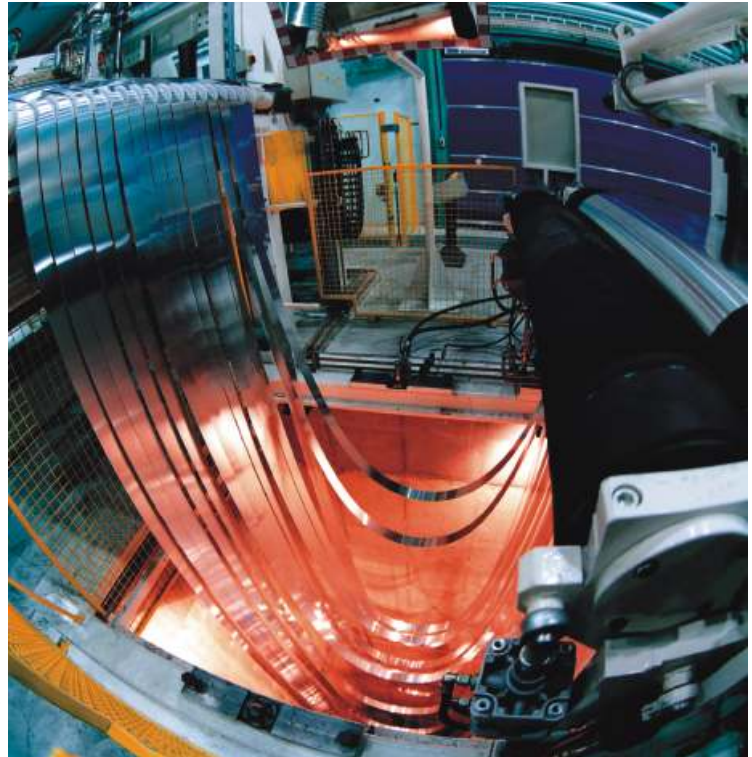


Speed measurement for strip control on slitting lines

DANIELI FRÖHLING



As line speeds increase, simultaneously coil weights increase and require the use of better controlled drives as well as the implementation of modern control concepts for strip lines. With the appearance of CNC technology, slitters today have reached a degree of automation that makes it possible to clearly increase the production volume and, at the same time, to meet the higher demands on cutting quality. Non-contact measuring, particularly for an accurate reading of the real strip speed, is the precondition for meeting this performance demand. The VLM 200 has meanwhile become the standard gauge in new plants, replacing the mechanical encoders subjected to slip.



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Looping pit of a slitting line

The company Josef Fröhling GmbH & Co. KG Walzwerksmaschinenbau in Olpe (today it belongs to the Danieli group) is worldwide well-known for its high-quality lines for trimming and slitting of metal strips. With respect to the strip lines, the production concentration of aluminium (particularly) has led to a noticeable rise in coil

weight. Also, whilst in 1968 the weight usually was 2 - 3 kg/mm strip width, the standard weight now amounts to 12 kg/mm strip width. The result is that actual coils with a strip width up to a maximum of 2.150 mm have an outer diameter of 2.700 mm and therefore reach a weight of up to 30 tons.

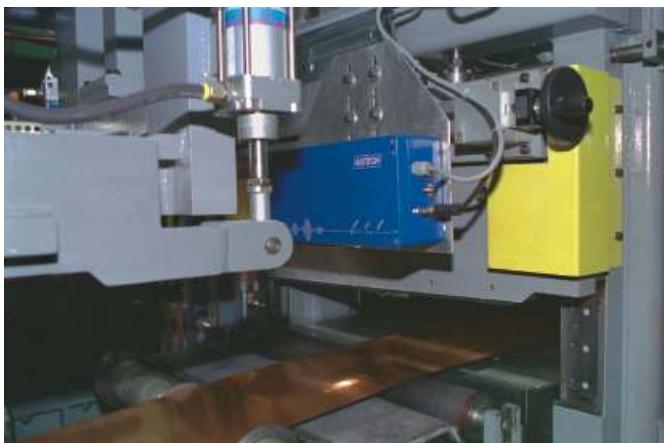
High quality demands

Similar tendencies are observed for the line speed. While 20 years ago slitting lines operated at maximum speeds of 400 m/min - 600 m/min, today they have the ability to run at speeds of more than 1.000 m/min. Even strip speeds of 1.500 m/min can be achieved on trimming lines. Thereby production times are also shorter. Coils with a medium strip thickness of 0,35 mm have a strip length of approx. 23.000 mtrs and now need a 12 min strip cycle time at a speed of 1.500 m/min.

Along with the above mentioned performance parameters, the following very high quality criteria must also be met. The edge quality after the cutting process, the coiling quality, the scrap removal of the border strips during the trimming process or the elimination of the slit strips

during the slitting process and with respect to the can stock, the oil quantity applied evenly. In order to be able to meet these optimal demands, innovative line engineering that can assure an annual production capacity of over 450.000 tons in one automatic cycle, (e.g. aluminium strips) is necessary.

CNC technology enables the automatic run from the control stand, the trimming shears for the adjustments of the strip width, the cutting depth and the clearance. The existing adjustment data is stored and can be modified or corrected on-site. Even in case of the finished widths of 2.000 mm and more, the plants made by Fröhling can achieve high cutting width accuracy for the smallest cutting slit widths. The use of coils and sleeves and the elimination of scrap sheets and border scrap coils also occur during automatic



VLM 200 on slitting line for non-ferrous metal

Anniversary device VLM 200

The company ASTECH GmbH has recently celebrated the manufacture of the non-contact VLM200 speed measuring system bearing the serial number 500. During a small company ceremony, Dr Klaus Christofori, managing director at ASTECH GmbH, handed over this anniversary unit to Mr Peter Fröhling, the long-standing Managing Director of this worldwide leading manufacturer of slitters and rolling mills Danieli-Fröhling. For this purpose, all the members of the management, Mrs Konopka-Fröhling, Mr Peter Fröhling and Mr Graumann, came from Olpe. Dr Christofori used this anniversary as

an opportunity to personally thank the management of their long-standing and good customer for their excellent co-operation.

Due to the use of the non-contact VLM 200 speed measuring sensors, Danieli-Fröhling decisively contributes to the success and the worldwide distribution of the VLM 200 in the steel and non-ferrous metal industry. In 1996, as the company ASTECH started marketing the newly developed VLM 200, Mr Fröhling was personally committed to the using of this modern technique and pointed the way in his plants. Thereby, the non-contact VLM 200 measuring system became the

standard tool used for recording the strip speed on slitting lines developed by Fröhling. In the meantime, a multitude of devices has been delivered directly to the engineering company, or to the commissioned electronic suppliers. During the conversations it was agreed that the VLM 200 will now be used in a more intensively in rolling mill applications on Fröhling's stands.

The anniversary device goes to Taiwan and will be used at S & T Copper Industries Co. Ltd on a slitting line for the strip flow control. S & T, a well-known company in the Asian market, manufactures copper, brass and phosphate bronze strips. The ASTECH technology has a good reputation within this Asian company and two devices are already functioning reliably on a thin or medium wide strip line for speed control and coil diameter control.

The excellent standing that the Rostock Company Astech today occupies as leading position worldwide, was also confirmed by the mechanical engineering company at the end of the celebrations, underlining the clear technical advantages as well as the outstanding cost effectiveness. This particular status results from the fact that the VLM 200 is the only sensor in the market that uniquely, with white light precisely and optically records strip speed.



Solemn handing over of the anniversary device (Mrs Konopka-Fröhling, Dr. K.Christofori, Mr V.Ahrendt, Mr A.Tweer, Mr P.Fröhling from the left to the right)

sequences. The time required for changing the rolls on the coiling line is minimised by an automated reeling drum tightening head. In order to control the high accelerations or delays when starting and braking the line, the strip guide rollers now have back-up drives. Thereby, relative movements that might cause surface, damages can be avoided.

Speed master

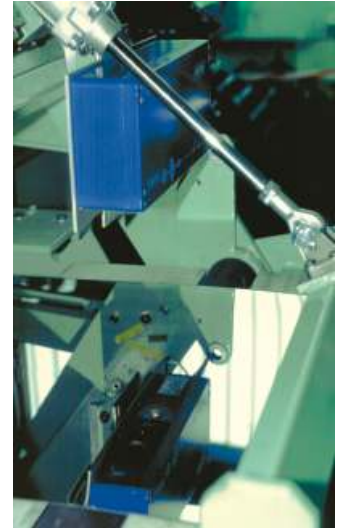
The VLM 200 determines the strip speed without contact and transmits it to the control system, thereby functioning as a speed master. The non-contact working principle enables slipless recording and therefore an extremely precise measurement. The device works optically and is able to reliably determine the speed on all metal surfaces, ranging from

rough to high-reflective ones. Even aluminium vaporised strips used as pre-products on the line for the manufacturing of mirrors or reflectors in the automotive industry register in a secure way.

The VLM 200 working method with white light, unlike nearly parallel laser beam, represents a broad beam and makes this possible. Consequently, a split beam always reaches the sensor, even where there is a direct reflection on the mirrored surface. However, laser beams will be reflected uncontrolled on such surfaces and may therefore be hazardous (e.g. laser class 3B). Consequently, the health and safety measures prescribed by the employers' insurance association are not necessary for the VLM 200 as it operates with white light.

Looping pit control

Post connected coil diameter control determines, with exact strip speed, the diameter increase and reduction of the coils as well as, following this, controls the drives. When using several devices, the separate control of the braking units and/or even a looping pit control is possible. The latter determines the loop length in



Measurement on reflective surfaces

the pit from the difference between the lengths of the incoming and outgoing strips and thereby controls and keeps it constant. With this aim in view, the devices were positioned on the corresponding track in order to record the shortest or longest loop. The VLM 200 is designed to run off strip at a speed of up to a maximum of 3,000 m/min and achieves a measurement uncertainty that is better than 0,1%. Because of this, the limits of the measuring technique are far from being reached, even on the fastest strip lines (foil winder, Doppler with a $v_{max} = 2500$ m/min).

Along with the above-mentioned accuracy, the high reliability is a decisive argument for the Company Fröhling. Since 1995, devices from the VLM 200 series developed by ASTECH are used on Fröhling slitters and have today become something like house standards in Olpe. In the meantime, at Fröhling and in this segment alone, there are well over 50 applications of this technology. ■



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Aluminium slit strip coil

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