

Metals

Strip Tension Measurement and Tension Control



FMS: Application Capabilities

Materials	Processes	Advantages
Carbon steel	Cold milling	Reliability
Stainless steel	Levelling	Process stability
Aluminium strips	Pickling	Documented quality
Aluminium foil	Painting	Minimum waste
Copper	Annealing	Improved amortisation
Other non-ferrous metals	Galvanizing	No material tear
	Slitting	
	De-coiling	
	Re-coiling	

QUALITY



FMS: Top of the Line

All FMS force sensors offer the highest accuracy, reliability, and durability in the industry. Utilizing a combination of stainless steel construction, built-in mechanical hard-stop overload protection, and individual sensor performance verification, FMS sensors are perfect for all high performance strip tension measurement applications.

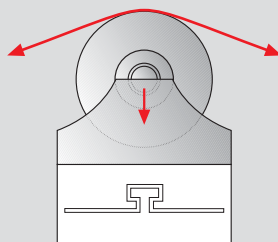
High accuracy foil type strain gauges mounted in a full Wheatstone Bridge configuration in each sensor perform the actual tension measurement. This in combination with the mechanical hard stop ensures the highest overload protection without the need for recalibration.



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FMS Strip tension measurement

The strip tension is measured on an idler roll. Via the wrap angle, the strip tension generates a proportional force whose horizontal or vertical component is measured by the force sensor.



FMS Measuring amplifier

The signals from the force sensor are transmitted to the measuring amplifier. The measuring amplifier is installed either in a sealed housing directly on the machine or designed into the controls cabinet.



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1 Strip tension measurement for de-coiler control of high-strength, high-grade steel strips.

2 Aluminium slitter. High and reproducible coil quality is achieved by strip tension controlled re-coiling.

3 Aluminium rolling mill for strip widths of up to 2,150 mm at production speeds of up to 2,000 m/min. Strip tension measurement for control in the milling process.

4 Leveller for high-grade steel strips.

5/6 Tension control in the strip mill system: The tension indicator roller that is equipped with SMGZ force measuring blocks is located directly before the re-coiler. The material tension is measured using the tension indicator roll. This measurement signal is transmitted via digital measuring amplifier to the control unit to control the drive. Using a dual-channel measuring amplifier, the individual sides, A and B, are measured and the lateral tension distribution in the strip can be analysed.

7 Very thin, high-strength, high-grade steel strips are flattened at high tensions on the stretcher-and-roller levelling system pictured. The tension measured prior to the leveller and on the re-coiler form the basis for controlling the machine in the „Level with Tension Control“ mode.



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FMS: Product Flexibility

FMS force sensors can be combined with any FMS measuring amplifiers and controllers. Both offer a high level of operational and functional security. FMS force sensors are suitable for strip tension measurement in dry or harsh environments including rolling oils. They are capable of processing from the strongest steel strips to the thinnest aluminium foils.

All requirements can be met by the variety of electronic units available. Several variations are available from cost-effective analogue amplifiers to fully integrated field bus connections with multi-channel measuring amplifiers.

FMS Strip tension measurement • Force sensors



SMGZ force measuring blocks for harsh environments

- IP 67 protected
- Rolling oil resistant
- For strip tensions > 1 MN
- Many dimensions available



UMGZ force measuring blocks for dry environments

- IP 42 protected
- For strip tensions > 1 MN
- Special versions up to 150 °C
- Many dimensions available



LMGZ force measuring bearings with integrated bearings

- Combines force sensor with bearing
- For strip tensions from 10 N to > 100 kN
- 20 times overload protection
- Special versions up to 150 °C



LMGZ.D double range force measuring bearings

- Extreme tension ranges up to 1:100 accurately measurable
- For strip tensions from 1 N to 20 kN
- High overload protection
- Special versions up to 150 °C

FMS Material tension measurement and control ● Measuring amplifiers and controllers



EMGZ 306A Analogue Tension Measuring Amplifier

- Standardised analogue outputs $\pm 10V$ und $0/4 \dots 20mA$
- No programming required
- Gain and offset setting by 20-turn trimmers
- Galvanic isolated



EMGZ 309 Digital Tension Measuring Amplifier

- 3 programming keys
- Two-line LCD each at 8 characters
- Available in housings for wall, rail and panel mount
- Auto-Calibration und Auto-Tare Weight
- Ethernet-capability
- Galvanic isolated



EMGZ 470 series digital field bus measuring amplifiers

- No analogue settings required
- All functions can be parameterised via field bus
- Compact IP 67 sealed versions
- Galvanically isolated
- DIN rail mountable versions



EMGZ 600 series digital measuring amplifiers

- Up to 4 measuring channels
- Monitoring with limit switches
- Field bus connection integratable
- Left / right reporting
- Integrated LCD display
- IP 54 sealed housing
- Galvanically isolated



CMGZ 600 series digital tension controller

- Combines measuring amplifier and tension controller
- Capable for coiler and intermediate drive control
- Field bus connection integratable
- Integrated LCD display
- IP 54 sealed housing
- Galvanically isolated



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