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The safety aspects of IMS gauges are described in detail in our system documentation, which is available as a written manual and on DVD. All system documentation is supplied in German or English. Other languages can be accommodated on request.

Technical specifications
The main IMS gauge specifications and gauge performance figures:

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measuring range</td>
<td>50 mm to 3000 mm</td>
</tr>
<tr>
<td>Profile measurement</td>
<td>100 mm to 2600 mm</td>
</tr>
<tr>
<td>Measuring accuracy</td>
<td>≤ ± 0.1%, not better than ± 0.2 µm</td>
</tr>
<tr>
<td>Statistical noise σ</td>
<td>&lt; ± 0.1% at T = 1 to 5 ms</td>
</tr>
<tr>
<td>Availability</td>
<td>≥ 99.5 %</td>
</tr>
<tr>
<td>Number of measuring channels</td>
<td>1 to 200</td>
</tr>
<tr>
<td>Detectors</td>
<td>Ionisation chamber, maximum efficiency 98 %</td>
</tr>
<tr>
<td>Type of radiation</td>
<td>X-ray radiation: 10 to 160 kV, Radioisotope radiation: Caesium Cs 137</td>
</tr>
<tr>
<td>Shutter unit</td>
<td>Pneumatic: air pressure to open (auto-close by return spring)</td>
</tr>
</tbody>
</table>

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You can also find brochures on other products in the download section of our internet site at www.ims-gmbh.de.
**Thickness and profile**

Increasing automation and continual improvements in production line-out in the ferrous and non-ferrous industries have resulted in demands for increased accuracy, higher quality of measurement, and lower costs of production. Measurement technology is key to ensuring compliance with industry standards, and is a critical factor in ensuring quality and cost-effectiveness of production processes. The choice of measurement technology is therefore an important consideration for any manufacturer.

IMS gauging systems are designed and engineered for long-term use in industrial applications. They are equipped with long-life detectors, ensuring high reliability and durability. The systems are configured to meet the specific requirements of each application, ensuring the best possible performance and cost-effectiveness.

**System configuration**

The standard configuration of an IMS thickness and profile measurement system is a C-frame. This frame is designed to provide a high level of performance, flexibility, and cost-effectiveness. The main components of the C-frame include the radiation source, detector, and signal processor. The radiation source emits a beam of radiation, which is absorbed by the material being measured. The detector measures the intensity of the radiation beam, and the signal processor analyzes the data to determine the thickness and profile of the material.

**Front-end measuring position**

The large variety of C-frame designs means that IMS gauging systems can be applied individually through the complete range of the line. The following examples show a typical example of the line of front-end measuring equipment available:

- Multi-channel gauge measuring positions on the line of C-frame (length profile)
- Multi-channel gauge measuring positions on the line of C-frame (cross-profile)
- Multi-channel gauge measuring positions on the line of C-frame (cross-profile, edge-drop profile)
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**Gauge operation and service & maintenance**

Gauge operation and service & maintenance functions are supported by a user-friendly monitor screen. The gauge is equipped with a service & maintenance interface, which allows the service personnel to perform routine maintenance and service tasks. The interface provides access to all diagnostic functions, allowing the service personnel to troubleshoot and resolve any issues that may arise.

**Optimizing heat exchange**

In order to optimize heat exchange, the radiation source and the gauging system are kept at a distance. The radiation source is designed to ensure continuous and complete coverage of the strip thickness. The measurement range of the radiation source is limited by the size of the C-frame, which is typically around 8 mm. The radiation source is designed to emit a radiation beam that is parallel to the strip, ensuring that the radiation beam is directed at the target material.

**Applications**

IMS gauging systems are used in a wide range of applications, including:

- **Steel industries:** They are used to measure the thickness and profile of steel sheets and plates.
- **Aluminum industries:** They are used to measure the thickness and profile of aluminum sheets and plates.
- **Plastics industries:** They are used to measure the thickness and profile of plastic sheets and plates.
- **Non-ferrous industries:** They are used to measure the thickness and profile of non-ferrous metals sheets and plates.

**Conclusion**

IMS gauging systems are designed and engineered for long-term use in industrial applications. They are equipped with long-life detectors, ensuring high reliability and durability. The systems are configured to meet the specific requirements of each application, ensuring the best possible performance and cost-effectiveness. The choice of measurement technology is therefore an important consideration for any manufacturer.
Thickness and profile measurement

The variety of gauge types available in this respect are high, operational requirements of the customer’s host computer and the gauging system are kept in perfect harmony. A standard Windows operating system, MMI = Operation and visualisation interface, FW = Remote maintenance/diagnostics, MU = Measuring transducer, HSG = High voltage generator.

In IMS gauges this detector also serves the radiation beam exit. The C-frame oscillates at a frequency of 20 Hz. Overall thickness measurement of the complete cross-strip profile is performed by the C-frame equipped with a number of ionisation gauge detectors. The C-frame oscillates on an elliptical path. The outer radius of the C-frame is 1600 mm, the centre of the elliptical path is at a distance of 20 mm from the strip. Each profile channel provides a monitoring signal (the measuring signal) which is proportional to the thickness of the strip. The measuring signal is converted into a digital signal in a measuring transducer, which is located in the control cabinet. It is then transmitted to the gauge signal processing computer at different TOP/IFs. The output signal from the gauge computer is a signal representing the raw signal from the gauge.

Today’s gauging systems are equipped with modern x-ray technology. The x-ray signal from a radiation source passes through an absorber (e.g. the strip). A detector located at the other side of the strip measures radiation intensity. In IMS gauges the detector always takes the form of an ionisation chamber, designed specifically for the application. The radiation passes either through the strip or by absorption by the strip material. The remaining, i.e. non-absorbed radiation serves as the detector. The detector measures the intensity of the radiation and produces an ionisation current (the measuring signal) which is proportional to the thickness of the strip. The ionisation current is converted into a digital signal in a measuring transducer, which is located in the control cabinet. It is then transmitted to the gauge signal processing computer at different TOP/IFs. The output signal from the gauge computer is a signal representing the raw signal from the gauge.

Front-end measuring position

The large variety of C-frame designs means that IMS gauging systems can be applied individually, through-out the plant and at different points in the world – through interpretation of gauge output from the host computer and communication interfaces.

Depending on the application, thickness and profile gauging systems can be supplemented by additional measurements from the IMS product range.

Multi-channel profile gauge

- Multi-channel profile gauge measurement
- Speed and length measurement
- Gauge operation and service & maintenance
- Additional operator stations and external peripherals such as printers, chart recorders and display devices can be integrated into the gauging system. All types of interfaces are provided for data communication between the customer’s host computer and the IMS gauge computer. The modular design of the gauge hardware and software offers considerable flexibility in terms of system configuration.

A standard Windows operating system allows the operator to work in a familiar environment. Gauge operation and service maintenance functions are supported by user-friendly menus. Gauging system performance can be analysed and problems diagnosed remotely – from our own plant in Germany or from the customer’s plant. For multi-line operation, detection circuits are monitored for pressure, temperature and flow.

Measuring principle

IMS gauges operate on the principle of transmission radiation. In a typical radiation measurement system, radiation is produced from a radiation source (e.g. the strip). A detector located at the other side of the strip measures radiation intensity. In IMS gauges the detector always takes the form of an ionisation chamber, designed specifically for the application. As the radiation passes through the strip or is absorbed by the strip material, the remaining, i.e. non-absorbed radiation serves as the detector. The detector measures the intensity of the radiation and produces an ionisation current (the measuring signal) which is proportional to the thickness of the strip. The ionisation current is converted into a digital signal in a measuring transducer, which is located in the control cabinet. It is then transmitted to the gauge signal processing computer at different TOP/IFs. The output signal from the gauge computer is a signal representing the raw signal from the gauge.

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Thickness measuring systems in various production lines

Thickness measuring system in hot-rolled mill: C-frame oscillates at a frequency of 20 Hz. Overall thickness measurement of the complete cross-strip profile is performed by the C-frame equipped with a number of ionisation gauge detectors. The C-frame oscillates on an elliptical path. The outer radius of the C-frame is 1600 mm, the centre of the elliptical path is at a distance of 20 mm from the strip. Each profile channel provides a monitoring signal (the measuring signal) which is proportional to the thickness of the strip. The measuring signal is converted into a digital signal in a measuring transducer, which is located in the control cabinet. It is then transmitted to the gauge signal processing computer at different TOP/IFs. The output signal from the gauge computer is a signal representing the raw signal from the gauge.
Various production lines and the increasing automation and continual improvements in production have resulted in the need for measuring systems in the gauging systems used in the production processes in addition to the material qualities of formability and strength, other criteria of high-precision are dimensional accuracy, flatness and surface quality.

Innovative development in the field of thickness and profile measurement systems has enabled IMS to face this challenge and contribute greatly to improvements in the quality and compliance of products.

IMS business systems are used in cold and hot-roll applications in the steel, aluminium and other non-ferrous industries. They usually consist of a front-end measuring position, a computer system for measuring signal processing and external peripherals. They are normally also equipped with data archiving systems for statistical analysis and evaluation for quality control purposes.

Increasing automation and continual improvements in production breaks and downtimes.

New gauging systems are developed and engineered with full regard to the technical requirements of the customer. The new gauges used by IMS are customised to the specific application by IMS for each particular customer, thereby ensuring optimum heat exchange. All cooling circuits are monitored for pressure, temperature and flow.

Gauging Systems?

Exactly how reliable are your gauging systems?

In IMS gauges this detector also allows the operators to work in a familiar environment.

A standard Windows operating system allows the operator to work in a familiar environment.

Gauge operation and service maintenance functions are supported by user-friendly menus. Gauging system performance can be analysed and problems diagnosed remotely – from our main plant in Germany to any location in the world – through interrogation of gauge operation parameters from a remote communication interface.

Depending on the particular application, thickness and profile gauging systems can be supplemented by additional measurements from the IMS product range.

In IMS gauges optical fibre scanning technology is used for the principle of transmission radiation. In isotope gauges optically emitted radiation is converted from a radiation source through the measuring object (tip of the strip). An X-ray detector positioned on the other side of the strip measures the radiation intensity. In IMS gauges this detector always takes the form of an ionisation chamber, designed specifically for the application. As the radiation passes through the strip some of it is absorbed by the strip material. The remaining, unabsorbed radiation serves as the detector. The detector measures the intensity of the radiation and produces an ionisation current (in the measuring signal) which is proportional to the thickness of the strip. The ionisation current is converted into a digital signal in a measuring computer.

To obtain optimum measuring results the radiation beam exit and entrance windows – after the radiation sources and before the detectors – must be cleaned on a regular basis. residences are Optimised for each particular measurement task. For example, an isotope gauge is equipped with an adequate supply of clean air in the form of a blower. This is normally of particular interest in the strip mill.

In IMS gauges all gauging systems are equipped with manual and automatic performance monitoring facilities for the determination of repeatability and correct gauge operation. The gauges are optimised during production to ensure that measurement is within tolerances.

The IMS multi-channel profile gauge provides measurement of the thickness profile across the full width of the strip. The arm of the C-frame is equipped with a number of radiation sources and detectors depending on the application. In profile gauges with two radiation sources, the remaining radiation intensity is measured from a radiation source passes through the measuring position with a radiation source and an electronic charge storing housing an integrated computer system for measuring signal processing. Additional operation stations and variable peripherals such as printers, chart recorders and display devices can be integrated into the gauging system. All types of interfaces are provided for data communication between the customer’s host computer and the IMS gauge computer. The modular design of the gauge hardware and software offers maximum flexibility and cost effectiveness.

A large variety of C-frame designs is available, each with its specific application (clean and oil-free). The cooling medium for the gauge computer is a separate air supply.

Today’s gauging systems are equipped with modern x-ray technology. The high radiation output of X-ray gauges is such that the signal noise is very much smaller that from an isotope gauge. The X-ray energy can be optimised for each particular application by calculation of the high-voltage supply to the X-ray source. As a result of this optimisation a very high measuring accuracy is achieved at very low measuring time constants.

Another advantage of x-ray gauges over isotope gauges is that an x-ray radiation can be switched off during production breaks and downtimes.

Flattening

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Technical specifications
The main IMS gauge specifications and gauge performance figures:

- Measuring range:   maximum 180 mm
- C-frame air gap
- Thickness measurement: 50 mm to 3,000 mm
- Profile measurement: 100 mm to 2,600 mm
- C-frame throat depth
- Thickness measurement: 350 mm to 6,000 mm
- Profile measurement: 500 mm to 4,000 mm
- Measuring dynamics
- Measuring time constant: 1 to 10 ms, adjustable
- Measured value processing cycle time: 1 to 10 ms
- Measured value output cycle time: 1 to 10 ms
- Measuring position air wipe: High performance blower 400 V, 21 kW, or compressed air
- Power supply: 230/400 V AC, 50/60 Hz, maximum 5 kVA
- Weight:   Maximum ca 10 t

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