



## Measurement of Thickness and Speed for Mass-flow Control at Krupp Thyssen Nirosta

In strip rolling, maintenance of the thickness tolerance of the end product is the decisive quality characteristic. In new equipment installation or modernisation projects, technological regulation by the mass-flow principle is used almost exclusively. Highly accurate thickness measurement and reliable, slip-free speed measurement are the prerequisites for implementing this modern control concept. Now, for the first time anywhere in the world, both thickness and speed measurement are combined in a compactly built measurement C-frame supplied by the Company IMS.



*C-frame for thickness- and speed measurement, right side*

The new System is already in practical use for the rolling of stainless steel strip at the Dillenburg cold rolling mill of Krupp Thyssen Nirosta (KTN), in a 20-roll stand manufactured by Sundwig. This solution, however, is particularly interesting for the aluminium

industry where compact technology is always an advantage because aggressive rolling emulsions greatly reduce the life of measurement instrumentation and accordingly entail much higher maintenance costs.

Owing to customers' strict thickness requirements and the wish to meet thickness specifications from as close to the beginning of the strip as possible, the task was to improve mass-flow regulation by no-contact measurement of the speed.

In close collaboration with the companies IMS and ASTECH, a multi-functional System was produced for the first time anywhere in the world, which combines the thickness and speed measurement devices in a single yoke. The thickness measurement unit, from IMS, consists of a single-channel X-ray device (X-ray tubes as emitters and ionisation chambers as detectors).

The KTN mill was already equipped with a mass-flow regulation System (Siemens) in which the new, no-contact speed measurement device had to be incorporated. Since the thickness measurement technology was also to be renewed, KTN decided to combine together the thickness and speed measurement Systems.

The thickness measurements work on the principle of transmission through the material. An X-ray or isotope beam coming from an emitter passes through the object being



*Control room of rolling mill no.3 at KTN Dillenburg*

measured and, attenuated by the thickness of the material, falls onto a detector (Ionisation chamber) specially developed by IMS. The measurement current flowing in the Ionisation chamber is proportional to the incident radiation and is therefore a measure of the material thickness to be determined.

For speed measurement, the VLM 200 SD was used. This is a compact speed sensor

determines the instantaneous strip speed and is therefore ideal for use in mass-flow regulation.

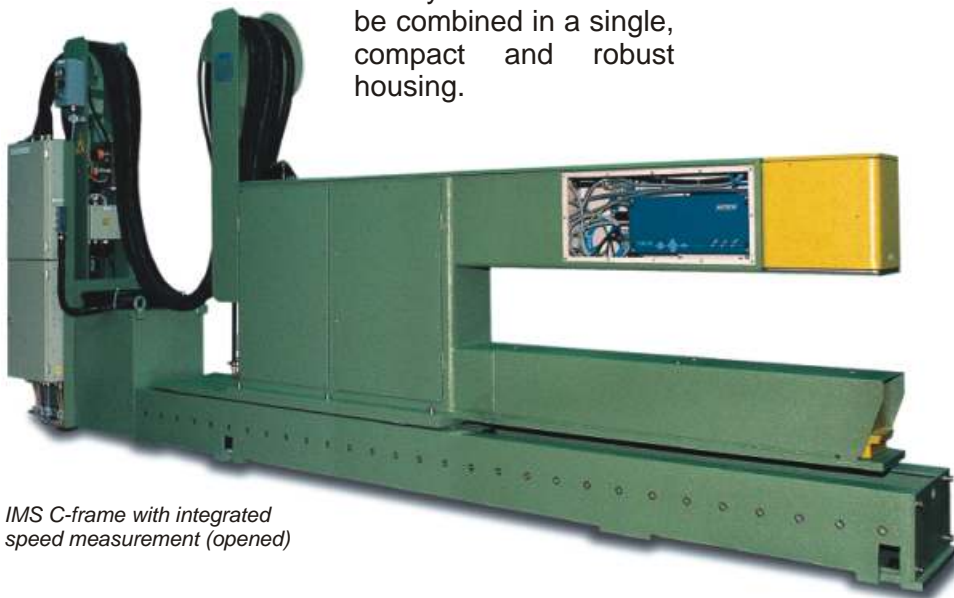
High-speed hardware enables the synchronisation of several units with the least possible lag, and so offers a guarantee of the highest precision, especially during acceleration stages of the strip. The use of highly integrated chip configurations gives a further advantage: the sensor, signal processing and a wide variety of interfaces can be combined in a single, compact and robust housing.



Roll replacement at the SUNDWIG 20-roll stand

and then made available as compressed data for the unit.

technology with a modern Siemens control System has enabled production results to be improved decisively. Under all rolling conditions and at any speed up to a maximum of 900 m/min, the Company's specifications have been fulfilled in a completely satisfactory way. ■



IMS C-frame with integrated speed measurement (opened)

from the VLM 200 family of instruments manufactured by ASTECH, which has already proved its worth many times in rolling mill applications. With an accuracy of 0.05% and a reproducibility of 0.03% the instrument

A signal processing System specially developed by ASTECH ensures that even at the highest rolling speeds all measured values can be processed, i.e. instantaneous values are registered on a microsecond time scale

### Convincing results

Two multifunctional yokes were installed, one on the run-in and one on the run-out side. The combination of non-contact measurement



Rolling mill at 800 m/min, left side

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