

# Pioneering Sustainable Industrial Solutions for a Greener Future



[johncockerill.com](http://johncockerill.com)





At John Cockerill, we proudly uphold a 200-year legacy of addressing the evolving needs of our time. Our unwavering commitment is to blend the expertise from our rich tradition with modern technologies, fostering innovative large-scale technical solutions for a sustainable future. We are dedicated to promoting responsible industrial production and enabling their transition to sustainable operations.

**François-David MARTINO,**  
Executive President John Cockerill Industry

## Technological Solutions to Meet Our Clients' Needs

John Cockerill leverages its extensive know-how and experience to drive product advancements, innovation, and services across various sectors, including energy, defence, industry, environment, transport, and infrastructure. Our goal is to help clients enhance plant availability and safety, improve product quality, and reduce their ecological footprint.

### Index

Designing the Equipment of the Future.....	04
Iron and Steel Making .....	05
Processing & Rolling .....	06
Acid Regeneration .....	08
Rolling Mills .....	10
Strip Processing.....	12
Innovative Furnace Designs.....	14
Services & Energy Efficiency.....	16
Automation and Technology control.....	18
Heat Treatment.....	20
Surface Treatment.....	21

## Driven by Innovation Since 1817

Since 1817, driven by the entrepreneurial spirit and passion for innovation of our founder, we have developed and delivered large-scale technological solutions to meet the needs of our time.



## Towards Greater Energy Efficiency

John Cockerill constantly improves its technologies, developing equipment dedicated to reducing energy losses in steel processes. These solutions help industrialists reduce their environmental footprint and improve costs by reducing energy consumption and enhancing processes.

### Complete Integration & Support

From basic layout design to routine operation, we offer turnkey solutions for complete industrial complexes. Our expertise cover mechanical, chemical, and thermal process sections, ensuring comprehensive project management, from design and engineering to commissioning and maintenance, as well as expansion, and upgrading to deliver solutions that improve production efficiency, quality, and sustainability. This approach allows clients to focus on their core operations, assured that their projects are in capable hands.

### Compliance with stringent safety standards

We prioritize safety and reliability by integrating advanced safety features into durable, high-quality equipment designed to withstand rigorous use. Our comprehensive training programs, ongoing support, and predictive maintenance systems help clients operate safely and prevent costly downtime, ensuring both efficient and secure production environments throughout the lifecycle.

### Commitment to Sustainability

We are committed to minimizing our environmental impact and maximizing energy efficiency. Our cutting-edge equipment and technologies empower clients to reduce energy costs and optimize their processes. With a strong focus on innovation, we lead in advancing new technologies, developing customized solutions aligned with industry trends like digitalization, automation, and energy efficiency—helping steelmakers remain competitive in a rapidly evolving market.

# Designing the Equipment of the Future

Our unique blend of engineering expertise and global experience underscores our reputation as a leading supplier of technological solutions. John Cockerill's teams focus on developing state-of-the-art technological innovations to help clients improve their competitiveness globally.



**METALS**

**SURFACE TREATMENT**

**HEAT TREATMENT**

## How We Ensure the Best



# Iron and Steel Making

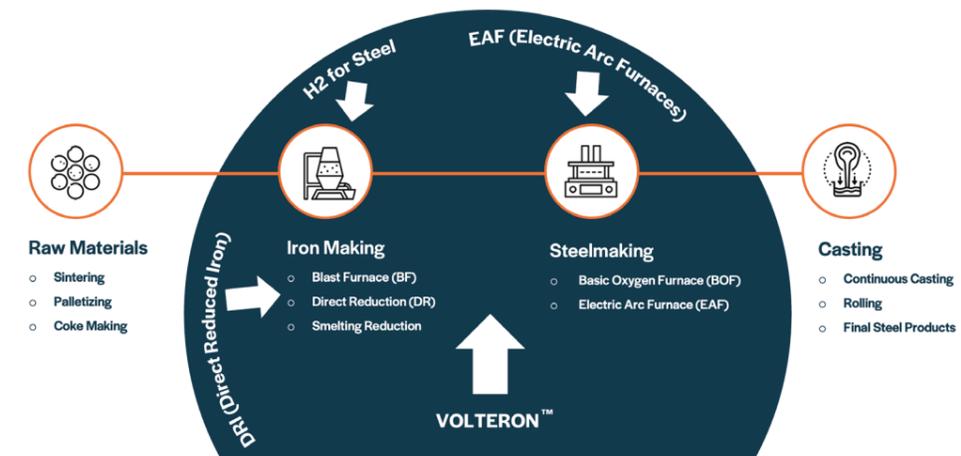
## A Mission to Decarbonise Steelmaking

Steelmaking contributes 7% of global CO2 emissions. We combat this by electrifying primary steel production to advance green steel.



### Innovations in Steelmaking

Our new upstream offerings include DRI (Direct Reduced Iron), EAF (Electric Arc Furnaces) technologies, and the use of Hydrogen in steelmaking. John Cockerill is also developing Volteron™, a first-of-its-kind iron reduction and steel processing route via direct cold electrolysis, co-developed with ArcelorMittal.



Volteron™ is a carbon-free, cold direct electrolysis process that extracts iron from iron ore using electricity.

The iron plates created during the electrolysis process are then processed into steel in an electric arc furnace.

Volteron™ is a disruptive innovation project aiming at CO<sup>2</sup> free steelmaking combined with a significant energy reduction. The innovative electrolytic process, will allow to reduce the direct energy consumption by 31% and greenhouse gas emissions (GHG) by 87%, when compared to conventional steelmaking.

After the pilot plant has confirmed the viability of this energy efficient, low temperature process, and given the potential it holds to decarbonise steelmaking, the two partners have decided to construct the world's first industrial scale low temperature, iron electrolysis plant targeted to start production in 2027. Once the technology has been proven at this scale, the plant's annual capacity will be increased to between 300,000 and 1 million tons. While the Processing & Rolling segment is regrouping our historical downstream product portfolio, the newly created Iron & Steelmaking segment focuses on John Cockerill new upstream offerings related to Volteron (direct electrolysis), DRI (Direct Reduced Iron), EAF (Electric Arc Furnaces) technologies, and the use of hydrogen in steelmaking.

# Processing & Rolling

## Game-Changing Downstream Technologies



### Pickling Solutions

The full range of pickling solutions for effective removal of mill scale and other surface impurities

As a market leader, John Cockerill supplies the full range of pickling solutions for both flat and long products, ensuring the effective removal of mill scale and other surface impurities from hot and cold rolled stainless steel, carbon steel or silicon steel, to non-ferrous metal strip such as aluminum, brass, etc. The resulting scale-free quality of the pickled strip improves the quality of the downstream rolling and coating processes.

Used for processing individual coils without strip joining, John Cockerill's **push pull pickling lines** are ensuring excellent operational flexibility in the face of frequently changing strip dimensions and steel grades, and also non-weldable material. Their specific design makes such lines the only practical way of descaling heavy gauge coiled product. John Cockerill's unique v-shaped tank profile facilitates threading the strip through the pickling tank. The fact that there is no strip accumulator in the line makes this technology easy to operate and the most cost-effective method of hot band finishing. Applications range from the typical service center to the high production requirements of the largest mini mills.

**Semi-Continuous- and Continuous Pickling Lines** are used for high capacity production with continuous operation by stitching or welding. The strip accumulators, also called loopers, provided at the entry and exit sections of the line ensure a consistent product flow during joining, coiling and removal of the steel coils.

In continuous pickling, the line runs at constant speed, while in the Semi- Continuous Line the speed of the strip is reduced during changeover or coil joining, due to the lower capacity of the loopers. The installation of Semi-Continuous Lines is highly cost-effective due to the simpler looper design, while Continuous Pickling Lines provide the highest production capacity.

John Cockerill's **high turbulence pickling tank technology** for continuous pickling lines is currently among the most efficient and also the most cost effective solutions on the market. In order to most effectively cover all types of applications and product mixes, these pickling tanks come in a range of profiles and acid injection systems, including the latest John Cockerill development, **spray pickling modules**. Accurate strip and pickling process control optimizes scale removal without over-pickling. John Cockerill's Pickling Process Management (PPM) system, together with its fully automated acid control management system, ensures the environmentally safe operation of the plant.

In stainless steel pickling applications, **John Cockerill's Neolyte Purification Systems** not only reduce harmful chromium (+6) to non-toxic chromium (+3), but also regenerate the electrolyte, thus reducing operating costs and the environmental impact of such lines, while fumes loaded with NOx produced during stainless steel pickling, are most efficiently treated in John Cockerill's latest generation of Selective Catalytic Reactors (SCR-Technology).

### Pickling Line Designs:

- Push Pull or Semi-Continuous Push Pull Pickling Lines
- Continuous Pickling Lines

### For carbon steel, including silicon steel Continuous Pickling Lines (CPL) can be part of combined lines:

- Tandem Cold Mills (PLTCM)
- Annealing Lines for Silicon Steel
- For stainless steel a CPL is incorporated into:
  - Hot Strip Annealing and Pickling Lines (HAPL)
  - Cold Strip Annealing and Pickling Lines (CAPL)
  - Combined Hot/ Cold Strip Annealing Lines (H/CAPL)
  - Direct Roll Annealing Pickling Lines (DRAP)

### Batch pickling plants for ferrous and non-ferrous metals:

- Wire Coil Pickling Lines
- Tube Pickling Lines
- Bar Pickling Lines
- Plate Pickling Lines
- Universal Pickling Lines



Pickling lines for long products are a highly specialized group of batch treatment lines, designed according to the product shape, process required and unique parameters defined by the client. John Cockerill's new generation plants feature automated processing using a Level II or Level III control system, multiple fill-drain cycles via an independent transportation function, cascade rinsing using spray and immersion, waste air and waste water treatment aimed at minimizing emissions, and acid control, as well as management through recovery or regeneration processes.

Along with high turbulence pickling that ensures uniform pickling conditions and high heat transfer rates, John Cockerill uses hook vibration for uniform pickling and a high pressure spray rinse arrangement that guarantees a clean surface without residual contamination.

### Key Benefits

- Highest product quality through uniformly pickled surface
- Highest achievable production rates
- Optimized pickling parameters through mathematical modelling
- Low operating costs with controlled utility consumption
- Environmentally friendly operation
- Low maintenance costs
- Closed loop systems for acid, water and air treatment



# Acid Regeneration

Leading-edge technology in acid regeneration for all types of acid and all available technologies



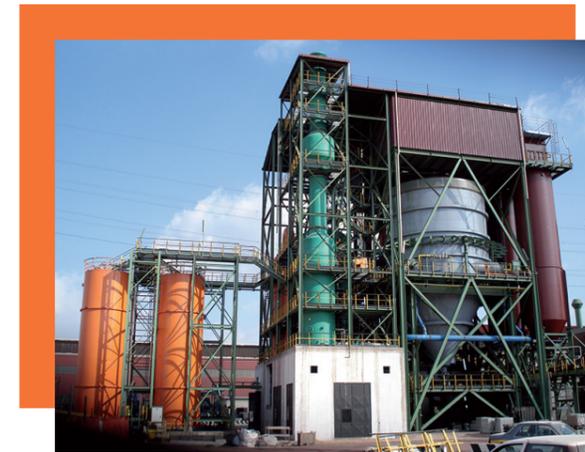
As a leader in this market segment, John Cockerill offers a modular design that guarantees its customers the optimal solution for all their individual process requirements and applications, with acid recovery rates of virtually 100%.

**Eco-friendly solutions**, addressing today's market requirements and increasingly stringent environmental regulations. Today two pyrohydrolysis processes are available, namely fluidised bed and spray roaster technology, both of which have distinct advantages. While both technologies are mature, it is not always easy to make the choice. A number of considerations potentially affect the decision. Being able to offer either of these processes enables John Cockerill to focus fully on its clients' specific site conditions and help them to choose the best option. Simplified processes such as our quick-change spray nozzles, the improved design of our venturi rendering it completely maintenance free, or the most modern plant control system (PCS), are just a few examples of the features provided by the latest generation of our plants.

**John Cockerill's Acid Regeneration Plants (ARPs)** are equipped with a highly automated control system that minimizes field intervention by the operator and enables safe and reliable daily operation from a single control room. For the total regeneration of Hydrochloric Acid (HCl), the waste pickle liquor from the pickling line is concentrated by direct heat and mass exchange in the venturi circulation system, before being injected into the spray roaster or fluidised bed reactor, where it reacts with O<sub>2</sub> and H<sub>2</sub>O to form solid iron oxide and hydrogen chloride gas. John Cockerill's latest generation of ARPs are coming with an innovative **Combustion Air Preheating System** (patent pending) that helps to reduce fuel consumption by up to 10%. The HCl contained in the reactor off-gas is then passed through an absorber system, using a counter-current circulation system, in which the rinse

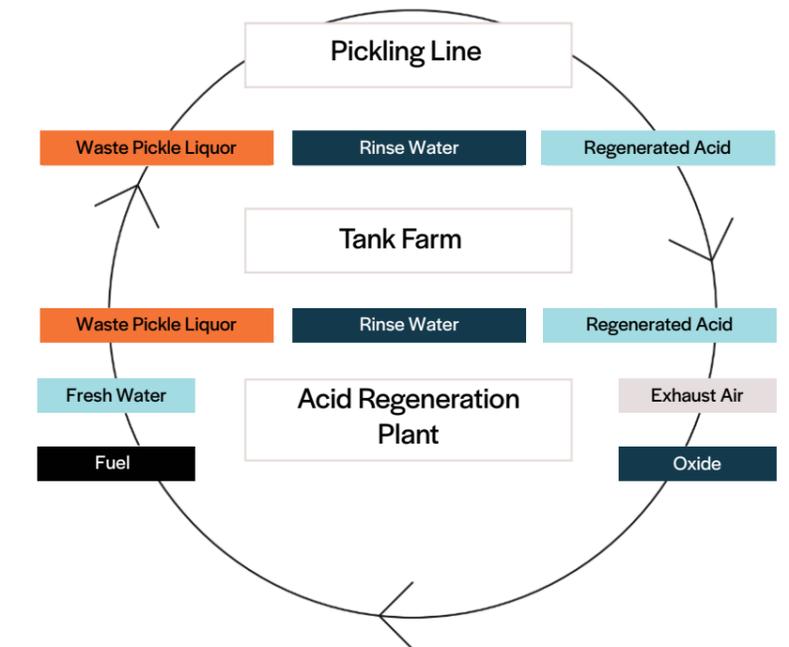
water from the pickling line absorbs the HCl in the reactor off-gas. Thus close to 100% of the waste pickle liquor (WPL) is converted back to liquid acid, which is then reused in the pickling line. The remaining off-gas passes through several treatment steps, including the exhaust fan which regulates the negative pressure in the whole upstream system preventing gas leaks, before being released via the stack into the atmosphere. John Cockerill's ARPs can optionally be equipped with a **Plume Reduction System** (patent pending). This newly designed, and highly innovative system not only reduces the fume at the stack, but also further reduces emission values, thus allowing to achieve the most stringent environmental regulations.

**Regeneration of small-scale waste acid streams coming from galvanizing and pickling plants** While acid regeneration systems for bigger pickling installations are state of the art in the steel industry, small capacity waste acid streams are generally not regenerated due to economic reasons, thus generating a negative environmental impact. CARLA® has been developed to address this environmentally unacceptable situation. Based on an innovative batch process to economically handle waste acid capacities down to 100l/h, CARLA® is closing the loop on acid regeneration also for installations only producing small amounts of waste acid. The single reactor process reduces investment costs, but also the waste streams of the plant, as well as the amount of fresh acid to be purchased.

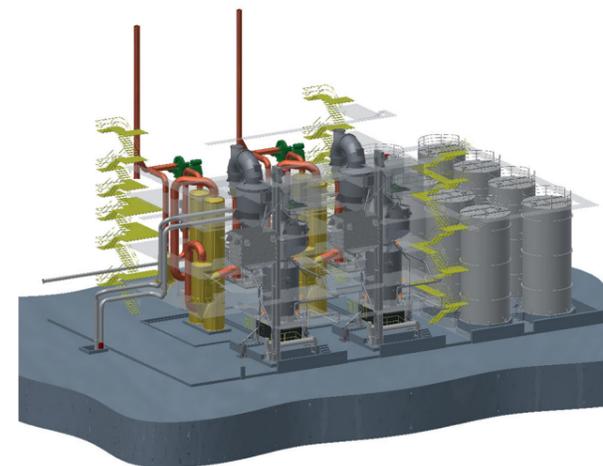


## Key benefits

- Environmental protection due to recovery of hazardous chemicals
- Virtually emission-free operation
- Recovery of costs by sale of oxide as high quality by-product
- Highest achievable production rates
- Optimised pickling due to constant operating parameters
- Independence from chemical suppliers
- Short payback time
- Present and future legal requirements on emissions are met
- Low maintenance costs
- Proven design
- Adaptable to all types of Pickling Lines



For surface treatment or waste acid treatment plants with no or limited access to conventional acid regeneration technology, the use of CARLA® will have a significant positive impact on their environmental balance.



## Acid Regeneration Technologies:

Carbon steel including silicon steel applications:

- Fluidised Bed Acid Regeneration Plant
- Sprayroaster Acid Regeneration Plant
- CARLA® - "ready-to-install" small-scale acid regeneration system

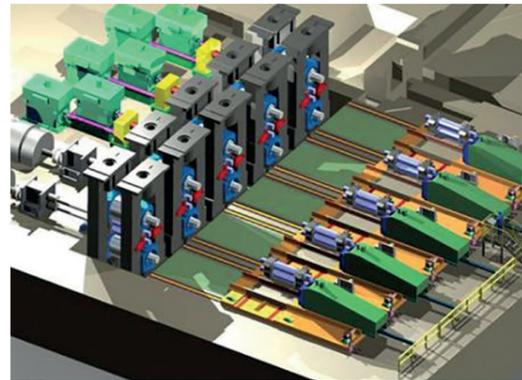
## Rolling Mills

Rolling technology combining field-proven reliability with cutting-edge innovation



John Cockerill's latest generation cold rolling mills, always made to measure for individual client requirements, offers many advantages, like reliable terminal equipment reducing downtime, accurate tension control and steering, as well as optimum strip thickness and flatness, to mention only the major ones.

A value offer that is enhanced by proven-and- tested equipment like **shear systems, tension leveling, scale breaking, mandrels and coilers**, all of which are important components in the modernization and the installation of new Pickling Lines/ Tandem Mills (PLTCM).



John Cockerill has built a strong technology experts team, over the years and offers the most efficient, yet lean mechanical design and engineering for all of its mill types. Additionally, the demand for higher-capacity production and improved product quality, increasingly results in existing rolling mills and equipment being in need of modernization. As such, John Cockerill is not only supplying new mills, but is also offering customized rolling solutions aiming to cost-effectively and efficiently help clients with the modernization and the upgrading of their existing mills to meet today's need for high performance mills. The latest development of high-end automotive and tinplate applications of its mills, as well as process models and automation packages are enriching John Cockerill's value proposition.

**Rolling technology designed for all applications and requirements**



John Cockerill designs 4-High and 6-High reversing cold rolling mills with high output and high flexibility for all rolling requirements. These type of mills come in single or twin stand configuration. The wide range of products able to be rolled by these mills includes low, medium and high carbon steels, along with copper, brass and a number of alloys. Additionally, a very wide range of strip widths can be treated, at mill speeds that are sufficient for the highest volume of demand within steelmaking companies. The mill model for an optimized pass schedule is provided along with the mill itself.

John Cockerill also designs and supplies skin pass mills with wet and dry skin pass systems. In-line skin pass mills are supplied for continuous annealing lines and continuous galvanizing lines.

Both stand-alone and in-line skin pass mills supplied by John Cockerill treat a very wide range of strip widths, with precise output thicknesses and the highest possible mill speeds, guaranteeing its customers a great level of productivity and cost-effectiveness.

### Key benefits

- Suitable for wide range of strip width and output thicknesses
- Suitable for wide range of products (low, medium and high carbon steels, silicon steel, copper, brass and a number of alloys)
- Reliable terminal equipment reducing downtime
- Accurate tension control and steering
- Optimum strip thickness and flatness

### Rolling Mills Technologies:

- Tandem Cold Mills (Batch or Conti-Conti)
- Pickling Lines/ Tandem Cold Mills (PLTCM)
- Reversing Cold Mills (Single or Twin Stand)
- Skin Pass Mills
- Modernization and Special Equipment for Cold/Hot Strip Mills



## Electrical Steel (E-Si™)

Innovative technologies for the production of electrical steel.

The electrical steel market is projected to grow at an average rate of 6.3% from 2021 to 2026, achieving business sales of \$45.8 billion. This growth includes demand for high-grade non-grain-oriented (NGO) electrical steel, especially for e-mobility applications.

John Cockerill has developed advanced technologies to meet these high-grade requirements, focusing on key production units such as Annealing and Pickling Lines (APL), Cold Rolling Mills (CRM), and Annealing and Coating Lines (ACL). The APL processes up to 240,000 tons annually at 35 m/min with advanced furnaces and pickling, while the ACL has a capacity of 2 High-efficiency pickling technology, with shallow, high-turbulence tanks, boosts line capacity by up to 36%, reducing costs and enhancing quality.

Induction heating in early rolling also minimizes breakage for high-silicon steels, crucial for efficient electric motors. These innovations are designed to maximize productivity, improve material properties, and enhance energy efficiency in NGO steel production.



## Strip Processing

High performance strip processing lines for every application

In the face of an ever changing business environment, and the resulting challenges for increasingly demanding quality and flexibility, John Cockerill is enabling its clients to process today's latest high strength steels (AHSS/ UHSS) including DP (dual phase), TRIP (Transformation Induced Plasticity), FB (ferrite-bainite), CP (complex phase) and TWIP (TWIn Induced Plasticity) steels.

**Innovative technologies to address processing challenges** related to the latest generations of high strength steels. While Advanced High Strength Steels (AHSS) and Ultra High Strength Steels (UHSS) are considered as the dominant future light-weight material, the steel industry is moving into the third generation of high strength steels for the automotive industry. John Cockerill is preparing for these even more challenging steel qualities, with a number of innovative automated and modern cooling technologies and its latest patented design of a pre-oxidation chamber to control the selective oxidation of the steel surface, mainly due to high Si content, during annealing prior to galvanizing, which is resulting in poor wettability and zinc (Zn) adherence. The combined oxidation and pre-oxidation chamber incorporates a system and a method that perfectly exert the necessary oxidation control on both sides of the steel sheet. As a global full-liner John Cockerill is providing unique expertise and know-how in steel processing. John Cockerill's lines and equipment are designed and manufactured to offer maximum

value, from the delivery of complete new installations, to modernization and productivity and quality improvements of existing lines.

As such John Cockerill is addressing its customers' needs for increased operational flexibility with innovative designs for dual and combi lines.

The latest examples of this development are combi continuous annealing lines/ continuous galvanizing lines (Combi CAL-CGL) providing superior surface quality, for high-strength automotive structural components, which improves the safety of vehicles while reducing their weight, or combined continuous galvanizing lines/ color coating lines (CGL/ CCL) limiting capital and operational expenditure and eco-friendliness as no intermediate storage, no oiling after CGL and no degreasing before the color coating is required. But also continuous galvanizing lines (CGL) designed to apply different coatings including the very latest AluSi coatings.

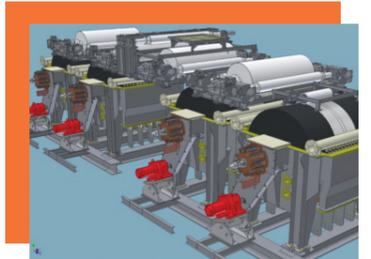
Today John Cockerill's state-of-the-art strip processing lines, feature the full spectrum of John Cockerill's very latest process technologies: Multi-stage cleaning section, Vertical furnace, L-Top math model and jet cooling system with energy recovery Zinc pot section and Air-Knife system, APC Blowstab® cooling system, In-line skin pass mill and Tension leveler, Chemical and Organic roll-coat post treatment, Side trimmer Exit shear.

### Key benefits

- Reliable operation
- High throughput rates
- Optimized process sections (mechanical, thermal and chemical)
- High degree of operational flexibility
- Proven high plant availability
- Consistent top product quality
- Line design adapted to lower maintenance costs (easy service of major equipment increases uptime)

### Strip Processing Lines

- Continuous Annealing Lines
- Continuous Hot Dip Galvanizing Lines
- Dual Product Lines
- Continuous Electro Galvanizing Lines
- Electrolytic Cleaning Lines
- Flux Type Lines
- Color Coating Lines
- Inspection/Correction/Tension Leveling Lines
- Process Equipment:
  - Multi-stage cleaning section
  - Bath equipment (zinc pot + air knife)
  - Tension levelers/ skin pass mills
  - Chemical or Organic roll coaters
  - Shears/ side trimmers



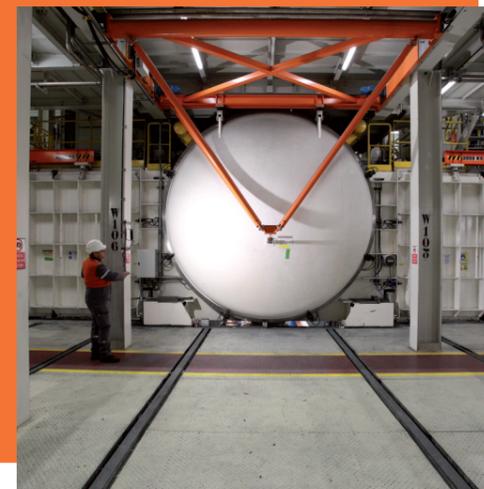
## Jet Vapor Deposition (JVD)

The coating technology for the future

The JVD (Jet Vapor Deposition) line represents a significant technological breakthrough in steel coating. Developed for ArcelorMittal in Liège at the Metallurgical Research Center (CRM), this unique technology is now being commercialised globally.

Jet Vapor Deposition (JVD) is an advanced coating process that vaporizes zinc in a vacuum and deposits it onto steel at sonic speeds, creating a uniform, adaptable coating. Used at ArcelorMittal's Kessales site in Belgium, JVD supports high-speed production with minimal waste and a high zinc yield of 99.5%, achieving up to 1 million tons of coated steel annually.

With a low carbon footprint and efficient, dry, water-free process, JVD offers customizable coating thicknesses and superior surface quality, making it ideal for automotive, appliance, and industrial applications where durability and corrosion resistance are key. This eco-friendly technology is setting a new standard for energy-efficient metal coatings in the steel industry.



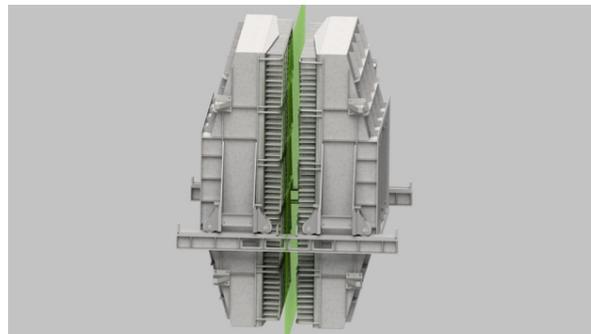
## Innovative Furnace Designs

Innovative furnace designs to meet the most advanced requirements for production flexibility and strip quality. The latest generation of John Cockerill's processing line furnaces and corresponding mathematical models are designed to process the widest possible range of products from fragile ultra-low carbon to high strength steels, including thin and wide steel strips, while minimizing thermal inertia to allow, next to improved energy consumption, also for the quick change of production parameters, thus guaranteeing increased line flexibility.

Based on physical, mechanical, and thermal models that help predict the strip behavior on line, the optimal heating solution is developed. The use of all ceramic fiber Non Oxidising Furnace (N.O.F.), Inconel P or PP-shaped radiant tubes, the latest generation of patented jet coolers (Blowstab®) without insulation, or the patented furnace control mathematical models L-TOP® (vertical furnaces) and LH-TOP (horizontal furnaces) controlling all process conditions whether steady or transient, are all integral parts of an optimized, state-of-the-art John Cockerill furnace design.



As such, John Cockerill set the benchmark with its patented steel strip stabilization and cooling system (Blowstab® II) guaranteeing the non-fluttering of the steel strip in the jet coolers or after the pot cooling. John Cockerill's furnace design also allows eliminating heat and cool buckles by means of a dynamic and global control concept for strip tension, roll profiles, and strip temperature. John Cockerill's mathematical models have been successfully implemented on John Cockerill furnaces, as well as those of all major competitors to improve their productivity and the produced strip quality.



### Furnace Designs for Continuous Galvanizing Lines (CGL) and Continuous Annealing Lines (CAL) (horizontal or vertical design):

- Non Oxidizing Furnaces (N.O.F.)
- Radiant Tubes Furnaces (R.T.F.)
- Any other specific chambers

### Cooling systems:

- Blowstab®
- IWAC®
- Ultra Dry Cooling (UDC®)
- L-TOP® & LH-TOP® mathematical models

### Furnace Designs for Stainless Steel Lines:

- Hot rolled only (for annealing and pickling lines)
- Cold rolled only (for annealing and pickling lines)
- Combination HR and CR (for annealing and pickling lines)
- Bright annealing with high purity internals (vertical or horizontal)
- Bright annealing with muffle tubes (vertical or horizontal)

### Furnace Designs for Silicon Steel Lines.

The Inconel 2P tube with its regenerative flameless and low NOx burners for continuous annealing furnaces.

## Modern Cooling Technologies

John Cockerill has always been focusing on providing its customers top quality based on innovative technologies to meet the most challenging market requirements. As such, one of the major fields of innovation of the past years has been related to the development of several ultra-rapid cooling technologies to meet the requirements of tomorrow's steel qualities. To guarantee the required top strip quality and stability, as well as reduce energy consumption, John Cockerill is therefore offering three complementary cooling technologies.

The latest generation of the patented Blowstab HSS® coolers. Cutting-edge technology available for all line furnaces and APCs supplied by John Cockerill, as well as for the revamping of other furnace brands. The new generation of our state-of-the-art Blowstab low vibration cooling system, the Blowstab HSS® (patent applied), offers an improved cooling performance of up to 200°C/s, as well as an ultimate strip cooling homogeneity. Our two patented latest generations of cooling devices, IWAC®, our liquid cooling, and UDC, our Ultra Dry Cooling, allow for extremely high heating coefficients and cooling rates needed for the production of ever stronger, yet ductile, cold-rolled steel grades. As such, IWAC® reaches cooling rates of up to 1000°C/s, while the UDC attains cooling rates of up to 600°C/s without strip oxidation.

# Services & Energy Efficiency

## Elevate Your Plant's Performance

**1**  **Fit-to-purpose upgrading & modernisation**

**2**  **Decarbonising existing plants**

**3**  **Process & technological consultancy**

**4**  **Customised services & spare parts**

Redefining cost-efficiency with specialized engineering solutions and helping in decarbonization efforts. We focus on enhancing plant performance, lowering operating costs, and supporting the transition to greener operations. By combining engineering expertise with advanced technologies and help steelmakers unlock the full potential of their facilities.

**1** **Fit-to-purpose upgrading & modernisation**

- Optimize your operations with solutions tailored to your plant's unique needs.
- Targeted Modernization:** Each modernization project begins with a detailed analysis of existing equipment and procedures to identify bottlenecks and areas for improvement. Our tailored solutions reduce the need for entirely new equipment and minimize costly downtime.
- Sustainable Production:** With a focus on furnace electrification, hydrogen combustion, and optimized operations, our technologies can reduce emissions by up to 90%. This shift not only aligns with global sustainability goals but also enhances your plant's competitiveness.
- Reliability and Safety:** Our modernization services aim to minimize equipment failures, enhance plant availability, and improve both productivity and product quality, all while reducing operational and environmental cost.

**2** **Decarbonising existing plants**

- Reduce emissions and achieve sustainability with our targeted energy solutions.
- Energy Audits:** Our in-depth energy audits identify key areas where energy savings can be achieved, helping you optimize processes, reduce costs, and meet environmental targets.
- Advanced Modernization Solutions:** We provide expertise in furnace electrification, equipment modernization, and emissions reduction, enabling your plant to operate more sustainably and profitably. This modernization effort promotes a responsible approach to steel production, addressing both industry standards and environmental goals.

**3** **Process & technological consultancy**

- Maintain your competitive edge with expert advice and advanced tools.
- Comprehensive Equipment Audits:** Regular audits are essential to ensure high performance and production quality. Our audits are designed to help steelmakers expand their product portfolios and stay competitive in the global market.
- Technical Assistance:** Our team of experts provides tailored support, offering guidance on enhancing equipment efficiency, refining product quality, and increasing operational flexibility. This hands-on assistance ensures that your plant can adapt to evolving demands and maintain robust performance.

**4** **Customised services & spare parts**

- Increase uptime and productivity with reliable, responsive service and part solutions.
- Global Spare Parts Network:** With manufacturing centers around the world, we ensure fast delivery of critical parts, minimizing downtime and ensuring plant reliability. Our services include providing original parts as well as developing high-quality replacement options tailored to your equipment.
- Innovative Re-engineering:** We maximize the lifespan and performance of third-party spares by re-engineering and enhancing parts to fit specific operational requirements. This approach provides cost-effective solutions and extends equipment durability.

## Mathematical models for improved productivity & quality

### LTOP® Model for Processing Lines: Precision, Productivity, and Control

John Cockerill's LTOP® model enhances productivity, quality, and control in continuous processing lines. By precisely managing heat exchange and roll profiles across various furnace chambers—NOF/DFE heating, radiant tube heating (gas or electric), soaking, and cooling—LTOP® optimizes performance.

Key features include advanced radiative and convective cooling models for accurate control, particularly on vertical lines where strip-to-roll heat exchange is critical. Real-time hot roll profile calculations prevent issues like heating buckles and ensure safe production resumption after stops, reducing downtime.

Built on proven heat transfer principles, LTOP® adapts quickly to line speeds with its maximum-speed algorithm, achieving over 99% tolerance adherence for improved quality and productivity. Its flexible software can be tailored to meet specific needs, offering high reliability for critical applications.

LTOP®'s offline shadow mode allows production trials without disruption, while its modern architecture and Level 1 controls ensure fast response times and streamlined operation. LTOP® is the ideal solution for processing lines focused on optimized productivity, high-quality standards, and responsive control.

### RTOP Model for Reheating Furnaces: Advanced Performance, Quality Control, and Precision Monitoring

John Cockerill's RTOP model for reheating furnaces optimizes product quality and efficiency with advanced temperature control for uniform heat distribution, reducing decarburization and scale formation. It integrates key thermal parameters, such as dissolution times and temperature gradients, to enhance the heating process.

Real-time 3D thermal modeling, powered by GPU-based computing, accelerates calculations, providing fast and precise insights. RTOP's proven reliability optimizes firing ratios and heating curves, preventing skid marks and ensuring consistent quality with real-time mill feedback.

Incorporating Best Available Technology (BAT) practices, RTOP adapts heating curves and reduces energy consumption with ultra-low carbon thermal characteristics, supporting sustainable operations.

# Automation and Technology Control

## Efficient Systems for Optimised Production



Steel production processes are highly energy-intensive and comprise many complex operations. Each of these operations impacts the quality of steel produced and requires constant monitoring.

**Control solutions enable steelmakers to execute real-time control and maintain critical process parameters.** To assist steelmakers in energy optimisation and continuous quality monitoring across the cold route of their steel production and related scheduling, John Cockerill is further developing its customised automation systems and models. With comprehensive know-how and extensive experience in the steel processing industry, John Cockerill offers the most suitable solutions tailored to clients' requirements.

Process control solutions enable clients to execute real-time control and maintain critical process parameters, producing higher quality products with consistent metallurgical properties.

### Multi-Platform PLC (Level 1/Level 2) and HMI System

Today, John Cockerill offers a wide variety of services and tried-and-tested technologies and products related to automation, technology, and process control. Its excellent knowledge of industrial processes and experience in automation in rolling mills, processing lines, chemical technologies, and industrial furnaces are major inputs for optimised design and supply of automation packages.

This includes conducting studies, creating, and commissioning software systems for Programmable Logic Controllers (PLC), and developing and upgrading Human-Machine Interfaces (HMI) and Level 1 + Level 2 systems.

### "OPEXs® GoMobile": Virtual Operator Pulpit for Increased Flexibility

One of our latest developments in intelligent solutions related to Industry 4.0 is the "Virtual Operator Pulpit," which increases line operators' mobility. The first industrial implementation was carried out on a continuous galvanising line in Turkey. Instead of accessing line data only via the three fixed control rooms, a tablet now allows line operators to obtain all necessary process information and accept and implement control instructions via a mobile HMI (Human-Machine Interface).



### Process Models and Control Systems

#### Mathematical Models

- Thermal Process Optimisation
- Production Optimisation
- Material Tracking
- Material Scheduling

#### Multi-Platform PLC (Level 1/Level 2) and HMI Development and Upgrades:

- Automation hardware migration
- Safety upgrades
- Redundancy upgrades
- HMI upgrades
- Drive systems upgrades

In response to increasingly complex process technologies, John Cockerill has developed a flexible and application-oriented automation and technology control system. By combining modern hardware and software systems, John Cockerill has created a multi-platform system. This system is built on comprehensive process knowledge and insights gained from numerous successfully operating reference lines and equipment.

## Empowering Engineers with Future-Ready Tools



Equip your team for optimized production and continuous improvement. Through our innovative e-training platforms, TrainLab and OPEXs GoMobile™, we empower engineers and operators with the latest knowledge and skills in advanced technology. These platforms are designed to enhance workforce efficiency, ensuring your team is well-prepared to drive sustainable and high-quality production for the long term.

# Leading-Edge Heat Treatment Solutions

High-Performance Equipment for Enhanced Quality and Efficiency

At John Cockerill, we provide leading-edge heat treatment equipment tailored to meet diverse industrial needs while adhering to the highest international safety and quality standards. With our advanced designs and technologies, we ensure exceptional performance, flexibility, and sustainability for all your heat treatment operations.



## Our Heat Treatment Equipment Portfolio

Designed to accommodate various production scales and requirements:

- Furnace Types: Box, Tilt Top, Car Bottom, Atmosphere Bell, Movable, Rotary Hearth, Mobile Hearth, Roller Hearth, Shoe Pusher, Walking Beam, Wire Mesh Belt, Continuous Chain Belt
- Specialty Equipment: Cooling Chambers, Horizontal & Vertical Solution/Quenching Furnaces, Quenching Equipment
- Integrated Systems: Standard Furnaces, Loading & Handling Systems, Flexible Heat Treatment Lines

Our equipment is capable of processing a wide range of materials — including steel, aluminum, copper, stainless steel, and specialty metals such as titanium and zirconium — to meet all size, shape, and thermal cycle requirements.



# Surface Treatment Solutions

## Innovative & Sustainable Surface Treatment Facilities

With a commitment to reliable functionality, accurate deliveries, and global support, we bring over a century of expertise to various high-performance industries. Our surface treatment solutions are designed to meet demanding standards across aviation, automotive, defense, energy, and metal finishing sectors.



### Aviation industry

- Comprehensive treatment solutions for aircraft components and MRO (Maintenance, Repair & Overhaul).
- Capabilities include anodizing, chemical milling, etching, and electrochemical processes.
- Certified plants for treating large components such as fuselages and wings.
- NADCAP certification support for aerospace applications.

### Defense Industry

- Specialized solutions for military applications, including electroless coating and hard chrome plating.
- Strict adherence to MIL and ISO standards for naval and aerospace defense requirements.
- Confidential, high-precision treatment for military electronics like radars and communication systems.



### Energy Industry

- State-of-the-art plating solutions, including nickel and platinum, for hydrogen electrolyzers.
- Advanced acid stripping for gas turbine blade maintenance.
- Wastewater treatment systems tailored for flue gas cleaning in power plants.

## Automotive Industry

- Solutions for manufacturing automotive parts and car chassis structures.
- Our comprehensive workshop solutions ensure precision and efficiency in the production process, enhancing the quality and durability of automotive components.
- We support manufacturers with advanced technologies and expert guidance to optimise their operations.



## Finishing

- Solutions for various applications of metal finishing, from hard chromium to hot dip galvanising.
- Our finishing solutions cater to a wide range of industries, providing superior surface treatments that enhance the performance and longevity of metal products.
- We offer customised solutions to meet specific requirements, ensuring high-quality finishes every time.



## Products

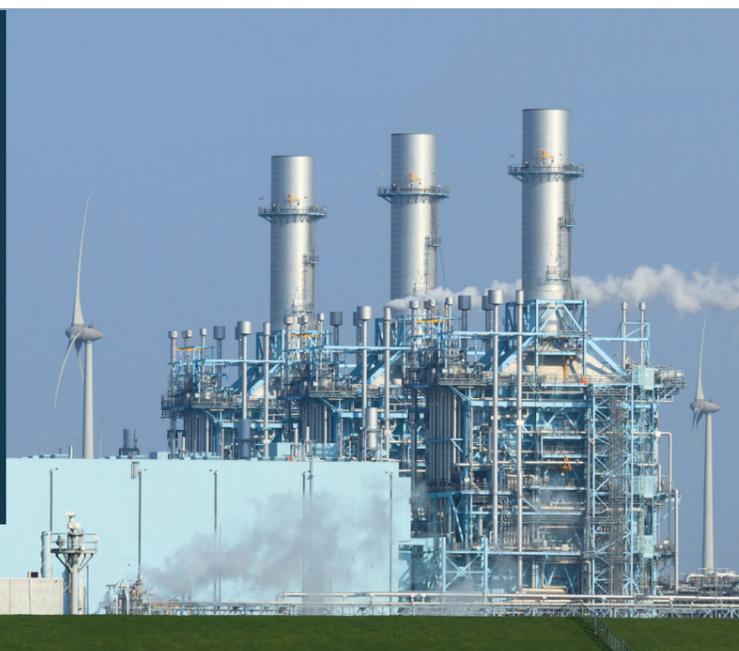
- True turnkey delivery - initial design to launch of finished line with all necessary tanks, structures and plant components as standard.
- Our turnkey solutions include comprehensive project management, ensuring seamless integration and minimal downtime.
- We provide ongoing support and maintenance to ensure the long-term success of your operations.

## Complete Workshop Solutions

From Concept to Production John Cockerill designs surface treatment workshops to meet the client's needs. Anodizing Plants, Chemical Cleaning Lines (CCL), Chemical Stripping Lines, Electroplating Plants, Chemical Surface Treatment Plants, Non-Destructive Testing Plants, Waste Painting Plants, Water Treatment Plants

### John Cockerill's Worldwide Surface Treatment Clients Benefit From:

- Construction of new lines, plants, and complete workshops
- Transfer, retrofit, and upgrading of existing installations
- After-sales services and spares
- Training and technical support (also remote)
- Plant/equipment qualification assistance



# Your Partner in Industrial Excellence

## John Cockerill

John Cockerill enhances industrial production efficiency and environmental friendliness. As specialists in industrial processes, we design, supply, and modernise equipment for the steel, non-ferrous, aviation, forging, casting, automotive, and chemical industries. With decades of experience, we provide Green- and Brownfield installations, services, training, and technical assistance. Our innovative solutions are tailored to each client's needs, promoting responsible production and industry decarbonisation.

Innovations aimed at decarbonising iron reduction and steel production include furnace electrification, carbon capture, heat recovery, and revolutionary innovations like the CO2-free steelmaking process Volteron™, co-developed by our process experts along with the world's largest steelmaker, ArcelorMittal.

Breakthrough downstream processing technologies such as the Jet Vapor Deposition (JVD) galvanising technology, which cost-effectively and efficiently replaces standard hot-dip or electro galvanising, and our latest technologies (E-Si™) for the production of high-performance electrical steel to support green mobility, are recent additions to our product portfolio. These innovations support our clients in their efforts towards more sustainable and greener steel production. Additionally, with hydrogen driving change for the future of green steelmaking, John Cockerill's electrolyzers are a crucial element in supporting hydrogen-based steel production. The large amounts of hydrogen produced by our electrolyzers on-site, coupled with electrification, represent the ultimate form of green steelmaking in a net-zero economy.

Founded in 1817, John Cockerill is an international engineering company with a strong manufacturing base, allowing it to provide cost-effective engineered solutions. With over 6,000 employees across 23 countries on five continents, John Cockerill brings global expertise to its clients.



### Contact Us

For more information about our services and how we can help your business achieve its sustainability goals, visit our website at [www.johncockerill.com/industry](http://www.johncockerill.com/industry)

Empowering industries to achieve sustainable growth.

**#WeAreJohnCockerill**

**#StrongerTogether**



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Solutions Tailored for Every Industry