

**Engineered Solutions
For Thermal Processing**

Induction Heating & Melting



Ajax **TECCO**
Magnethermic

Steel Industry

Advanced Heating Technology

Ajax TOCCO has developed solid state induction technology along with innovative inductor designs enabling mills to dramatically improve processes such as bar and slab rolling, and strip processing.

In-Line induction heaters working in conjunction with continuous casting lines save thousand of energy dollars by utilizing casting generated heat and restoring only the additional energy required to reach optimum rolling temperature. Continuous strip heating with strategically placed heating coils that accurately control temperature cycles using only a fraction of the space of convention heating methods.

The ISG Induction Strip Galvannealing, developed by Ajax TOCCO, is easily integrated with new or existing equipment. Strip heater designs present many cost cutting opportunities for applications such as strip annealing, coating line heating, and taper heating for more uniform rolling.

Melting Technology

Large high powered channel induction furnaces with “Jet Flow” inductors are used to:

- Superheat blast furnace iron prior to use in a steel making process. Increased yield coupled with a lower cost make the Superheater a viable alternative to conventional practices.
- Provide a large initial charge of molten iron to arc furnaces for the melting of steel scrap. The initial iron charge enhances electrode life and increases the initial melt rate of the arc furnace.
- Provide melting and holding capability to a new melting process where DRI and/or fine scrap is continuously melted to supply iron for the steelmaking process.

Ajax TOCCO ceramic lined induction coating and pre-melt pots are the industry standard in the production of coated steel strip and tubing.

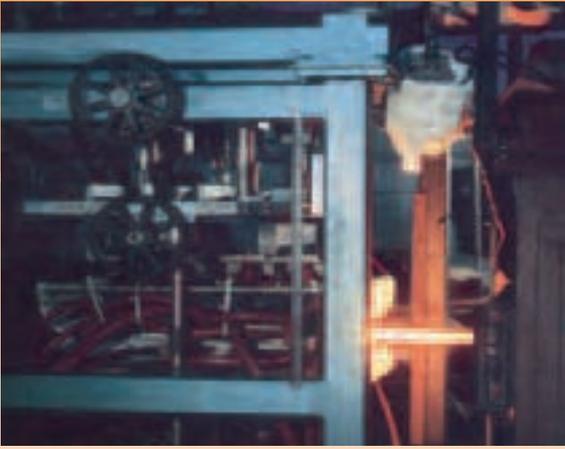
Coreless furnace technology is used for a wide variety of applications in the steel industry. These include:

- Heating tundishes in continuous casting processes
- Melting of steel alloys in mini-mill applications
- Vacuum induction melting (VIM) for processing alloy steels

Ajax TOCCO's latest design in High Power Density (HPD) furnaces has improved performance and refractory life over previous designs for high capacity melting operations.



Ajax TOCCO supplies systems to provide the most advanced state of the art heating equipment. These systems offer the shortest heating lengths and the most efficient system in the industry. We continue to develop new ways to improve the system to satisfy our customer's needs.



Ajax TOCCO, Transverse Flux heating is changing the way processors want to heat strip. TFIH enables the user to heat a wide variety of strip with the same inductor and enables our customers to make adjustments to the system without shutting down the line. Processing costs can be cut as much as 22%, and scale formation reduced as much as 67%.



Manufacture and overhaul for vacuum melting coreless induction furnaces.



This 1500 ton Superheater melts at the rate of 33 tons per hour and superheats blast furnace iron 400° F at the rate of 250 tons per hour.



Ajax TOCCO quench and temper lines for solid bars and shapes are known industry wide for producing superior metallurgical and physical properties in the final product. These benefits are achieved with the ultra high heating rates and temperature control possible only with induction heating.



A view of a 1200 kW strip drying application. This equipment is being used for a wide variety of coating applications. The equipment is designed for horizontal or vertical installations.

Forging Industry



Advanced Technology

Ajax TOCCO continues to refine induction technology offering the most efficient and flexible heating systems to the forging market.

Utilizing “cast brick” or “open coil” inductor technology, we supply heating systems designed to meet customer’s thermal requirements and increase process efficiencies required to meet the challenging demands of the world economy.

For typical heating applications, we provide increased operating efficiencies, reduction in installation cost plus minimizing floor space by offering our “MONO FORGE” heating systems.

For larger applications we market our standard heating concepts, which are easily modularized to meet customer’s specific process applications.

Power Systems

Our constant current power supplies are the proven choice. Their patented designs, operating into a 3 to 1 conductance range, minimize the number of inductors required, thus reducing capital expense, insuring process integrity and reducing changeover time while increasing productivity and profits.

Control and monitoring of our systems is provided through our “FORGE VIEW” control packages, which monitor and control the power supply, billet feeding system and temperature of the billets.

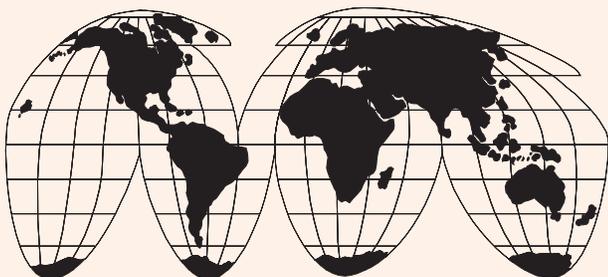
Standard controls are PLC based, offering basic power and system monitoring. When process requirements dictate more precise control and monitoring, PC based controls can be supplied with capability to monitor and/or upgrade operating parameters via the internet allowing the user to change production requirements as needed to meet their customer’s needs.

Fixturing

We offer billet feeding solutions via pinch wheel, pusher, and caterpillar type drive units. For special applications, a walking beam fixture may be considered.

Technical Support and Service

With our ability to integrate billet handling systems plus offering “turn-key” installation, Ajax TOCCO has the engineering, technical, service and spare parts network in position to meet the needs of the forging industry as we meet the challenges of an ever changing global market.



Authorized OEM for AIH, IEH, Ajax Magnethermic®, and TOCCO®

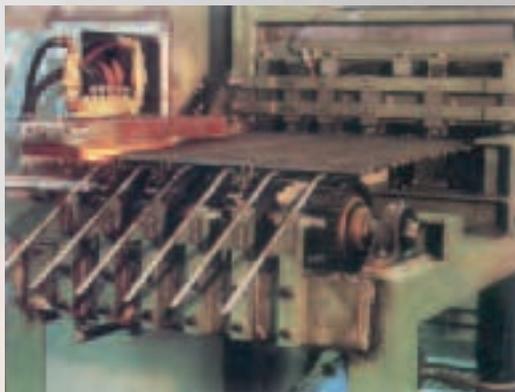


Ajax TOCCO consistently leads the way in developing new induction heating technology providing new ideas to the forging industry's drive to support existing customers plus capture new markets.

In this age of international competition, the key to survival, in a constantly changing environment, is efficient and flexible use of plant space, energy, and manpower.



Wide oval walking beam heater for 1/2" to 1 1/8" bars 8" to 18" long. All sizes can be heated with the same inductor.



150 kW, 10 kHz automatic bar end heater on a unitized base, with drop bottom tote box loading.



Sway bars for automobile suspensions are forged with this Ajax TOCCO heater. Bars are continuously fed through five cast coils for fast scale free heating.



The first of several dual-line heaters supplied to process in excess of 12,000 pounds per hour.

Foundry Industry

Advanced Technology

Ajax TOCCO leads the way with induction melting technology allowing our customers to maintain a competitive edge in today's worldwide market.

Pacer Power

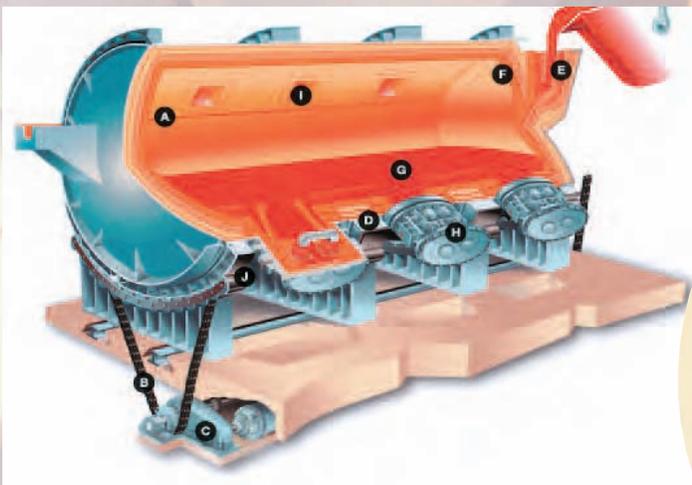
The Ajax TOCCO Pacer power supply has the ability to melt a wide range of alloys at maximum power without tap changes or capacitor switching. Pacer is the only solid state power supply that utilizes fiber optics to extend component life. Efficiency remains high at all power levels. The Pacer is available in sizes to 16000 kW.

Jet Flow Inductors

As the world leader in channel furnace technology, Ajax TOCCO continues to refine the design of the world famous Jet Flow inductor. Ajax TOCCO has not only broken the 8000 kW barrier, but can also point to the successful start up of the largest channel furnaces in the world.

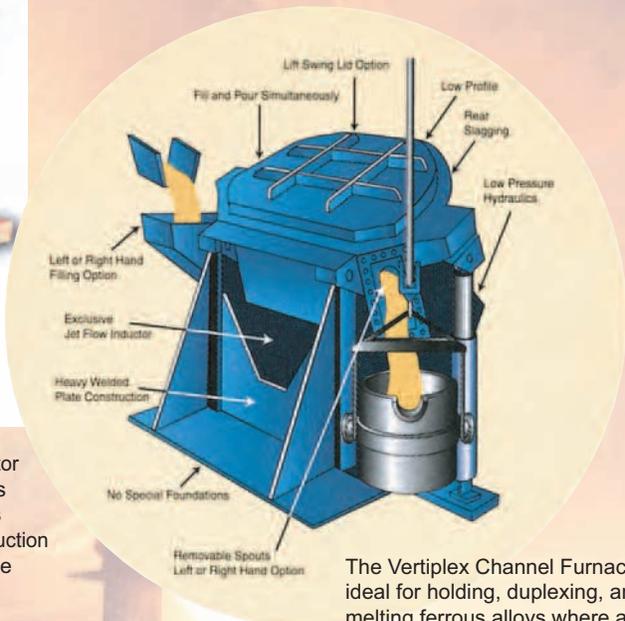
Melt Control Systems

The Magne-Com melt control system enhances the overall melt system making furnace start up, daily melting, and maintenance simpler. This system can also provide access to valuable process information, alarm management, troubleshooting, data logging, trending, and report generation.

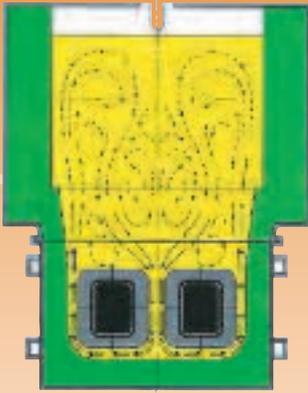


Ajax TOCCO leads the industry with high powered Jet Flow channel inductor technology. This, coupled with our innovative large furnace designs, has allowed us to create "Superheaters" for the steel industry. Superheaters are designed to melt scrap and superheat blast furnace iron prior to introduction into a steel making process. Ajax TOCCO designs and manufactures the world's largest channel induction furnaces.

The channel furnace offers a great deal of upper case design versatility to meet the demands of all casting processes. Channel furnaces with "Jet Flow" inductors are used for traditional foundry applications, up-casing, horizontal, and vertical direct chill casting processes. All channel furnaces are available with solid state controls.



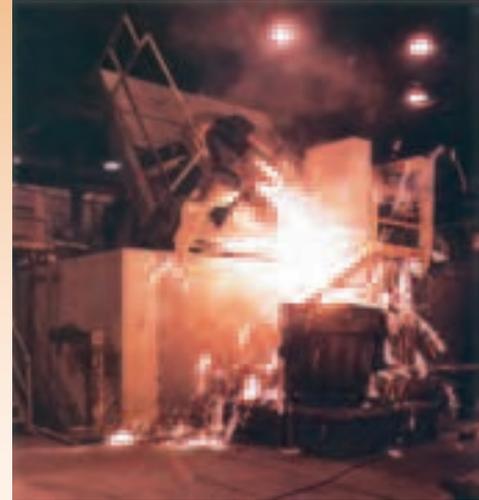
The Vertiplex Channel Furnace is ideal for holding, duplexing, and melting ferrous alloys where a constant supply of metal is required to meet production demands. The Vertiplex can pour and receive metal at the same time. Vertiplex furnaces feature Jet-Flow channel inductors.



◀ The heart of a channel furnace is the inductor. For optimum performance, the inductor must be extremely reliable. Ajax TOCCO leads the industry in high powered inductor designs for both ferrous and non-ferrous applications. Jet Flow inductor designs set the worldwide standard for inductor performance.



◀ This 90 ton vertical channel furnace increased gray iron pouring capacity without increasing energy cost during peak demand periods. It acts as a buffer between primary melting and molding requirements providing a continuous flow of temperature-controlled and metallurgical constant iron.



Two 3600 kW medium frequency solid state power supplies are used here with two 10 ton coreless furnaces to provide this foundry with the flexibility required to meet a variety of hot metal needs. The ruggedness of the Ajax TOCCO design provides day in and day out trouble-free operation.

The Swinger Furnace is fast, clean and efficient for melting non-ferrous alloys. ▶ Low metal losses justify this two position melter for the non-ferrous foundry. This furnace is ideal when batches of different alloys are required.



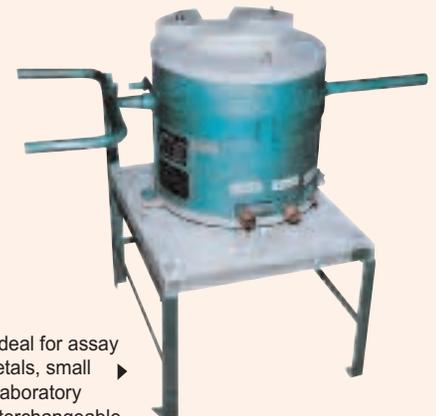
Magna-Melt Furnace is a rugged design for high frequency melting applications. Cast refractory top and bottom, stainless steel tie rods and the heavy-duty fabricated aluminum side plates form a rigid structure. ▼



Compact packaged coreless furnace melting systems drastically reduce installation costs.



▲ The Steel Shell Furnace design provides maximum strength and support for all melting applications. Ideal for use with charge buckets and vibratory conveyor charge systems.



▶ The Table Top Furnace is ideal for assay determination, precious metals, small melting requirements and laboratory projects. The hand tilted interchangeable body provides maximum flexibility.

Heat Treating Industry

Dynamic Variable Frequency

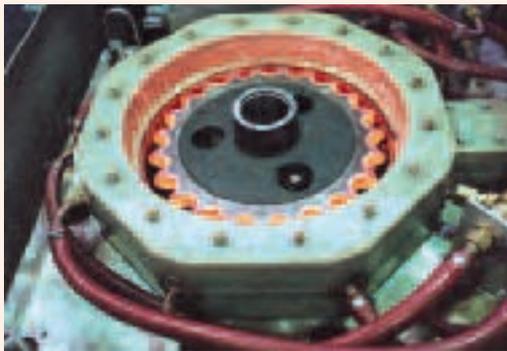
Ajax TOCCO has developed power supplies that free the user of the one frequency, one job syndrome. Ajax TOCCO's solid state power supplies were specifically developed for induction applications. They enable the user to accommodate part variations and patterns with very little effort. Ajax TOCCO's variable dynamic frequency approach provides the user with the capability to tune to a specific load, enhance pattern development and improve the production flexibility of any induction system.

Standard Equipment and Custom Automation

Industry demands system designs that are cost effective and contribute to the bottom line. To meet these challenges, Ajax TOCCO has developed computer control systems to speed change-over, improve quality and set new reliability standards. Many systems are self monitoring and automatically adjust for minor variations. The use of lean manufacturing cells with automated pick and place fixtures, robotics, and built-in quality control provides the means of handling a wider variety of parts with the same equipment.

Performance

Performance and reliability are only as good as the effort designed and built into the system before it is shipped to the customer. Ajax TOCCO makes the extra effort. Our metallurgical testing facilities, complete with our staff metallurgist, assure process parameters are satisfied before equipment shipment.



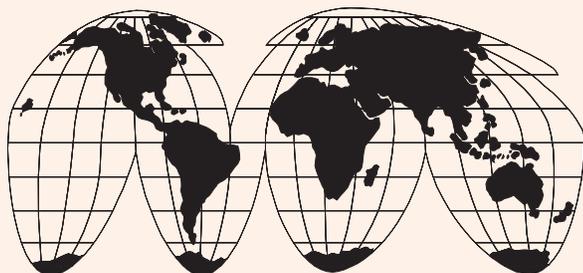
Dual frequency heating of sprockets provides uniform root and tip temperatures required for hardening. The programmable lift fixture is designed to harden sprockets up to 25" diameter using up to 1000 kW.

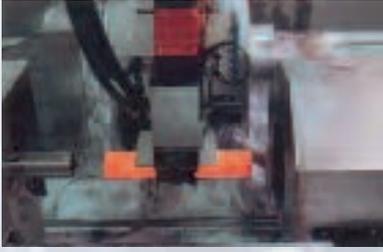


Robots load and unload heavy truck axle tube assemblies into a heavy duty single spindle vertical scanner for hardening and tempering.



Chrome shafts and cylinder rods are continuous or skip hardened on horizontal scanners designed and built by Ajax TOCCO. The servo drive and computer provide precise control of recipe information.





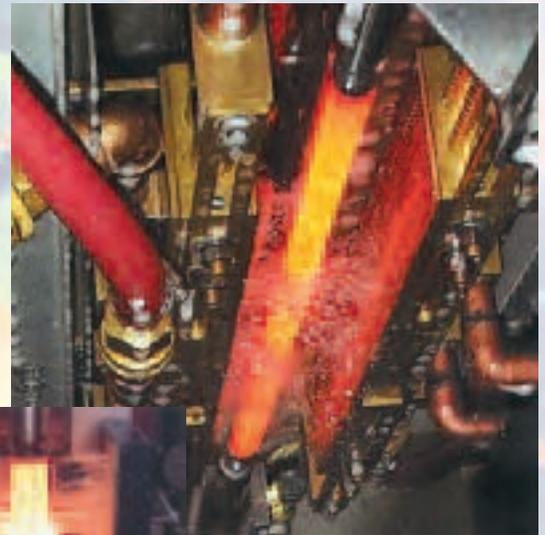
◀ This track pin harden and quench system for off-highway equipment is fully automated and computerized. The user gains exact repeatability and flexible scheduling.



◀ Yoke shafts and flanged axles are induction hardened and tempered at rates up to 50 parts per hour on dual spindle scanners. Scan speeds and power levels are precisely controlled and monitored with servo drives and computer operator interfaces.



◀ Factory cell and pick and place systems such as this Ajax TOCCO designed hub hardening unit are completely self-contained and shipped ready for utility hook up. They are ideal for achieving consistent high quality and reducing labor costs.

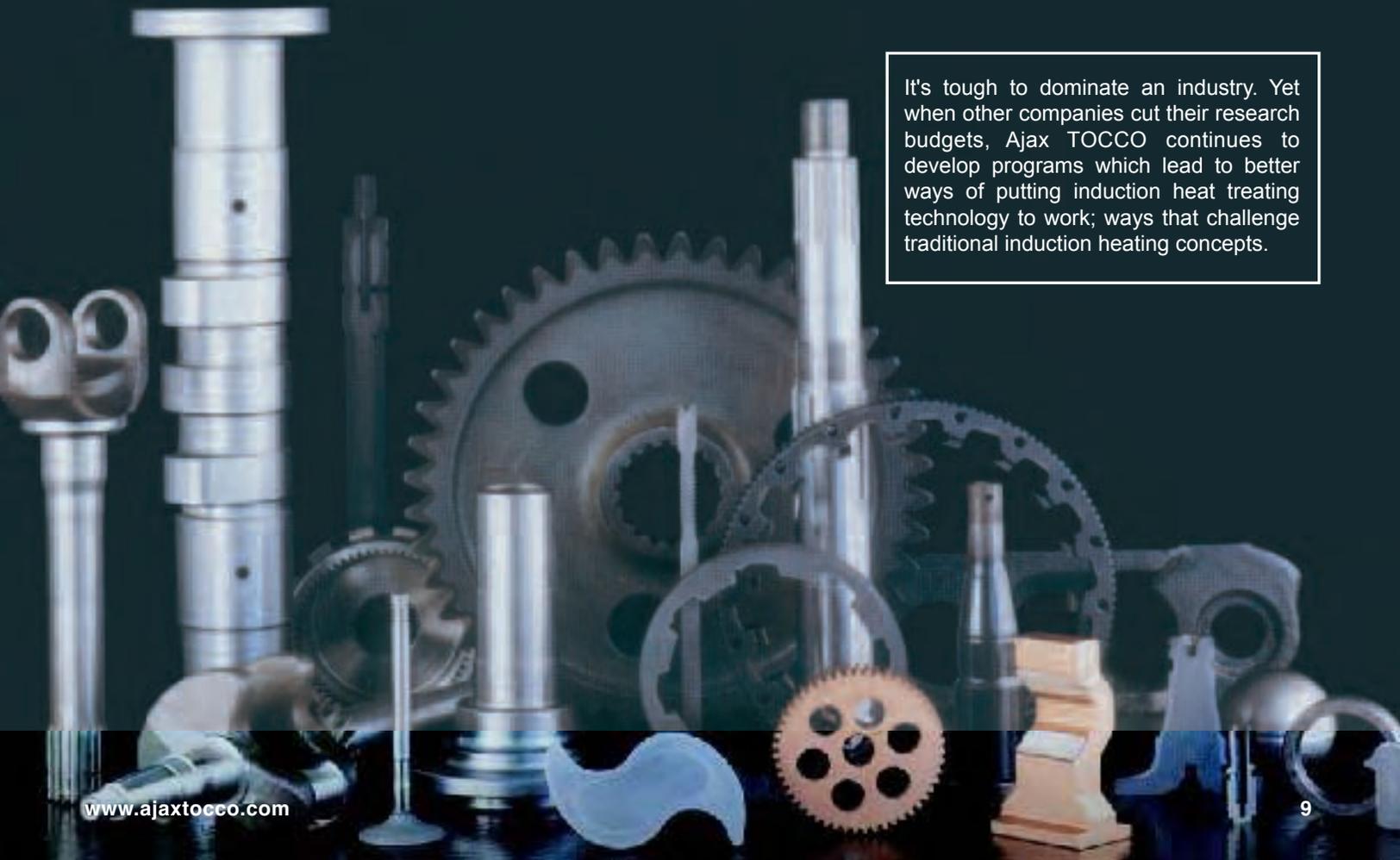


Single shot hardening of drive shafts, transmission shafts and axles are provided utilizing horizontal and vertical systems.



Stems of CV joint components and wheel spindles are hardened on a variety of standard and custom designed lift and rotate systems.

It's tough to dominate an industry. Yet when other companies cut their research budgets, Ajax TOCCO continues to develop programs which lead to better ways of putting induction heat treating technology to work; ways that challenge traditional induction heating concepts.



Pipe and Tube Industry

Pipe and Tube Technology

Ajax TOCCO has a global commitment to the pipe and tube industry in developing new induction heating technology for tubular products. As a result, lines are in use that process up to 120 tons of high quality pipe and casing per hour with consistent quality and ovality.

Induction heating equipment supplies heat where you want it, when you want it, with flexibility, control and reliability. Ajax TOCCO converters provide that flexibility with a patented, wide operating window. This ability allows a larger range of sizes to be processed in one induction coil size without the need for capacitor or voltage switching.

Converting barrel furnaces to induction heating for stretch reducing, enables the use of existing handling equipment and the advantage of fast, controllable, energy saving induction heating. The results are a dramatic savings in space, reduced energy consumption, improved quality and the benefit of recipe control.

Ajax TOCCO is at the forefront of API pipe production for the oil and gas industry. Because casing drill pipe and line drill pipe reliability is critical, you can depend on the experience of Ajax TOCCO to supply systems to harden and temper pipe, casing and couplings to full API specifications.

With the skilled specialists of Ajax TOCCO on your team you can expect a wealth of experience to assist you in your pipe and tube heating requirements. Let Ajax TOCCO provide you with a full “turn-key” installation tailored to meet your individual requirements.

Ajax TOCCO is the industry expert for pipe and tube heating specializing in:

- Seam annealing
- Solution annealing
- Bright annealing
- Coating
- Bending and Forming
- End heating for upsetting
- Curing
- Quench and Temper
- Galvanizing



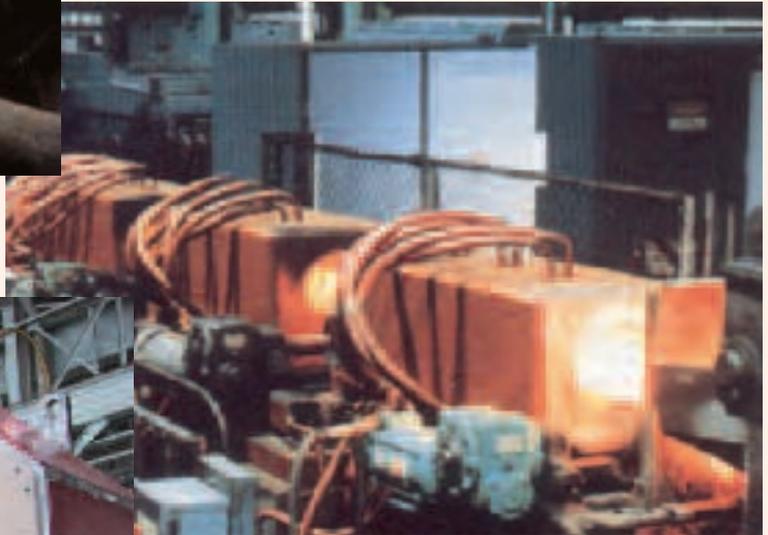
Seamless and ERW pipe and casing is hardened at production rates up to 120 tons per hour.

Heating both seamless and ERW tube prior to entering the stretch reducing mill, zone weld annealing, complete hardening and tempering lines, pipe coating, pipe forming and bending, solution annealing, internal hardening, and much more are produced and designed by Ajax TOCCO.



Ajax TOCCO supplies systems that provide the most advanced state of the art technology available. Less space, greater efficiency and continual design development are just some of the ways we strive to satisfy our customer's needs.

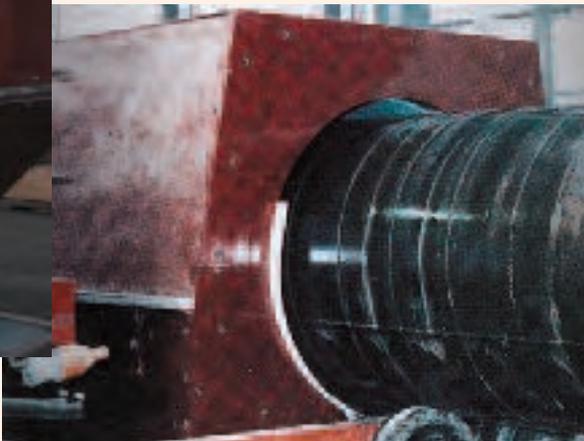
Ajax TOCCO pioneered induction quench and temper lines for oil country line pipe and casings.



Nine megawatts of power is used to preheat tubing for stretch reducing. Induction heating advantages include fast start and stop capabilities, low scale formation, better surface quality, speed and scheduling flexibility.



Close tolerance pipe coating with good bonding characteristics make induction heating the ideal method of pre-heating line pipe. Equipment is available to handle a wide range of pipe sizes.



Custom Applications

The Custom Applications Team was formed with the task of exploring new areas of use for low power induction heating. Our goal is to bring the many benefits of induction to every application where thermal enhancement is required.

Our team is composed of engineers and technicians with a "can do" attitude, excited to tackle opportunities that have been unthinkable with the induction process in the past. Our success has been possible due to the many new advances in power supply and electrical control technology. Backed by Ajax TOCCO's experience, and the support of the entire Ajax TOCCO staff, we are capable of accurately evaluating each new process. We work closely with the customer to ensure exact process results are achieved.

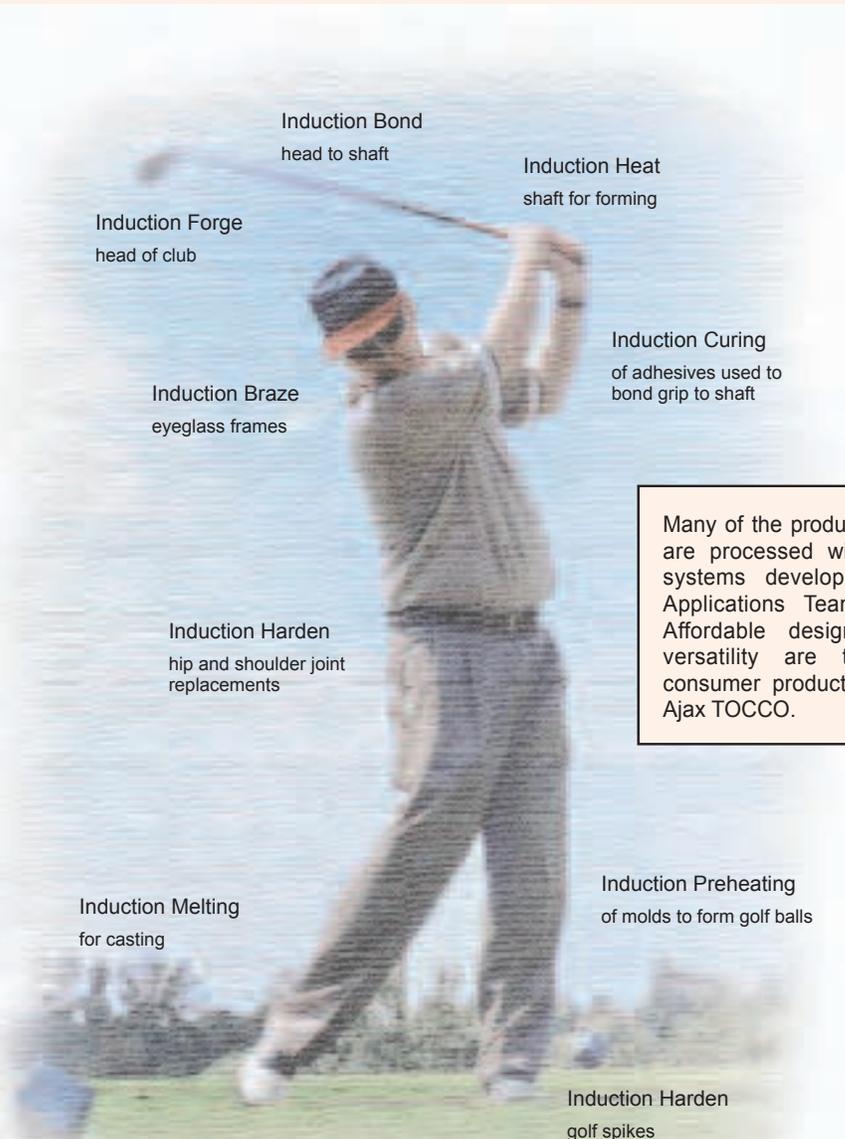
The Custom Applications Team specializes in low power applications from 1kW to 50kW. We offer both air cooled and water cooled, self tuning power supplies that have a frequency range of 10 kHz to 450 kHz. The Custom Applications Team gives Ajax TOCCO the added flexibility to tackle any process from brazing fine jewelry to forging.



A 5kW TOCCOtron AC power source is shown within the confines of a NASA space shuttle. This 100% air-cooled system is used to braze critical fuel and hydraulic lines. Its lightweight and small size allow it to be placed most anywhere within the orbiter.



Hand held induction coils as shown in this photo have facilitated the replacement of gas torches in many applications. Induction heating by Ajax TOCCO provides many advantages, such as increased production, improved quality and repeatability, and less impact to our environment.



Induction Bond head to shaft

Induction Heat shaft for forming

Induction Forge head of club

Induction Braze eyeglass frames

Induction Curing of adhesives used to bond grip to shaft

Induction Harden hip and shoulder joint replacements

Induction Melting for casting

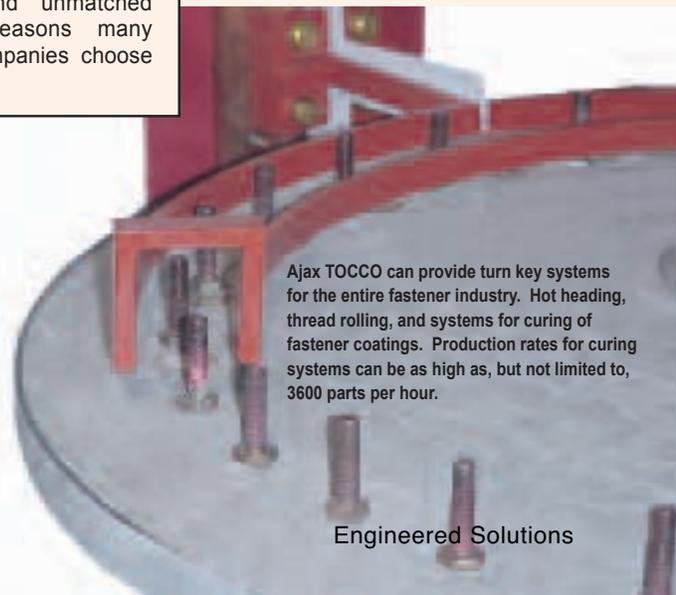
Induction Preheating of molds to form golf balls

Induction Harden golf spikes



Many of the products we use every day are processed with induction heating systems developed by the Custom Applications Team at Ajax TOCCO. Affordable designs and unmatched versatility are the reasons many consumer products companies choose Ajax TOCCO.

◀ No more welds! Today's automobile panels are increasingly being assembled with heat sensitive adhesives, making welding and other mechanical assembly methods obsolete. Ajax TOCCO offers an off the shelf, 100% air cooled induction hem bonding system that assists in facilitating this process at major automotive plants around the world.



Ajax TOCCO can provide turn key systems for the entire fastener industry. Hot heading, thread rolling, and systems for curing of fastener coatings. Production rates for curing systems can be as high as, but not limited to, 3600 parts per hour.

Engineered Solutions

Ovens

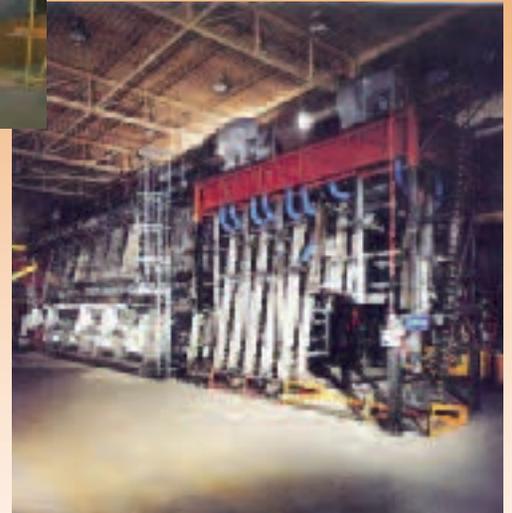


The three ovens pictured above temper parts for CV joints on front wheel drive vehicles. In each oven 240 parts per hour are heated to 450 degrees F for one hour, then cooled to room temperature in less than 20 minutes.

Ovens by Ajax TOCCO Magnethermic

The oven division of ATM has over 90 years experience in custom oven designs. We specialize in unique applications, with the exclusive capability of combining ATM Induction with Convection Oven technology to deliver the most efficient and precise heat process systems.

Ovens by Ajax TOCCO Magnethermic include specially designed dry and cure ovens for the Metal Decorating Industry. This industry includes road signs, "thin plate" advertising, and food and beverage containers. Lithography on various base materials requires a dry and cure cycle of very precise uniformity.



This "Pin Oven" dries and cures inks on the outside of beverage cans. Typical speeds of these ovens are 2000 cans per minute.

Development Center

Full line of metallurgical preparation and inspection equipment including digital imaging staffed by qualified metallurgists.



Process Development Expertise / Meeting Critical Timing Objectives

Ajax TOCCO provides the metallurgical, technical and product expertise to develop the design of experiment, tooling and process that will meet your product performance objectives in today's fast paced environment. Tooling can be manufactured and modified within days and the Induction Laboratory has over 450 inductors ready for immediate trials.

Experience and Skills

The rapid heating cycles that make induction so attractive also offer new challenges for the metallurgist and process engineer. Ajax TOCCO development and process-engineering group has the induction knowledge only gained by experience. As materials advance and near net shapes become the hottest trend, we're already looking beyond historical methodologies to advance our customers to the front of the technological edge by developing the most robust processes available in the industry.



Aftermarket Support

Spare Parts

Ajax TOCCO offers an extensive computerized inventory of factory certified replacement parts for our induction heating and melting equipment to assure quick turn around. We also offer replacement parts for all other makes of induction equipment. Our commitment to customer support means Ajax TOCCO is available to handle emergencies any time of the day and any day of the week.

Repair Centers

Strategically located facilities are geared to meet the repair requirements of all induction users. Our skilled workforce assures the customer's peace of mind in knowing that their job will benefit from the latest technological advances in state-of-the-art materials, components, and craftsmanship.

Service

Technical assistance is available any time of the day or night using our 24 hour hot line. Our experienced service team is strategically located to provide quick response to our customers wherever they are located.

Customer Support

- Replacement power units designed to replace all makes and models.
- Solid State contactors designed to replace the electromechanical devices.
- Infrared imaging for locating extraordinary sources of heat in induction equipment.
- Induction Power Supply Maintenance and Troubleshooting Schools.
- Pre-packaged set of tools for equipment maintenance.
- MAGNE-CLEAN water system flushing service.
- MAGNE-FIELD electromagnetic field mapping of induction equipment.

Installation

Installation of induction equipment performed timely and accurately is critical to the financial success of a project. Ajax TOCCO offers complete turn-key installation service on all equipment.

Total Support Beyond / Commercial Heat Treating

Only Ajax TOCCO enhances a successful laboratory development with fine production equipment and also offers a certified production heat treating division capable of producing thousands of parts a day. Being there when you need us is our commitment to our customers.

 **any brand, type or application**
Induction system parts, field service, maintenance, repairs





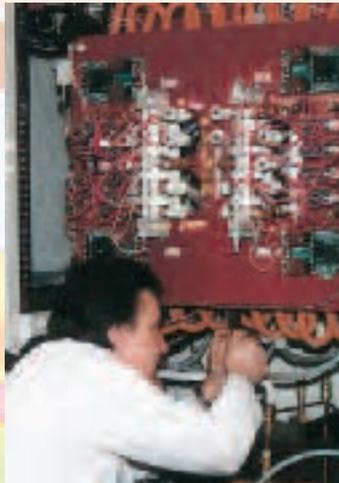
Well equipped workshop facilities provide skilled services for the repair, refurbishment and upgrade of most types of heating and melting equipment.



Ajax TOCCO has heavily-invested in facilities dedicated for the sole purpose of repairing and reconditioning electronic control boards and components. Using exclusive electronic simulators that duplicate actual operating conditions we are able to pin-point problems quickly and to speed repairs.



New or repaired, every step of the way, you can rely on Ajax TOCCO quality – and at reasonable costs too. That's because Ajax TOCCO has never been closer to our present and future customers. You can be sure that, regardless of the type and make of equipment, Ajax TOCCO stands behind every repair.



Ajax TOCCO commissioning and service engineers are involved with many of our customer's main equipment contracts – from commencement of manufacturing through to final on-site commissioning. Technical assistance from numerous engineers is available to solve the most complex of problems, and to offer suggestions for performance improvements and reliability.



The Ajax TOCCO Magnethermic Service Department offers a full line of services to our customers. These services include our Customer Care Program, Infrared Imaging, Induction Power Supply Maintenance and Troubleshooting Schools, and much more!

Induction Heating & Melting

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Birmingham, England	44-121-322-8000
Tokyo, Japan	81-3-3647-7661
Queretaro, Mexico	52-44-2221-5415
Seoul, Korea	82-2-837-0413
LeRoeulx, Belgium	32-64-67-37-77
Hirschhorn, Germany	49-6272-9217-500
Hemer, Germany	49-2372-55980
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Bangkok, Thailand	66-2-625-3045

Call 1-800-547-1527, **24/7** for Service Assistance.



LECTROTHERM



Authorized OEM for AIH, IEH, Ajax Magnethermic®, and TOCCO®

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