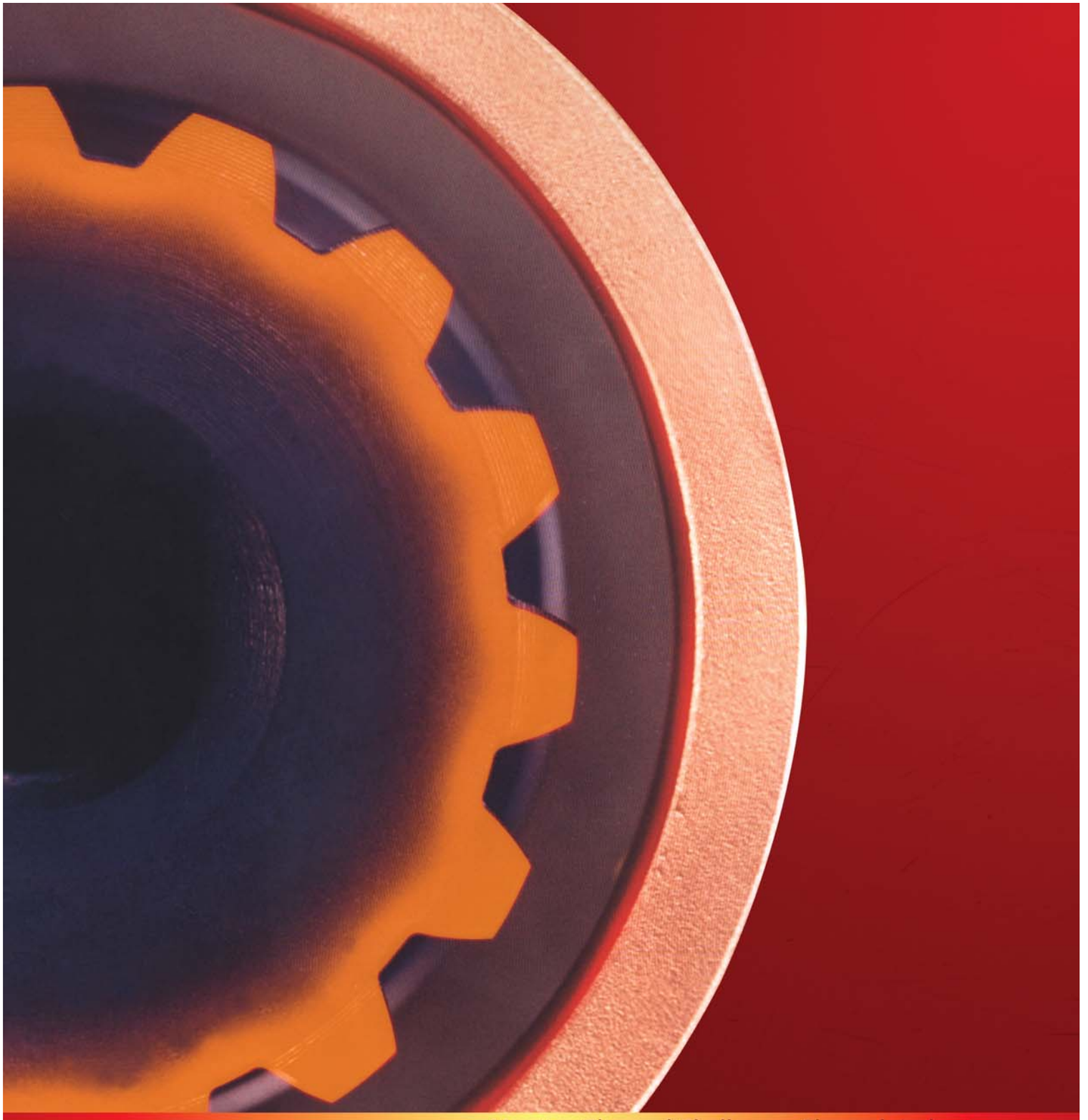


Meeting Thermal Challenges Through Induction

megatherm

Induction Heat Treating System

We deal in Metal Heating & Melting and possess the strength to meet Thermal Challenges through Induction.

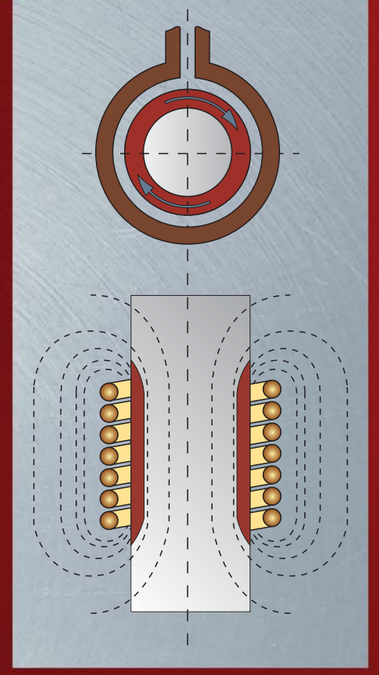
In 1989 as we sparked-off, we banked upon our troupe of Electro Thermal Processing experts and the capital of experience that we had gathered since the 70's. We made our presence felt across Steel, Foundry, Forging and various other Metal Working Sectors. Surging forward with spirits held high and the fire burning within.

Today, Megatherm is recognized and preferred by its ever-extending list of domestic and international clientele. Our installation are spread over the globe in countries, such as Brazil, Argentina, Chile, Mexico in latin America; South Africa, Nigeria, Egypt, Kenya in Africa; Georgia, Kazakhstan, Azerbaijan, Iran in Central Asia; India, Pakistan, Bangladesh, Malaysia in South Asia, Kuwait, Saudi Arabia, U.A.E., Teman in Middle East Asia; Poland, France, Germany in Europe to name a few.

Megatherm is committed to customer delight and performance excellence. We have invested in progressive in-house R&D which in turn has yielded both profit and praise for the company. On an aggregate we have over 1500 satisfied customers of Electro Heating Equipment till date. Our systems are incorporated with the best contemporary technology that ensures optimum utility and comprehensive productivity.

Being certified as an ISO 9001:2000 Company, the name Megatherm today is synonymous to quality.

the company



No job too big. Or too small

Most materials that conduct electricity will heat up when exposed to a high-frequency magnetic field. By induction, energy can be rapidly and precisely transferred into the work piece without physical contact with the source. The result is a fast and efficient heating process that can be performed in a variety of environments, even vacuum.

Induction is the heating method choice for application such as surface hardening, brazing, bounding and crystal growing. And, because induction does not heat non-metallic materials and does not need to touch the part, it is an ideal solution for container sealing.

Megatherm generators provide robust, reliable and stable performance even in the harshest of production environments. Behind every Megatherm generator stands our many years of experience developing solutions in close collaboration with our customers.

Process

Induction heating is a non contact heating process which utilizes the principle of electromagnetic induction to produce heat inside the surface layer of a work-piece. By placing a conductive material into a strong alternating magnetic field electrical current can be made to flow in the steel thereby creating heat due to the I2R losses in the material. In magnetic materials, further heat is generated below the curie point due to hysteresis losses. The current generated flows predominantly in the surface layer, the depth of this layer being dictated by the frequency of the alternating field, the surface power density, the permeability of the material, the heat time and the diameter of the bar or material thickness. By quenching this heated layer in water, oil or a polymer based quench the surface layer is altered to form a martensitic structure which is harder than the base metal.

Definition

Induction hardening is a widely used process for the surface hardening of steel. The components are heated by means of an alternating magnetic field to a temperature within or above the transformation range followed by immediate quenching. The core of the component remains unaffected by the treatment and its physical properties are those of the bar from which it was machined, whilst the hardness of the case can be within the range 45-60HRC based on the requirement and the application. Medium / High Carbon and alloy steels with an equivalent carbon content above 0.4% are most suitable for this process. A source of high frequency electricity is used to drive a large alternating current through a coil. The passage of current through this coil generates a very intense and rapidly changing magnetic field in the space within the work coil. The workpiece to be heated is placed within this intense alternating magnetic field where eddy currents are generated within the work piece and resistance leads to Joule heating of the metal.

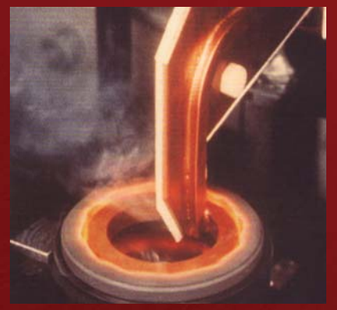
Induction surface hardened low alloyed medium carbon steels are widely used for critical automotive and machine applications which require high wear resistance. Wear resistance behavior of induction hardened parts depends on hardening depth and the magnitude and distribution of residual compressive stress in the surface layer.

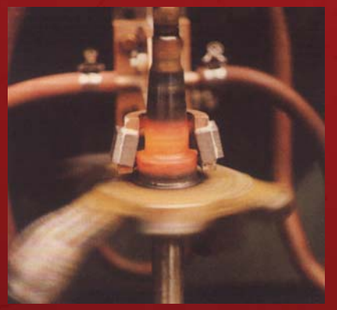
induction hardening

The Equipments

Our Induction hardening machines cover the following range

- **Output Power** – 25KW through 500KW
- **Frequency** – 500Hz - 10Khz – Medium Frequency
  10 KHz – 50 KHz – High Frequency
  50 KHz to 450 KHz – Radio frequency
- **Machine types** – Vertical Scan hardening , Horizontal scan hardening, Lift & Rotate, Rotary indexing with pick & place systems integrated
- **Controls** – Allen Bradley, Siemens, Mitsubishi CNC / PLC systems with energy monitoring, quench monitoring and temperature feedback systems
- **Accessories** – De-Mineralized water recirculating type cooling systems, quench media re-cooling and recirculating systems, Inductors, Quench rings and various kinds of work holding fixtures.





Standard Process Controls Employed in our Induction Hardening Machines are:

- Energy (KW-Sec) Monitoring
- Quench Medium Flow Monitoring
- Quench Medium Temp. Monitoring
- Scan Speed Monitoring
- Rotation Speed Monitoring
- Part Temp. Monitoring (Optional)
- Input Power Factor Monitoring

Steels suitable for Induction Heat Treatment

AIS/SAE No	Hardness RC values 50 55 60 65	Composition C %	SI %	Mn %	P %	S %	Cr %	Mo %	Ni %	V %
Heat Treatable Steels										
1035		0.35	0.35	0.80	0.045	0.045				
1045		0.45	0.35	0.80	0.045	0.045				
1050		0.53	0.35	0.70	0.025	0.035				
1060		0.60	0.35	0.90	0.035	0.035				
1070		0.70	0.35	0.90	0.035	0.035				
1140*		0.35	0.40	0.90	0.060	0.250				
1145*		0.45	0.40	0.90	0.060	0.250				
1160*		0.60	0.40	0.90	0.060	0.250				
1335		0.36	0.35	1.50	0.035	0.035				
4135		0.34	0.40	0.80	0.035	0.035	1.05	0.25		
4140		0.41	0.40	0.80	0.035	0.035	1.05	0.25		
4150		0.50	0.40	0.80	0.035	0.035	1.05	0.25		
4340		0.34	0.40	0.70	0.035	0.035	1.55	0.25	1.55	
5045		0.45	0.40	0.80	0.025	0.035	0.50			
5132		0.34	0.40	0.90	0.035	0.035	10.5			
5135		0.37	0.40	0.90	0.035	0.035	1.05			
5140		0.42	0.40	0.80	0.025	0.035	1.05			
5640		0.36	0.40	0.80	0.035	0.035	1.05	0.25	1.05	
6150		0.50	0.40	1.10	0.035	0.035	1.05			0.15
Tool Steel										
H13		0.41	1.00	0.40	0.015	0.010	5.00	1.30		0.50
Stainless Steel										
420		0.20	0.50	0.40	0.035	0.035	13.0			
440		0.40	0.50	0.40	0.030	0.030	13.0			
Bearing Steel										
52100		1.00	0.35	0.40	0.030	0.025	1.55			
Cast Iron										
A48-40B										
80-55-06										
100-70-03										

Hardening Depths:

- 2mm Max
- 4mm Max
- 6mm Max
- Over 6mm

* Higher Hardening Variations are possible

Relationship between case depth, output frequency and heating time

Frequency (khz)	Depth (mm)	Time (sec)
0.05	9-17	8.5-14
1	5-10	6.5-12
3	3.5-7.5	5.5-10
10	2-5	4-8.5
25	1.5-3.5	3.5-7.5
200	0.9-2.5	2.5-5
450	0.8-2.2	1.5-4.5

Based on Power density of 0.8-2.5kw per sq. cm[5.0 to 15.0 kw /sq. inch]. Approximate guidelines, please check with us.

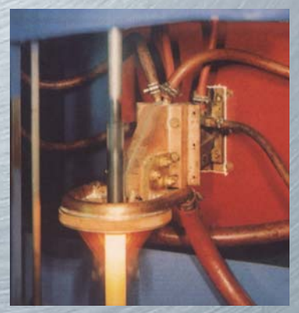
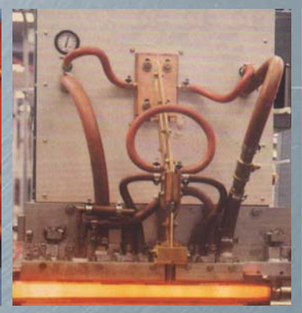
Induction Heating - a better method

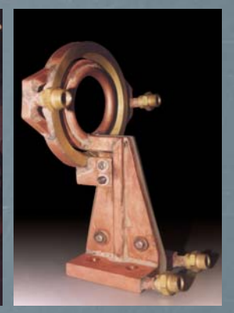
Improved Economics

- Shorter Start Up Time
- Shorter Heating Times
- High Efficiency
- Reduced Scaling
- Accurate Temperature Control
- Controlled Heat Zones
- Reduced Floor Area
- Improved Product Quality (Less Rejects)
- Easily Adaptable to Automatic Process

Improved Environment

- Improved Working Conditions
- No Products of Combustion
- No Effluent



- Argentina
- Azerbaizan
- Bolivia
- Botswana
- Bhutan
- Bangladesh
- Brazil
- Cuba
- Egypt
- France
- Ghana
- Georgia
- India
- Iran
- Kuwait
- Kenya
- Malaysia
- Mexico
- Nepal
- Nigeria
- Pakistan
- Poland
- Saudi Arabia
- South Africa
- Sudan
- Tanzania
- Tunisia
- U.A.E.
- Uganda
- Yemen

Worldwide Installation

megatherm

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