Heat treatment solutions.
Laser Hardening.
Hightech by Gerster:
The highest level of precision for the most demanding components.

Advantages.
▷ Highest level of process safety and reproducibility
▷ Hardening of ready processed parts without post processing
▷ Blank hardening with inert gas possible

Properties.
▷ Precise heat application on edges, grooves and corners too
▷ Minimum grinding allowances on parts with post processing
▷ Very low risks in relation to cracks and distortion
▷ Hardening of highly hardened and tempered material
▷ Series production with NC quality and regulated process
▷ Flexible 3D-processing in a fixed position or on a rotating/tilting table

Areas of use.
▷ Hardening roller tracks on ready processed components
▷ Protection of contact faces against denting and wear
▷ Control curves
▷ Guides
▷ Wearing edges
▷ Rails
▷ Small parts
▷ Tensioning elements

Unit cost comparison.

Short delivery times, process elimination and cost redistribution: Laser hardening allows the realisation of optimised processes in many cases.
Advantages.
▷ Increased working life due to wear-resistant, hard parts
▷ Precise hardening with high process safety
▷ New combination possibilities with coatings and other heat treatments

Properties.
▷ Increase in wear resistance on particularly stressed parts (roller tracks, stop surfaces etc.)
▷ Partial hardening of tracks on large scale tools
▷ Hardening of highly hardened and tempered material
▷ Very low risks in relation to cracks and distortion
▷ Quick process times due to use of CAD/CAM-data
▷ Free 3D-movements thanks to a robot controlled laser
▷ Generous plant dimensions (floor area of cabin 5 m x 7 m)
Hightech by Gerster:
Surface hardening with laser technology.

- Fine grained, tough joint
- High wear resistance
- No stress relief treatment necessary
- Low risk of cracks
- Minimum heat influence
- Minimum distortion

A broadly focused laser beam heats the surface of the component to hardening temperature (>1000 °C) locally in a very short time. As soon as the laser beam no longer acts, the heat is conducted into the base material of the work piece (self quenching) and a hard, martensitic joint emerges. The feeding of the laser beam over the component surface results in a hardened track with a hardening depth (Rht) up to a maximum of 1.5 mm.

Laser hardened tracks are distinguished by very fine grained joints thanks to the high speed of heating (>1000 °C/sec). This joint is extraordinarily tough and therefore does not have to be annealed any more after hardening as a rule. Fewer hardening strains emerge during laser hardening thanks to the self-quenching. The danger of cracking is thus lower than for conventional processes.

In laser hardening the heat required for conversion is applied very precisely and locally defined. In this way the component is just processed with the minimum necessary energy.

The advantages are a minimum heat influence of the base material and also minimum hardening distortion.

All steels and casting materials, which can be directly hardened, can be processed with the laser. In the hardening area the most consistent preparation possible is required (N7/N8 or better).

Tracks up to 20 mm wide can be hardened. For greater track widths several tracks are laid down alongside one another. A small overlapping zone with slightly less hardness develops (annealing effect).

Components can be hardened without oxidation of the surface through the use of inert gas. Post processing is thus often not required after hardening.

Plant design.
- State of the art industrial robot plant with 9 NC-axes
- NC-controlled rotating/tilting table
- Useful space 5 m x 7 m x 4 m
- Track widths up to 20 mm
- High performance diode laser
- Regulated surface temperature
- Hardening with inert gas for blank surfaces

Comparison of laser hardening with classical surface hardening processes.

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Flame hardening
Induction hardening
Laser hardening

Hardening depth (Rht)
Up to 40 mm
Up to 10 mm
Up to 1.5 mm

Reproducibility/process safety
Good
Good to very good
Excellent

Distortion behaviour (for identical geometry and identical material)
Good
Good
Very good and identical

Sequence of operations in the hardening process
Can also be selected flexibly
complete product line before end processing
before end processing
after end processing

Surface condition
component surface discoloured
resulting from oxidation
possible

End processing after the heat treatment
Necessary as a rule
Necessary as a rule
Omitted in normal case

Precision of the heat input
Medium
Good
Meets highest standards
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Quality Management System
ISO 9001:2008
Automotive Quality Standard
ISO/TS 16949:2009
Environmental Management System
ISO 14001:2004

Hightech by Gerster.

Surface hardening
- Induction hardening
- Dual frequency hardening
- Flame hardening
- Non-destructive determination of hardening depth

Laser technology
- Laser hardening

Through hardening/annealing
- Hardening under inert gas conditions
- Vacuum hardening with pressurised gas quenching
- Tempering
- Annealing under inert gas conditions
- Stress relief treatments
- Cryogenic treatments down to –180 °C
- Precipitation hardening of aluminium alloys

Brazing
- Under vacuum conditions
- Under inert gas conditions
- Inductive
- With flame

Thermochemical diffusion methods
- Carburising
- Carbonitriding
- Case hardening
- Gas nitriding
- Oxinitriding
- Gas nitrocarburisation
- Pronox
- Plasma nitriding
- Plasox
- Boronising
- Performance enhancing treatments for stainless steels SolNit-A®, SolNit-M®, HARD-INOX®

Consulting and additional services