MIMO Thickness Control for cold rolling mills
Improve your strip quality and operating speed

Proven to deliver significant improvements in thickness tolerance reduction in practice compared to other state-of-the-art control technologies, this ABB Ability™ System 800xA-based advanced thickness control concept sets the standard for high-end performance in terms of material quality and productivity.

Thickness control crucial to rolling
Keeping strip thickness within a tight tolerance band is crucial in cold rolling, and deep drawing of aluminium and steel sheet for cans or car body set the benchmarks. The more thickness variation can be reduced, the closer a mill can be operated at the minimum permissible thickness, resulting in reduced material usage and improved cost-efficiency. Effective control of the rolling process can only be achieved where mechanical, electrical, hydraulic and instrumentation, as well as lubrication and the control strategy all fit together.

Advanced thickness control
State-of-the-art thickness control algorithms consist of single control loops and feed-forwards, and are limited in achievable thickness performance since they do not fully take into account the couplings between thickness, roll position and tension. In contrast, this ABB solution is based on a Multi-Input Multi-Output (MIMO) control concept where existing mechanical/metallurgical couplings are dynamically decoupled. The decoupled loops are controlled with PI control algorithms and dynamic feed-forward strategies support disturbance rejection.

MIMO controller parameters adapt online to actual process conditions using an integrated process model, ensuring consistent strip quality and robust control performance for different materials and operating points.

Customer benefits
• Faster in specified tolerances contributes to reduced scrap length
• Pauseless ramp-up and higher operating speed help to increase throughput
• Better disturbance rejection during acceleration and deceleration and at constant speed provides improved strip tolerance over the whole strip length
Key features
• Online estimation of time varying process parameters
• Online MIMO controller parameter adaptation using an in-built process model
• Dynamic feed-forward strategies supporting disturbance rejection
• Dynamically decoupled MIMO controller
• Supervision layer for monitoring and tracking control quality

Impact on thickness deviation when switching the MIMO thickness control on/off.

Results from 4th full pass under normal rolling operation: Length series of thickness deviation for classic control concept (top) and for new MIMO control (bottom) with the same scaling. 3Sigma improved from: 1.3% classic thickness control (top) down to 0.7% for new MIMO thickness control (bottom)