qontrol

steelmaking

Level 2 process automation software

qontrol

smarter steel production, greater efficiency

Steel production thrives on precision and optimization. **qontrol steelmaking** provides real-time intelligence, automation, and full production tracking—enhancing productivity, reducing costs, and ensuring quality while effectively integrating with your systems.

CORE CAPABILITIES

- **Intelligent Process Control & Optimization**
  Digital twins, automated setpoints, and raw material optimization improve efficiency and yield.
- **Full Melt Shop Integration & Tracking**
  End-to-end heat tracking, material genealogy, and automated quality validation ensure process reliability.
- **Cross-Process Data Management & Reporting**
  Real-time dashboards, production reports, and Factory Radar provide live operational insights.
- **Modular & Scalable Architecture**
  Modular architecture supports individual units or full-scale steelmaking with seamless system connectivity.

> Redefine efficiency, quality, and sustainability in steel production with **qontrol steelmaking**.

System Highlights

For Steelmakers: Intelligence that supports production

Real-time setpoint calculation based on metallurgical models

- Temperature, melt and slag composition are continuously calculated using real-time data to determine process setpoints such as alloy additions and gas flow rates.

AI-enhanced decision support in critical process steps

- Hybrid models combine physical principles with machine learning to improve predictions and suggest actions during melting, decarburization, heating, refining, and casting.

Full traceability from raw material to final product

- All process steps, material movements, and production decisions are documented at the heat level for quality assurance, audits, and process evaluation.

For IT and System Owners: Reliable integration and secure operations

Standard interfaces for seamless system integration

- Communication with Level 1 automation, MES, ERP, and LIMS systems is enabled through OPC UA, REST APIs, TCP/IP, SQL views, and structured file exchange.

Modular architecture for flexible rollout

- The system supports gradual implementation across different units and depth levels, allowing plant-specific digitalization strategies.

Secure, web-based access and centralized maintenance

- Role-based access control, encrypted communication, and browser-based user interfaces ensure safe operation and easy administration.

Key Advantages

Where smart metallurgy meets future-ready performance.

Lower Costs and Smarter Resource Use

- Optimized charge mix, alloy use, and scrap utilization
- Precise control of blowing, heating, and purging
- Reduced oxidation losses and strand waste

Reduced Energy Use and Emissions

- Efficient use of electrical, chemical, and burner energy
- Controlled heating, tapping, and holding
- Lower CO_2 footprint through material and energy optimization

Stable and Repeatable Processes

- Grade-specific workflows and automated setpoints
- Model-based support for refining and casting
- Improved repeatability across operations

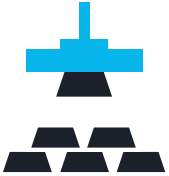
Better Insight for Faster Decisions

- Real-time data in charts, dashboards, and KPIs
- Trend analysis for anomaly detection and stability tracking

Ready for the Future

- Modular, open system architecture
- Integration-ready interfaces
- Structured data for audits and future optimization

Application Areas



Scrap Yard (SY) | Raw Material Optimization

- AI-driven scrap characterization for real-time yield, composition, and energy efficiency.
- **qontrol maps** for intelligent cost optimization and raw material input management.
- Automated bucket tracking with **qurve** camera sensors.

Electric Arc Furnace (EAF) | Optimized Melting Process

- Scrap yard integration to ensure material tracking.
- Optimization of decarburization, dephosphorization, and slag stability.
- Automated slag chemistry management (foamability, basicity, etc.).
- Improved energy input (electrodes, burners, chemical reactions and post-combustion) to reduce operating costs.

Ladle Furnace (LF) | Temperature Control & Efficient Steel Refining

- Optimized heating to ensure desired hand-over temperatures.
- Dynamic calculation of alloying and deoxidation additions.
- Determination of slag former additions to control refining processes (De-S).
- Control of stirring gas flow rates to ensure homogenization and inclusion removal.

SUPERVISION
Real-time tracking and detailed reports ensure full oversight of materials, products, and equipment.

GUIDANCE
Clear management of orders, materials, and advanced analytics provide strategic direction for efficiency.

Covering the Entire Steelmaking Process

Vacuum Degassing (VD/RH) | Hydrogen & Nitrogen Removal

- Optimized degassing to ensure efficient hydrogen and nitrogen removal (deep-vacuum time).
- Real-time display of steel bath temperature through well-validated metallurgical models.
- Control of gas stirring considering gas consumption, steel bath temperature and homogenization.
- Dynamic calculation of alloying and deoxidation additions.

Vacuum Oxygen Decarburization (VOD) | Stainless Steel Optimization

- Dynamic calculation of the set-points for oxygen and vacuum pressure.
- Control of oxygen blowing to optimize decarburization while limiting chromium oxidation.
- Calculation of slag reduction and alloying additions.
- Control and optimization of nitrogen additions through nitrogen purging (N alloyed steels).
- Real-time display of steel bath temperature through well-validated metallurgical models.

Argon Oxygen Decarburization (AOD) | Stainless Steel Optimization

- Dynamic control of all set-points of the blowing pattern to minimize chromium oxidation.
- Calculation of the optimum nitrogen-to-argon switchover point.
- Optimization of slag reduction and alloying additions startegies.
- Control of nitrogen gas supply to achieve the desired nitrogen content in N-alloyed steels.
- Real-time display of steel bath temperature using well-validated metallurgical models.

CONTROL
Streamlined control over production, inventory, and synchronized processes ensures consitent output.

OPTIMIZATION
Recipe management and adaptive adjustments drive continuous process optimization.

Driving Value at Every Stage of Production

Continuous Casting | Process Stability & Quality Control

- Monitoring and adjustment of mold oscillation to reduce breakout and cracking risk.
- Dynamic EMS control based on casting speed and strand dimensions.
- Adaptive spray water control using real-time strand surface temperature models.
- Solidification modeling to calculate shell growth and internal temperature profile.
- Control of soft reduction to minimize centerline segregation while avoiding crack formation.
- Detection and separation of mixing zones to ensure chemical consistency.
- Mixing zone calculation and cut-length optimization to reduce scrap while meeting quality requirements.
- Quality monitoring through tracking of process deviations.

Ingot Casting | Setup, Control, & Documentation

- Setup and configuration of casting sets (plates, molds, funnels, and auxiliary equipment).
- Management of casting recipes with predefined targets for temperature, casting speed, and powder addition.
- Assignment and documentation of casting parameters per setup and heat.
- Documentation of equipment usage and material consumption per cast.

> Set the standard, stay in control, and optimize with intelligence—powered by **qontrol steelmaking**.

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