TIC-lens

Laserske tehnologije, d.o.o.

LASER ENGINEERED NET SHAPING

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LENS (Laser Engineered Net Shaping™) is an additive manufacturing technique for rapidly fabricating, enhancing and repairing metal components directly from CAD data. The technology allows to design a part using standard 3D CAD software and build it directly from one or more of about 76 alloy powders including steel, titanium, nickel, aluminum, copper, and metal matrix composites.
LENS offers four technical advantages: fabrication of hollow or embedded structures, computer controlled gradient deposition of multiple materials in one part, material properties comparable to investment castings out of the machine or close to wrought materials after heat treating, and a small heat affected zone.
LENS is used in machine engineering (for repairing and renewal of most demanding component parts of contemporary tools and mechanical elements), airspace, military, electro, car and in other industry e.g. to medicine (surgical instruments and prosthetic implants).

LENS Advantages

- revolutionary designs
- excellent material properties
- fully dense microstructure
- processing of new materials,
- combination of different materials (gradient materials)
- atmosphere controlled chamber
- optimal and repeatable process
- less material waste and post process removal
- computer controlled process
- lower costs
- time compression
- manufacturing agility

LENS Applications

Rapid Prototyping:
- 3D metal prototypes
- medical implants
- plastic injection molds

Repair:
- moulds and forming tools
- turbine blades
- gears
- drive shafts
- axles

Wear Resistant Layers:
- rolls
- moulds and tools
- injection moulds
- turbine blades
- valves
- shafts

Equipment

- 5 - axes CNC machine
- X-Y-Z 900 x 1500 x 900 mm
- laser enclosure, hermetically sealed (Ar)
- tilt-rotate worktable
- positional accuracy ±0,25 mm
- deposition rate up to 0,5 kg/h
- tilt-rotate worktable (max. load 250 kg)
- 1 kW fiber laser
- antechamber Ø38 cm
- gas purification system Ar <10 ppm O_2 materials processed (Fe, Al, Co, Ti, Ni, Cu, W, Mo, TiC, WC)
- CAD data (IGS, STP)
- enclosure 3 x 3 x 3 m

Materials

- steel
- aluminium
- cobalt
- titanium
- nickel
- copper
- carbides

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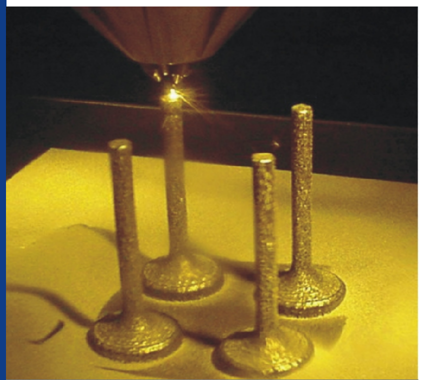

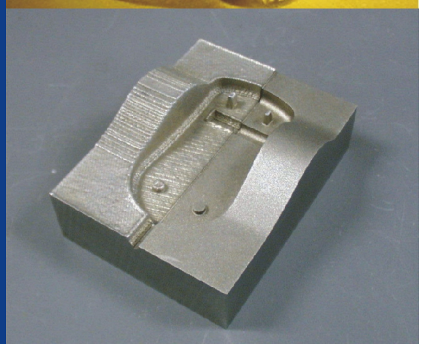

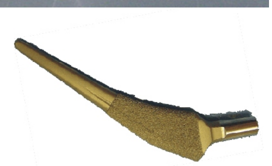

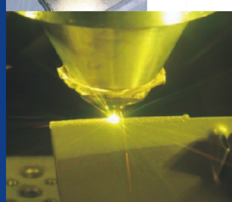

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LASER HARDENING

LASER HARDENING

Laser hardening is a metal surface treatment process complementary to conventional flame and induction hardening processes.
A high-power laser beam is used to heat a metal surface rapidly and selectively to produce hardened case depths of up to 1.5 mm with hardness values of up to 65 HRc.
The high hardness of the martensitic micro-structure provides improved properties such as wear resistance and increased strength.

Advantages of laser hardening

- laser is source of energy with outstanding characteristics (contactless method, controlled input of energy, high capacity, constant process, precise positioning),
- lower costs for additional machining,
- no use of cooling agents or chemicals,
- high flexibility,
- the process can be automated and integrated in the production process.
- superior wear resistance of hardened surface,
- selective hardening of complex geometrical shapes,
- local hardening,
- no local melting of material,
- minimal deformation,
- high accuracy,
- low heat input and thus low distortion,
- constantly high product quality due to process control
- applicable for any material that can be hardened,
- hardening of different 3D geometries (cutting edges, guide rails, grooves, …),
- adaptive temperature control, accuracy ± 5°K,
- hardness up to 65 HRc,
- laser width 5 - 28 mm,
- hardening depth to 1,5 mm,
- no 3D CAD data necessary

Applications of laser hardening

Machine parts:
- drive shafts
- axles
- torsion springs
- gears
- pulleys
- piston ring grooves
- punching tools

Forming tools and moulds:
- cutting edges
- forming radius
- selective areas

Problematic geometries:
- linear guide rails
- complex 3D geometries
- rollers, rim geometries
- inside surfaces of holes

Equipment
- 6 - axis robot
- X-Y-Z 2,3 x 4 x 2,5 m
- tilt-rotate worktable
- hardening width 5, 8, 11, 13, 16, 23, 28 mm
- working table (max. load. 5000 kg)
- tilt-rotate worktable (max. load. 500 kg)
- 3kW diode laser
- DCAM - CAD data (IGS, STP)
- LompocPro
- E-MAqS - thermo camera
- cabin 4,8 x 4,8 x 3,2 m

Materials
- tempering steels
- cold work steels
- hot work steels
- tool steels
- high speed steels
- spring steels
- stainless steels
- cast iron materials

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