

Polytec LSV Enables Modernization of Measurement Technology

Tata Steel (formerly Corus) runs an integrated steel plant at IJmuiden, Netherlands, where final products are made from ore and coke. One of the links in this process chain is the basic oxygen furnace where steel is made from raw iron in a blast furnace and cast into slabs in continuous casting machines. To ensure the quality of the slabs, the length of the strand from which they are cut is measured.

Previously, the length measurement of a strand from a continuous caster was made with contact rollers that were driven by the motion of the strand. Due to the increased production wear at the steel plant, this measurement was no longer accurate and produced many faults in the process. To improve the situation, a systematic investigation was carried out together with Utrecht University. The objective of the research was to obtain an alternative length measurement method which can replace the function of the

measuring rollers by simultaneously overcoming their drawbacks. Most importantly, the measurements should be extremely reliable and virtually maintenance free. The study began by determining the precise function needed from the measuring roller in the given application. From this information, an alternative length measuring system could be proposed. Afterwards, different market solutions for length measurement of a strand in a continuous casting machine were evaluated.

The decision on the new measurement technology had to be made and the equipment purchased in 2009.

After examining a variety of possible solutions, the investigation was focused on the three most promising methods which were:

1. Laser distance measurement at the front of the strand in combination with the cutting machine
2. Laser-Velocimeter measurements on the side of the strand
3. Laser-Velocimeter measurements on the top of the strand

Of these three methods, there was only one deemed suitable, the Laser-Velocimeter measurement from the top of the strand (Fig. 1). This measurement was the only method that can measure the length at any time and allows the equipment to survive the extreme conditions of the measurements.

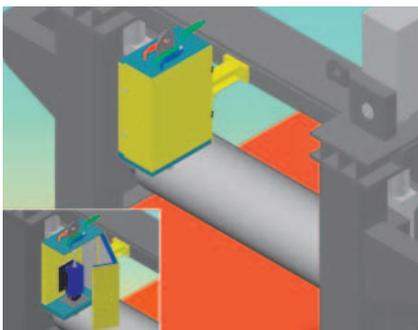


Fig.1: Laser-Velocimeter measurement on the top of the strand.



Fig. 2: Polytec LSV Sensor at work.

The Laser Surface Velocimeter (LSV) series from Polytec was identified as the best solution (Table 1) since it met all the requirements set by Tata Steel:

- Allows very accurate measurement even at very low material speeds as are typical for continuous casters
- Allows easy integration with process control systems (level-2 systems) using Polytec's flexible interface concept
- Survives the harsh mill environment of a steel plant due to a rugged industrial housing with cooling
- Short delivery time

The new Laser-Velocimeter length measurement system based on Polytec's LSV technology has now been successfully implemented with all project targets reached.

Comparison of Laser-Doppler Sensors

Specifications	Sensor 1	Polytec LSV	Sensor 3
Velocity range -2.5 m/min ... +2.5 m/min	no	yes	yes
Standstill detection	no	yes	yes
Bidirectional	no	yes	yes
Uncertainty max. 0.1% of measured value	yes	yes	yes
Temperature range 50 °C ...1200 °C	yes	yes	yes
Cooled housing	yes	yes	yes
Maintenance free	yes	yes	yes
Spare parts easily separate	yes	yes	no
Separate sensor	yes	yes	no
Separate processing unit	yes	yes	no
Encoder connection	yes	yes	yes
Diagnostics via level 2	yes	yes	no
Delivery period weeks	12	6	12

Literature

Cees Min, "Door Meten tot Weten", CORUS/Tata Steel internal report 2009.

LSV Improves Quality and Lowers Costs

Cut-to-length and Speed Control of Cardboard, Plastics Extrusion, and Other Non-metal Products

Laser Surface Velocimetry (LSV) is an optical method that can measure speed on virtually any surface. While often applied in steel mills and metal processing, LSV is equally effective in the production of nonmetallic goods such as wood, cardboard, foil, plastics extrusion, cable, building materials, textiles and fabrics. The image below shows the LSV determining cut-to-length of corrugated paperboard sheets. Please read on to learn about some exemplary applications.



Speed Synchronization in Paper Production Cuts Manufacturing Costs

In response to a significant number of breaks during splicing operations on a continuous coater, a paper mill installed a Polytec LSV on its high speed paper unwind. By integrating the LSV's surface speed signal into the control loop, the mill can consistently match parent reel speeds to within ± 5 ft/min at 5,000 ft/min ($\pm 0.1\%$). The return on the mill's investment in the new technology was less than one year.



Length Measurement for Conveyor and Drive Belt Production

A leading manufacturer of drive and conveyor belts uses several laser surface velocimeters for length measurements at the cutting station. Thus, customer-specific cuts can be automated, simplifying the process significantly. The cut-to-length accuracy is independent of the belt surface and achieves a precision of 0.1%.

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