

Metso:Outotec

Copper Electrorefining Technology

Benefits

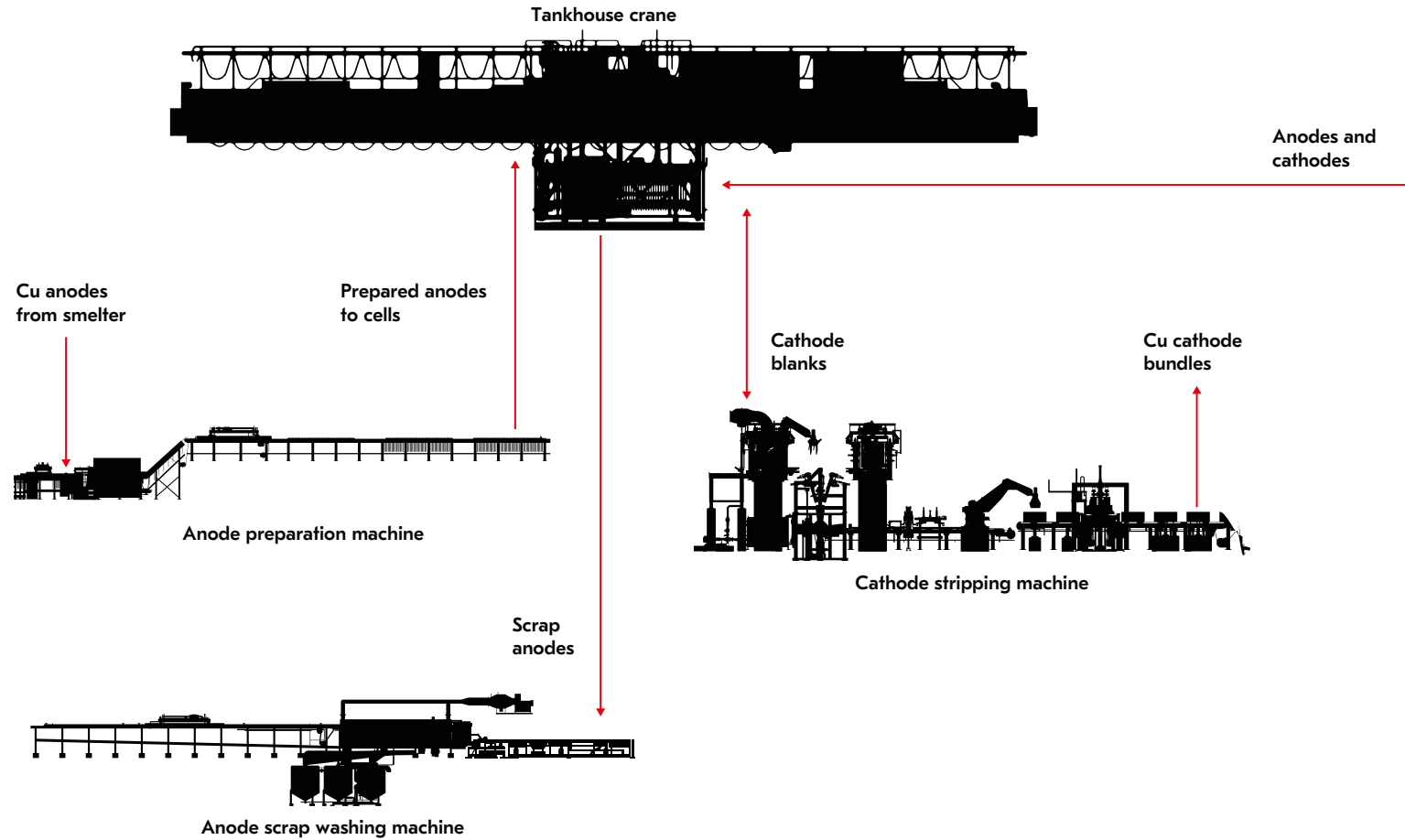
- State-of-the-art technology ensures sustainable and cost-efficient production of high quality copper
- Full range of solutions from individual equipment to full turnkey plant delivery
- Full process and equipment performance guarantees
- Lower total cost of ownership through high quality design and manufacturing combined with global service network support



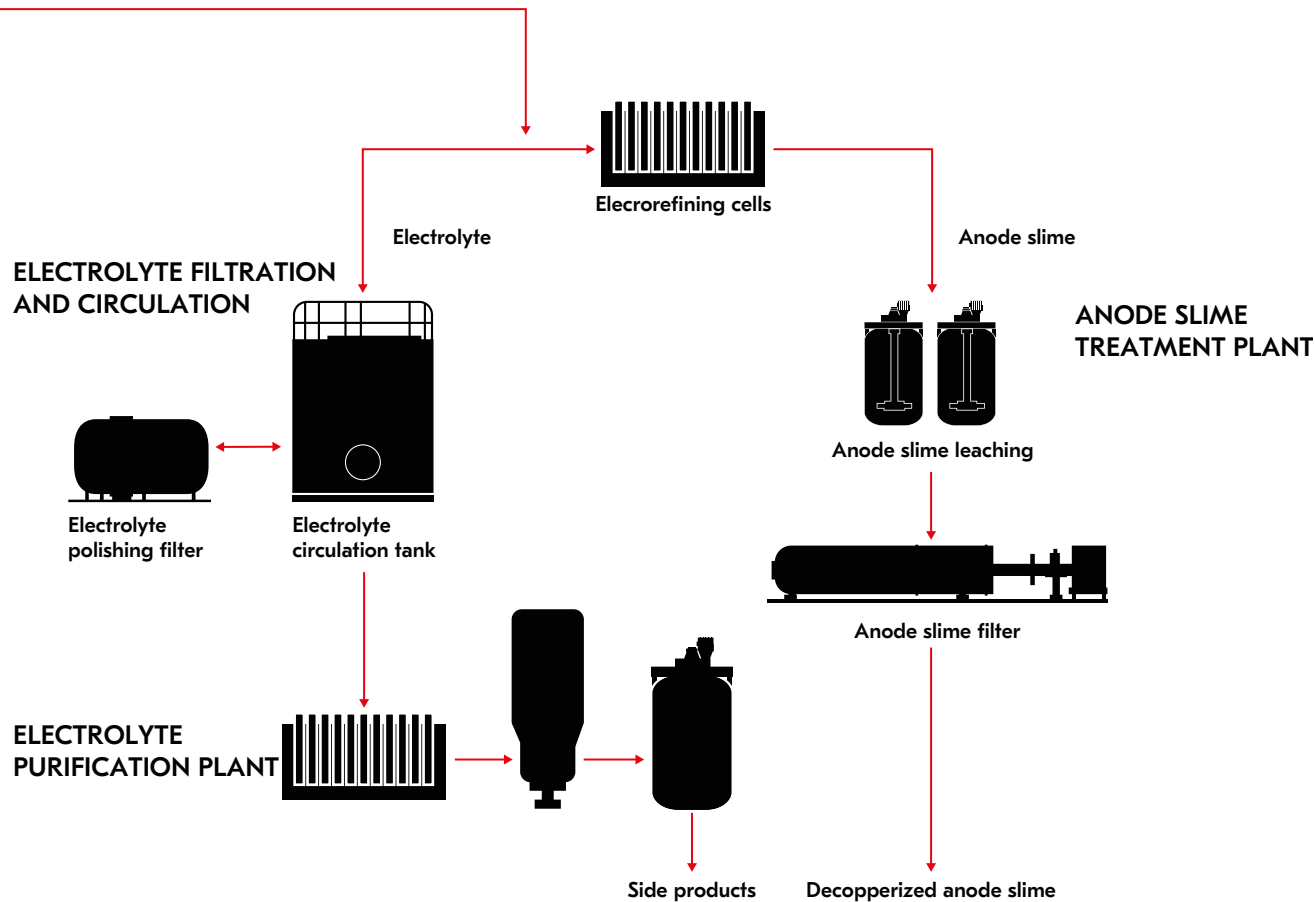
Metso Outotec is the leading provider of copper refining technology, with the industry's widest range of solutions and a proven track record. Our offering covers the entire production chain from mine to metal, and is based on environmentally sustainable technology that enables economically viable copper refining. Designed to minimize operational challenges throughout your plant's life, our electrorefining technology is suitable for both new and existing operations.

Total solution from anode to cathode

TANKHOUSE MATERIAL HANDLING



We combine our extensive knowledge and experience of metallurgy to design solutions that meet your demanding process guarantee requirements



The Metso Outotec electrorefining solution covers the entire refining process chain from anode to cathode. It integrates our process know-how and proven material handling technologies with advanced process control, resulting in a holistic system where all interfaces are optimized for high performance and quality. Our continuous research and development enable sustainable and efficient copper refining technology helping you to achieve significant savings in operating expenses and further reducing the environmental impact.

We combine our extensive knowledge and experience of metallurgy to design solutions that meet your demanding process guarantee requirements. Our professional engineering and project management capabilities ensure smooth implementation, while our comprehensive customer service minimizes operating risks throughout the lifecycle of the plant.

The Metso Outotec tankhouse material handling system is fully integrated, comprising cranes, cathode stripping machines, anode handling machines, electrolytic cells, busbars, and electrodes. Our electrolyte circulation and filtration process is equipped with Outotec Larox LSF polishing filters to ensure high quality electrolyte. The Outotec electrolyte purification plant is tailored to the requirements of your raw material. Our anode slime treatment plant consists of slime collection, leaching, and dewatering using Outotec OKTOP leaching reactors and Outotec Larox slime filters. Decopperized anode slimes can be processed further in our precious metals plant, in either a pure hydrometallurgical or a combined pyro/hydrometallurgical process.

Our cost-effective and process-optimized design ensures the fastest possible return on investment and maximizes the efficiency, availability, and safety of your operations.



Our lifecycle solutions help to ensure that you get the best return on your investment.

Maximize productivity for the entire plant lifecycle

Our sustainable and reliable lifecycle solutions are tailored for your specific application and help to ensure that you get the best return on your investment. You benefit from unparalleled expertise that you can rely on to maximize equipment performance, environmental efficiency, reliability, and safety. Our goal is to help you optimize total cost of ownership, minimize equipment downtime, and maximize production efficiency.

Leading research and development

We offer research and piloting services through the Metso Outotec Research Center in Pori, Finland. Our industry-leading R&D capabilities are used in process simulation, as well as laboratory and pilot plant testing to define the optimal processes and equipment for your specific application.

Comprehensive service portfolio

Receiving spare parts and maintenance services from the same organization that provides you with process and equipment design will ensure that your plant runs optimally for its entire lifecycle. We supply high quality spare parts, upgrades, and modernizations that can be seamlessly integrated into your plant.

Lifecycle solutions for every stage of your project

- Advisory services
 - Feasibility studies
 - Project management and control
- Basic and detail engineering
- Proprietary equipment supply
- Ramp-up services
 - Construction management and site services
 - Plant commissioning and start-up services
- Operation and maintenance agreements
- Remote services
- Spare parts solutions
- Equipment inspection and maintenance audits

Metso Outotec material handling equipment

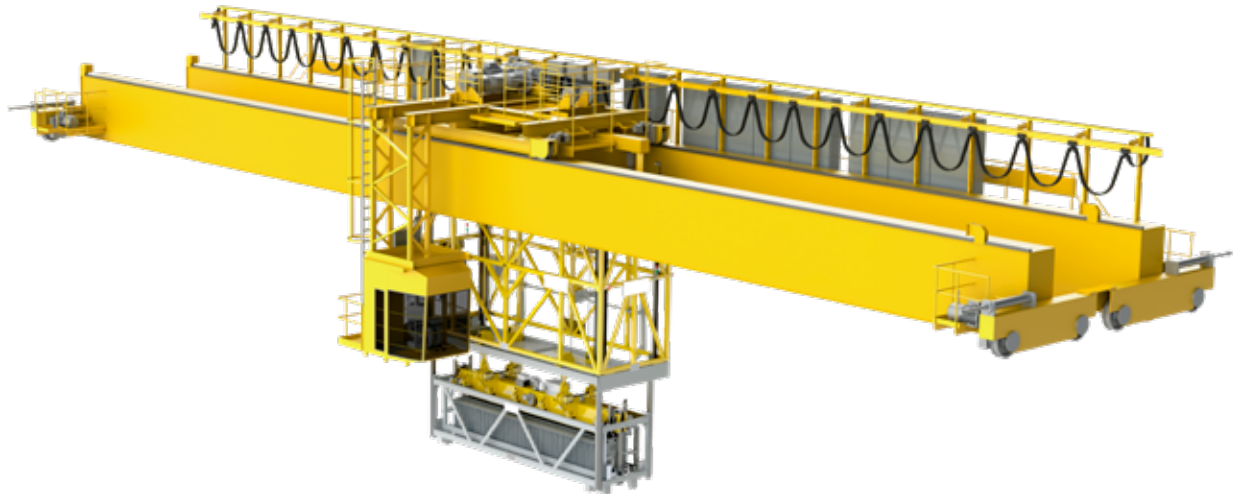


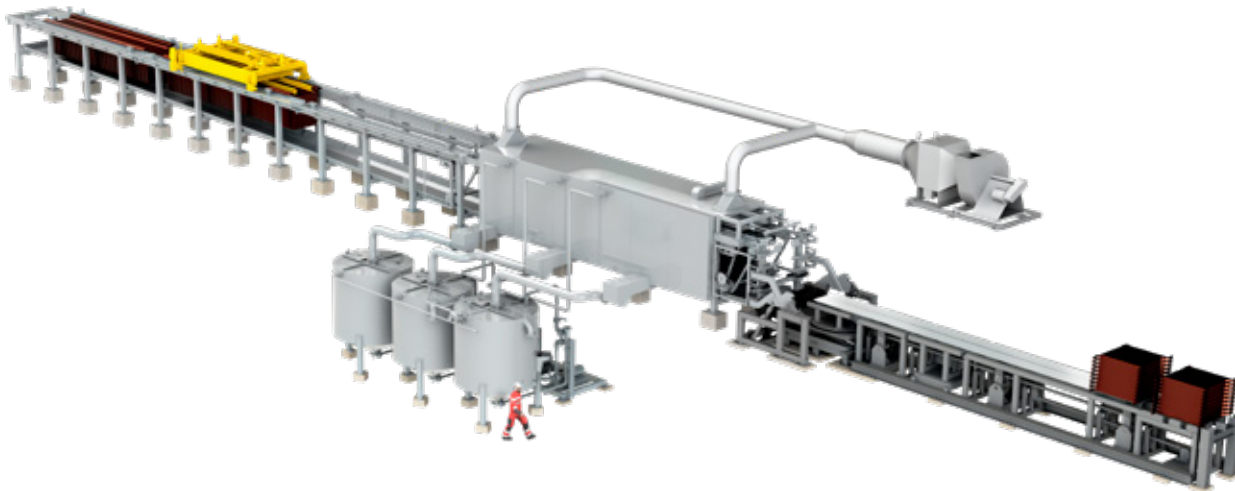
Anode preparation machine

- Improves physical quality of casted anodes by straightening anode bodies, correcting orientation of anode lugs, and improving electrical conductivity by milling of the anode lug contact areas
- Ensures accurate positioning of anodes in the cell
- Automated operation with capacity of up to 500 anodes per hour
- Market-leading technology used to handle over 60% of the world's ER anodes

Refinery tankhouse crane

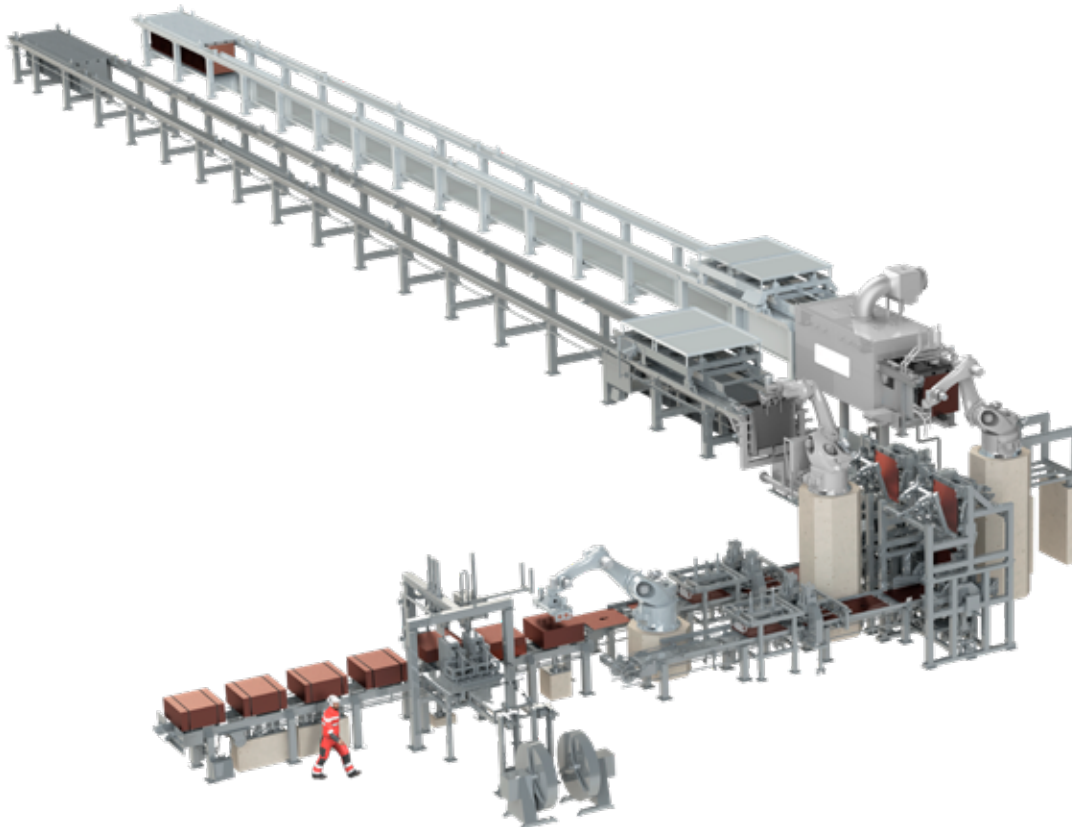
- Proven bridge crane technology for electrode handling, designed for heavy-duty applications
- Our double-lifting bale with patented Metso Outotec anode handling enables gentle and efficient simultaneous anode and cathode transfers with high spacing and electrode positioning accuracy
- User-friendly automatic operation with integrated safety functions
- Proven technology used by copper refineries around the world





Anode scrap washing machine

- Excellent slime recovery
- Fully automated and safe operation
- Closed washing water circulation and clean, slime-free, and dry washing process reduces operational cost and improves environmental performance



Full deposit stripping machine

- The industry's most extensive range of equipment, comprising state-of-the-art robotic and conventional linear-type stripping machines
- Cost-effective, flexible solution can be customized for different production and layout requirements without compromising on quality
- Gentle cathode handling with a wide range of functional options and upgrades available
- Leading technology with 60% share of the global full deposit stripping machine market



Our fully integrated material handling solution maximizes the efficiency, availability, and safety of your operations.

Long-lasting cathodes and advanced automation solutions

Permanent cathode

- Outstanding durability and long operational lifetime of proprietary molded-edge strip technology minimizes process disturbances and maintenance costs
- High quality materials with high mechanical strength and dimensional accuracy to maximize process performance
- Fully automated manufacturing process with strict quality control
- Integrated ID code enables automated material tracking
- Proven technology with over 25 plant deliveries worldwide

Cathode maintenance services

- High quality cathode maintenance ensures high performance and problem-free production
- Tailored cathode maintenance plan can be carried out by your local Metso Outotec service center or on-site using dedicated equipment
- We offer a wide range of automated solutions, from plate straightening to fully automated cathode maintenance line systems

Advanced process monitoring and control system solutions

- Metso Outotec Procon process control system
- TIMS – Tankhouse Information Management System material tracking and process reporting solution
- Metso Outotec CathodeSense online cathode condition and quality inspection solution
- Metso Outotec CellSense online cell short circuit and temperature monitoring solution
- Metso Outotec AnodeSense online anode software quality inspection system

Metso Outotec is a frontrunner in sustainable technologies, end-to-end solutions and services for the aggregates, minerals processing and metals refining industries globally. By improving our customers' energy and water efficiency, increasing their productivity, and reducing environmental risks with our product and process expertise, we are the **partner for positive change**.