



Precise length measurement at VSM (Vereinigte Schmirgel- und Maschinen-Fabriken AG)

In the production process, monitoring, cutting and controlling tasks require tough but low-maintenance sensors. Contactless length measuring systems operate from a distance and are therefore slip-free. They do not disrupt the production process. Abrasives have strongly abrasive surfaces which drastically reduce the lifetime of mechanical encoders. The following example of a conversion to non-contact measurement technology shows the advantages resulting from the use of VLM 200.



VLM 200 on an roll slitting equipment

In cooperation with its eleven subsidiaries, the company VSM manufactures high-quality and flexible abrasives of various geometric forms. This makes the enterprise one of Europe's leading firms in the production of abrasives based on fibre and paper for varying applications from metal up to wood chips. The basic production as well as finishing

facilities are located at the original plant in Hanover, in which abrasive cloth is finished, phenolic resin is manufactured and abrasive grit is refined. In combined coating, drying and precipitation hardening processes, the abrasive grits are dispersed on the abrasive backing and fixed with a binding agent. During the finishing process, the

finished abrasive is then processed into belts, sleeves, rings, discs, straps, strips, etc.

Challenge

For functional reasons, the highly abrasive surfaces involved expose manually unwinding length measuring systems to extremely high wear.

The variety of products and the resulting wide range of surfaces, when similar abrasive grits are dispersed simultaneously and homogeneously, also represent a big challenge to the optical measuring technique. Measuring instruments operating on a correlative basis fail because of the regularity of similar structures, or they deliver erroneous lengths which must be corrected in accordance with material specifications.

Due to the incorporation of grits into phenolic resin and the technically desirable breakup of the bond bridges involved, very different optical reflective properties are produced that

can no longer be handled when in movement by the sharply focussed point-based Laser-Doppler approach. VLM-200 convinces by its clear advantages. The materials processed at VSM have from very coarsely textured surfaces (emery paper with grits of 16 gauge) up to the finest coatings (emery paper with grits of 1200 gauge) in various colours.

This wide range of different surfaces is measured with one and the same VLM 200 without changing any parameters or further settings. This property of VLM 200 results from the use of a CCD chip and its fast exposure time control. The intensity of the light source is simply adapted to the material requirements.

With this technological approach, VLM 200 provides a measurement dynamic that is very well suited to precisely measuring all the above-mentioned different surfaces while in continuous change. The recordable materials range from deep black rubber to high-reflective high-gloss ▶



Abrasive products in rolls

polished stainless steel surfaces.

Reliability

The measuring area on the surface is line-shaped in the direction of motion, resembling a short extremely thin pencil stroke. This small measuring area enables virtually any surface to be accurately measured. This applies to every point at a measurement separation of 185 ± 7.5 mm. This allows small and big particles to equally generate a signal, while dust and other shifting and interfering particles not belonging to the material surface to be efficiently eliminated.

The CCD line delivers a frequency that is proportional to the speed. In case of VLM 200, the evaluation of those signals is only carried out in one chip, an ASIC. Unlike microprocessors, this module already contains a logic which is especially tailor-made for the measuring task and therefore over 10,000 times more efficient. This ultrafast chip determines not only the frequency without intermediate stages but also simultaneously verifies the constancy by comparing neighbouring periods. The VLM 200 thus also checks the plausibility of the raw signals. Thereby any signal disturbances, which remain undetected during other evaluation processes (e.g. the FFT) and which lead to measuring errors, are filtered out.

Abrasive, dust, or other similar particles which could randomly pass the measuring point at a different speed, would cause a falsified measuring frequency if they were not detected. The above-described patent-protected process is only able to filter out the actually relevant belt speed. A common principle



Production line for abrasives' conveyors

Specifications of the Line

Roll-Slitting Line

Capacity of jumbo feederup to 10 big rolls
Speed of roll slitting line230 m/min
Number of big rolls movedapprox. 1000 per month
Produced orig.-rolls and rollsapprox. 4500 per month
Produced quantity600.000 m² per month
Construction year of the line1983 (modernized in 2000)

Length measuring Gauge VLM 200 Serie A

Accuracybetter 0,1 %
Working distance185 ± 7,5 mm
Detector / measuring principleCCD-Line / spartial filter
Light sourceHalogen lamp 10 W
OutputsPulses with 2 phase-encoder emulation, opto-isolated
Case sizes360 x 160 x 90 mm
Temperature range0 up to 50 °C
Protection grade.....IP 65
Power consumption< 50 VA

of the plausibility analysis consists of detecting the freak values out of all recorded average speed values with presumed acceleration limits. Unlike VLM 200, only gross errors can inherently be recognised here. Minor errors decisively cause the dispersion of measured values.

The accuracy and excellent reliability in many applications that have been realised up to now are based on the above-described functional principle of VLM 200. That is why the VLM 200 is especially recommended for the highly-precise length measurement in the finishing of rolls. The VSM company immediately recognized the value of integrating the VLM 200 into the processes in its plants. With VLM 200, the required high degree of accuracy could immediately be achieved.

length measuring facility. The cut-to-length accuracy was clearly enhanced by the use of VLM 200, providing contactless measurement. The measurement uncertainty achieved on the line is clearly better than 0.1%, so that the mill greatly reduces its production length safety margin costs that erroneous manual length measurement techniques used to require. Owing to the positive experience, VSM is planning to retrofit further plants. ■

Next SENSITIVE:

- Measurement of the extension ratio at Krupp VDM
- Product presentation - TCP/IP interface board for VLM 200



Measuring system VLM 200 A

Practical experience

VLM 200 is used in a roll cutter in order to measure precisely the length of rolls of continuous abrasives. The roll cutter is an integral part of a production line that consists of a two-story jumbo roll accumulator for both infeed and outfeed, an automatic roll feeder, the actual roll slitter, a fully automatic retrieving manipulator as well as a roll packaging machine post-connected within the buffer zone. The jumbo feeder allows accommodating up to 10 big rolls. Thus it is possible to convert monthly more than 600,000 m² of abrasives on roll slitters. With the equipment modernised in 2000, operating speeds up to 230 m/min are achieved.

On the one hand large-size abrasive rolls coming from primary production are cut-to-length on the roll cutters by rewinding on the original wide rolls in different standard lengths according to the series/grain size and customer's order; on the other hand, they are cut off and then slit into smaller width rolls according to customers' requests. The basis of such cut-to-length and slitting processes, which are in part highly dynamically controlled, is, in addition to modern automation and drive techniques, a precisely running

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