

Heat Treatment

United Induction Heating Machine Limited

We are experienced in Induction Heating, induction heating machine, Induction Heating equipment. They are widely used in induction heating service, induction heat treatment, induction brazing, induction hardening, induction welding, induction forging, induction quenching, induction soldering induction melting and induction surface treatment applications
<http://www.uihm.com>

In recent years this plant is using hardening with preceding induction heating for more

than 50% of the total amount of heat-treated parts. These are mainly tractor parts made from

45, 40Kh, 38KhGS, and 33KhS steels. The overwhelming majority of parts (85% of all items)

undergo heat-treatment within the machining lines. The parts made in small series are

treated on induction devices in the mechanical shop, in the repair-mechanical shop, and in

the experimental section of the electric heating laboratory.

The induction heating prior to hardening is carried out mainly at frequencies of 8, 10~ and 70 kHz.

The induction devices with vacuum-tube oscillators are fitted with hardening attachments

or general-purpose hardening tanks with an adjustable holder for the hardening attachments.

The holder is a horizontally mounted fork which moves in the vertical direction for securing

the device at the required level in relation to the inductor.

For heating parts in the inductors fed from machine generators mainly hardening machines

are used which consist of a universal heating station (UHS) mounted on a common frame with a

hardening transformer, condenser battery and devices for control and cooling; the contactor

cupboard with a high-frequency disconnecting switch, contactor measuring transformers; a

large hardening device (mounted on the frame) or a special tank, on which a small hardening

device is mounted, enclosed in a casing with a hole for the part. The space under the casing

is connected to a ventilation system provided for letting out smoke and steam produced during

the hardening process.

When oil is used as the hardening liquid, the tank is equipped with a pump for

feeding

oil into the sprayer or in some other cooler.

Sprayer-cooling by oil or cooling by a flow of oil* delivered in the inductor is used mainly for cooling parts made from steels 40Kh and 38KhGS.

In some cases for cooling parts from alloyed steel in plants use is made of cyclic cooling

(this method has been taken over from the Chelyabinsk Tractor Plant) where the section

of the parts heated for hardening is rotated near the sprayer, cooling at each moment of time

only a section of the heated surface. Here each surface element is periodically exposed for

a short time to the action of the hardening medium, while during the remaining part of the

cycle it is heated by heat transfer from inside the part. The variation of the rotational speed of the part and of the size of the section being cooled makes possible to

change the

cooling regime. It should be noted that cooling is of a pulsating nature only on the surface

and in the metal layers close to the surface. With the decreasing distance from the surface the pulsation amplitude decreases while the cooling rate becomes averaged.

The plant makes wide use of the centralized feed system of hardening machines by highfrequency

current. Each step making use of this system has a transformer substation with mechanical frequency transformers. The capacity of such a substation is 200-12,500 kW. The

generators mounted in the substation work in parallel on common busbars in which the voltage

is maintained by a thyristor-transistor voltage control unit. Common busbars supply all

hardening machines of the shop normally using different power.

The installed capacity of consumers exceeds the output of the substation and to avoid

overloading of generators use is made of a system for limiting the load or of selective connection

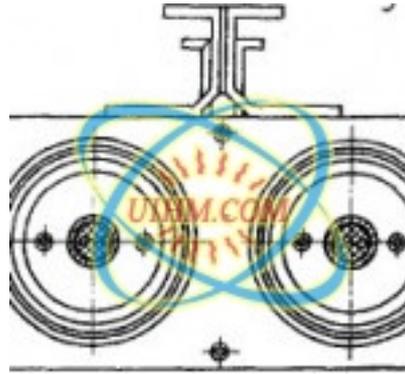
of machines.

The plant has developed and makes use of original technological processes and equipment.

They include, in particular, the process of continuously successive hardening of the rear

semiaxis [i], and hardening of holes in the rotating inductor-transformer and of

plates of
the gear box fork in forced condition.



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