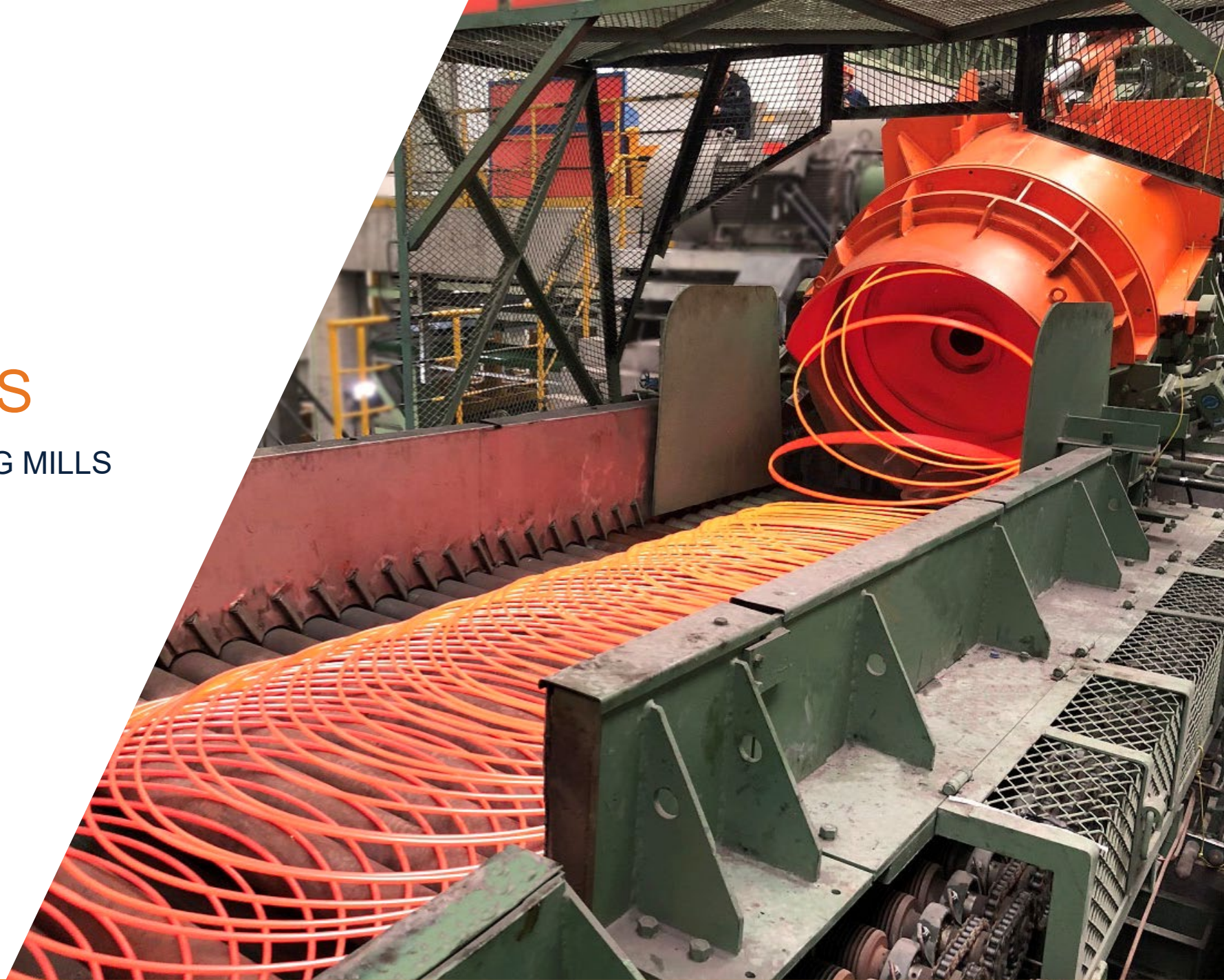


MAINTENANCE TECHNOLOGY IN ROLLING MILLS

SOLUTIONS FOR LONG ROLLING MILLS



Wire rod mills

Product sizes

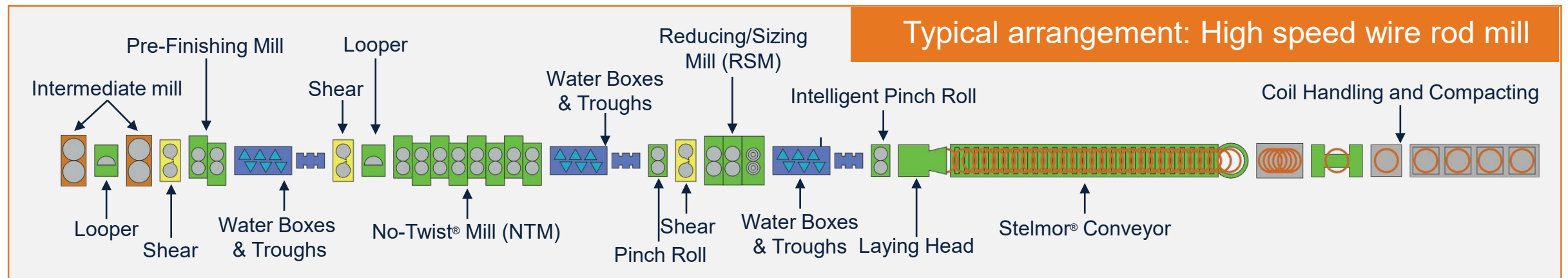
- 5.0 – 28.0 mm plain rounds (typical range)
- 6.0 – 16.0 mm ribbed (quenched and tempered or fine grain rebar)

Production

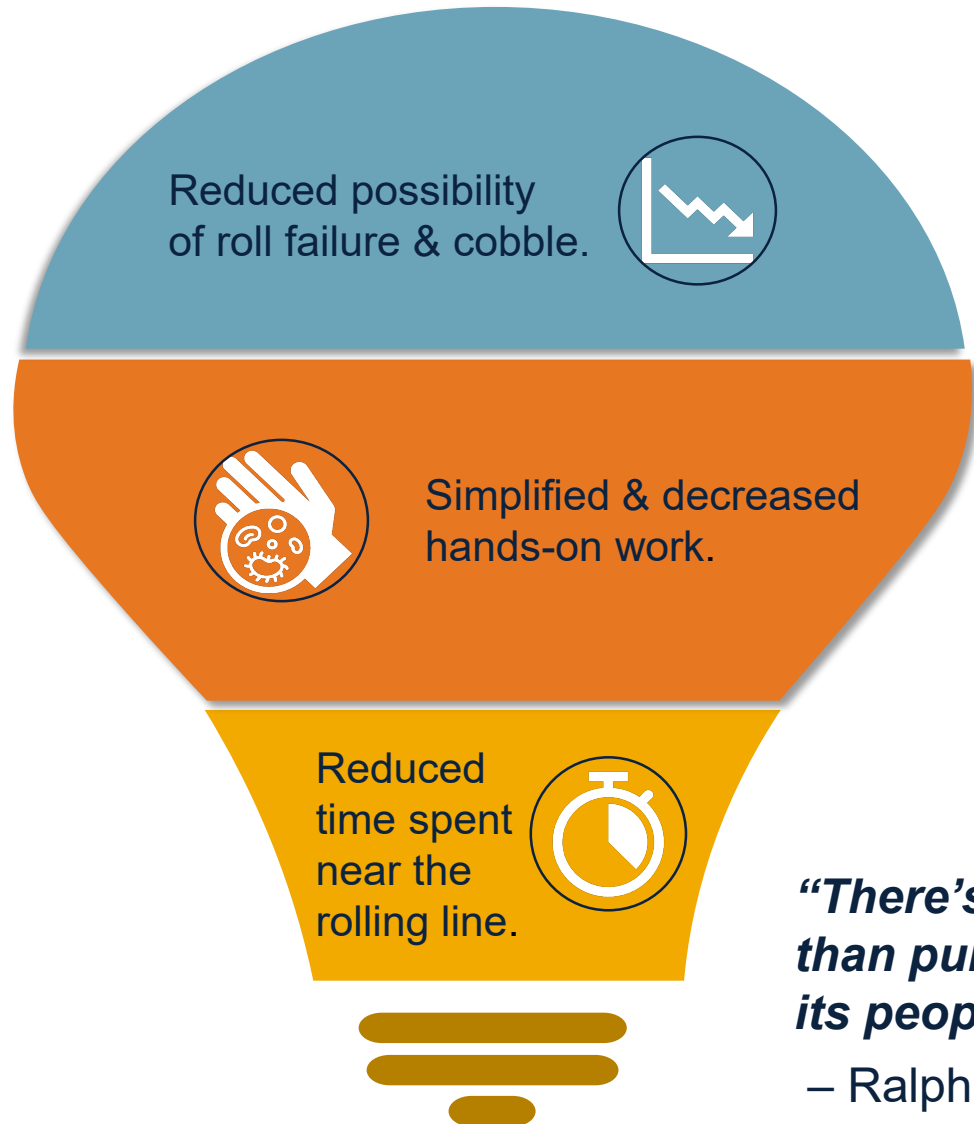
- Up to 150 t/h (typical maximum for single-strand configuration)

Configurations

- Single-strand rod mill
- Two-strand rod mill, with side-by-side strands
- Combination mill – roughing and intermediate trains feeding a wire rod outlet, plus a bar in coil outlet and/or straight bar line



Safety Goals in the Mill



“There’s no better policy in society than pursuing the health and safety of its people.”

– Ralph Nader

Application of Digitalization for long rolling



Production Management System

Dynamic planning and tracking of production for optimal plant utilization

Through-Process Optimization

Know-how based identification of faults and immediate definition of corrective measures



Maintenance and Asset Technology

Definition of maintenance protocols for efficiency

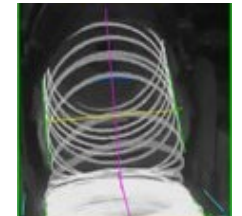
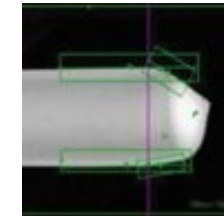
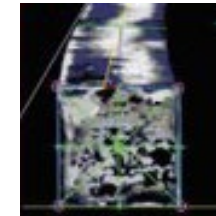
The players (and examples)



SMART SENSORS

Process improvement by knowing more

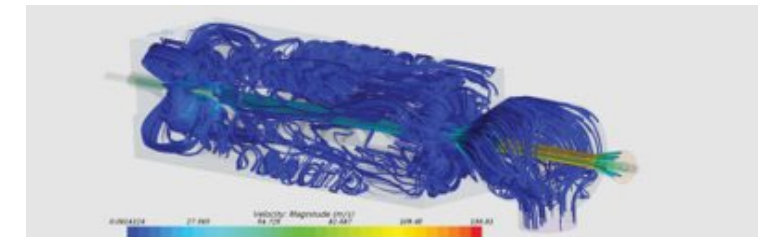
- Imaging systems, laser measurement
- Billet measurement
- Shear crop optimization
- Laying head ring pattern monitoring



CYBER-PHYSICAL SYSTEMS

The plant and its digital twin

- 3D model of flow through cooling nozzles



AUTOMATIC FUNCTIONS

More focus on the essentials



CONDITION MONITORING

Knowing how the plant “feels”

Robotics applications in wire rod mills

Challenge

- Cut non-confirming rings from head and tail of coils before compacting, accurately and consistently without safety risks to operators

Solution

- The patent-pending TrimRob system; an autonomous robot for trimming within the coil handling system, guided by an intelligent vision system to separate, trim and remove rings

Benefits

- Provides a means to trim coils consistently, without operator safety risks

Features

- Flexible design for virtually any coil handling system

Other Applications

- Automated roll changing
- Product sampling at in-line shears
- In process of more robotics in the mill



NEW TECHNOLOGY – Digital Caliper monitoring system

Challenge

- Accurately measure product dimensions while maintaining a safe distance from the pass line.

Solution

- The dimensional, portable, non-contact, Digital Optical Caliper

Benefits

- Accurate within +/- 0.1 mm
- Removes inaccuracies due to variations in operator-to-operator measurement methods
- Continuous monitoring, taken over several minutes rather than once an hour, product or shift change
- Measurements can be recorded and stored to analyze trends and alert for situations such as roll change requirements

Features

- Lightweight design with IP67 rated camera enclosures
- Fixed version available – Data can be stored and exported to external systems for further analysis
- Can project display to additional screens wirelessly



NEW TECHNOLOGY – Next Generation Guide

Challenge

- Reduce downtime and increase operator safety

Solution

- Advanced Smart Guiding equipment with smart sensing technology

Benefits

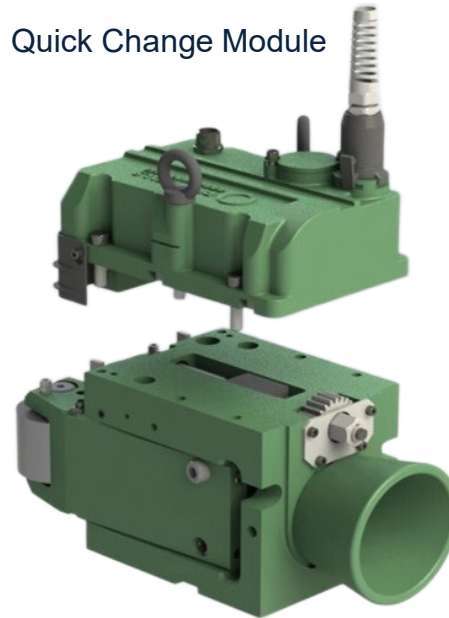
- Hands off safety approach to the machinery while rolling
- Removeable module component allows guide to be operated as a stand-alone mechanical guide

Features

- Remote adjustment to guide roller parting
- Real time feedback and alerts for bar size and guide data



Quick Change Module



Mechanical Module



NEW TECHNOLOGY – Advanced water header

Challenge

- Improve roll life and reduce OPEX costs

Solution

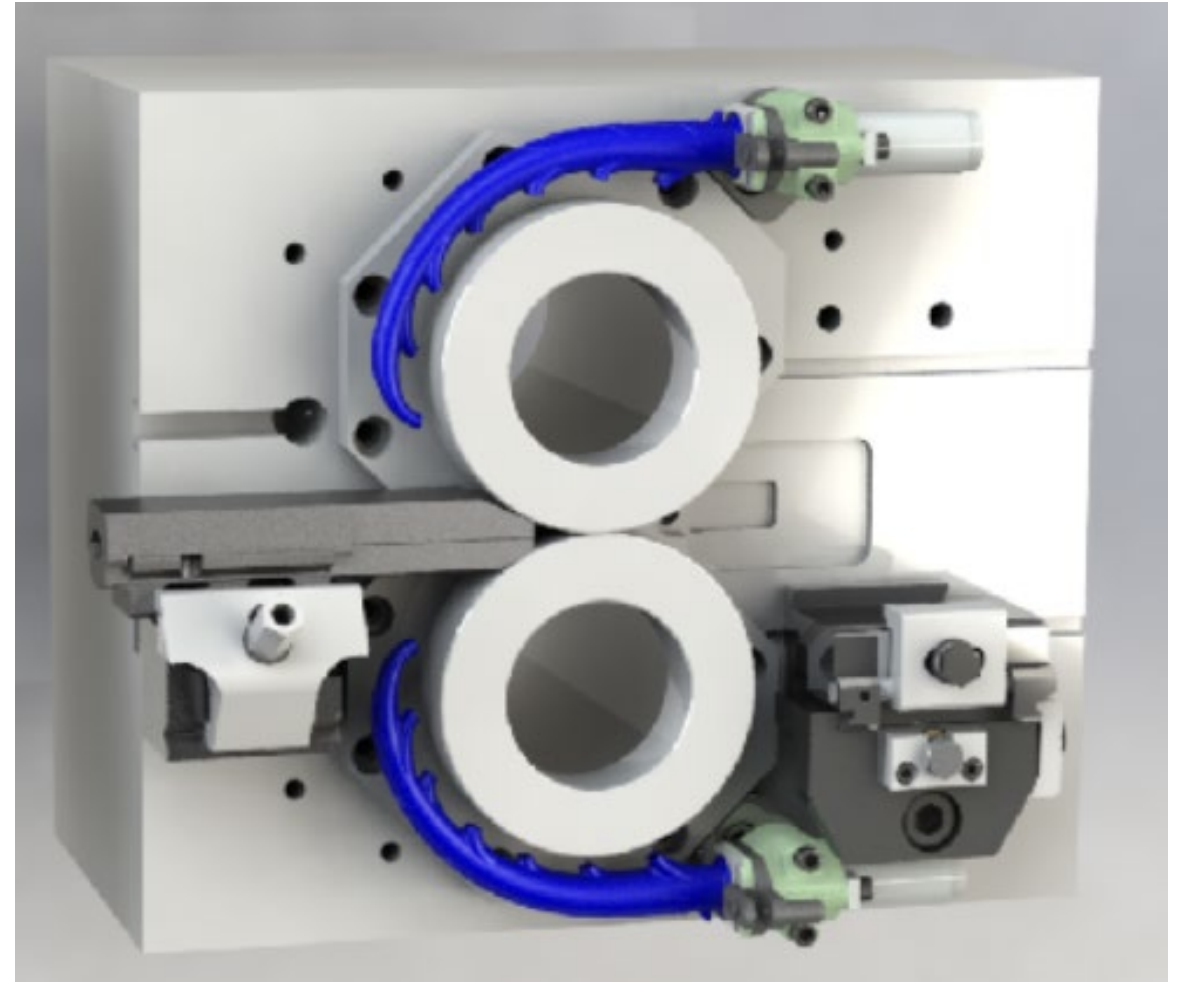
- Additive manufactured Advanced water header with quick change and smart sensing technology

Benefits

- Quick-change design with no tools required
- Removable non-handed cartridges, leaving the mounting block permanently in the mill

Features

- Real-time feedback and alerts for wear and clogs
- Provides more consistent optimal cooling long term which gives the potential for reduced mill roll wear



NEW TECHNOLOGY – Advanced Uploopers

Challenge

- Overcome tension in the mill
 - Reduced Quality, unplanned downtime and increased wear
- Unsafe operation

Solution

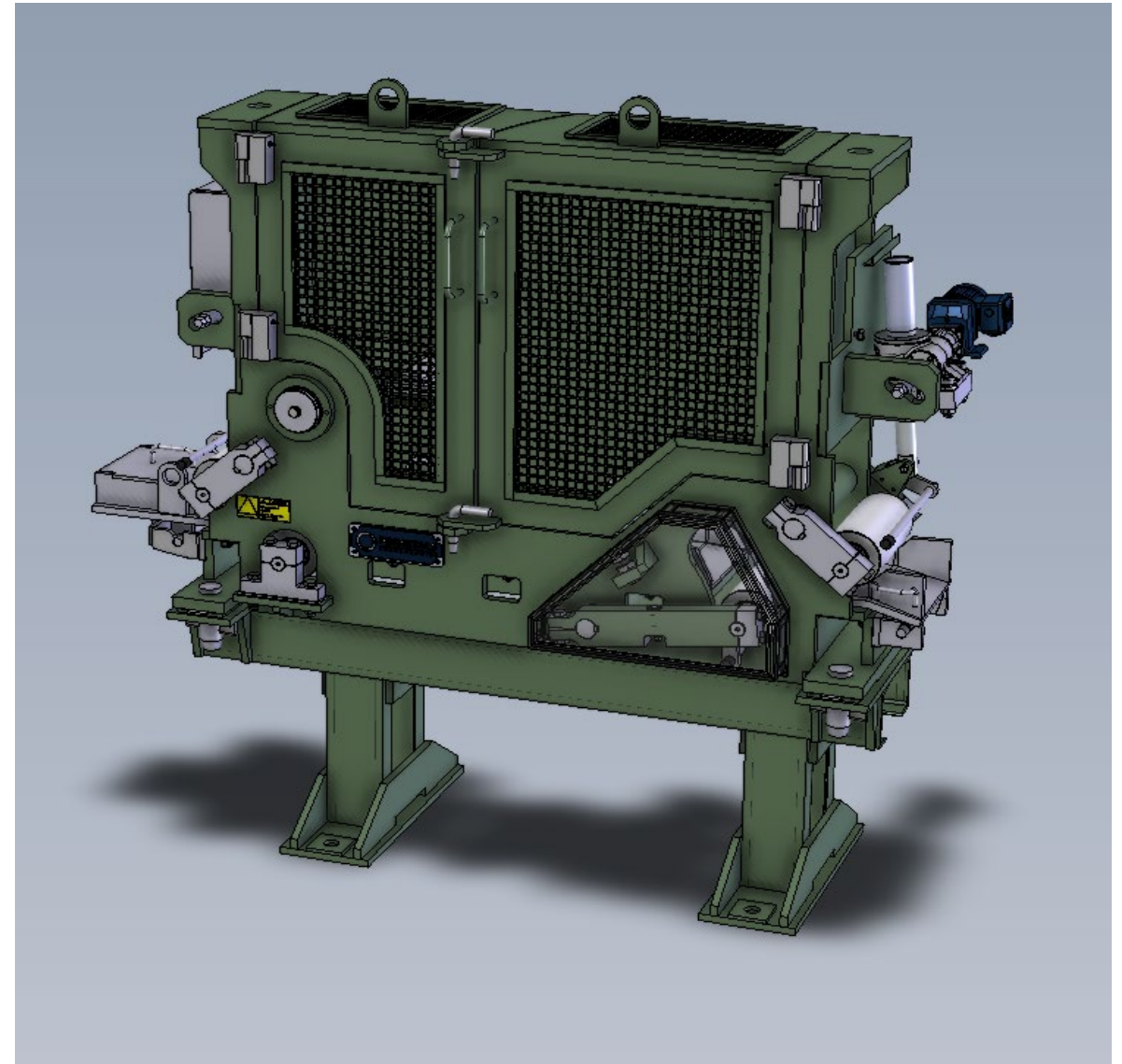
- Enclosed motorized Uploopers achieve tension-free rolling

Benefits

- Robust 20mm plating to protect mill equipment and personnel
- Reduced maintenance time and cost
- Improved finish product quality

Features

- Remote operation distances personnel from pass line
- Bolt-on snap shear enclosed inside
- Tool-free wear-plates and troughs
- Loopers to be tailored to the specific product mix



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