Stressometer continues to boost the business for China Steel after more than 16 years in operation

– a true story based upon experience from the 5-stand tandem cold mill at China Steel Corporation, Taiwan

China Steel Corporation (CSC) in Taiwan is one of the major steel producers in the world. In 1991 the 5-stand Tandem Cold Mill (TCM) was revamped with a new Stressometer Flatness Control System. After seven years of operation, in 1998, the tandem mill was undergoing a major revamp. The purpose of the revamp was to increase productivity and quality even further by connecting the mill to the pickling line thus achieving continuous rolling. For the Stressometer this meant moving the roll to a new position, an upgrade of the electronics to version 4.0 and new control functions. A Millmate Strip Scanner for measurement of the edge position and strip width was also installed.

CSC experience after 16 years – almost zero rejections

What has been achieved? We ask the general foreman in TCM and the superintendent in CSC cold mill (TCM+PLCM). The general opinion is that the Stressometer performance is very good. The general foreman says "Scratches due to bad flatness is almost zero at the Continuous Annealing Line (CAL) and the batch annealing."

"Almost zero scratches at the CAL and at batch annealing."

There has been very few problems over the years. Due to the continuous operation CSC has very high demands on reliability and maintenance-free rolling. ABB Stressometer has lived up to these high demands. The only real equipment failure has been the DC motor of the roll drive. This motor has been replaced after 16 years of operation.

CSC feels that the most important property of the system is the stable operation. This means that very little maintenance has been needed and there has been very few unplanned production stops. The actual time spent for maintenance is very low, averaging 8 hours per year. This is the time it takes to clean the Signal Transmission Unit (STU) and check the roll.

Over the years the Stressometer has shown to be very reliable and adaptable which has made it possible for CSC to further improve the results that were achieved after installing the system in 1991. See below.

CSC has also gained a lot of knowledge about how to optimize the process by setting different targets for different products. When producing for CAL then the target with long edges should be

used and when producing for batch annealing then the middle/short edges should be achieved in order to avoid sticking.

The system has also shown to be flexible for changes in the production and product mix. The product mix has been changed to high carbon steel and high silicon steel. Also material thickness has been reduced. These changes have been done without any problems in the flatness control.

The upgrade with MSS in 1998 made it possible to further improve the flatness control especially in the strip edge area.

Supplied equipment

- One Stressometer Flatness Control System, release 4.0
- One Stressometer Measuring Roll with 26 measuring zones
- One Millmate Strip Scanner System for measurement of edge position and strip width

Improvements over time in the TCM	After Stressometer installation in 1991	After Stressometer upgrade in 1998
Production increase	13%	21%
Staff reduction	From 4 to 3 per shift	
Reduction of overall production costs	19%	28%
Rejections at CAL (scratches)	From 1.9 to 0.22%	From 0.22 to 0%
Rejections at batch annealing (sticking)	From 0.53 to 0.15%	Remains at 0.15%
Rejections at electrolytic cleaning line	From 0.26 to 0.01%	From 0.01 to 0%

The achievements in 1991 are typical when installing a Stressometer Flatness Control System in a tandem mill without automatic flatness control. The continuous improvements at CSC, after 1998, are due to both the mill revamp and Stressometer upgrade.

H. D. Chang, mill operator. In 2003 the quality control inspector was removed and the job was taken over by the operator.

Mill data	5-stand tandem cold mill	
Rolled material	Carbon steel and high strength low alloy steel	
Tonnage	1 230 000 tons/year	
Coil weight	25 tons	
Strip width min./max.	750 – 1270 mm	
Exit strip thickness min./max.	0.20 – 3.25 mm	
Max. rolling speed	1708 mpm	
Work rolls	514 – 584 mm	
Backup rolls	1270 – 1430 mm	
Mill motor	STD 1 3356 kW	STD 2, 3, 4, 5 4848 kW (2424×2)

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