



**sij** | ravne systems

HEAT TREATMENT



The heat treatment process uses heating and cooling to modify the properties of steel, to make it more suitable for its intended application. Our experience and expertise in metallurgy and materials, gathered over many years, enables us to suggest the best heat treatment process for the type of workpiece and how it will be used.

**We provide the following types of heat treatment:**



Volume heat treatment



Flame hardening

## VOLUME HEAT TREATMENT

In volume heat treatment, the entire volume of the workpiece is heat treated to change its structure and properties.

**It involves:**

- Annealing (soft, diffusion, stress-relief)
- Quenching
- Normalizing
- Hardening
- Tempering

**Maximum workpiece dimensions:**

1,200 mm diameter × 10,500 mm length, maximum weight 22,000 kg or 1,400 diameter × 3,000 mm length, maximum weight 3,500 kg.

## HEAT TREATMENT IN SALT BATH

For hardening tool and high-speed steels: maximum workpiece dimensions: 250 × 600 × 900 mm, maximum weight 60 kg.

## SURFACE HARDENING

In surface hardening processes, only the surface area is heated. It is heated to a specific depths, in accordance with the requirement. This type of heat treatment is used to improve wear resistance of surface without affecting the softer and tougher core. We offer surface flame and induction hardening.

**Flame hardening**

- Flame hardening of running wheels and gearwheels to modul 10 ranging from 50 to 1,100 mm diameter x 350 mm. Maximum weight 850 kg.
- Flame hardening of running wheels and gearwheels to module 40 with dimensions up to 2,500 mm diameter x 750 mm. Maximum weight 3,000 kg.
- Flame hardening of axles and rolls ranging from 30 to 250 mm diameter, maximum length 4,600 mm and maximum weight 3,000 kg.
- Flame hardening of rails and guide rails with maximum dimensions 20 x 250 x 4,600 mm and maximum weight 3,000 kg.

Between 3 and 10 mm hardened surface layer depth can be achieved.



Induction hardening



Vacuum hardening

### Induction hardening

- Induction hardening of rolls and axles ranging from 150 to 800 mm diameter, maximum length 5,500 mm and maximum weight 8,000 kg.
- Induction hardening of roll necks ranging from 100 to 400 mm diameter. Maximum roll weight 6,500 kg.

The BIKS 830 induction hardening machine for hardening the working surface and the IKS 200 induction hardening machine for hardening roll necks are fully computer-controlled CNC machines which provide complete control over achieving the desired hardened layer depth, ensuring consistent product quality.

#### The benefits of this heat treatment technique include:

- Easier automation of the process
- Easier regulation of the hardening depth
- Very fast performance
- Minimal deformation of products
- Guaranteed quality - 100% repeatability of products.

### VACUUM HARDENING

Vacuum furnace dimensions: 750 × 900 × 3,700 mm. Maximum weight of workpiece 1,500 kg.

Materials which respond well to vacuum heat treatment are tool steels, high-speed steels and powder materials.

#### The main benefits of vacuum hardening are:

- minimum dimensional changes and minimal deformation of the workpiece
- accurate control of heating and cooling, making the process more stable
- fewer impurities
- workpiece surface remains clean and bright
- environmentally friendly process.

Modern vacuum furnaces are computer-controlled, which ensures stability and reproducibility of the hardening process.

Our unique combination of metallurgical and engineering expertise, combined with many years of practical experience with different types of heat treatment and applied knowledge, enables us to achieve the highest quality of heat treatment processes.

We boost our competitiveness by being highly adaptable to customer requirements, ensuring short delivery times and providing service of the highest quality.

We ensure the reproducibility and traceability of our processes in accordance with the ISO 9001: 2015 standard. For each process, we issue the acceptance certificates for the surface hardness check or required mechanical properties check that has been performed.

On request, we can perform all kinds of destructive and non-destructive testing in our own laboratories.

## **Sales network:**

### **Headquarters**

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