fatigue resistance
- ▶ Minimal heat affected zone and distortion through reduced heat input
- ▶ Economic treatments due to rapid process and CNC control
- ▶ Localised treatments possible
- ▶ Areas with difficult access often treatable

Laser Hardenable Materials

The range of treatable materials extends from low alloy steels, through to high alloyed tool steels and hardenable stainless steels. Various cast irons can also be easily laser hardened providing the ferrite contents are low.

Selected examples

Material No.	Hardness HRC	Material No.	Hardness HRC
1.1740	64–66	1.2379	62–64
1.2083	59–60	1.2738	58–60
1.2311	58–60	1.2767	58–60
1.2316	56–58	1.2826	64–65
1.2343	60–62	1.7225	58–60
1.2363	64–66	0.7070	65–66

Equipment

Ionbond Lasertechnik in Nürnberg employs diverse laser systems (CO₂- und Nd:YAG-Laser) and Robot handling with a wide capacity and offers a wide range of treatments. Part weight up to 10t, hardened depth to 3mm and length to 5m is possible.

Our service

Ionbond offers a long experience in the field of laser hardening. Our experts are ready with their knowledge to offer you engineered solutions to your hardening problems.

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