

INDUCTION HARDENING  
SOLUTIONS FOR LARGE  
RINGS AND BEARINGS

## SAET IS A COMPANY THAT DEVELOPS AND PRODUCES CUTTING-EDGE SOLUTIONS IN INDUCTION HEATING

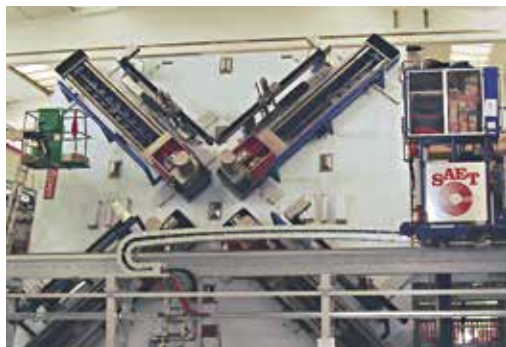
THE COMPANY'S MAIN GOAL IS TO SUPPLY THE CUSTOMERS WITH THE BEST SOLUTIONS THROUGH A COLLABORATIVE RELATIONSHIP, MAXIMIZING RELIABILITY AND PRODUCTION.

SAET's strength derives from a long tradition of innovation and the capability of taking induction technology to the next level. Founded in 1966 in the surroundings of Turin, Italy, SAET quickly became the leading supplier to the numerous manufacturers in the automotive industry. Due to the renowned expertise in innovation and an open approach to tailor-made products and services, SAET continued to grow and now has sales and manufacturing locations worldwide. In December of 2014 SAET became a wholly owned subsidiary of Park Ohio Industries and joined the AjaxTOCCO Magnethermic Corporation group of Companies.

### WITH SEAM - HORIZONTAL



### WITH SEAM - VERTICAL/INCLINED



WITH SEAM

TYPE OF

## OUR COMPETITIVE ADVANTAGES & FEATURES

- High speed hardening machine: > Multiple heating heads > Wide frequency range down to 2kHz
- Accurate positioning repeatability and precision (0.2 mm at coil level)
- Full CNC controlled
- Real time process monitoring system CQI9 compliant
- Extensive experience on various parts up to 9 meters in diameter (29.5 foot diameter - horizontal and vertical)
- Remote machine and power supply trouble shooting capability
- Coil design for cost reduction and easy maintenance



Fast



Energy efficient



Environment friendly



Repeatable

Induction heating offers a convenient and useful production solution for gears, bearings and large ring hardening. Induction hardening can meet process needs for a large range of gear and ring designs, from small sprockets, linear gears, and helical gears to single shot rings up to the very large slew rings.

SAET also produces equipment for the undercarriage sector with machines for heat treating pins, rollers, bushing, sprockets, idlers, and track links.

New process developments have led to important features on the machines such as automatic inductor air gap positioning utilizing a SAET designed tracking system. SAET has introduced a seamless hardening solution for bearings and slewing rings thanks to the development of a patented scanning technology that eliminates the soft zone between start and stop locations on the rings.

### SEAMLESS - SCANNING



### SEAMLESS

### SEAMLESS - SINGLE SHOT



## ONE TECHNOLOGY, MANY APPLICATIONS



Construction Machinery



Wind Energy



Mining



# LARGE RING AND BEARING HARDENING

## WITH SEAM - **HORIZONTAL**

SAET PROVIDES TO ITS CUSTOMERS A PROVEN PROCESS KNOW-HOW FOR THE HARDENING OF RINGS AND GEARS.

Key features of SAET horizontal machines are the advanced control of the coupling distance between the part and the coil, the automatic or semi-automatic centering device, the possibility to have two fully independent heating heads, and the accurate control of the quench flow to minimize part distortion.

The capability of SAET machines currently installed in the field are for parts up to 9m in diameter and 30 tons in weight with single or dual table.





## WITH SEAM - **VERTICAL/INCLINED**

FOR RACEWAY SCAN HARDENING, SAET INCLINED MACHINES ARE A SUITABLE ALTERNATIVE TO THE TRADITIONAL HORIZONTAL SOLUTIONS.

The use of an incline of about 75°, with the ring rotating past the coils and shower unit, allows for better quench control for enhanced metallurgical characteristics. Main features of the horizontal machine are also available on the inclined solution.

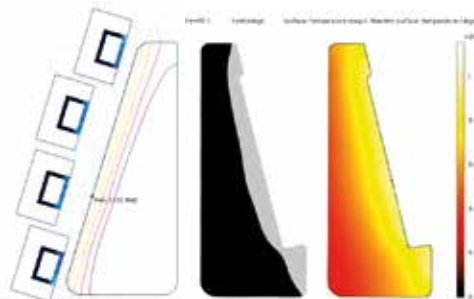


# LARGE RINGS AND BEARINGS HARDENING

## SEAMLESS - SINGLE SHOT

SAET HAS PIONEERED HIGH POWER SINGLE SHOT HARDENING MACHINES WITH MORE THAN 30 YEARS OF EXPERIENCE ON SINGLE SHOT HARDENING OF LARGE GEARS FOR BOTH INTERNAL AND EXTERNAL TEETH, AND INSTALLED CAPACITY OF UP TO 2400 MM GEAR DIAMETER AND 2000 KW OF POWER.

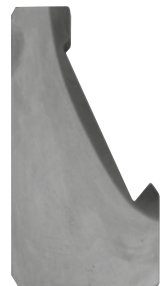
Our skilled lab team focuses on process development to reach new targets.



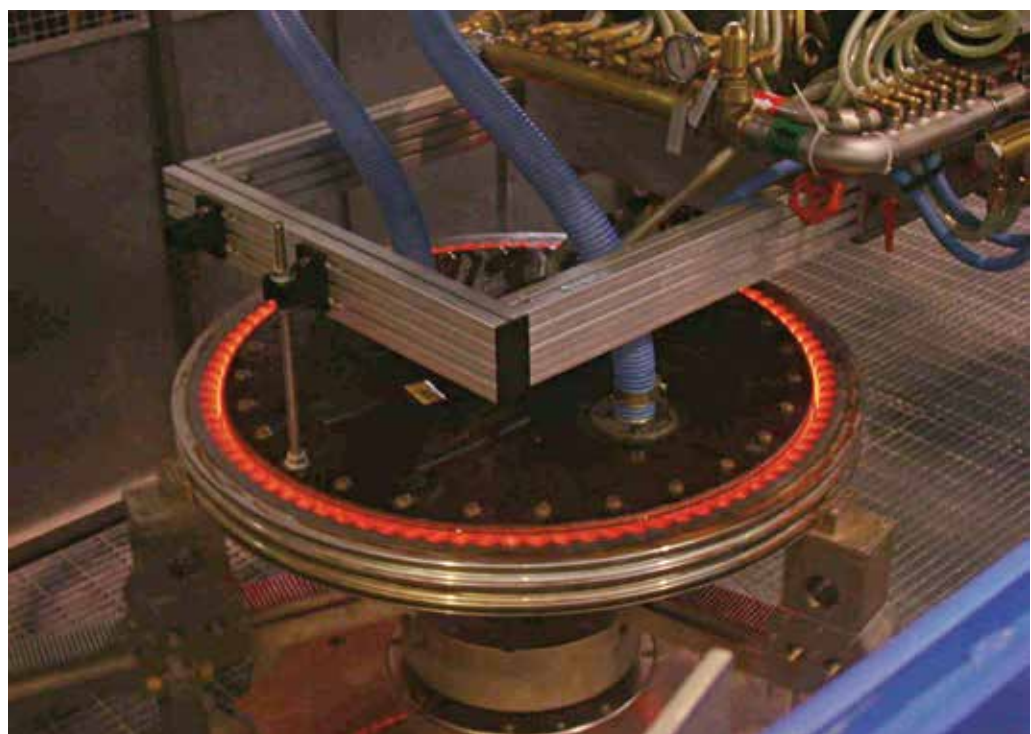
Race hardening simulation for IR/OR.



Temperature test



Real macro profile IR



Single shot with single coil.

## SEAMLESS - SCANNING

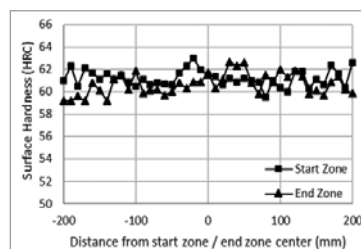
FOR CONTINUOUS ROTATION BEARINGS OR HIGH STRESSED APPLICATIONS OF SLEWING RINGS (WIND TURBINES, TUNNEL-DRILLING MACHINES, OIL PLATFORMS,...) IT IS ESSENTIAL FOR THE ABSENCE OF A SOFT ZONE IN THE RING AS IT CAN BE A SOURCE OF FAILURE.

To offer a cost effective solution to carburizing, SAET has developed the most innovative machine on the market.

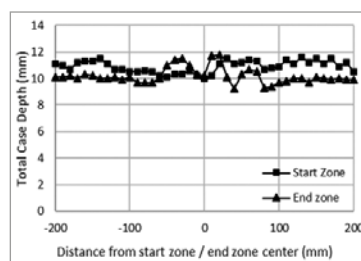
Able to scan harden large seamless rings with the coordinated movement of 4 independent heating heads around the ring with automatic control of every relevant process parameter.

The outstanding metallurgical results, achieved by the installations already running, attest to the extraordinary possibilities of the patented SAET design.

The machines prove to be extremely flexible and suitable for the largest rotary bearings.



Surface hardness measured by Leeb hardness tester and converted to Rockwell C scale in start zone and end zone.



Total case depth measured by ultrasonic device in start zone and end zone.



# SAET PROCESS DEVELOPMENT LABORATORY

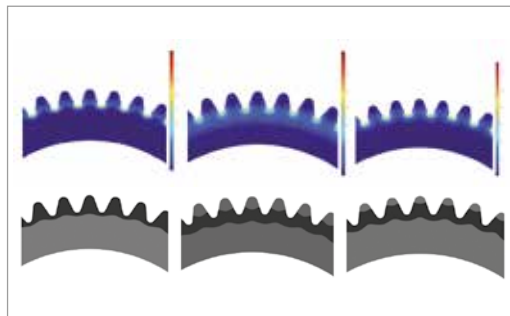
OUR METALLURGICAL LABORATORY AND PROCESS DEVELOPMENT DEPARTMENT PROVIDE EXPERTISE IN THE DEVELOPMENT OF INDUCTION HEATING AND HEAT TREATMENT.

SAET's Lab is the core of development, with 50 years of experience in the design of tailor-made processes based on induction heating, where engineers test all the variables to obtain the desired heating profile, inductor design, quench system, and recipe. SAET's application engineers, materials scientists, and metallurgists bring unparalleled capabilities to process development.

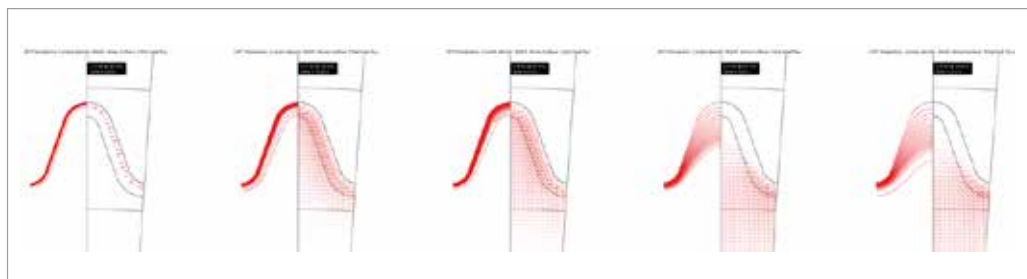


## SIMULATION

Simulation is a powerful tool for virtual prototyping and it shortens the time needed for the experimental setup of the process. Simulation is very important because it can define and influence the inductor design and position of the workpiece. SAET's Lab engineers deal with the most demanding simulations in induction today.



Frequency effect on the hardening pattern of gear teeth



Current path during heating process





Cone of a seamless bearing.

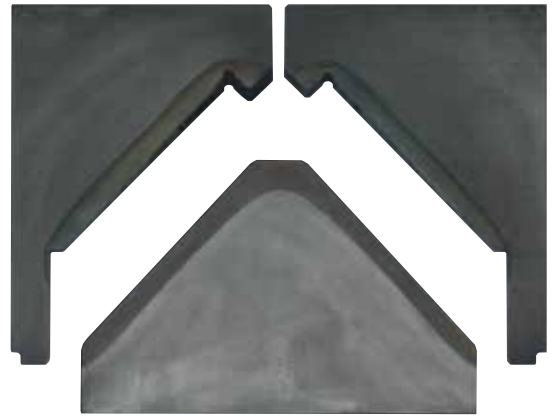


Cup of a seamless bearing.

## LABORATORY ANALYSIS

The SAET laboratory team is able to perform a wide range of tests including: non-destructive testing of part integrity, hardening case depth by an ultrasonic measurement, metallurgical analysis, macrography and microstructure analysis, integrity analysis and surface hardness by Leeb or Vickers testers.

The lab is equipped with a double column band saw capable of cutting sections up to 400x400 millimeters along with a range of water cooled saws and testing equipment to perform an in depth analysis.





# AFTERMARKET AND SUPPORT SERVICES



## HELP DESK & TELEASSISTANCE

SAET help desk team is available for a prompt response to guide customers over the phone or through remote control. This system allows our engineers to communicate with SAET systems through modem or wireless network, providing real time analysis of equipment located at our customer's facilities. Our technical staff provide helpful troubleshooting expertise, urgent spare parts delivery and on-site visits.



## TECHNICAL ASSISTANCE ON SITE

The Worldwide network of service centers and experienced service teams are ready to provide immediate response to customers wherever they are located.



## FIELD MODIFICATION & EQUIPMENT RETROFIT

We are committed to the continuous improvement of your induction system reliability. During field visits, our engineers evaluate the operating conditions of the machine and diagnose the cause of equipment failure. Once the root cause has been identified, our engineers make recommendations for system improvements.



## SPARE PARTS & REPAIRS

SAET offers an extensive computerized inventory of replacement parts for induction heating systems regardless of its original manufacturer, type or application. Our commitment to support all customers goes well beyond being simply a supplier of parts and components, we ensure that you receive the best technical support to operate your system and to handle part emergencies. SAET skilled engineers can assure customers that they will benefit from the latest technological advantages with state of the art machine tools, materials and skilled craftsmen, all working together to provide the best coil repair. SAET laboratory team has developed special expertise to design or refurbish any type of coil used for heating, hardening, annealing, tempering and heat treating processes. Coils and tooling for all types of induction heating applications are processed regularly.



## MAINTENANCE CONTRACT

Risk of Induction System downtime can be dramatically reduced by implementing a proper maintenance program. SAET preventative maintenance procedures are customized according to each specific power unit and control system.



## CONNECTIVITY AND REMOTE PRODUCTION MANAGEMENT

Induction equipments are no longer stand-alone machines. Fully integrated within the Industry 4.0, SAET converters dialogue with the plant network, send signals to Control Rooms where the whole production can be monitored, and from which they receive instructions regarding setup and quality sampling. This is made possible by CMS 4.0, a smart connection device making information about production, alarms, maintenance and quality available on a touch panel, on the Machine HMI screen, and above all on any device with a Web Browser, in a safe and controlled way.



## PREVENTIVE AND PREDICTIVE MAINTENANCE SOFTWARE

The competition in modern manufacturing is based on quality and productivity - SAET PPM modules support the operators in the maintenance tasks, track the history of the activities, suggest interventions based on carefully trimmed algorithms, increase machine availability and reduce the overall maintenance costs. Easy, non-invasive and fully customizable, PPM modules are the cornerstone of today's machine maintenance.

## AUGMENTED REALITY AIDED MAINTENANCE



A breakthrough in knowledge sharing with the use of augmented reality devices, SaetReality is the ultimate experience of remote guidance, where on-site maintenance, troubleshooting and production restoration take place by means of an industrial tablet, connected with SAET HQ in voice and video, capable of overlay hand and tools, movements on screen, text chatting, screenshots and video recording. SAET best-in-class field service is now instantaneously available, reducing time of analysis, enhancing first-time fix ratio, leading to major savings thanks to reduced downtime.

## Worldwide Service

SAET and EMMEDI customers can benefit from the resources of a global corporation.

We provide worldwide assistance through our network of regional sales and service engineers. Our experienced service team is strategically placed for quick response to customers wherever they are located.

Our commitment to customer support means that SAET and EMMEDI are available to deal with emergencies at any location worldwide.



## World Headquarters

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