

## High degree reduction control for ThyssenKrupp Stahl

*Skin-pass rolled quality strip is the initial material for the differing pressed and formed parts for autobodies. The required surface and deep drawing properties are obtained in the skin-pass mill stands by skin-pass rolling. The demand for lower tolerances requires modern high degree reduction control and a precise measuring technology. Consequently, reliable and slip-free speed measurement is the pre-condition for finer reduction degrees in the future. A modernisation, which SIEMENS realised together with ThyssenKrupp and ASTECH, is hereon presented.*



Skin-pass stand TKS Dortmund

ThyssenKrupp Stahl AG is one of the most important suppliers in the key market of automobile manufacturing and is a world wide leading manufacturer of quality flat steel. In its five cold strip mills, over 6 millions tons of warm strip are processed into sheet annually.



Skin-pass rolled coils

In their Dortmund location they carry out the following manufacturing steps: pickling, cold rolling, annealing, skin-pass rolling and adjusting. One of the most well known plants is their continuous furnace (continuous annealing line) in Dortmund. Modern poly-phase as well as dual-phase steel (DP) and residual austenite steel (TRIP) is produced here. In the cold rolling mill K3, the skin-pass mill stand placed within the continuous annealing line is a SEXTO stand with a strip width between 600 to 1680 mm and a strip thickness between 0.4 to 1.8 mm.

### Three partners - one solution

Over the last 15-year-operating period plant reduction control has been based on pulse measurements and Siemens was commissioned to modernise the old plant. Because of

that, ThyssenKrupp Stahl expected a clear product improvement and measurable customers' advantages. Considering the slippage occurring, particularly in the case of critical rolled strips, the impulse measurement was to be replaced with new, precise, reliably functioning and contact free one.

Thanks to their already good experiences with our high-precise speed measuring system VLM 200 operating with white light, the decision was made in favour of the

company ASTECH. The latest development, VLM 200 SD-series was used. An ASIC (an integrated circuit) ensures that, even at high rolling speeds, all measured values are checked for plausibility, before being averaged. This type of device is exactly synchronised by an external trigger signal. Thereby speed differences can be precisely recorded during high accelerations. ▶



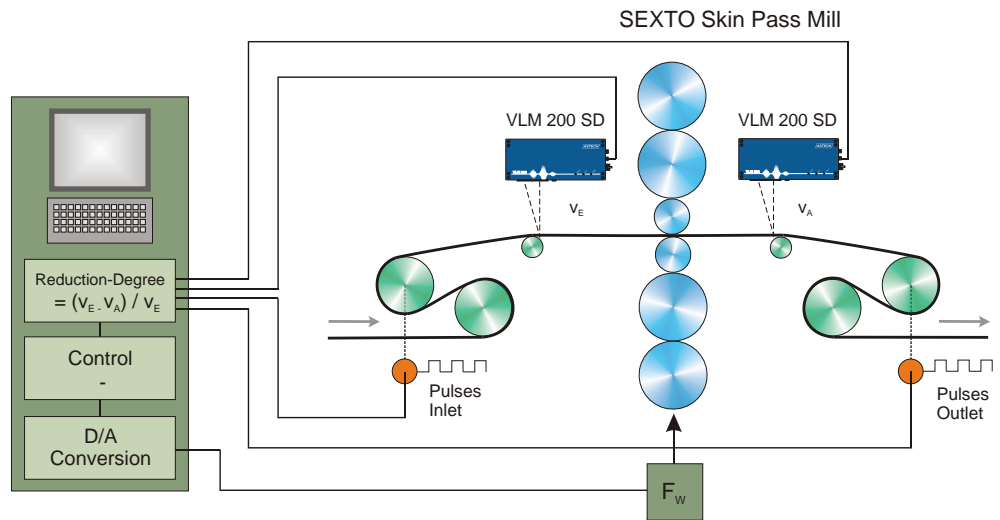
CB4b  
VLM 200 cooling and protection housings suitable for rolling mills

The project was carried out as an informal partnership under the direction of SIEMENS: ThyssenKrupp Stahl realised the mechanical construction of the measuring devices. SIEMENS undertook the technological integration, the electrical connection and the commissioning of the new equipment for high degree reduction control in the existing plant. ASTECH provided the measuring instruments. In addition, SIEMENS and ASTECH jointly developed the evaluation technique and required extensions.

### Execution suitable for rolling mills

The operation of the skin-pass mill stand within the continuous annealing line put particular high demands on technology and the suppliers. The plant runs night and day, whilst with the strip accumulator capacity, only brief stoppages of a few minutes possible. Consequently, the systems were first checked for their reliability during a long-time test of nearly a year. Thanks to the integration into the long-time recording system of Thyssen, the required proof of reliability was recorded.

The preliminary works were carried out while the plant was running without disturbing the



Basic design of reduction-degree control on SEXTO

production process. The main restructuring works were rapidly executed during periodical maintenance stoppage. The commissioning occurred within one shift so that the production could be resumed immediately after, to the complete satisfaction of the customers.

The measuring devices, in high-grade steel secondary protection housing, were mounted on the inlet and outlet side of the stand (see pictures). In order to achieve ultimate durability in the dirty

and dusty atmosphere, the instruments are purged with air, optimising the optical purity. This measurement can also be used in wet skin-pass stands.

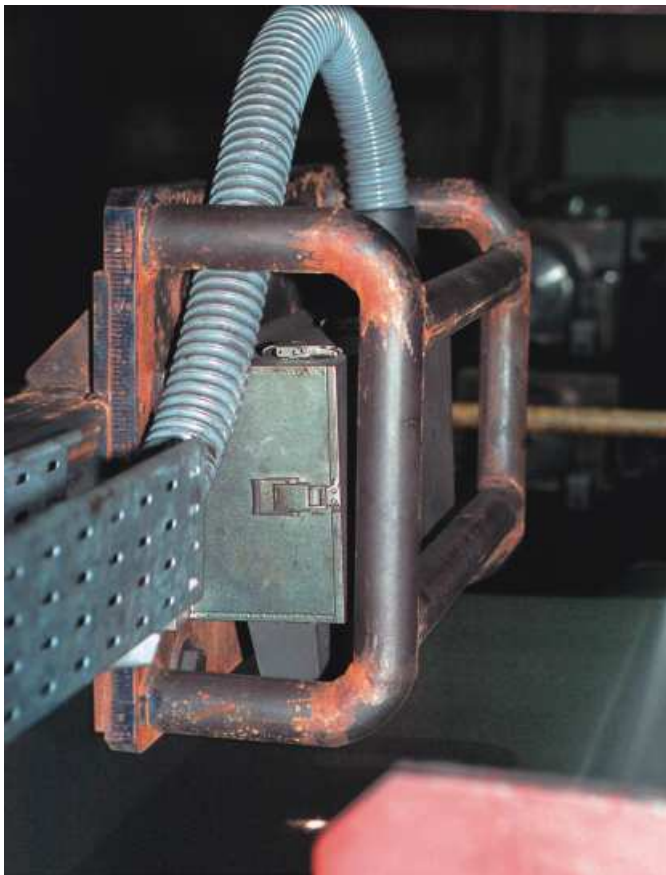
### Advantageous solution

As a result of the modernisation, the new quality of the contact-free measurement is confirmed by lower fluctuations in measured values in comparison with the old impulse measurement. Especially in the dynamic field, where in the case of speed changes, the advantages of the new technology become more evident. The averaging length was gradually reduced to 40 cm by the operator, with the same accuracy of reduction degree measurement (better than 0.1%). The triggered synchronous operation, the rapid hardware and the plausibility check of raw signals improved on the standards set up originally by the replaced laser technology. The new advantages are necessary in order to obtain and maintain close manufacturing tolerances for the production of metal sheet, both at small speeds and in the acceleration phases.

In addition to the already mentioned advantages, VLM 200 is as white light system in comparison with laser measuring instruments as well as being clearly cheaper with regard to investment and service costs. The utilised halogen lamp is very easily replaced by preventive maintenance during maintenance work. The amount of work needed for legal radiation protection (cutting-off and labelling the equipment) and the obligatory visit of the

radiation protection representative is unnecessary, since the halogen light is completely harmless.

Thus the presented solution is also a meaningful alternative for operators who, due to the relatively high costs, have been reluctant to use contact-free reduction-degree measuring systems up to now. ■



Measuring instrument VLM 200 SD, inlet side

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