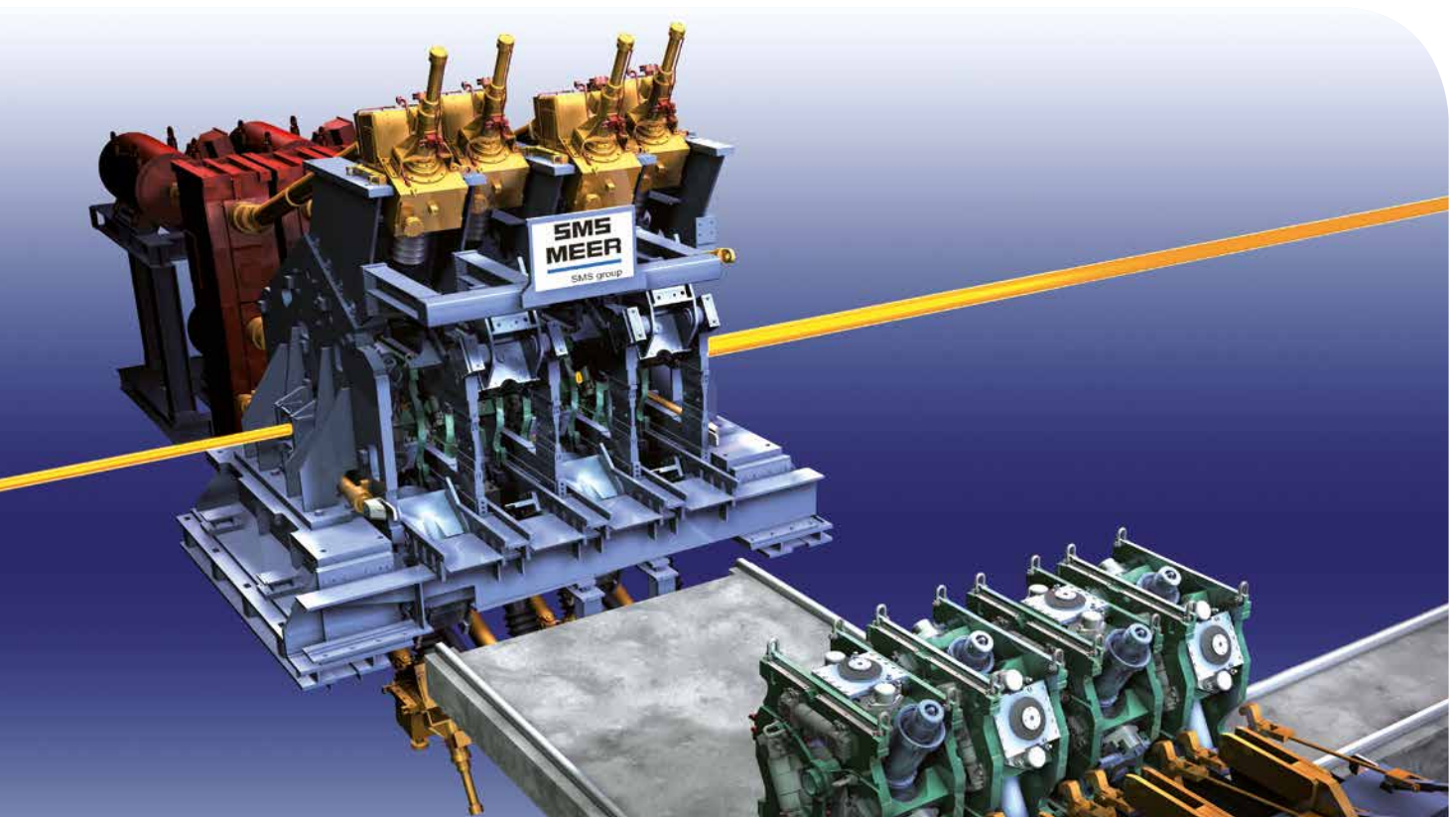


PSM[®] – PRECISION SIZING MILL

Advanced 3-roll technology for SBQ and wire rod production



The advanced 3-roll PSM[®] is a milestone in state-of-the-art SBQ and wire rod production. It significantly improves tolerances and efficiency, while allowing for reliable, easy and fully automated control of the rolling process under load.

BENEFITS AT A GLANCE

PSM[®] offers real time hydraulic roll adjustment under load. Therefore it reacts intelligently to deviations from ideal setpoint values. Its benefits include:

- Maximum precision
- Infinite product sizes
- Low labour and costs for maintenance
- Cassette changes within five minutes
- Single pass family rolling for all steel grades and product sizes

**Any size,
any grade,
any time**



BEST SIZING TECHNOLOGY

Major improvements through process transparency

The key success factors in SQB and wire rod production are flexibility and efficiency. The 3-roll PSM® (Precision Sizing Mill) meets these demands by far. One of its outstanding principal features is its capability to adjust each roll under load – fully automated and in real time. The adjustment under load function is made possible thanks to the advanced design of the 3-roll cassette in combination with three hydraulic cylinders. It provides the operator with the opportunity to optimise the bar shape during the rolling process. The hydraulic cylinders can adjust all three rolls concentrically. Where required the system is also able to individually adjust one or all three rolls independently. As a result, symmetrical as well as asymmetrical positioning adjustments of individual rolls under load provide opportunities for finely tuned optimisation of the net shape tolerances.

MONITORING CONTROL SYSTEM

This is made possible thanks to the advanced closed loop Technological Control System (TCS), which also provides plant operators with full process transparency, including pass and roll position indication and on-line correction, as well as rolling force measurement and active, fully automated overload protection.

Together with sophisticated control and automation systems, this opens up unique possibilities for optimising

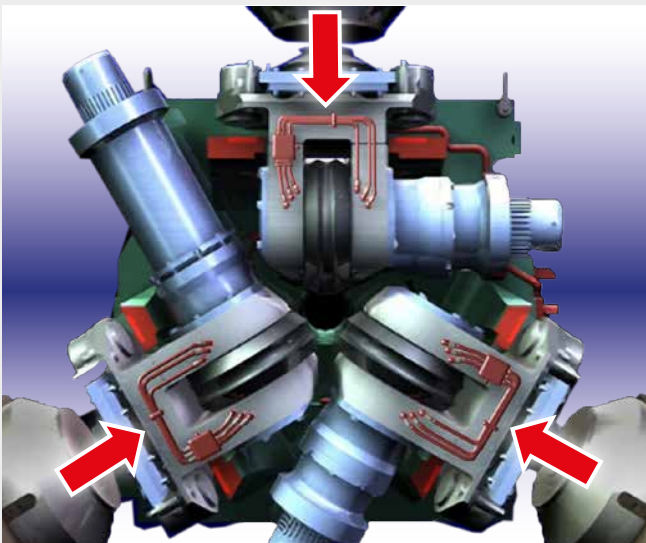
products and processes. Furthermore, the system is able to automatically compensate individual mill spring, feeder variations and bar entry impacts. It is also able to level out temperature variations along the bar. Based on the TCS closed loop control system, the system adapts to different rolling conditions and thus instantly optimises the process for maximum yield, availability and product quality.

Thanks to the advanced automation level, reliable and reproducible results across the whole size range can be achieved – in semi-automatic rolling mode or in fully automatic rolling mode independently of the skills and experience of the operators.

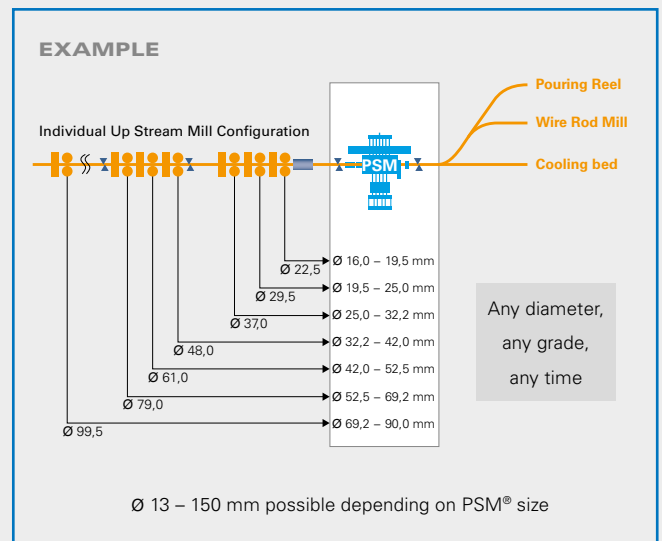
INTEGRATED PROCESS MANAGEMENT AND PLANNING

The mill setup required to attain the necessary quality of the final product is planned by the MEERcon PSM® system. The technological mill configuration system determines the individual setpoints based on requirements and transmits the relevant setup information to the PSM® automation system via a data network. It can be linked to an unlimited number of workstations for example to the rolling mill managers, technologists and/or the roll shop and operating personnel.

ADJUSTMENT UNDER LOAD BY HYDRAULIC CYLINDERS



SINGLE PASS FAMILY ROLLING WITH PSM®



Whether it's for a wide range of special steel grades or individual requirements, the operator can choose either a standard setting based on an empirical database or can create completely new settings. What's more, he can flexibly adapt any settings using an editor – from the diameter of the initial pass, the design of the actual groove form through to the calculation of the optimum rolling speed.

The configuration system stores the rolling mill setup and calibration data for each product as well as key rolling result information. For evaluation purposes, the data is displayed as tables and graphics. By providing simulations and visualisations, MEERcon PSM® assists the operators from the product planning stage right through to the final set-up parameters. In addition, the data can be stored in the empirical database, thereby ensuring reliably reproducible results.

**TOOL MANAGEMENT:
FAST, LEAN, COMPREHENSIVE**

Another feature of MEERcon PSM® is the tool management function which is a great support to operators and mill management in optimising tool and roll ring costs. It allows for tracking of the roll ring sets and 3-roll cassettes as well as the 3-roller guides and provides information, for example on roll and roller wear.



PSM®:
Advanced 3-roll technology
with adjustment under load capability

Furthermore, the MEERcon PSM® system supplies all data for the setup of the 3-roll cassettes, 3-roll guides and static guides in the roll shop. All stands and guides are prepared off-line in the roll shop during rolling. In order to meet very tight tolerance requirements, the stands can be aligned in the roll shop by an optical measuring device (OMD). The rolls and rollers can be axially and radially positioned with maximum measurement accuracy using a CCD camera. That's why PSM® mill operators achieve best quality and can meet even the most demanding customer requirements.

OPTICAL MEASURING DEVICE (OMD)



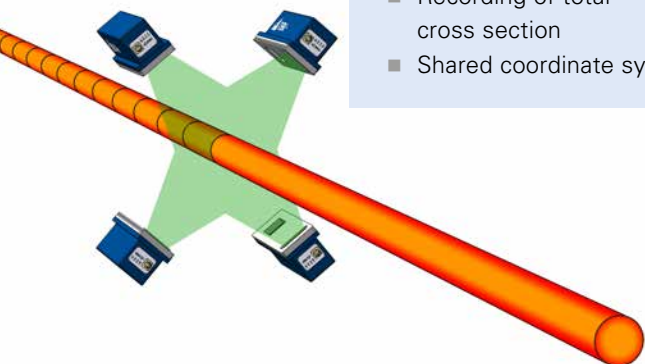
WORKSHOP ASSEMBLY & TESTING OF 3-ROLL CASSETTES



TRUE SHAPE MEASUREMENT WITH MEERgauge®

The combination of the MEERgauge® measuring system and the hydraulic adjustment under load feature is another revolutionary milestone in advanced 3-roll technology, offering the measurement accuracy to optimise and fine-tune products online during rolling.

- Laser light section measurement
- Four measuring heads
- Static system, no oscillation
- Synchron scanning
- Recording of total cross section
- Shared coordinate system



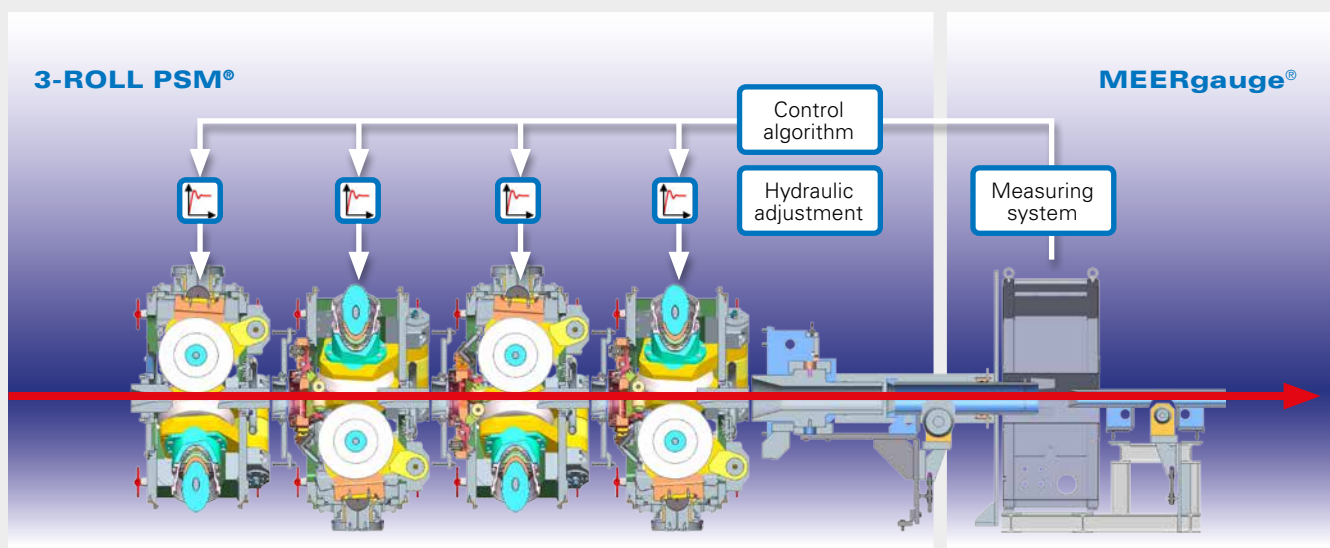
The MEERgauge® system at the exit side of the 3-roll PSM® operates on the basis of the light cut technology. Four sensors perform synchronous, contact-free measurements over the entire cross-section of the bar. With no moving or oscillating parts, the system is almost maintenance-free.

With a scanning rate of 500 scans per second, a true-shape cross-section is created from up to 400 synchronous measuring points in a shared coordination system, then displayed with maximum precision.

The key characteristic values from the individual measurements are transferred to the Technological Control System (TCS) of the PSM® via a direct process field bus link in real time. Based on the received data, the TCS logic can analyse the values and assign relevant adjustment setpoints for gap corrections if required, or the operator can do this himself manually.

The combination of a highly dynamic control system and a true-shape measuring unit, however, means a fully automatic rolling operation of the 3-roll block using the advanced diameter measurement gauge can be successfully realised independently of the operator.

CLOSED LOOP MONITOR CONTROL POSSIBLE WITH THE MEERgauge®



AHEAD OF THE COMPETITION

Cutting-edge technology based on decades of experience

The implementation of the 3-roll PSM® represented a milestone in the field of wire rod and special bar quality production.

The experts at SMS Meer utilised the experience gained from the successful delivery of more than 20,000 3-roll stands when designing the 3-roll PSM®.

SATISFIED CUSTOMERS

SMS Meer incorporates the 3-roll PSM® and MEERcon PSM® technology into new plants, but also integrates them into existing plants during upgrades or revamps. Reputable mill producers have already implemented this cutting-edge technology into their plants, others are about to do so.

REFERENCES

#	Company	Country	Year
#1	Deutsche Edelstahlwerke	Germany	2007
#2	The TIMKEN Company	USA	2009
#3	Fujian Wuhang Stainless Steel	China	2011
#4	Xining Special Steel	China	2011
#5	Steel Dynamics	USA	2012
#6	Not to be released	Asia	2013
#7	Jiangsu YongGang Iron & Steel	China	2013
#8	Kardemir A.S.	Turkey	2013
#9	Qingdao Iron & Steel	China	2013

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