

Forging

with Induction Heating Equipment

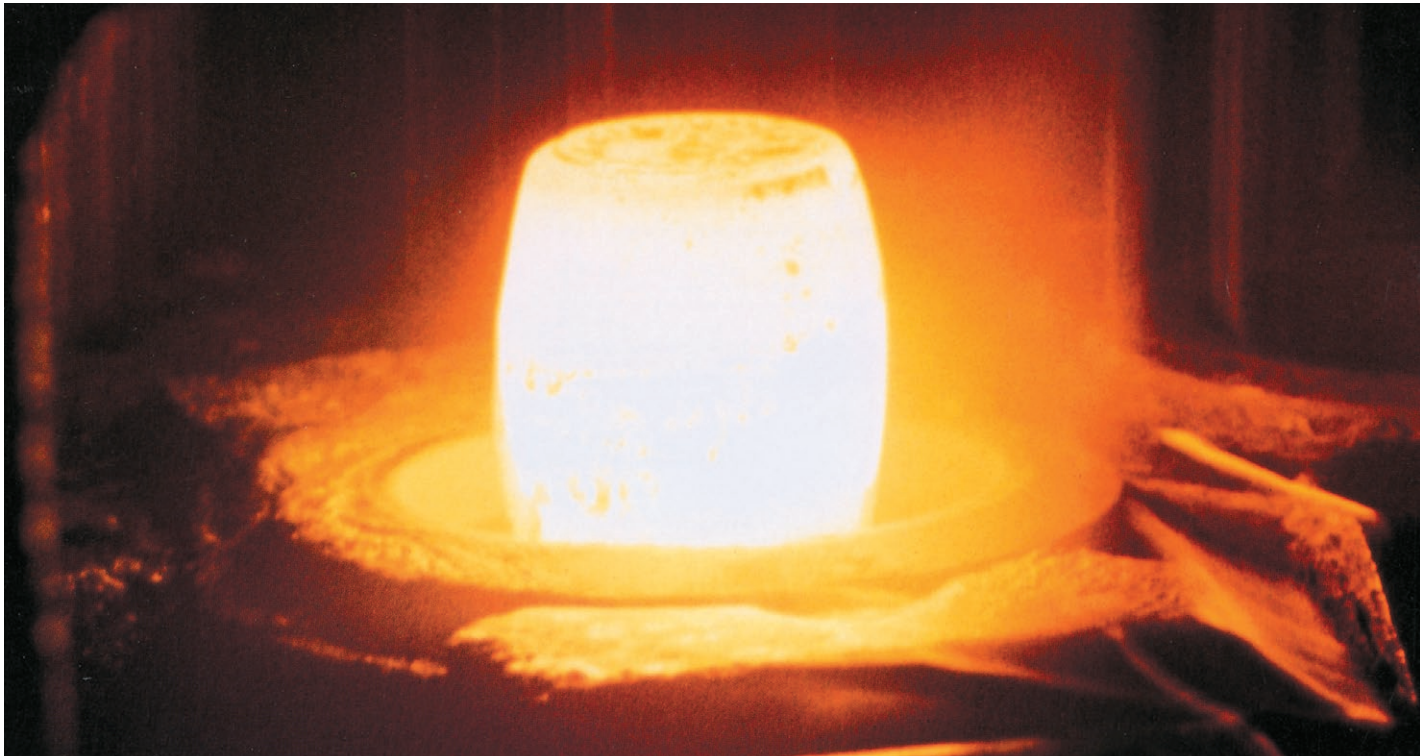


Induction Original
Equipment Manufacturer



Ajax TOCCO is your partner for Induction Forging Solutions

“DO MORE WITH LESS” — this is the challenge you face every day. Make the most of your existing resources. Maximize your return on new technology. Achieving this balance is difficult. When rising to the challenge, it helps to have a partner — both a technology provider and an expert on how to implement it — that partner is Ajax TOCCO.



Solutions Designed for You

When you have unique requirements, Ajax TOCCO will tailor a solution based on our extensive application experience. Through a combination of standard products and innovative engineering, Ajax TOCCO will meet your most demanding production and quality needs. With a wide range of field-proven solutions, our engineering team can provide the experience and expertise to optimize your process.



The Global Force in Induction Technology

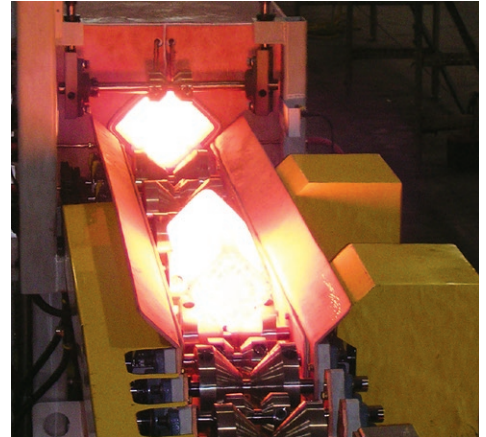
A Heritage of Excellence

Ajax TOCCO Magnethermic is a leading supplier of induction heating and forging equipment. Reflecting the proud heritage of 100 years of induction heating experience with our group of companies, our personnel and innovative traditions remain central to our strategy and future. Our high-quality standards match our reputation, as does our expertise in process engineering and modernization resulting in stable, long-term solutions that last for decades.



Continuous Innovation

Not only are we one of the worlds largest induction suppliers, we are one of the most progressive market leaders in developing customer-valued new technology. Finite element analysis, process heating simulations, state-of-the-art manufacturing capabilities, application laboratories, and on-staff metallurgists guarantee that our customers always stay ahead of the industry. Our PowerForge Induction Heater features Ajax TOCCO's reliable, energy efficient IGBT PowerBlock Technology or our optional SCR Technology. In addition, our PowerZone induction heating systems utilize the IGBT PowerBlock Technology with our advanced zone heating technology.



Your Process Partner

Through close collaboration and personal attention, Ajax TOCCO is dedicated to sharing our customers' passion and focus on their business goals. Ajax TOCCO doesn't just sell equipment, we provide the right solution. We optimize your floor plan. We streamline your energy consumption. By applying our years of experience and knowledge of best practices, our customers are empowered to compete more effectively.



Product Solutions

Our systems capabilities include application review, development, induction heating equipment, process tooling, material handling with installation and commissioning services available to complete a 'full turn key' manufacturing solution.



Customer Service and Support

Before the contract is signed and for years beyond start-up, customers can count on Ajax TOCCO. Whether creating a turnkey solution from scratch, retrofitting and updating your existing lines, or evaluating future possibilities, the level of service is the same. Our maintenance specialists are available 24 / 7 and customers can enroll in preventive maintenance contracts to keep their lines up and running.

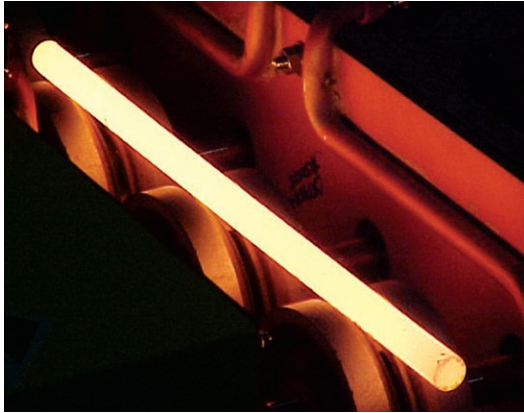
Ajax TOCCO Support Network

Along with providing each customer personal service, a proven process, and reliable equipment, Ajax TOCCO customers can benefit from the resources of a global corporation. We provide worldwide assistance through our network of regional sales and service engineers. Wherever you are, we can help.



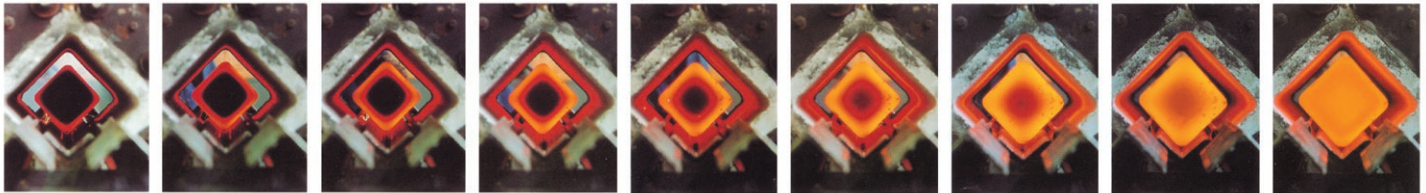
Induction Forging Technology & Equipment

Induction heating is efficient, easily controlled, uses no energy when not heating, and puts the heat where you want it, when you want it. No idle time, no massive refractories to heat, and close coupling enables you to use energy in the best possible way.



Equally important is the manufacturer's experience and know-how in providing the right equipment to match your overall objectives. The Ajax TOCCO Magnethermic® Corporation (ATM) has experience that spans over 90 years and covers heating all metals in all shapes and sizes utilizing a wide range of advanced solid state power supplies ranging from 50 and 60 Hz, to 450,000 Hz.

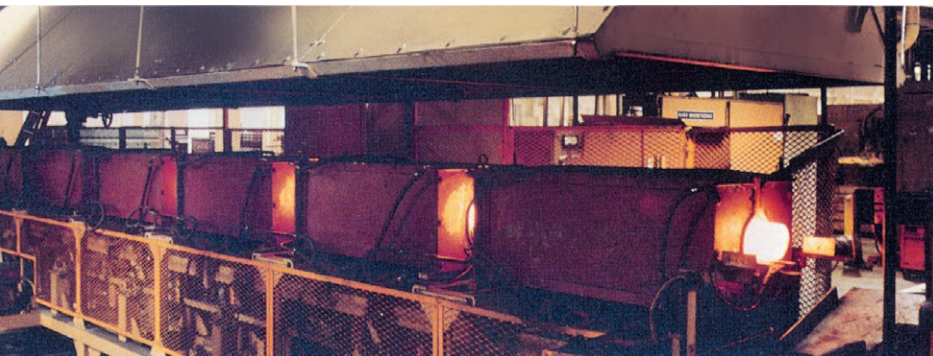
The photo sequence below shows the heating process. However, there are other determining factors which set induction heating apart from other heating methods. Factors such as energy efficiency, labor costs, quality, automation, maintenance, scale losses, cleaning and scrap losses are some of the advantages of induction heating.



This induction heater and forge press work in perfect harmony at this automotive forge shop. Powered by a 250 kW, 10 kHz Ajax TOCCO Pacer®, bars are heated in a channel coil and automatically fed to the press operator. Typical forging installations provide maximum efficiency – requiring minimal floor space, labor and material handling.



No wasted energy, no wasted billets with Walking Beam induction heaters. Heavy duty single action lifts, advances, and returns in one smooth, continuous action.



Benefits of Induction

Quality

Precise control provides consistent temperature uniformity and exact repeatability. Forgings have fewer inclusions and improved surface finish because of reduced scale.

Flexibility

Induction heats only the workpiece using only the needed energy to achieve the exact temperature. New solid state power supplies seek the best frequency for the load further improving operating flexibility and efficiency.

Productivity

An integral induction heating system increases productivity because it is easily integrated with in-place processes. An induction heater, not the operator, sets the pace for the production rate. Induction heaters can be started from cold to achieve full production rates within minutes. Heaters are designed for automatic hold cycles during delays and rapid recovery at re-start.

Limited Material in Process

Induction heating requires fewer parts in-process which reduces the chance of rescheduling errors and substantially reduces material inventories.

Reduced Scale & Increased Tooling Life

Induction heating brings the work piece up to temperature in the shortest possible time and in effect reduces the amount of scale which improves the surface finish of the end product and increases the customer's tooling life.

Maintenance

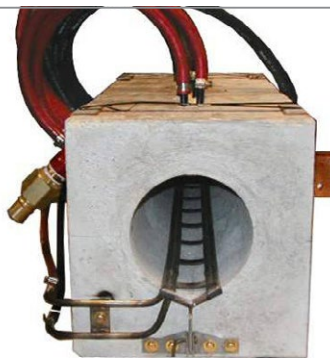
The only use of refractory in an induction system is in the coils. With the benefit of long coil life in an ATM induction system, refractory repairs and relining are greatly minimized. Die life is also extended with the drastic scale reduction.

Yield

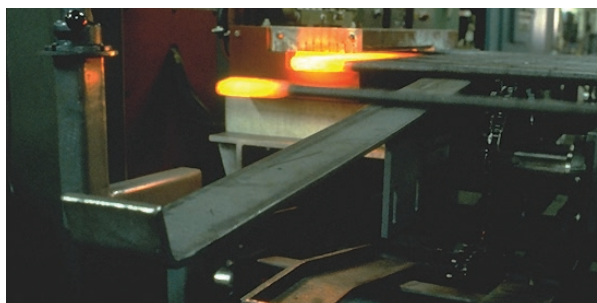
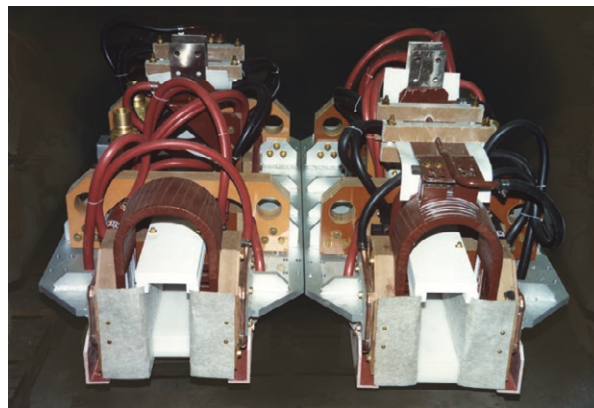
Typical scale loss in gas fired furnaces is 3% and from induction 0.5%. Consequently, for each ton of forgings the raw steel purchased is reduced by 2.5%.

Work Environment

Since there is no heat or products of combustion, a cleaner and more comfortable environment will enhance the workplace.



Our field-proven American Induction style open coil design is the industry standard



Automated induction heating system utilizing channel coils

Ajax TOCCO Induction Heating Systems



POWERFORGE
Featuring PowerBlock Technology

PowerForge Technical Specifications:

Power Range: 300 kW – 2,400 kW
Frequency Range: 500 Hz – 30 kHz
Input Line Voltage:
3 phase, 380 – 575 Vac

PowerForge induction forge heater - 2,000 kW system

FEATURES & BENEFITS:

- IGBT PowerBlock technology
- Minimal floor space requirement
- Turn-key operation
- Built-in heat station
- Built-in power supply
- Built-in pinch roll drive
- Built-in exit conveyor
- Quick change coil(s)

OPTIONS:

- ForgeView or ForgeView Plus technology
- SCR power supply
- Coil shuttle
- Cooling water recirculating systems
- Loaders / feeders
- ProSolv software
- Coil cassettes
- Replacement liners
- Wear rails

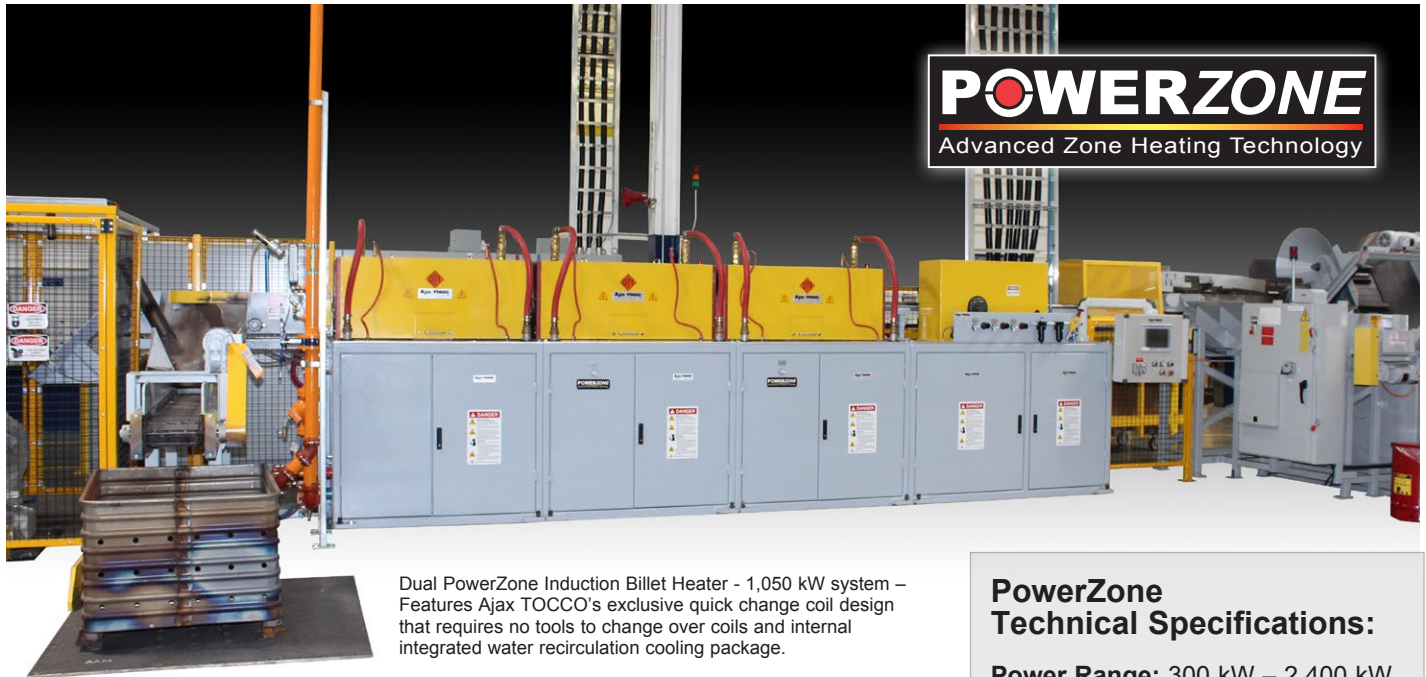
PowerForge Induction Heater

The Ajax TOCCO PowerForge design integrates the entire induction system, including the water cooling system, onto a common base for a quick, efficient installation that conserves floor space. Whether you need 500 lbs per hour or 12,000 lbs per hour, heating billets or bar ends, Ajax TOCCO has over 147 years of combined experience to provide systems which meet your requirements for maximum efficiency.

Two PowerForge 800 KW Systems



Ajax TOCCO Induction Heating Systems

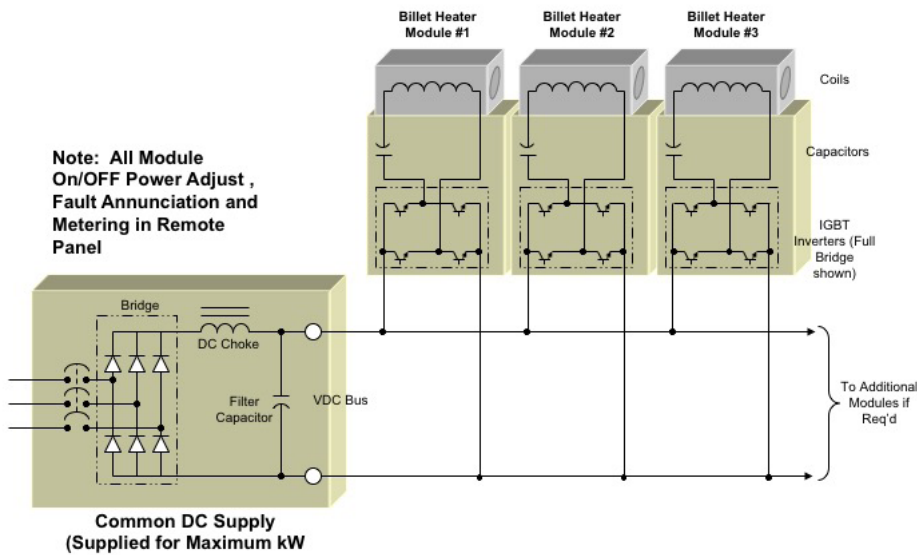


Dual PowerZone Induction Billet Heater - 1,050 kW system – Features Ajax TOCCO's exclusive quick change coil design that requires no tools to change over coils and internal integrated water recirculation cooling package.

PowerZone Technical Specifications:

Power Range: 300 kW – 2,400 kW
Frequency Range: 500 Hz – 30 kHz
Input Line Voltage:
 3 phase, 380 – 575 Vac

PowerZone Advanced Zone Heating Technology



FEATURES & BENEFITS:

- Easily expandable
- IGBT PowerBlock technology
- Minimal floor space requirement
- Turn-key operation
- Built-in heat station
- Built-in power supply
- Built-in pinch roll drive
- Built-in exit conveyor
- Quick change coil(s)

OPTIONS:

- ForgeView or ForgeView Plus technology
- Coil shuttle
- Cooling water recirculating systems
- Loaders / feeders
- ProSolv software
- Coil cassettes
- Replacement liners
- Wear rails



Dual PowerZone 1,000 kW Induction Billet Heater operating within a frequency range of 1 to 3 kHz. Features standard heavy duty cast block induction coils, complete with ForgeView controls, ProSolv Pro and dry cooling water recirculation system.

Ajax TOCCO Induction Heating Systems

Application Considerations



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 MonoForge, PowerForge and PowerZone heating systems.

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

Power Systems

Our 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, utilizing our ForgeView and ForgeView Plus technology, 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 “turnkey” 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 Original Equipment Manufacturer for American Induction Heating, Industrial Electric Heating, Ajax Magnethermic® and TOCCO®



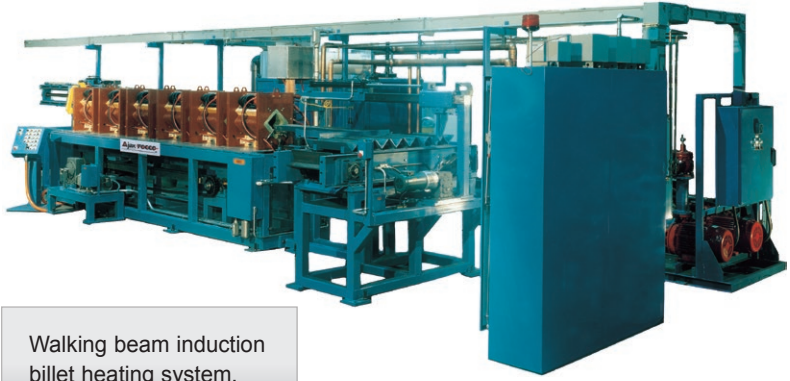
Ajax TOCCO Induction Heating Systems



Complete PowerForge billet heating system with elevator feeder, preheat, graphite coater and 600 kW PowerForge.



PowerForge dual coil shuttle billet heating system.



Walking beam induction billet heating system.



Pusher style automated billet heating system.



Five-position, pigeon hole style bar end heating system.

Induction Heating Components

System Power and Reliability

Experience and know-how play an important role in recommending the right equipment to handle your heating requirements dependably and economically. Properly designed induction heating equipment offers many advantages. The difference in equipment is in its reliability and the way it is applied to solve a heating problem. Each component has a function to perform. The components selected are developed by Ajax TOCCO specifically for induction heating applications. As a result, we offer a full range of frequencies, power sources, and inductor designs to insure that each installation is designed for your specific application.

In addition, Ajax TOCCO's power supplies have been streamlined to occupy 50% less floor space than competitive units. Ajax TOCCO has also solved the age old problem of how to heat a wide range of workpieces at the highest electrical efficiency with the minimal number of coil sets. Transmission losses have been minimized by shortening lead lengths, butting coils end to end, and making use of integral power systems.

Whether your forging system demands an incremental feed, a continuous feed, or a propulsion system that keep billets separated, Ajax TOCCO has modern, proven units in the field plus the technology to select and furnish the best equipment for the forger's needs. A full time research and development department is also available for test heats or laboratory work.



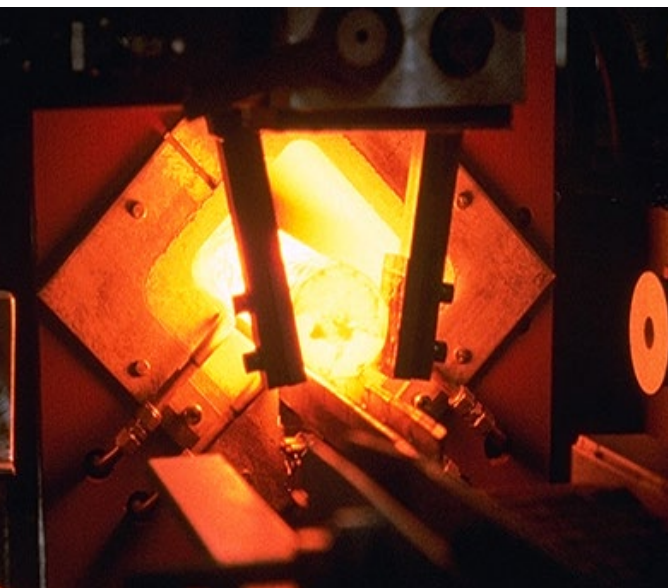
Automatic load table



Patented wobble wheel at exit end of machine and ID of coil with hard faced coated water cooled wear rails



Replaceable coil liners

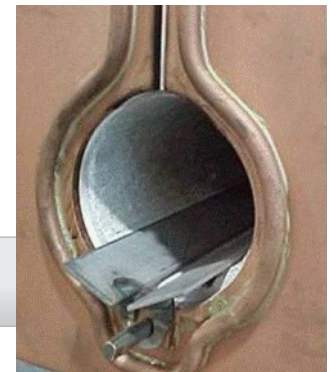


Fast extractor



Cross Section of a Plasma Coated Hard Faced Rail

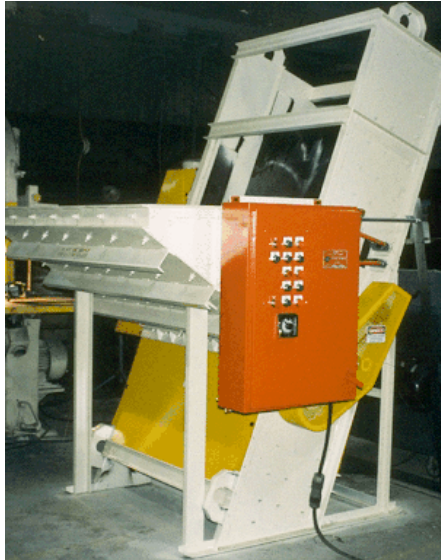
Optional Induction Coil Hot Rails



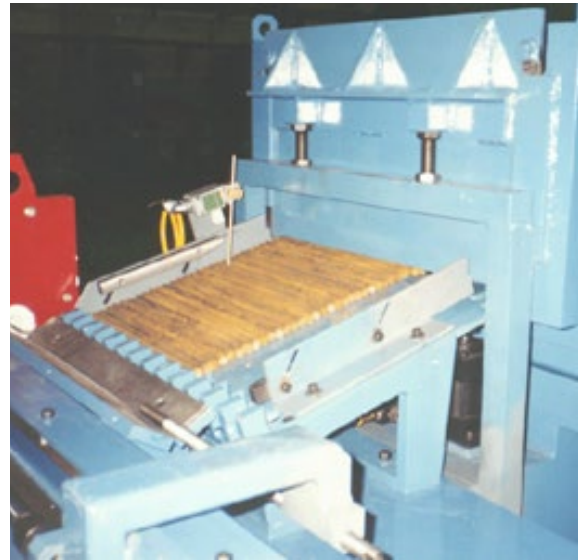
Induction Heating Components



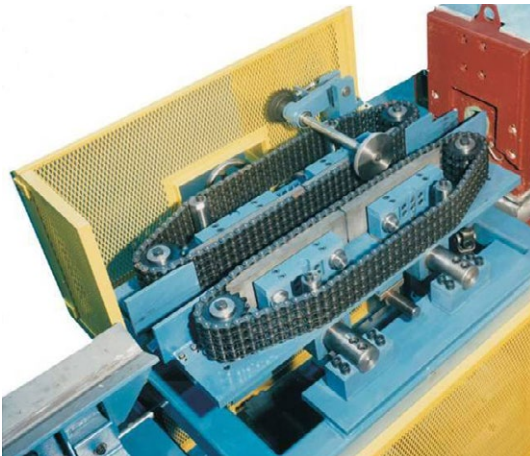
Dual powered pinch roll drive drives with standard urethane wheels or optional metal drive wheels



Step feeder



Feeder loader

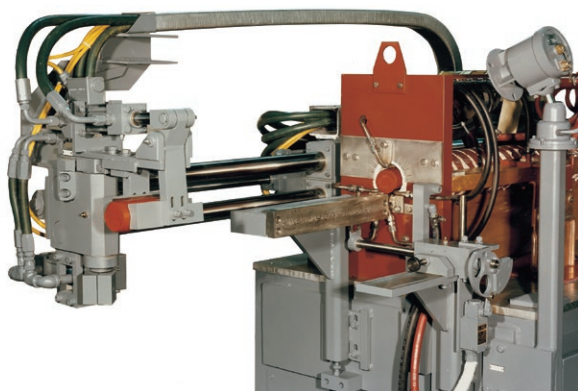


Optional caterpillar drive system

Bin bowl and material handling



Pick and place robot arm



Software

ForgeView and ForgeView Plus

The ForgeView Plus System is an intelligent HMI terminal that provides the operator direct access to the induction heater's controls. With a few key strokes, the unit automatically sets up all the operating parameters for a given part.

OPERATOR CONTROLS

The operator can control all functions of the induction heating system from the ForgeView Plus terminal including all material handling.

PROCESS MONITOR

A graphic pictorial screen representing the complete induction system simulates the flow of billets through the induction heater along with a display of pertinent data of the process.

PART SELECTION

ForgeView Plus provides precise and rapid setup for various production operations. Once a proper operating condition has been established for a specific part, it can be saved for later recall.

INCREMENTAL TEMPERATURE CONTROL

The ForgeView Plus System incorporates Incremental Temperature Control (ITC). Final billet temperature is continually monitored and this information is used to reset the power supply output before the final billet temperature reaches either the over or under limit.

PRODUCTION SUMMARY

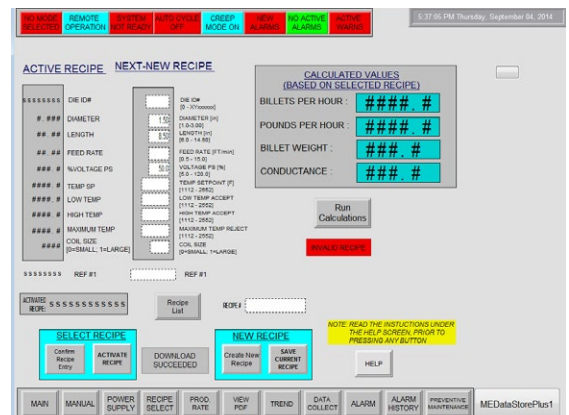
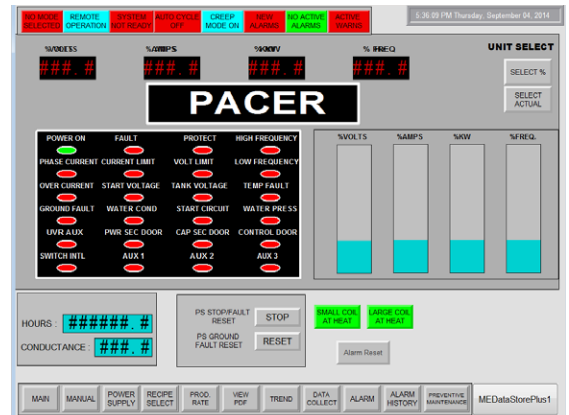
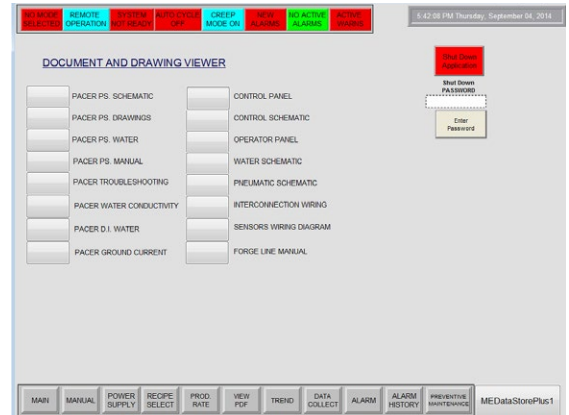
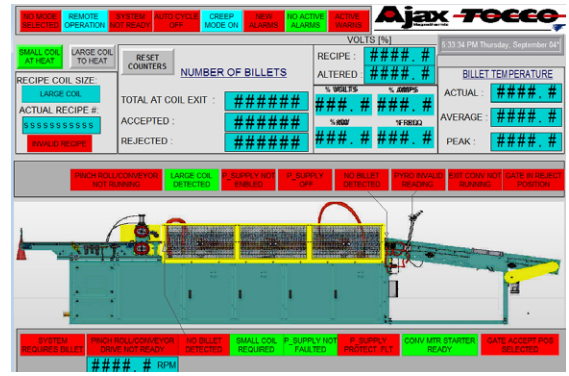
The production summary screens provides a current and accumulated status for the number of billets which have been processed through the heater which includes number of rejects for under temperature conditions or the number of rejects for over temperature conditions which are not reusable and should be accounted for under a quality control program.

FAULT ALARMS

Multiple screens are provided for interrogating any fault conditions along with suggested corrections by the operator or maintenance personnel. One viewing the screens will see an active fault "blinking" with a highlighted color condition.

MAINTENANCE SCHEDULE

Periodic maintenance schedules are established within the induction heater control system and alerts the maintenance personnel when miscellaneous actions are required based on production time or other criteria.



ForgeView Plus technology

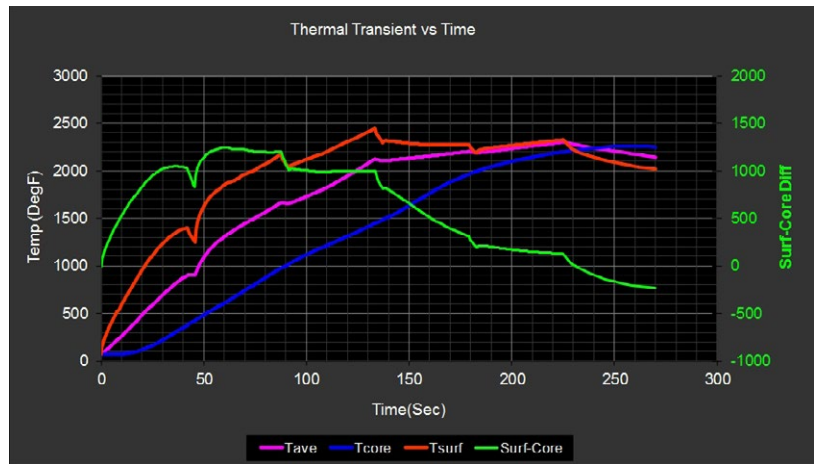
Software

ProSolv and ProSolv Pro

Ajax TOCCO has developed ProSolv and ProSolv Pro, induction heating optimization software that provides superior control of the billet, bar and tube heating processes. This advanced software facilitates complete calculation and simulation of the induction heating process. The end results are many times more accurate than optical pyrometry technology which can be affected by smoke, scale and emissivity. The optical pyrometer is then simply used as a go / no-go device to further insure the end temperature that has been achieved. This powerful tool takes the guess work out of Induction Heater set-up and saves time and waste. The precise control provided by ProSolv and ProSolv Pro provides precise control for the Ajax TOCCO PowerForge and PowerZone advanced technology induction heating systems.



ProSolv comes standard on a USB memory stick with the purchase of an Ajax TOCCO PowerZone billet heating system. Use it on your PC to run temperature profile modeling which aids in the proper selection of settings necessary for simple setup and control of the PowerZone system. Results are then easily entered into the machine controls by the operator or setup personnel to create stored "recipes" from your company part numbers or alternative method of part identification.



PRO SOLV

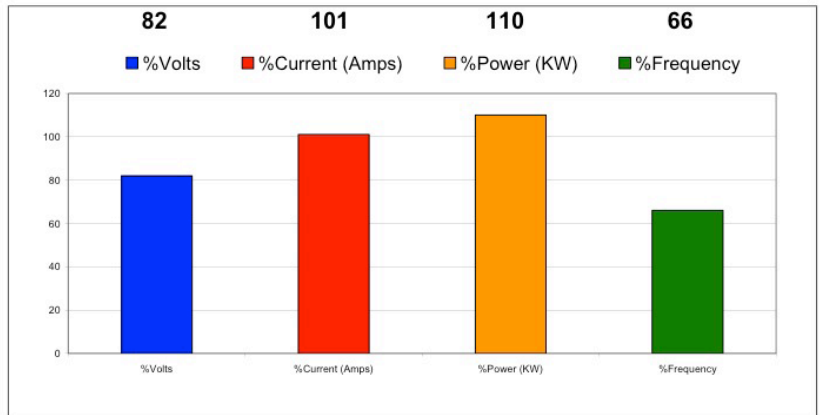
Optimized Induction Heating

FEATURES & BENEFITS:

- Accurate, professional results
- Customizable
- Slow speed / creep hold mode
- Temperature optimization



Pro-Solv easy-to-use USB memory stick for local machine use and setup



PRO SOLV PRO

On-Demand, Optimized Induction Heating

Pro-Solv Pro takes the PowerZone temperature profile modeling to the next level providing, on-going, on-demand, customized results. Ask your Ajax TOCCO representative for details on how you can utilize this powerful tool to make part-specific setup and control of your PowerZone system a breeze.

Induction Power Supplies

Power to Spare

Ajax TOCCO has lead the way in developing and improving induction power supplies. Our frequency line ranges from 50 Hz to 450,000 Hz to cover your frequency needs. With Pacer's flexibility, you can heat a wide range of work pieces at the highest efficiency. In fact, Pacer® is the only solid state induction power supply with a 3 to1 conductance range to allow custom adjusting of frequency for each billet size with only a capacitor change. This feature allows the equipment to run a broad range of diameters in a single given coil size delivering full power over the range of sizes.

THE PACER POWER SUPPLIES HAVE THE FOLLOWING FEATURES:

Cabinet isolation of the control section from the power section for safety.

- Infinite power control from 10% to 110%
- Main disconnect with under voltage trip
- Digital metering of output kW, volts, amps and frequency
- Complete short circuit protection
- Nonferrous internal water piping
- Fan cooled gate driver
- Single board logic control system located in a separate fully enclosed climate cooled compartment
- Self diagnostics of the logic control and pulse amplifier boards with front annunciation panel aids in trouble shooting. Optional water path temperature monitoring is available.



Pacer® T

Optional side mount water system



Pacer® II

Air-Cooled TOCCOtron® AC



Pacer® T Diagnostic Controls



Inductron® II

Training & Customer Support



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.

Ajax TOCCO has heavily-invested 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.

Well equipped workshop facilities provide skilled services for the repair, refurbishment and upgrade of most types of heating and melting equipment. Induction Power Supply Maintenance and Troubleshooting Schools, and much more!

Complete & Comprehensive 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.

Customer Support

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

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.

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.

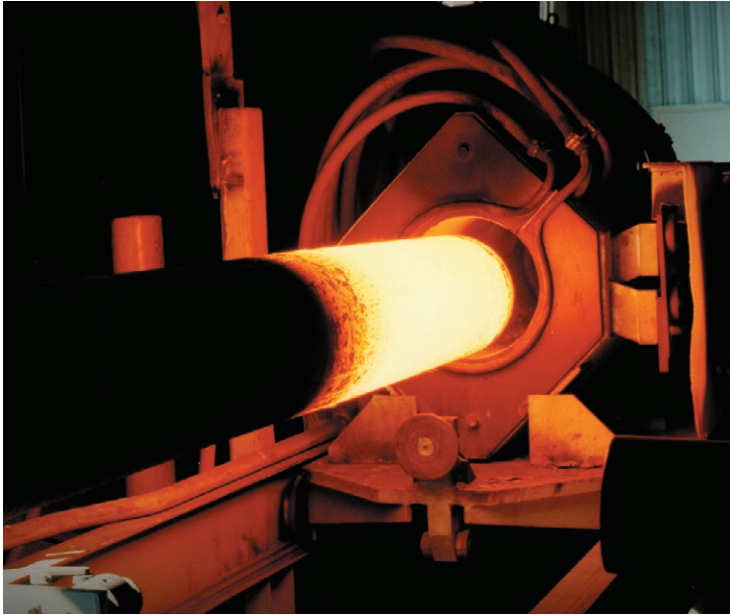
Training

Ajax TOCCO offers professional training by certified, experienced instructors. Regularly scheduled schools combine classroom and hands-on training on power supply troubleshooting techniques and maintenance, safety procedures, testing, reading schematics, applications and the basics of induction.

The schools can be taught at our training facility or on-site, customer locations. Class curriculums are customized to the customers needs. Classes are held in a computer friendly training center designed specifically for this purpose.

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

Ajax TOCCO Forging Solutions



Ajax TOCCO has earned an outstanding reputation within the forging industry for reliability through superior technology and quality of design. Our reputation carries on after the sale with outstanding service and support from dozens of trained dedicated field service engineers located strategically across North American and around the world. Ajax TOCCO is dedicated to maximizing the profitability of our customer partners. We are leading the way with new advanced process controls, data trending and new induction power source designs that minimize energy consumption and maximize process adaptability.

Ajax TOCCO Magnethermic® Companies Group designs and manufactures world-class induction heating and melting equipment for various industries and applications throughout the world. In addition, we provide a wide range of services including laboratory process development, preventive maintenance, equipment repair, and parts, coil repair facilities and installation services with locations in North America, South America, Europe and Asia. www.AjaxTocco.com



GLOBAL SALES, SERVICE & SUPPORT

World Headquarters

Ajax TOCCO Magnethermic Corporation
 1745 Overland Avenue NE
 Warren, Ohio USA 44483
 +1-330-372-8511
www.AjaxTocco.com

**24/7 Customer Service:
 800-547-1527**

USA

Albertville, AL +1-256-279-1200
 Wickliffe, OH +1-440-295-0244
 North Canton, OH +1-330-818-8080
 Longview, TX +1-903-297-2526
 Madison Heights, MI +1-248-399-8601
 Sterling Heights, MI +1-586-254-8470
 Brookfield, WI +1-262-317-5300

Worldwide

Brasil 5535-3435-2074
 Belgium (LeRoeulx) 32-64-67-37-77
 Canada (Ajax, Ontario) 905-683-4980
 China (Shanghai) 86-21-6800-9546
 England (Birmingham) 44-121-322-8000
 France 39-011-99-77-999
 Germany (Hirschhorn) 49-6272-9217-500
 India 91 72005 05904
 Italy (Turin) 39-011-99-77-999
 Japan (Tokyo) 81-3-3647-7661
 Korea (Seoul) 82-2-837-0413
 Mexico (Queretaro) 52-44-2221-5415
 Singapore 65-9699-4089
 Spain (Valencia) 34 961 352-020

