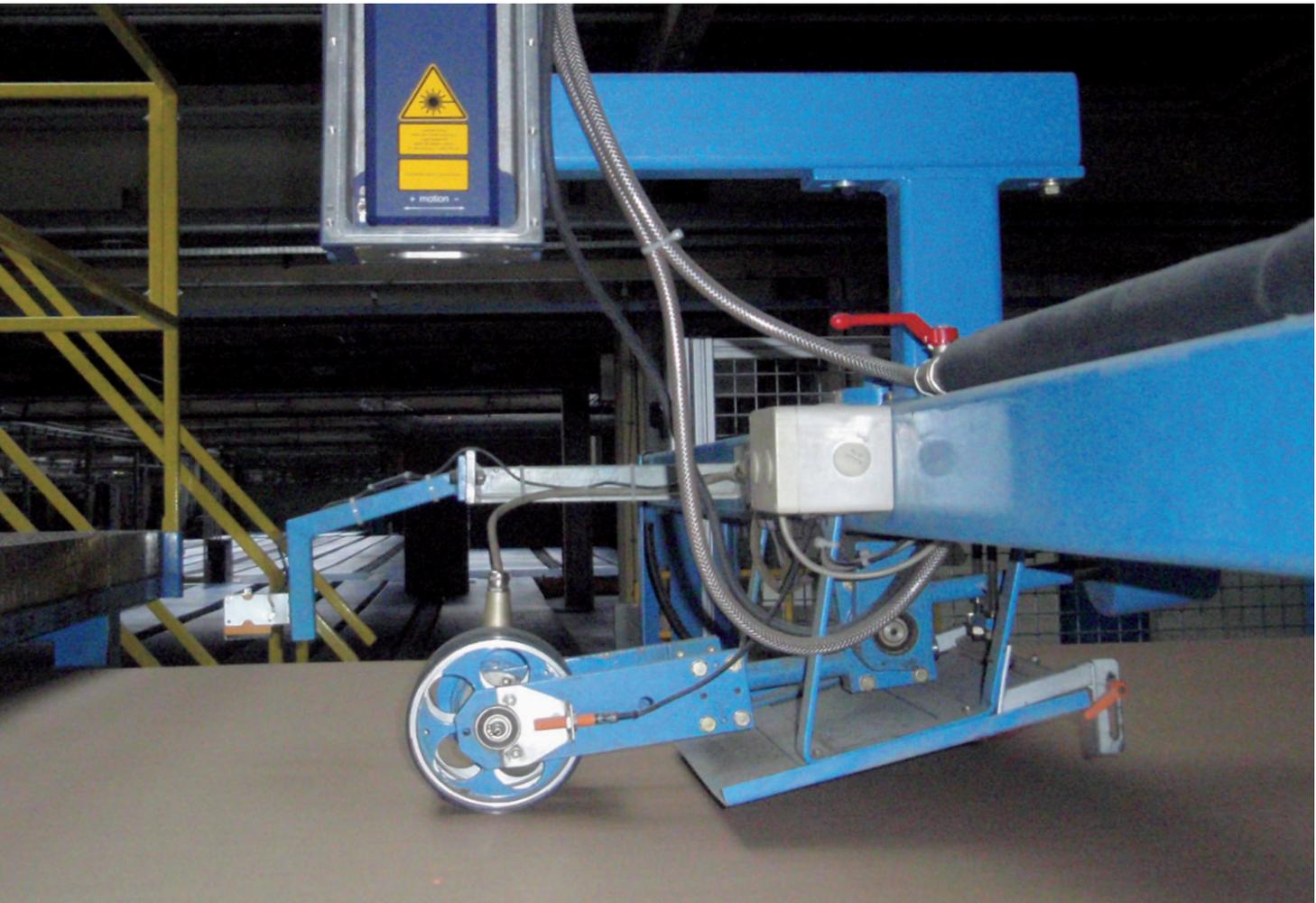


The LSV Cuts It

Contact-free Velocity Measurement in the Corrugated Board Industry in Comparison with Conventional Measurement Methods



Increasing Accuracy Requirements in Corrugated Board Production

In addition to triggering at the correct length, knowledge of web speed is required to synchronize the motion of the cross cutter. In practice there are two solutions for measuring the line reference: a classic measuring wheel during normal production, and a feed roller encoder which is selected during a size change, the so-called order change (fig. 1). To achieve better accuracy, a non-contact laser surface velocimeter was implemented.

Comparison Between Laser Measuring System and Existing Measuring Methods

As part of the investigation, the laser measuring system was used instead of

an encoder wheel for cross-cutter control of the corrugator (large image). The cut sheets, approximately 200 different sizes in a wide quality spectrum were then re-measured manually. The behavior was also investigated using various plant operating speeds. Continuously changing plant velocities represent the greatest challenge for the measuring systems. The instrument from Polytec achieved the best results – no deviations of greater than ± 1 mm were measured under all operating conditions.

Results of the Idler/Laser/Encoder Comparison

To give an indication of the size of the cut length error relative to the sheet length for the three measuring systems, fig. 2 shows all three curves in the same diagram. The analysis is based on a range of

3 x 1500 measurements of different sizes, velocities and corrugated board qualities. The laser provides very good results, cut length deviations of more than 3 mm do not occur, and the largest portion of the measurements, approximately 45%, show no deviation from the actual cut length.

Conclusions

The high absolute accuracy and repeatability of the laser measuring system cannot be achieved with the conventional idler encoder and feed roller encoder. Also, a significant performance difference exists between the laser measuring systems and idler systems and contact wheels. Laser measuring systems offer a measurable improvement over these traditional methods. And, for those customers having difficulties maintaining specified cut length tolerances due to slippage, changing

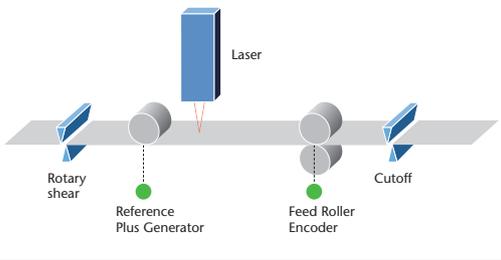


Fig. 1: Process flow at a cross-cutter.

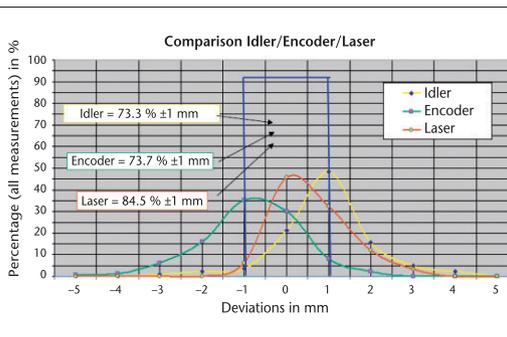


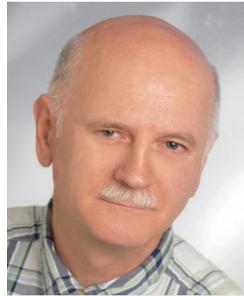
Fig. 2: Measurement deviations for all measurement systems.

wheel diameter and general wear & tear, the LSV provides greater accuracy and improved repeatability, with long term stability – three factors necessary for long term quality, consistent process control and improved yield. The higher investment cost for the laser compared to traditional tactile methods is why the area of deployment for the laser measuring system should be differentiated. For example, the investment pays off quickly for customers who operate with varying (especially very large) cut lengths and high quality spectra, and where accuracy is important.

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“The Laser is Actually Unbeatable”

Interview with Stanisław K. Musielak (B. Eng.), instrumentation expert with BHS Corrugated Maschinen- und Anlagenbau GmbH

■ **Mr. Musielak, you are a development engineer with BHS Corrugated, the world’s largest solution provider in the corrugated board industry. What area do you work in?**

I’m highly involved with rotary cutters, including the drive technology, instrumentation, service, and generally anything to do with vibration on the corrugated board installations.

■ **Since when have you and/or BHS Corrugated been involved with Polytec’s laser surface velocimeters and what triggered your interest?**

It all started 8 years ago. At that time, a German customer was having significant problems with cutting accuracy. The decision was then made to install the LSV-6000 measuring system from Polytec. And of course that was successful!

■ **How do you view the use of LSVs up until now? What do you consider are the essential advantages of optical measurements when compared with the alternatives?**

The laser is actually unbeatable! The technology has always proven successful over a number of years. Even when you are comparing advantages and disadvantages, the laser always wins.

■ **How are the velocimeters incorporated into process control, is there a direct data transfer into quality control?**

The LSV controller simulates a classical encoder that is coupled to the PC control of the cross cutter. The cut

length differences are determined in the PC and visualized in the WinCC system.

■ **What is the reaction of your customers. What proportion of orders has corrugators with LSVs as the velocity measurement technology?**

The customers who have implemented the laser system rate the modern instrumentation positively. Unfortunately the number of applications has remained low until now, because for many companies the technology appears expensive at first glance. Very often though it pays for itself, for example with machines producing a large range of different qualities, or when the measuring wheel or parts of them require frequent replacement. Also with special products, for example for certain surfaces where the slip cannot be controlled, or with narrow tolerances - because when a whole batch goes out of tolerance, that’s when it gets expensive!

■ **How do you see the potential for laser measuring technology in the corrugated board industry and in other areas of the paper and non-metal manufacturing and packaging sector?**

This technology has a future, not only in the corrugated board industry. In this day and age when companies are looking to save money, it’s a must. Anybody can run the numbers for themselves and reach their own conclusions; if just 1 mm per sheet is saved and in addition the cutting process is improved.

Thank you very much for the interview, Mr. Musielak!