

ELECTRIC ARC FURNACE
FOR THE TRANSITION TO ELECTRIC
STEELMAKING AND GREEN STEEL

ELECTRIC STEELMAKING

THE TRANSITION FROM CONVENTIONAL STEEL PRODUCTION TO THE USE OF ELECTRIC ARC FURNACES

THE TRANSITION TO “GREEN STEEL”

The increasing demand for sustainable “green steel” has led to a rethinking in the steel industry. In this challenging market, producers who wish to remain competitive are pressed to revamp their plants toward environmentally friendly processes and products. To achieve this, new advanced technologies are required, which must integrate into existing structures.

ELECTRIC STEELMAKING

Using electric arc furnaces (EAF) offers innovative solutions to minimize the environmental impact of steel production and improve energy efficiency. Electric arc furnaces can be used to maximize production and, at the same time, meet environmental regulations.

As the leading supplier of tailor-made steelmaking technologies, solutions, and services, Primetals Technologies also specializes in electric steelmaking and offers a complete range of powerful and cost-saving solutions.

Driven by innovation and due to permanent research and development, Primetals Technologies is positioned to present a new generation of electric arc furnaces for electric steelmaking.

ELECTRIC ARC FURNACE

In recent years, electric steelmaking has been the driving force of the steel industry. No other steelmaking technology has experienced a similar growth rate or developed at such high speed in recent years as the electric arc furnace.

Primetals Technologies has two primary electric arc furnaces to transition to electric steelmaking: the EAF Ultimate and EAF Quantum. These electric arc furnaces are oriented toward a sustainable steel industry.

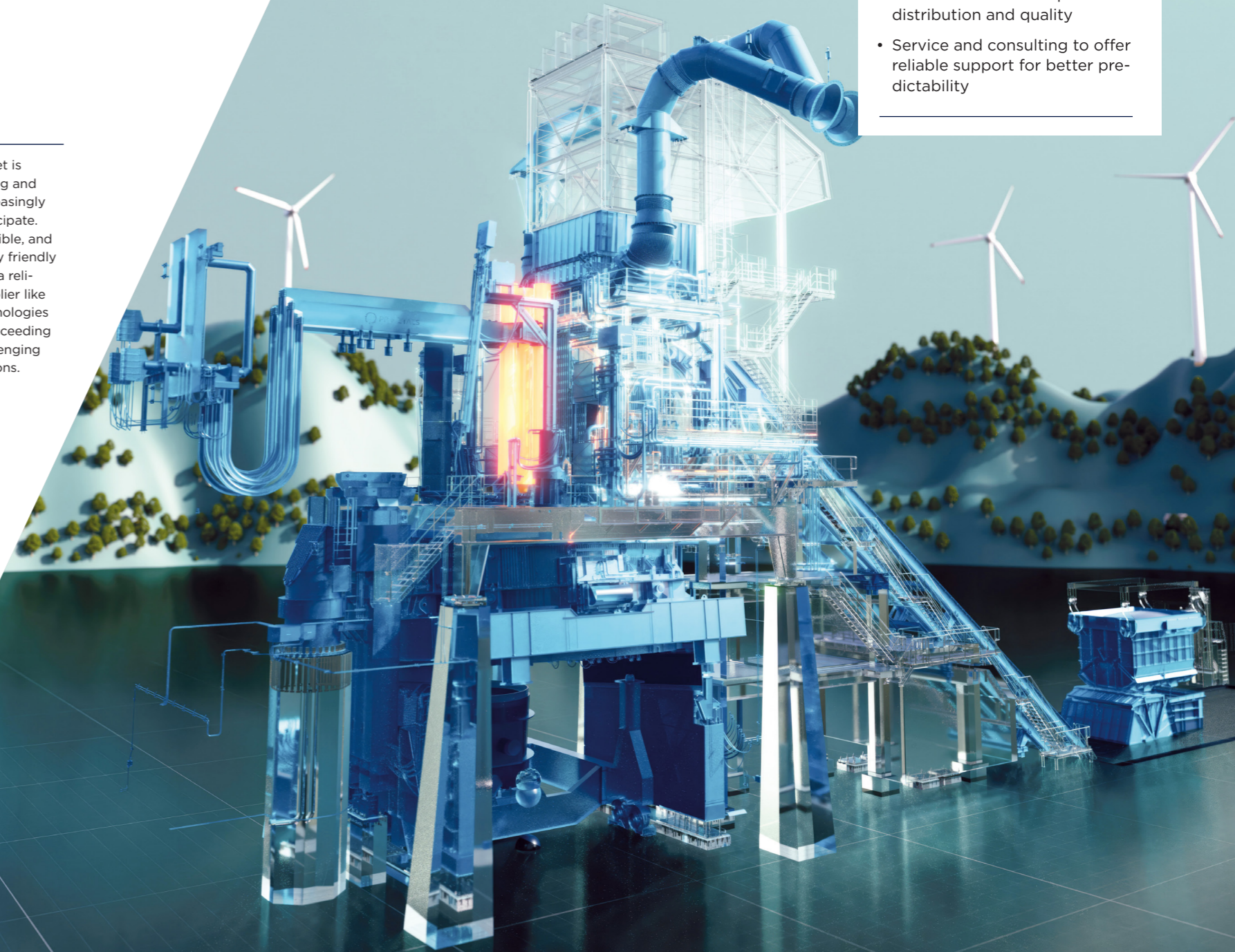
The EAF Ultimate delivers maximum furnace flexibility and performance, providing a solution equal to the basic oxygen furnace (BOF) in productivity and size, which makes the production greener and more profitable. On the other hand, the EAF Quantum offers a significant advantage for production and the environment, especially with its shaft-preheating system.

The steel market is rapidly changing and becoming increasingly difficult to anticipate. Optimized, flexible, and environmentally friendly solutions from a reliable plant supplier like Primetals Technologies are vital for succeeding in today's challenging market conditions.

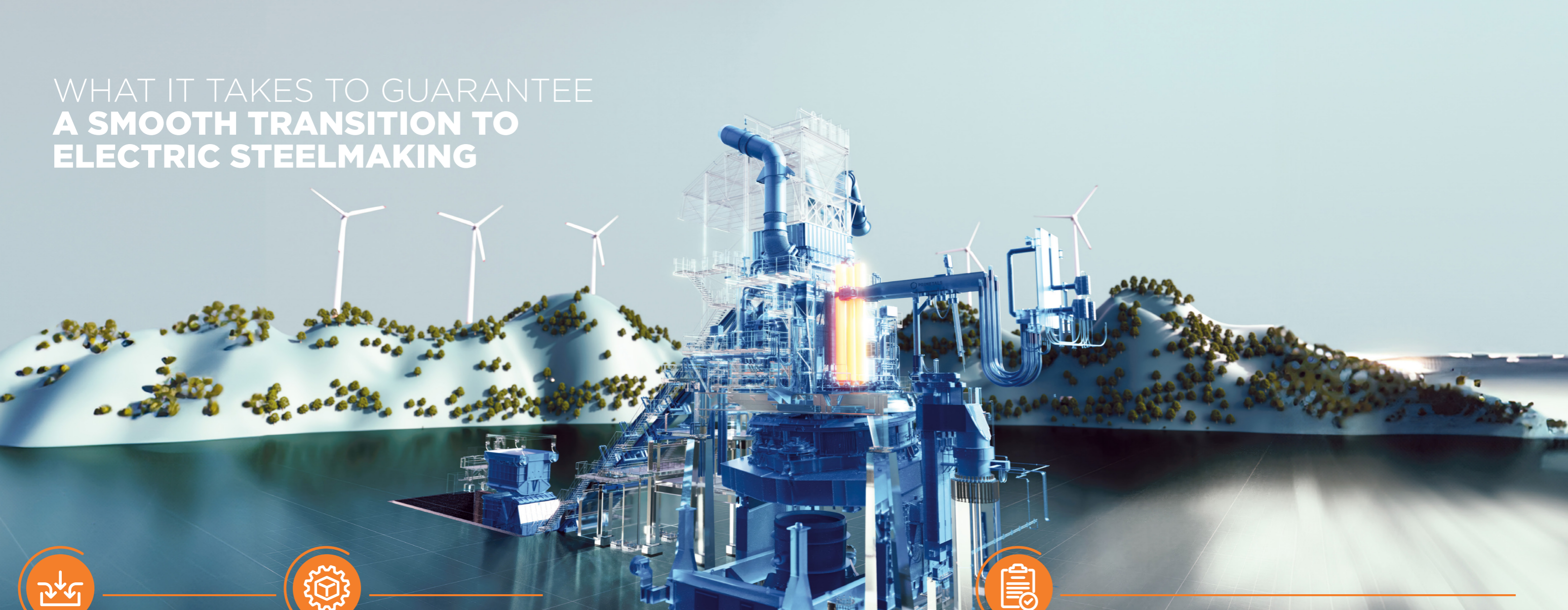
ONE PARTNER FOR ALL NEEDS

Primetals Technologies builds close partnerships with customers and offers solutions for the entire production process:

- Electric arc furnaces for decarbonized steel production
- Automation solutions for optimized processes
- Environmental technologies to protect humans and nature
- Power solutions for optimum distribution and quality
- Service and consulting to offer reliable support for better predictability



WHAT IT TAKES TO GUARANTEE A SMOOTH TRANSITION TO ELECTRIC STEELMAKING



GENERAL FRAMEWORK

What to consider when integrating an EAF to achieve ideal operations

-  Raw material
-  Power grid
-  Water supply



PRODUCT PORTFOLIO



How to enhance the electric steelmaking process for optimal performance

-  Automation and mechatronics functions
-  Power distribution and power quality
-  Environmental technologies
-  Additional EAF features
-  Support and services



THE OPTIMAL SOLUTION DEPENDS ON THE REQUIREMENTS

Conditions	EAF ULTIMATE	EAF QUANTUM
Bucket charging	✓	✓
Closed-roof operation	✓	✓
Scrap preheating	✓	✓
Maximized raw material flexibility	✓	✓
DRI/HBI charging	✓	✓
Hot metal charging	✓	✓
Flat bath operation	✓	✓
Productivity on large furnace scales	✓	✓
Slag-free tapping	✓	✓

 most suitable
  less suitable

EAF ULTIMATE

EXTREMELY HIGH-POWER INPUT AND HIGH RAW MATERIAL FLEXIBILITY FOR HIGH PRODUCTIVITY

THE ULTIMATE SOLUTION IN ELECTRIC STEELMAKING

The EAF Ultimate combines over 40 years of experience and innovative strength from Primetals Technologies in electric arc furnaces. State-of-the-art electric steelmaking technology and design features deliver maximum furnace performance in quantity and quality.

The cycle times of this electric arc furnace can be extremely short and the corresponding productivity is comparable to that of larger-sized basic oxygen furnaces.

FROM 40 TO 320 TONS

The EAF Ultimate concept features a larger diameter, which permits single-bucket charging, thereby reducing the power-off time by about two minutes. It also ensures an improved radius-to-power-input ratio for an optimized refractory index.

The transformer delivers 1.3 to 1.5 MVA/t liquid steel, of which up to 1.2 MW of active energy per ton of liquid can be used. Refining Combined Burners (RCB) technology allows the complete exploitation of the chemical energy, regardless of whether an oxygen or carbon lance is used.

DESIGN PARAMETERS

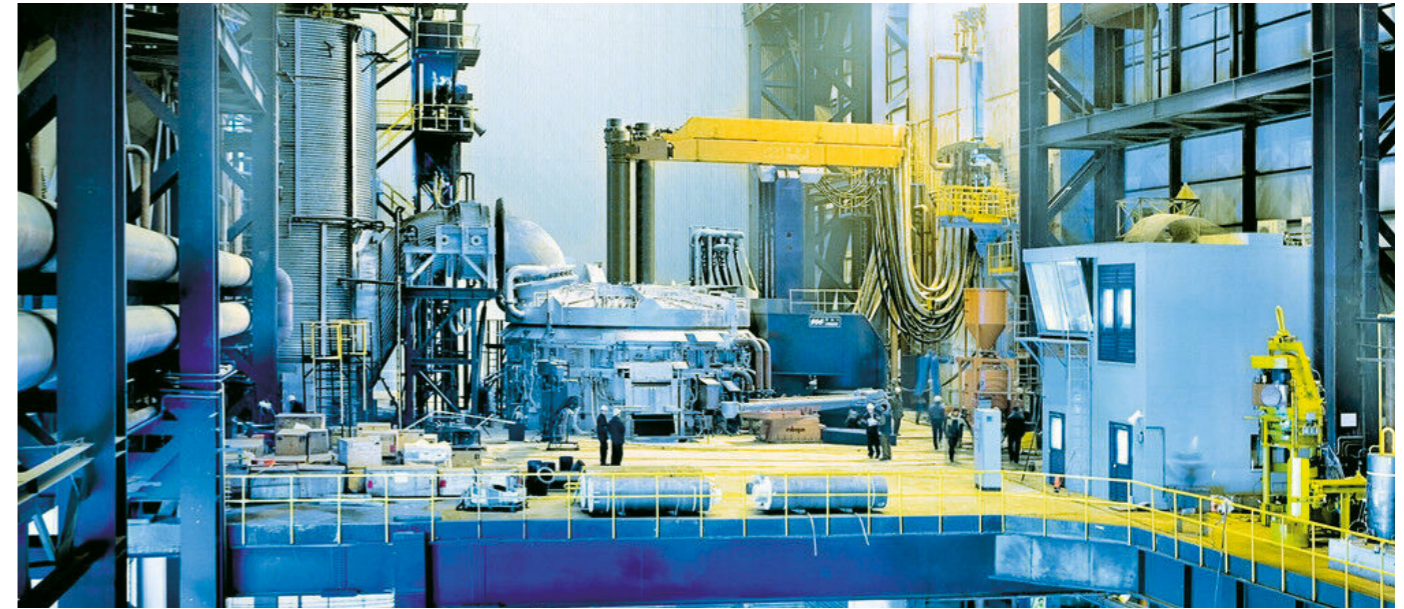
Tap weight	40-320 t
Type of scrap charge	one bucket
Transformer	35-315 MVA

PERFORMANCE VALUES

Power-on time	28-33 min
Power-off time	7-9 min
Tap-to-tap time	35-42 min
Heats per day	up to 41

CONSUMPTION VALUES

Electricity	350 kWh/t
Electrodes	1.2 kg/t
Oxygen	up to 45 m ³ /t



EAF Ultimate at Colakoglu, Turkey

PROCESS AND OPERATIONAL FEATURES

- Superhigh power input (up to 1.5 MVA/t)
- Arc voltage up to 1,650 V
- Combined oxygen and carbon injection by Refining Combined Burners (RCB)
- Continuity of the process due to single-bucket scrap charging
- Automatic repositioning of scrap bucket
- Continuous-feeding of systems for hot-briquetted iron and direct reduced iron (hot or cold)
- Hot-metal charging capability
- Contact-free steel temperature measurements
- Automatic tap control with video camera
- Automatic slag detection system during tapping

DESIGN AND EQUIPMENT FEATURES

- Robust and reliable equipment
- Gantry with single-point roof-lifting device
- Prismatic roller guide system for electrode masts
- High-capacity current-conducting electrode arms in copper-clad box design
- State-of-the-art electrode control system
- Copper or combi-panels with high-speed cooling water flow
- High furnace shell and roof for improved soft return
- All types of bottom tapping systems (EO-EBT, EBT, RBT, OBT)
- Crane with two auxiliary hooks for quick electrode exchange
- Split-shell design for fast exchange of shell sections
- Automatic taphole filling device
- Taphole- and door-cleaning robots

MAIN BENEFITS

- High degree of flexibility with charge materials
- High reliability and availability
- Proven and profitable technology for any steel route (flat and long)
- Highest productivity resulting in reduction of fixed costs
- Proven low consumption values for energy, electrodes, refractories, etc.
- Minimum maintenance with the use of heavy mill-type components

EAF QUANTUM

AN OPTIMIZED SCRAP PREHEATING AND MELTING CONCEPT FOR LESS ENERGY CONSUMPTION

THE EAF QUANTUM IS SHAPING THE FUTURE OF ELECTRIC STEELMAKING

The unique feature of the EAF Quantum is its preheating technology. The steel scrap is not fed directly into the furnace, as it is usually the case. The scrap is held in a preheating shaft through which the hot exhaust from the furnace operation passes. Steel scrap is preheated to up to 800° C in the preheating shaft, effectively recycling the heat from the steelmaking process. This considerably reduces the energy input required for melting.

ELECTRIC STEELMAKING REIMAGINED

The first EAF Quantum startup at Tyasa in 2014 marked a technological leap in the status quo of electric steelmaking and arc furnace design. Over the following decade, the EAF Quantum has continued to advance in shaft-based electric steelmaking. It has become critical to the steel industry's sustainable and eco-friendly future.

With an increased focus on flexible charge mixes for optimal steel quality, blending new input materials with scrap metal allows producers to tackle demanding limitations regarding power and performance. The revolutionary EAF Quantum is a game-changer in electric steelmaking.

DESIGN PARAMETERS

Tap weight	60-300 t
Type of scrap charge	closed-roof
Transformer	50-190 MVA

PERFORMANCE VALUES

Power-on time	28 min
Power-off time	4-8 min
Tap-to-tap time	32 min
Heats per day	up to 45

CONSUMPTION VALUES

Electricity	280 kWh/t
Electrodes	0.7 kg/t
Oxygen	<30 m ³ /t



EAF Quantum at Tyasa, Mexico

PROCESS AND OPERATIONAL FEATURES

- No bucket charging
- Energy consumption down to 280 kWh/t
- Tap-to-tap time of 32 minutes
- Electrode consumption 0.7 kg/t (steel only)
- Metallic yield advantage of 2% or more compared to conventional EAF
- Charging, tapping, and taphole refilling under power-on conditions
- Direct energy recovery due to 100% scrap preheating
- Reduced dust emissions thanks to shaft design
- Up to 30% reduction in electrode consumption
- Highest output even with weak power grids thanks to pure flat-bath operation and lowest possible flicker
- Full automation concept is feasible
- Slag-free operation
- No crane movement in furnace area reduces the danger of moving loads
- Quick vessel exchange

DESIGN AND EQUIPMENT FEATURES

- Elevator system with chute into sub-surface dumping station
- Optimized shaft design for 100% scrap preheating up to 800°C
- Patented long-life finger system for optimal scrap preheating
- Robust and reliable equipment
- State-of-the-art electrode control system
- Automatic and high-efficiency oxygen top-lance system
- FAST - Furnace Advanced Slag-free Tapping system
- Possibility to move shell in off position with cooling water supply to the upper shell
- Self-sustaining hydraulic for shell tilting
- Locking pillars for operational condition
- Combined vessel and ladle car for tapping and fast shell exchange
- Automatic taphole filling device
- Smaller transformer installation

MAIN BENEFITS

- Lowest OPEX
- Highest yield and consequently higher profit
- Minimum power-off time
- Reduced energy consumption
- Lowest noise emissions
- Lowest network disturbances
- Closed-roof operation

ECO SOLUTIONS

FUTURE-ORIENTED SOLUTIONS FOR ENVIRONMENTALLY FRIENDLY ELECTRIC STEELMAKING

SAVING RESOURCES AND CREATING VALUE

ECO Solutions from Primetals Technologies stand for a wide range of services and advanced technologies that minimize the environmental impact of electric steelmaking and improve energy efficiency. Primetals Technologies offers expert consulting services, advanced processes, and holistic solutions along the entire production chain that ensure strict adherence to emissions regulations and support producers in achieving substantial cost savings. The objective is always two-fold: save resources and create value.

SAVING RESOURCES

- Optimized use of raw materials
- Reduced energy consumption
- Reduced particulate and gaseous emissions
- Minimized noise emission

CREATING VALUE

- Improved plant performance
- Lower conversion costs
- Reduced environmental taxes and disposal costs
- Increased energy recovery
- Substantially improved working conditions and safety

ECO SOLUTIONS FROM ONE PARTNER

Primetals Technologies offers a spectrum of off-gas cleaning and energy recovery technologies from a single source, always in close collaboration with production specialists. This is our approach to create perfectly coordinated and economically viable solutions.

A reliable partner with innovative, tailor-made solutions is important for a successful project, and Primetals Technologies offers additionally:

- Full compliance with agreed upon limit values
- Tailored solutions using comprehensive expertise
- Consideration of future emission requirements in the plant layout and design
- More than 40 years of experience and profound knowledge in environmental technologies

REDUCTION OF ENVIRONMENTAL IMPACT TO PAVE THE WAY TO A GREEN FUTURE





Dedusting system at Carionx, Belgium



Energy recovery system at Arvedi, Italy



Noise protection doghouse at Carinox, Belgium



Water treatment system at ArcelorMittal, Texas

DEDUSTING SYSTEM

Primetals Technologies offers comprehensive in-house solutions for primary and secondary off-gas treatment in compliance with stringent environmental emissions regulations.

DEDUSTING SYSTEM & OFF-GAS CLEANING

This proven system is characterized by effective cooling and cleaning of the EAF off-gas and can be customized thanks to a modular design concept:

- Effective gas cooling in two stages (water-cooled ducts, forced draft cooler, quenching tower, etc.)
- Primary dedusting (active carbon injection, Pulse Jet filter, ID-fan, and stack)
- Secondary dedusting (canopy hood)
- Dust handling (storage, transport)
- Pulse jet-type bag filters

ENERGY RECOVERY

Most EAF off-gas systems are not thermally optimized. Up to 30% of the energy input in the electric arc furnace is currently unused. Primetals Technologies provides operators with highly efficient energy recovery systems that reduce energy-related costs to a minimum.

WASTE HEAT RECOVERY

The heat from EAF off-gas is transferred into hot water or steam via water-cooled ducts and/or a bundle “type” heat exchanger. The recovered energy can be used for the generation of

- hot water (heating or cooling)
- steam for internal or external steam consumers (processing or secondary metallurgical devices, power plants, etc.), or
- for electrical power.

NOISE PROTECTION

Primetals Technologies developed noise mitigation measures for the entire project scope to protect the EAF plant’s surroundings and to comply with strict noise protection limits.

NOISE ABATEMENT MEASURES

- EAF doghouse
- Concrete building, enclosures of equipment
- Insulation of gas ducts
- Enclosures of equipment (e.g., ID-fans)
- Equipment design with low noise emissions (e.g., low-speed drives)
- Application of silencers

WATER MANAGEMENT

Primetals Technologies offers customized and efficient water treatment and utility systems—backed by unique knowledge about the integration of fluid systems in the overall process technology.

WATER HANDLING & UTILITY SYSTEMS

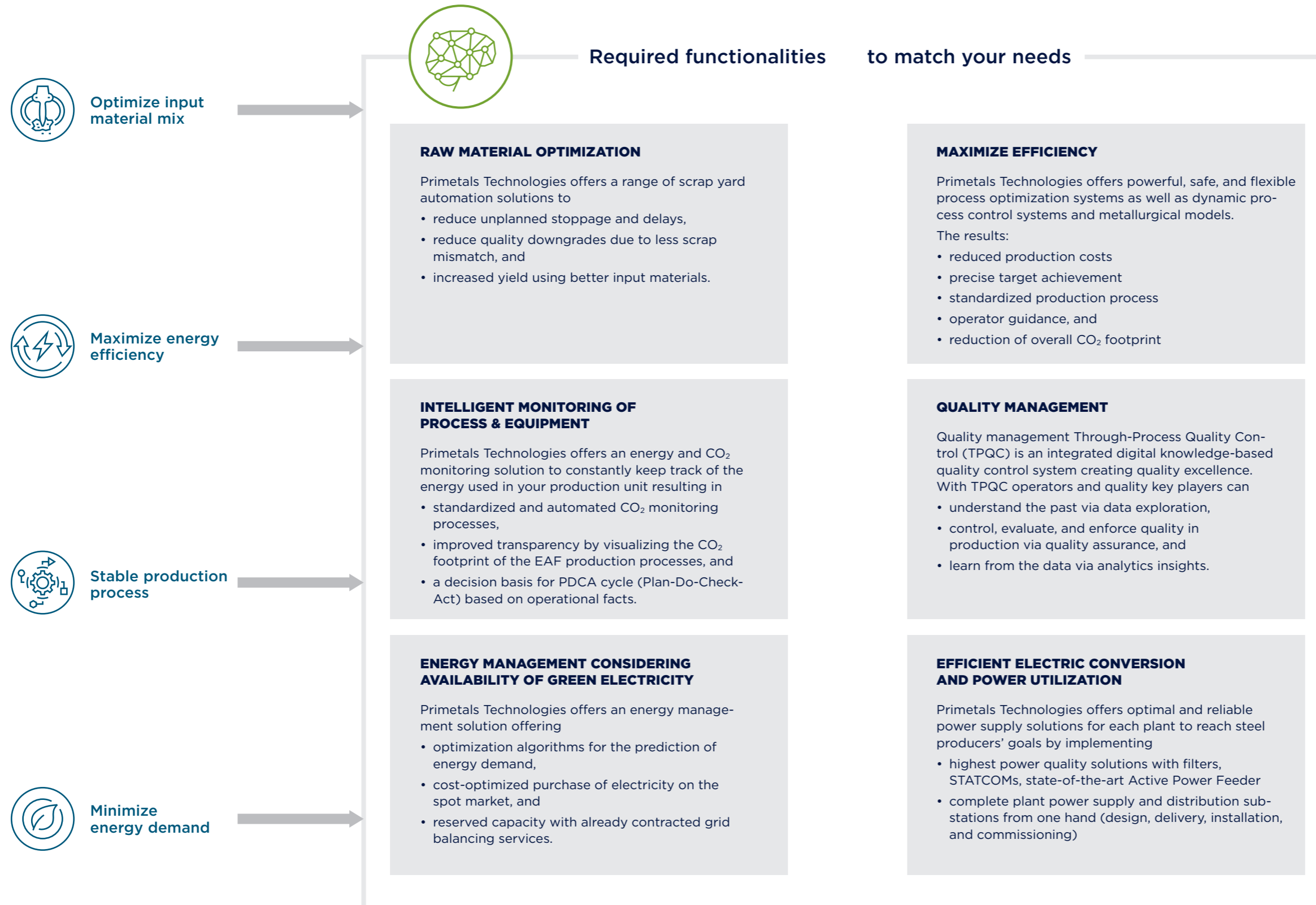
- Water treatment
- Slurry and residuals treatment
- Compressed air systems
- Steam and hot water systems
- Piping systems
- Gas and fluid supply systems



AI-ASSISTED
CENTRAL OPERATION
COCKPIT (COC)
ACCELERATES
TOWARD
AUTONOMOUS
EAF OPERATION



REDUCED ENVIRONMENTAL IMPACT DIGITALIZATION, ELECTRIFICATION, PROCESS AUTOMATION, SCRAP OPTIMIZATION, & ENERGY MANAGEMENT



Steel producers need the right solutions to optimize their processes, energy consumption, raw materials, and need to update and upgrade existing technologies. Primetals Technologies offers a range of innovative solutions to ensure that steel producers operate their EAF plant as green as possible.

OPTIMAL EAF OPERATION

SCRAP YARD, INTRALOGISTICS, POWER, AUTOMATION, ROBOTIC SYSTEMS, AND PROCESS CONTROL & OPTIMIZATION

Investing in a new production route with an EAF is a promising strategy to master the transition to green steelmaking. But how can one gain the know-how to optimally operate a new production route? How can one produce the same steel quality as before? Primetals Technologies offers several automation, digitalization, and power solutions to ensure autonomous plant operation to meet target qualities with optimal resource utilization, high throughput, and profit.



ACTIVE POWER FEEDER

The Active Power Feeder is a medium-voltage power supply system. It is based on modular multilevel converters to directly feed electric arc furnaces. Significant advantages for the grid connection and furnace operation can be achieved through

- increased productivity,
- dynamic process control,
- reduced electrode consumption,
- flexible installation at the medium voltage bus and outside of the furnace building,
- grid stabilization, and
- reduced stress and wear on electrical and mechanical equipment.



INTELLIGENT INTRALOGISTICS SOLUTIONS

Primetals Technologies offers solutions based on the digitalization of all key intralogistics processes, which allows for

- predictable and transparent intralogistics processes,
- a more efficient flow of materials and goods, and
- improved raw material quality and output.



PROCESS CONTROL

Achieve the highest availability and compatibility with the EAF Controller (Level 1) and benefit from

- improved process reliability,
- enhanced operational efficiency,
- digital technical documentation with augmented live production data.



TECHNOLOGY PACKAGES

Achieve the highest safety standards and productivity with fully automated process functions and profit from

- environmental improvements and energy savings,
- quality improvement and safety,
- cost reduction, capacity increase, productivity increase, and
- automatic robot-based applications.



PROCESS OPTIMIZATION

Achieve stable product quality and optimized costs with the EAF Optimizer (Level 2) and benefit from

- dynamic process control for optimized product quality,
- holistic tuning of input materials to reduce costs,
- powerful metallurgical models for precise target achievement.



CROSS-PROCESS OPTIMIZATION

Primetals Technologies offers a range of modular digitalization packages to optimize the entire meltshop, through

- combining information from individual production units to increase the performance of the whole steel plant,
- operator guidance and support for sustainable production know-how
- data analytics as lever for securing profitability.

PROJECT MANAGEMENT

EFFECTIVE PROJECT MANAGEMENT IS THE CORNERSTONE OF SUCCESSFUL FUTURE PLANT OPERATION



EXECUTION

EFFICIENT EXECUTION

Project management at Primetals Technologies ensures streamlined processes, optimized resource allocation, and timely completion. Together with our customers, fast start-ups and steep production ramp-ups are our defined goals. Cost control contributes to our client's profitability by keeping project expenses in check. We are focused on timely project completion: meeting deadlines enhances our customer's satisfaction and builds trust.



QUALITY

QUALITY ASSURANCE

The core purpose of our quality assurance is to prevent mistakes and defects in developing and producing provided solutions, manufactured equipment and delivered services. Project management at Primetals Technologies maintains the highest quality standards and ensures compliance with industry norms and safety regulations. Within the project management career path, Primetals Technologies continuously improves the skills of our experts based on international management standards and developments.



RISK

RISK MITIGATION

Proactive risk management means identifying risks before they happen and figuring out ways to avoid or migrate those risks. Our project managers promptly address risks, providing clients the confidence to implement the project smoothly by optimizing time and cost efforts. Open communication and regular updates contribute to the project's successful completion.



With more than 50 years of experience and expertise in electric steelmaking, we fulfilled over 600 projects. Deep knowledge of implementation procedures allows our project managers from our Centers of Competence located in Austria and Germany to apply their skills to manage the design, manufacturing, supply, and start-up of tailor-made electric arc furnaces and secondary metallurgy plants, including electric and automation solutions for our customers. Effective project management is the cornerstone of successful metallurgical plant building.

LIFECYCLE SERVICE AND TRAINING SUPPORT AND TRAINING FROM A SINGLE SOURCE – FAST, EXPERIENCED, RELIABLE

SERVICE, MAINTENANCE & TRAINING FOR IMPROVED EAF OPERATION

As a lifecycle partner, our metallurgical services offer our customers comprehensive operational and maintenance support for the entire lifecycle of a steel mill plant, including specialized services for electric arc furnaces to optimize their efficiency and maintenance. Our experts are experienced in improving performance, extending the service life, and ensuring the safety of these furnaces.

We provide real-time monitoring, preventive maintenance, and innovative solutions to challenges associated with high temperatures, electrical issues, and material handling in electric arc furnace operations.

The result of this win-win relationship between steel mill operators and Primetals Technologies is a continuous improvement in plant performance, product quality, and total cost of ownership. Additionally, we offer training to make electric steelmaking processes easier.

FROM CONSTRUCTION TO LIFETIME EXTENSION

Primetals Technologies is an expert in providing single-source solutions; including original equipment manufacturer components, third-party spare parts, modernization and mechatronic solutions, consulting and training, and maintenance and repair services.

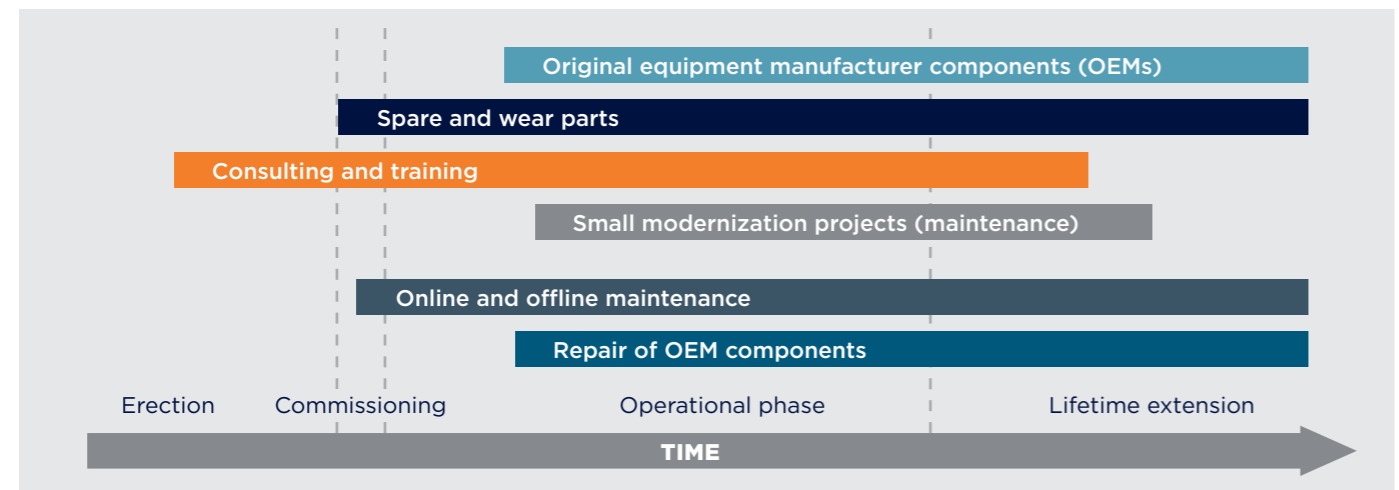
- Customized solutions allow decreasing operating and maintenance costs to offset growing cost pressure.
- Employees with outstanding problem-solving skills respond to challenging market requirements.

Spare parts & products – repair and reconditioning service, spare and wear parts, original equipment manufacturer components, spares management, long-term contracts

Training & services – consulting and studies, technical assistance, web-based training, classroom training, on-site-training, long-term contracts

Modifications & revamping – system upgrades, modernization, replacements, latest technology

Maintenance – on-/offline maintenance, predictive maintenance, consulting, support for warehousing and warehouse management, repair and refurbishment of equipment



Strong competitive pressure forces plant operators to keep production and maintenance costs at the lowest possible level. To improve both efficiency and performance, plant operators increasingly rely on operational support, maintenance, and repair services. Outsourcing crucial service activities is a very effective way for plant operators to improve their cost structures.

EAF REFURBISHMENT – CURRENT CONDUCTING ELECTRODE ARMS

The demand for continuous production of high-quality products is higher than ever. When operating an EAF, the electrode arms are essential for continuous production.

By overhauling older sets of electrode arms, steel producers can minimize capital expenditures and prevent stoppages. Primetals Technologies brings unique expertise in the fabrication and maintenance of these fundamental components. Suppose producers require the replacement of a full set or a single arm or require specialist maintenance support. In that case, Primetals Technologies can optimize the lifetime and running costs of the equipment.

A unique approach to electrode arm maintenance is vital for optimal electric arc furnace operation. An evaluation of current conditions, a repair feasibility analysis, and the creation of a comprehensive roadmap for redevelopment follow a thorough initial inspection. The refurbishment is optimized according to individual plant production conditions to maximize the EAF performance.

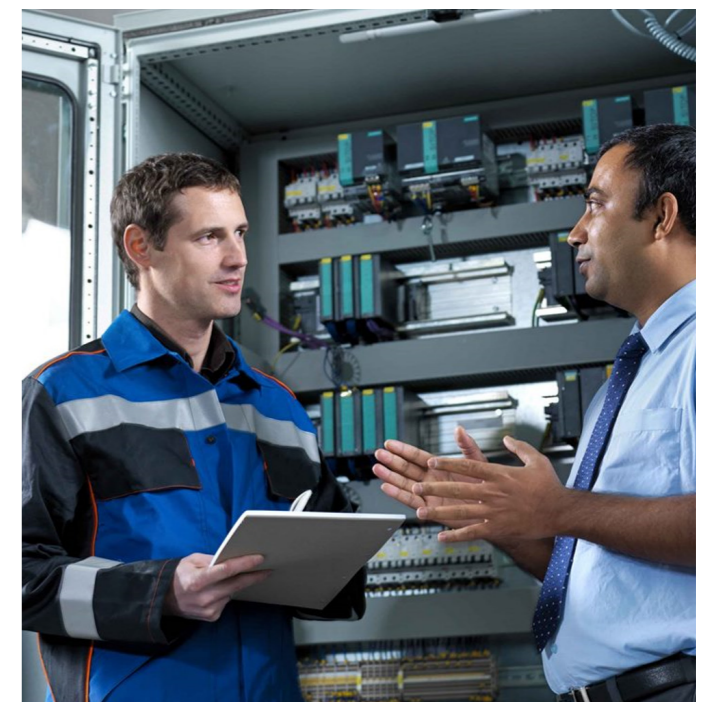


EAF AUTOMATION SUPPORT – CUSTOMIZED ELECTRICS AND AUTOMATION

Dedicated automation can assist company staff in detecting, analyzing, and solving all electric and automation-related problems. Local experts are highly qualified to provide technical support on short notice. Beyond that, the internet allows our service specialists to provide expert support from anywhere worldwide – based on remote access through reliable and secure encrypted connection.

Annual service contracts provide affordable, fast, and non-bureaucratic support. Steel producers can benefit from our experts' comprehensive knowledge of EAF automation systems to guarantee the following:

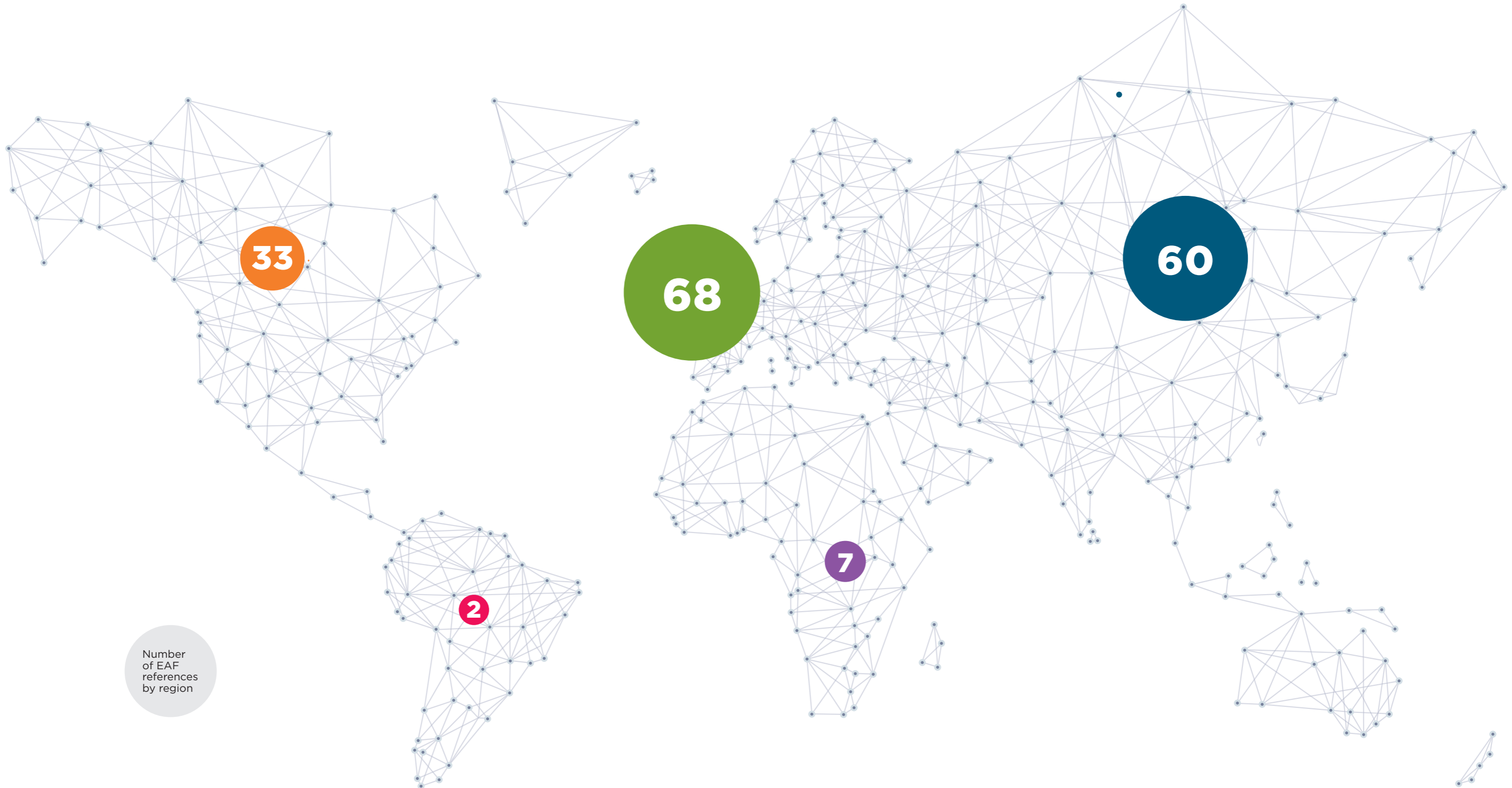
- Trouble-free and reliable operation, increased availability, and consistently high performance
- Fast automation and process support
- Access to expert knowledge of complex automation systems



REFERENCES AROUND THE WORLD

A COMPETENT AND EXPERIENCED PARTNER FOR ELECTRIC STEELMAKING

Today's steel producers face immense challenges when working with an EAF. These challenges may include anticipating tomorrow's more stringent environmental targets for green steel, achieving optimal energy efficiency, and dealing with the constraints of a weak electrical infrastructure. With many years of project experience in the steel industry, Primetals Technologies has developed a special expertise for the integration of electric arc furnaces in existing steelmaking plants and provides innovative solutions to the challenges mentioned above.



Number of EAF references by region

REFERENCE HIGHLIGHTS

SUCCESSFUL CUSTOMERS IN THE ELECTRIC STEELMAKING BUSINESS



SALZGITTER – GERMANY

EAF Ultimate – 220 tons tap weight

Salzgitter’s green steel transformation program SALCOS® aims to convert its existing integrated steel plant to green steel production by 2033.

The EAF Ultimate should replace their existing converter as part of their transformation. Salzgitter ordered the EAF Ultimate following recent successful EAF projects and competence in project management demonstrated by specialists from Primetals Technologies.

Additionally, to the EAF, Salzgitter ordered automation packages, eco solutions, and robotics systems.



VOESTALPINE STAHL – AUSTRIA

EAF Ultimate – 180 tons tap weight

The EAF Ultimate is key to voestalpine’s green transition program, “greentec steel.” As a first step, one electric arc furnace will be built at voestalpine’s site in Linz.

Successful collaborations, expertise in producing advanced steel grades, and leading automation solutions were the most important factors influencing the decision to choose Primetals Technologies.

The scope of delivery includes eco solutions, material handling, a robotic system, and automation systems.



ACCIAIERIA ARVEDI – ITALY

EAF Ultimate – 150 tons tap weight

Acciaieria Arvedi is an Italian steel producer who wanted to improve its steel production and ordered an electric arc furnace from Primetals Technologies.

The new EAF Ultimate increases the production capacity of Acciaieria Arvedi and reduces conversion costs.

The order also included a dedusting system combined with a heat recovery system, other features such as a water leakage control system, and a new type of automatic tap hole filling—automation rounds out the supply scope.



TOSYALI DEMIR CELIK – TURKEY

EAF Quantum – 150 tons tap weight

For the first phase of their melt-shop project, Tosyali ordered an EAF Quantum.

This electric arc furnace developed by Primetals Technologies combines proven elements of shaft furnace technology with an innovative scrap charging process, an efficient preheating system, a new tilting concept for the lower shell, and an optimized tapping system. This all adds up to very short melting cycles. Moreover, the electrical energy requirement of the electric arc furnace is extremely low, which has reduced both the operating costs and the CO₂ emissions.



TYASA – MEXICO

EAF Quantum – 100 tons tap weight

Talleres y Aceros, after successfully operating an electric steelmaking facility for 20 years, desired a production increase and modernization.

The result was a new compact steelmaking plant with a capacity of 1.2 million tons per annum. The heart of the plant is the EAF Quantum. This new furnace design reduces the conversion cost for electric steelmaking production by 20%.

The plant also includes secondary steelmaking facilities, a flexible 6-stand continuous caster, and a state-of-the-art water treatment and dedusting system.



HENAN YAXIN STEEL GROUP – CHINA

EAF Quantum – 120 tons tap weight

The Chinese steel producer Henan Yaxin Steel Group Co., Ltd. operates its eco-friendly mini mill consisting of two EAF Quantum and an Arvedi Endless Strip Production (ESP) line at its Fujian Dingsheng plant.

This setup allows for 85% CO₂ savings compared to the integrated production route. The extremely low electrical energy consumption for flat products contributes to a reduction of emissions as well as a reduction of operating costs. Their new EAF Quantum expedites a transition of the existing production to a more environmentally compatible electric steelmaking process.

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