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RUBIG
DRIVING SUCCESS

**Precise and
Reliable**

Heat Treatment





RÜBIG Vacuum Hardening R.VAC+®

Comprehensive hardening for tool materials

R. VAC+® covers all vacuum hardening processes provided by RÜBIG Heat Treatments. Precise process control and outstanding quality standards ensure consistent hardness, high strength and an optimum component framework. Vacuum hardening is the hardening process for deformation sensitive precision or formed components and tools which demand a clean, bright surface.

Benefits

- Minimum deformation
- Metallic blank surfaces
- No adverse effects on the surface of components
- Optimum component structure with minimal dimensional change
- Maximum reproducibility
- Several thermocouple elements per component for optimum process reliability
- Furnaces certified in line with aerospace standard AMS 2750E and CQI9
- Heat treatment processes tailor-made for individual materials and components

R.VAC+® treatments

- Vacuum hardening
- HELIVAC® (with helium quenching)
- UDAK (with helium or nitrogen quenching)
- Low pressure nitriding
- Vacuum soldering
- Annealing processes (including stress relief heat treatment, soft or standard annealing)
- Solution annealing and retrieval (steel and non-ferrous metals)

VACUUM HARDENING			
dimensions in mm	length	width	height
maximum dimensions	1200	900	900

RÜBIG Plasma Nitriding PLASNIT® & RÜBIG Gas Nitriding R.NIT+®

Top of nitriding

The MICROPULS® technology developed by RÜBIG is utilized in RÜBIG systems to perform plasma nitriding processes for premium quality. Since plasma nitriding is normally performed at lower treatment temperatures, it is the heat treatment with the lowest risk of deformation.

Benefits

- Steels with low to high alloy content are nitridable (incl. stainless steels)
- Improved tribological characteristics
- Compact, dense and more ductile compound layers
- Lower risk of deformation
- Partial treatment by means of

- mechanical masking possible
- Good reproducibility and low tolerances in the treatment results
- Less roughness and clean surfaces as compared to salt bath and gas processes
- Increased corrosion protection of unalloyed and low-alloy steels
- Possibility of post-oxidation
- Environmental friendliness

Treatments

- PLASNIT®
- PLASOX®
- PLAPOL

R.NIT+® covers all gas nitriding and related processes in the premium segment.

Benefits

- Short processing times
- Better corrosion protection with GASOX®
- Precipitation-free nitriding for customized applications
- High utilization levels for cost-effective batch processing

R.NIT+® treatments

- Gas nitriding processes (nitriding, nitrocarburizing)
- GASOX® (gas nitriding plus oxidation)

PLASMA NITRIDING PLASNIT®		
dimensions in mm	diameter	height
maximum dimensions	1500	2400



GAS NITRIDING R.NIT+® & ANNEALING PROCESSES		
dimensions in mm	diameter	height
maximum dimensions	850	2000





RÜBIG Material Analysis

Comprehensive advice & quality control as part of the treatment process

The combination of high-quality laboratory equipment and technical expertise enables sample preparation, optimisation and further development of components, failure analysis and seminars and training courses at the highest level. Furthermore the material testing according to automotive and aviation standards ensures the fulfilment of your quality requirements for heat treatment.

Hardness testing

- Hardness testing of metallic components and workpieces
- Hardness profile measurements
- Hardness testing of thin hard material layers

Component testing

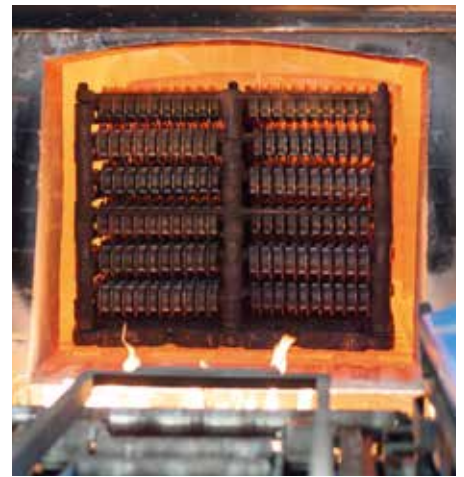
- Qualitative and quantitative structural characterisation
- Measurement of residual stresses or residual stress profiles in component surface areas
- Assessment of corrosion damage
- Determination of corrosion causes
- Salt spray test DIN 50021

Materials analysis

- Determination of material type
- Determining the residual austenite content
- Depth profile measurement (GDOES)
- REM-analysis

Sample Preparation

- Determination of the chemical composition of unknown metallic materials or in the event of suspected material mix-up
- Entry control to ensure material delivery quality or to restrict the origin of foreign particles
- Failure analysis (tears, breaks, wear and tear, corrosion)



RÜBIG Case Hardening R.CARB+®

Fully regulated and monitored

Not all case-hardening treatments are equal. RÜBIG's R.CARB+® processes have been used in the heat treatment sector for decades and still add optimum value. Tight tolerances and highest reproducibility are a given. Other advantages of R.CARB+® treatments by RÜBIG include uniform hardness and dimensional stability.

Benefits

- Tight tolerances
- Maximum reproducibility
- Uniform hardness and dimensional stability
- Standard or special heat treatments for your components

R.CARB+® Verfahren

- Case hardening
- Inert gas hardening
- Carbonitriding
- Carburizing
- High-carbon treatment
- Tempering
- Deep cooling

Benefits of Case Hardening

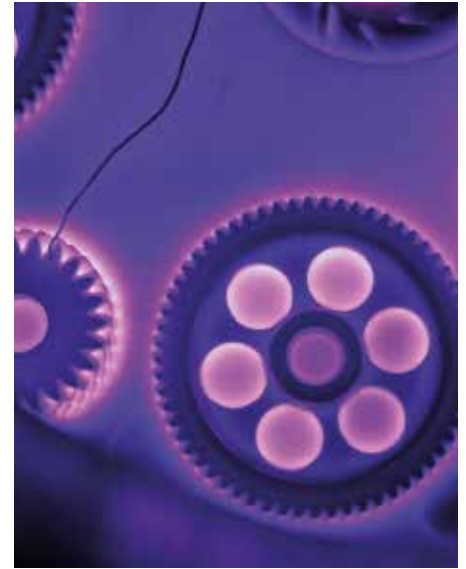
- Increased fatigue strength
- Increased wear resistance
- Combination of a hard, wear resistant surface and a tough core

Benefits of Inert Gas Hardening

- Improvement of the physical component properties

CASE HARDENING

dimensions in mm	length	width	height
maximum dimensions	1050	690	700



RÜBIG Hard Coating PLASTIT®

Surface hardening treatments using the diffusion of nitrogen

RÜBIG offers PACVD coatings (PACVD - plasma assisted chemical vapour deposition) which use a plasma assisted chemical deposition. Tools and components must withstand increasing stresses and strains in mechanical and tool engineering. Treated functional layers can almost fully meet these requirements nowadays, also giving the workpieces an increased edge strength and wear resistance.

Benefits

- Optimum wear and corrosion resistance
- Excellent gliding properties due to minimal friction
- Longer service life of your components
- Improvement of release properties
- Reduction of mold contaminations and weld deposits
- Can be used for complex geometries
- Internal coatings for tubes and through holes
- Protection of polished and structured tool surfaces

PLASTIT® treatments

Carbon-based coatings

- (for components)
- DLC Xtended®
 - DL coat (DLC)

Titanium-based coatings

- (for tools)
- Gold LF PLASTIT® (TiN)
 - Carbon LF PLASTIT® (TiCN)
 - BORON Nanocomp PLASTIT® (TiBN)



RÜBIG Aluminium Treatments

Short processing times at premium quality

During treatments, heat is applied in order to positively affect the material characteristics of aluminum. The aluminum atoms are arranged in a crystal lattice and contain imperfections, which increase the strength of the aluminium.

Benefits

- Improves strength
- Avoids deformation
- Dimensional stability
- Improves cold deformation
- Increases toughness
- Short processing times
- Close tolerance band
- Heat treatment processes tailor-made for individual materials and components
- Pusher type furnace with high throughput

Treatments

- Heat treatment for wrought alloys
- Heat treatment for casting alloys
- Solution annealing with air quenching
- Artificial aging
- T4: Solution annealed and cold precipitated (Al-Cu-Mg preferred)
- T5: Quenched from warm forming temperature and warm precipitated
- T6: Solution annealed and warm precipitated (Al-Mg-Si alloys preferred)
- T6: Air quenching
- T6: Water quenching
- T6: Polymer quenching
- T7: Solution annealed and overcured (warm precipitated)



RUBIG
DRIVING SUCCESS

RUBIG – Your partner for the perfect heat treatment

RUBIG has been working with steel for 70 years

Our enormous wealth of experience gained from practical drop forging applications, hardening treatments and systems engineering is a valuable basis for our expertise in metallurgy, material testing and a general understanding of metallic components.

Heat treatment is a key technology affecting the entire operational lifespan of a component. Material production,

material selection, component planning, design as well as manufacturing and end-use application are important factors. But they ensure smooth operation only in combination with the correct heat treatment. Our know-how and our practical experience make us a centre of excellence for metallic materials.

The material testing according to automotive and aviation standards ensures

the fulfilment of your quality requirements for heat treatment. Materials analysis, the optimisation and development of components, damage analysis, expert reports, as well as seminars and courses in the field of heat treatment technology complete our services.

Certifications
ISO 9001:2008
IQ-Net
VDA 6.1
EN 9100:2009

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