



Multi-Functional Reversing Mill.

Research Pilot Mill for Steel Applications

An Integrated Strategy - Our Commitment to the Industry

Quaker Houghton is a major supplier of process fluids to the steel industries. Along every transition, we've been there: solving problems, reducing costs, and improving every step of the process - in plants around the world. And now, we're bringing even more to the field.

The presence of Quaker Houghton's Multi-Functional Reversing Mill at the APAC R&D Center in Shanghai, China has strengthened our research capabilities for our range of products and services for steel mills, from beginning to end.

This investment demonstrates our continuous dedication to our customers in realizing their challenges, sharing our perspective on process technology, and bringing solid solutions.

The Service To Optimize Operations

The multi-functional, high-speed reversing pilot mill, can process both soft and hard steels. The presence of state-of-the-art laboratory equipment for rolled surface analyses (such as a scanning electron microscope) as well as a competent research team supplements the pilot mill offering.

Reducing Risks

The practical data supplied from the Multi-Functional Reversing Mill will complement knowledge development and (theoretical) laboratory research. Multiple test scenarios can be evaluated to anticipate issues that can surface during trials and full scale production, translating to lower costs, time savings and preventive measures.

Advancing Technology

The Multi-Functional Reversing Mill provides another platform for Quaker Houghton to fine tune our expertise. Our R&D efforts are further expanded because the mill simulates the real-world industrial use of rolling oils while allowing the development of application knowledge and new product solutions. Laboratory test methods can be validated and improved to understand the behavior of our products under particular process parameters. The end result - better performing, efficient products all around the world.

The Service To Optimize Operations

With high speed, flat rolling lubrication and multiple process settings, the 4-high Multi-Functional Reversing Mill provides the flexibility to study properties of both soft and hard steel rolling; new product development and new equipment validation.

Steel Cold Rolling – Soft and Hard

Both soft and hard steel coils can be cold rolled with an incoming thickness of up to 4.0 mm and width up to 200 mm. The minimum output thickness is 0.1 mm and rolling speed can reach a maximum of 1000 m/min.

A typical pass schedule for carbon steel involves 5 reversing passes at increasing speeds and at 30% reduction each, followed by a 6th pass in which speed dependence is assessed, e.g. at 20, 100 and 600 m/min. For harder steel types the reductions and speeds need to be adapted

Application

Another feature to the mill is that lubricant can be supplied in direct application (DA) mode, which can be done independently or in combination with emulsion circulation.

Cleaning

Unique to the Multi-Functional Reversing Mill is a cleaning line within the mill. This will ensure that any contaminants on the incoming material will be removed and not impact test results.

Overall, the Multi-Functional Reversing Mill offers the opportunity to study key factors within the rolling process.



Quaker's Multi-Functional Reversing Mill – Shanghai, China

Quaker Houghton Pilot Mill Specifications

Technical Specifications

PROPERTY	TYPICAL VALUE
Back-up roll diameter	400 mm
Max. roll force	1,200 kN
Main motor power	400 kW
Tension reel power	200 kW
Work roll diameter	165 mm
Work roll width	300 mm
Max. rolling speed	1000 m/min
Max. tension	30 kN
Strip width	100 - 200 mm

Research & Experimental Testing

- Optimizing products with respect to cost and performance in steel cold rolling
- Testing different lubrication concepts in steel cold rolling
- Generating 'Stribeck curves' to investigate product performance in relation to mill conditions
- Investigating the effect of product composition including EP/AW additives on roll force
- Evaluating product applications such as the difference between emulsion, pure oil, dispersion, and the effect of header position/angle
- Validating test methods for lubrication
- Testing effect of pollution, water and pH variations
- Studying defects: heat scratches, mottling, etc.
- Testing lubricant requirements with respect to new alloys and work roll types
- Collaborating with third parties
- Troubleshooting emulsions



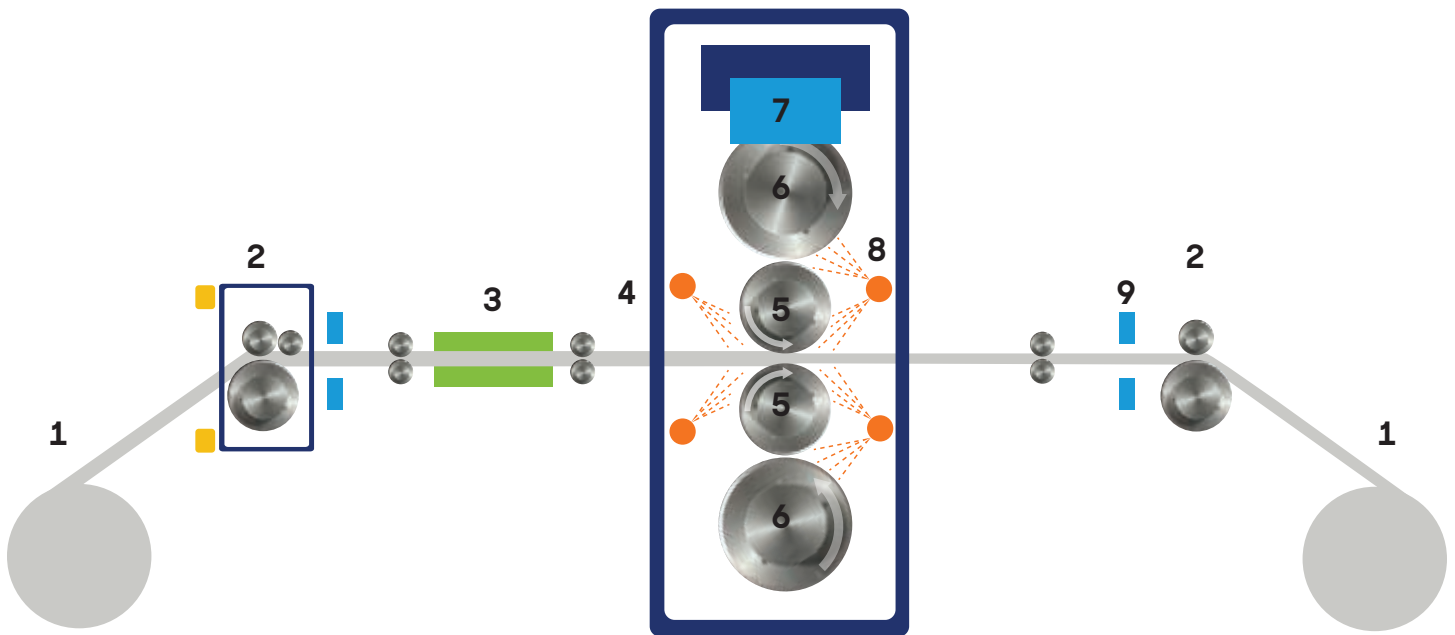
Emulsion system



Rolled coil

Main Mechanical Components

1 Tension Reel	4 DA Application Nozzles	7 Automatic Position Control Cylinder
2 Deflecting Roll	5 Work Roll	8 Emulsion Nozzles
3 Cleaning Section	6 Back-up Roll	9 Air Blow-off Nozzles



Main Fluid Components

PROPERTY	EMULSION SYSTEM	CLEANING SYSTEM	DA SYSTEM	HYDRAULIC SYSTEM
Max. Volume	3,150 L (3.1 m ³)	1,500 L	70 L	High Pressure: 21 MPa
Flow Amount	100-600 L/min	300 L/min	1.5 L/min	Low Pressure: 10 MPa
Max. Pressure	5 Bar	5 Bar	1.5-2.0 Bar	
Max.Heating	90°C (194°F)	90°C (194°F)	70°C (158°F)	

Forward Together™

Global Headquarters

901 E. Hector Street
Conshohocken, PA 19428-2380
U.S.A.
+1.610.832.4000

quakerhoughton.com | info@quakerhoughton.com

