Cold rolling mill technology
Carbon steel products
Full-liner for cold rolling mill types

ANDRITZ METALS is one of the very few mill technology full-liners, who keeps the state-of-the-art design competence with enhanced technology for the various mill functions. This allows to produce cold band quality with narrow tolerances.

<table>
<thead>
<tr>
<th>Cold rolling mill type</th>
<th>Typical mill stand types</th>
<th>Production capacity (t/y)*</th>
<th>Strip speed (m/min)*</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-stand reversing mill</td>
<td>4-high, 6-high, (S6-high)</td>
<td>150,000 – 450,000</td>
<td>up to 1,500</td>
<td>Discontinuous</td>
</tr>
<tr>
<td>2-stand reversing mill</td>
<td>4-high, 6-high, (S6-high)</td>
<td>350,000 – 850,000</td>
<td>up to 1,500</td>
<td>Discontinuous</td>
</tr>
<tr>
<td>Discontinuous tandem mill</td>
<td>4-high, 6-high, S6-high</td>
<td>1-1.6 mill.</td>
<td>up to 1,500</td>
<td>Discontinuous</td>
</tr>
<tr>
<td>Continuous tandem mill</td>
<td>4-high, 6-high, S6-high</td>
<td>1.6-2.4 mill.</td>
<td>up to 1,500</td>
<td>Continuous</td>
</tr>
</tbody>
</table>

(*) Typical values depending on customer's product mix

Mills for cold reduction

Skin pass / temper mills

<table>
<thead>
<tr>
<th>Cold rolling mill type</th>
<th>Field of application</th>
<th>Typical mill stand types</th>
<th>Production capacity (t/y)*</th>
<th>Strip speed (m/min)*</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-stand non-reversing mill</td>
<td>For adjusting material and strip surface quality</td>
<td>4-high</td>
<td>150,000 – 600,000</td>
<td>up to 1,500</td>
<td>Discontinuous</td>
</tr>
<tr>
<td>2-stand temper mill</td>
<td>For adjusting material and strip surface quality or tin plate</td>
<td>4-high</td>
<td>250,000 – 600,000 (2,000)</td>
<td>up to 1,500</td>
<td>Discontinuous</td>
</tr>
<tr>
<td>Inline temper mill</td>
<td>For continuous galvanizing, annealing, and push-pickling lines</td>
<td>4-high</td>
<td>CGL up to 220 CAL up to 450</td>
<td></td>
<td>Continuous</td>
</tr>
<tr>
<td>Hot skin pass mill</td>
<td>For adjusting material and strip surface quality, improving strip flatness and recoiling, dividing or inspection of coils</td>
<td>4-high</td>
<td>400,000 – 900,000</td>
<td>up to 700</td>
<td>Discontinuous</td>
</tr>
</tbody>
</table>

(*) Typical values depending on customer's product mix

2-high 4-high 6-high 8-high 10-high 12-high

▲ ANDRITZ METAL’S portfolio of mill stand types for cold rolling

▲ Quarto/S6-high combination rolling mill for mixed product range with low and high carbon steel

▲ 6-high: drive side with emulsion distribution
Over 300 rolling mill references worldwide

ANDRITZ METALS provides rolling mills with particular attention to high production-efficiency, tight shape and strip thickness tolerances to produce high quality products.

ANDRITZ METALS has attached great importance to the mill stand equipment influencing these targets and is permanently improving and re-designing the equipment according to the design concept philosophy of modern cold rolling mills. The ANDRITZ METALS Carbon Steel Cold Mill (ACCoM) design concept is based on a well maintained parametric 3D master model, which is operated with a tailor-developed parameter matrix. This results in a reduced project engineering period for a tailor-made cold rolling mill adapted to the individual requirements of the customer’s product mix.

Mill key components:

1. Finite element optimized mill housing
2. Top mounted hydraulic roll load cylinders with high accuracy position measurement and pressure transducer
3. Stepless bottom mounted passline adjustment
4. Powerful positive and negative roll bending and balancing system attached to the mill housing
5. Modular work roll shifting system
6. Longstroke intermediate roll shifting system
7. Back-up roll set with oil air lubricated roller bearings
8. Workroll set with grease lubricated roller bearings
9. Intermediate roll set with grease lubricated roller bearings
10. Strip blow-off system
11. Selective roll multizone cooling and emulsion system
12. Back-up roll change device
Modernization

We strive to support customers in extending the efficiency and value of their equipment by offering maintenance, repair and modernization packages over the entire plant lifetime.

Maximize output from your investment
- Improvement of strip thickness accuracy
- Improvement of strip flatness
- Increase of strip surface quality (incl. strip cleanliness, rust prevention)
- Improvement of mill availability
- Improvement of production capacity
- Improvement of strip threading procedure
- Reduction of operation costs (rolls, emulsion rolling oil, etc.)
- Reduction of off-gauge length
- Reduction of strip and coil damages (due to handling, threading, etc.)

Rolling mill upgrade for
- Mill drive-train systems
- Work roll bending systems
- Hydraulic roll load cylinders
- Pass line adjustment devices e.g. wedge-design
- Roll change devices
- Emulsion systems (revamp or new)
- Roll cooling systems
- Selective cooling spray headers

Electric and Automation

Equipment supply
- High/medium and low (PCC) voltage equipment and distribution
- Mill main drive systems
- Auxiliary drive systems
- Motor control centers (MCC)
- Instrumentation and sensors for process and terminal equipment
- Level 1 automation systems – PLC, HMI, TCS
- Level 2 process computer systems modeling
- ITV, intercom, lighting, etc.

Products
- Technological control systems (TCS) for ANDRITZ METALS products
  - Hydraulic gauge control (HGC)
  - Automatic speed/tension control
  - Automatic gauge control (AGC)
- Automatic flatness control (AFC)
  - Shaperometer rolls
  - One time calibration rolls
  - Model predictive controller (MPC)
- Level 2 system – process optimization
  - POS – Process optimization system
  - PSM – Pass schedule memory
  - SPC – Statistical process control
  - MMS – Mill management system
  - RSMS – Roll shop management

- Hydraulic roll force cylinder with direct mounted valve block for high‐dynamic control characteristic
Technical service and consulting

Examples

- Production optimization services:
  - Pass schedule optimization
  - Production capacity simulation
  - Production efficiency study
  - Product mix studies
  - Handling times optimization

- Logistic investigation services (studies):
  - Optimization of mill drive-train system
  - Strip quality optimization
  - Study of linked process sections
  - Layout studies
  - Safety analysis

- Mill window study
- Roll crown optimization
- Training for operation and maintenance personnel
- Project management
- Engineering and start-up services

ANDRITZ Sundwig GmbH
58675 Hemer, Germany
Phone: +49 (2372) 540
sundwig_welcome@andritz.com

ANDRITZ METALS Inc.
PA 15317-8584 Canonsburg, United States
Phone +1 724 746 2300
furnace@andritz.com

ANDRITZ AG
100004 Beijing, P.R. China
Phone: +86 (10) 6561 3388
andritz.cn@andritz.com

ANDRITZ (CHINA) Ltd.
200082 Shanghai, P.R. China
Phone: +86 (21) 3108 9388
andritz.shanghai@andritz.com

ANDRITZ (CHINA) Ltd.
528000 Foshan, Guangdong, P.R. China
Phone +86 (757) 8296 3222
andritz.china@andritz.com

ANDRITZ Technologies Pvt. Ltd.
700105 Calcutta, India
Phone: +91 (33) 23232165/66
atech@andritz.com

ANDRITZ Technologies Pvt. Ltd.
560 045 Bangalore, India
Phone: +91 (80) 2644 4640
atech@andritz.com

ANDRITZ Brasil Ltda.
80420-010 Curitiba, Brazil
Phone: +55 (41) 2103 7601
metals.br@andritz.com

ANDRITZ AG
Eibesbrunnergasse 20
1120 Vienna, Austria
Phone: +43 50805 0
metals.at@andritz.com
www.andritz.com

All data, information, statements, photographs, and graphic illustrations in this leaflet are without any obligation and raise no liabilities to or form part of any sales contracts of ANDRITZ AG or any affiliates for equipment and/or systems referred to herein. © ANDRITZ AG 2014. All rights reserved. No part of this copyrighted work may be reproduced, modified or distributed in any form or by any means, or stored in any database or retrieval system, without the prior written permission of ANDRITZ AG or its affiliates. Any such unauthorized use for any purpose is a violation of the relevant copyright laws. ANDRITZ AG, Stattegger Strasse 18, 8045 Graz, Austria.