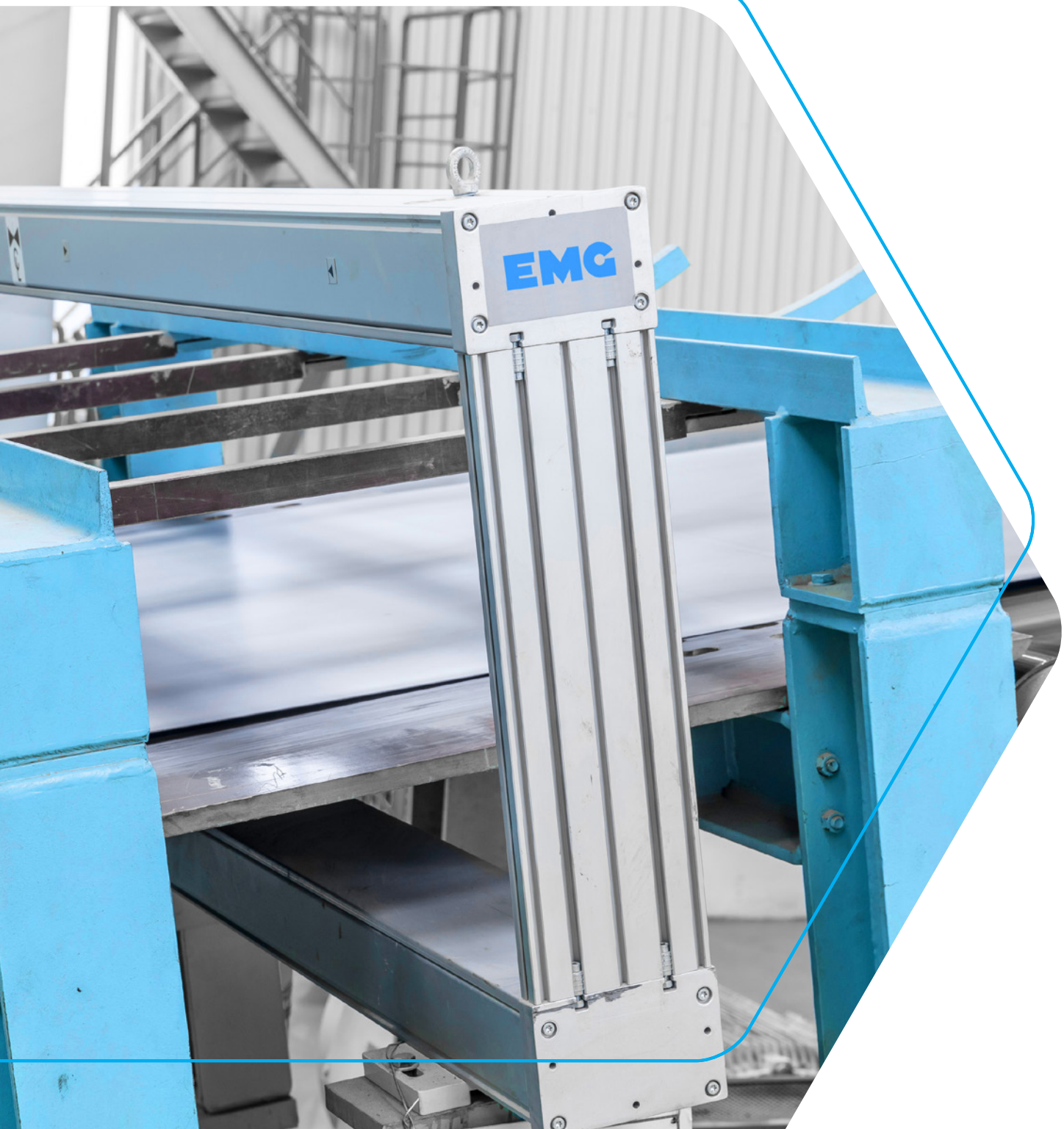
perfecting your performance

EMG Strip Guiding
Applications



EMG Strip Guiding

Basis for an optimum strip guiding system

Reliable strip guiding prevents damage to the product or even the production line and enables the strip to run through the treatment process evenly.

Due to ever higher quality demands and very high availability with few operating and maintenance personnel the requirements here are constantly increasing, which is also reflected in the required qualities of the strip guiding systems and their components.

The reliable determination of the strip centre position is always the most important goal for all strip guiding solutions.

After decades of experience and with approx. 1500 strip guiding systems sold per year, EMG has a wide range of sophisticated optical, inductive and radar-based sensors to realise this goal.

Depending on the customer's requirements and the respective installation situation, we will put together the ideal solution package for you.

Contact us!

- digital inputs / outputs
- analogue inputs / outputs
- Profibus-DP slave
- Ethernet OpenModbus / TCP server
- ProfiNet I/O device

- servo valve
- electro-servo-cylinder
- hydraulic power units

EMG Strip Guiding

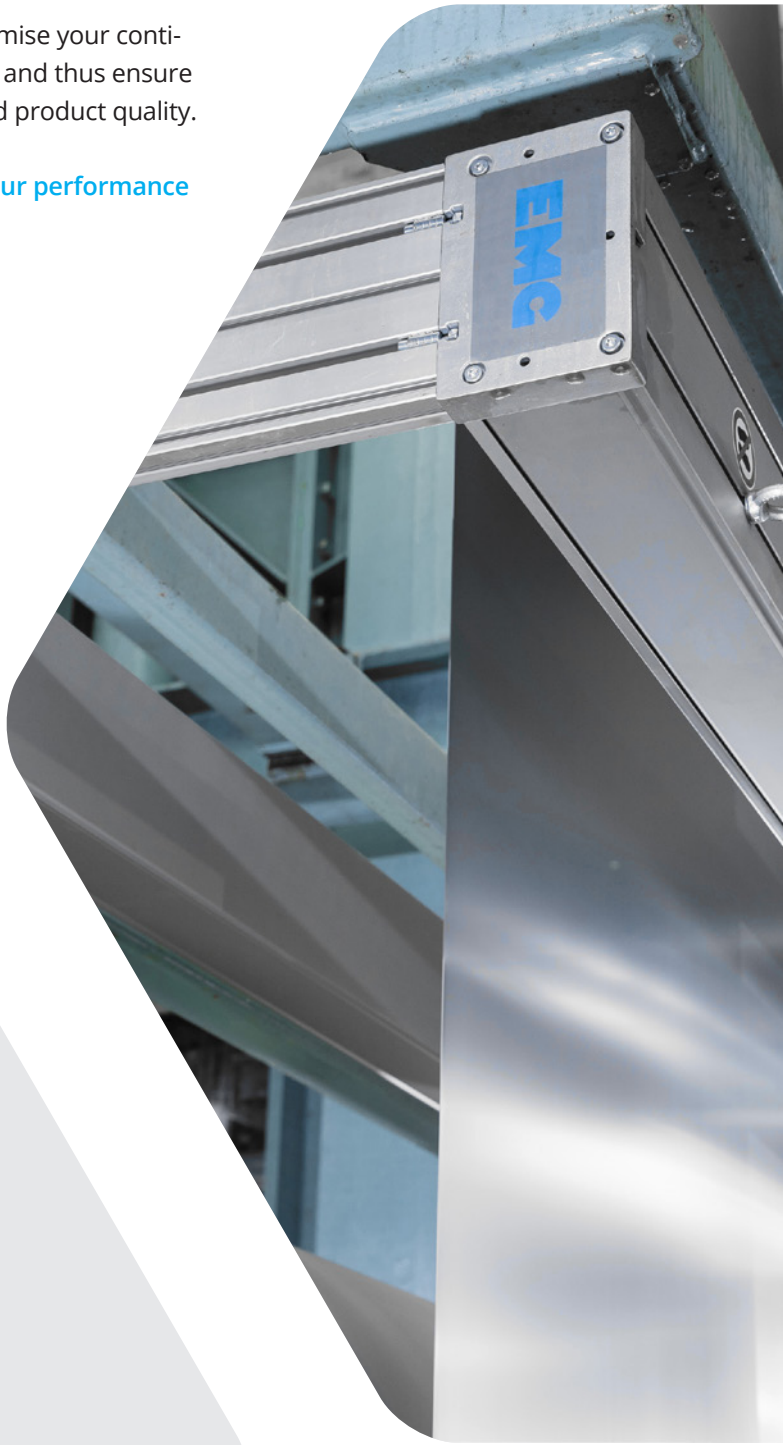
The perfect solution for each application

Whether on the uncoiler, recoiler or trimming shear - EMG strip guiding systems are always the ideal choice!

With us, you get everything from a single source! We manufacture all individual components from the areas of sensors, electronics and actuators in-house and combine them to suit your application.

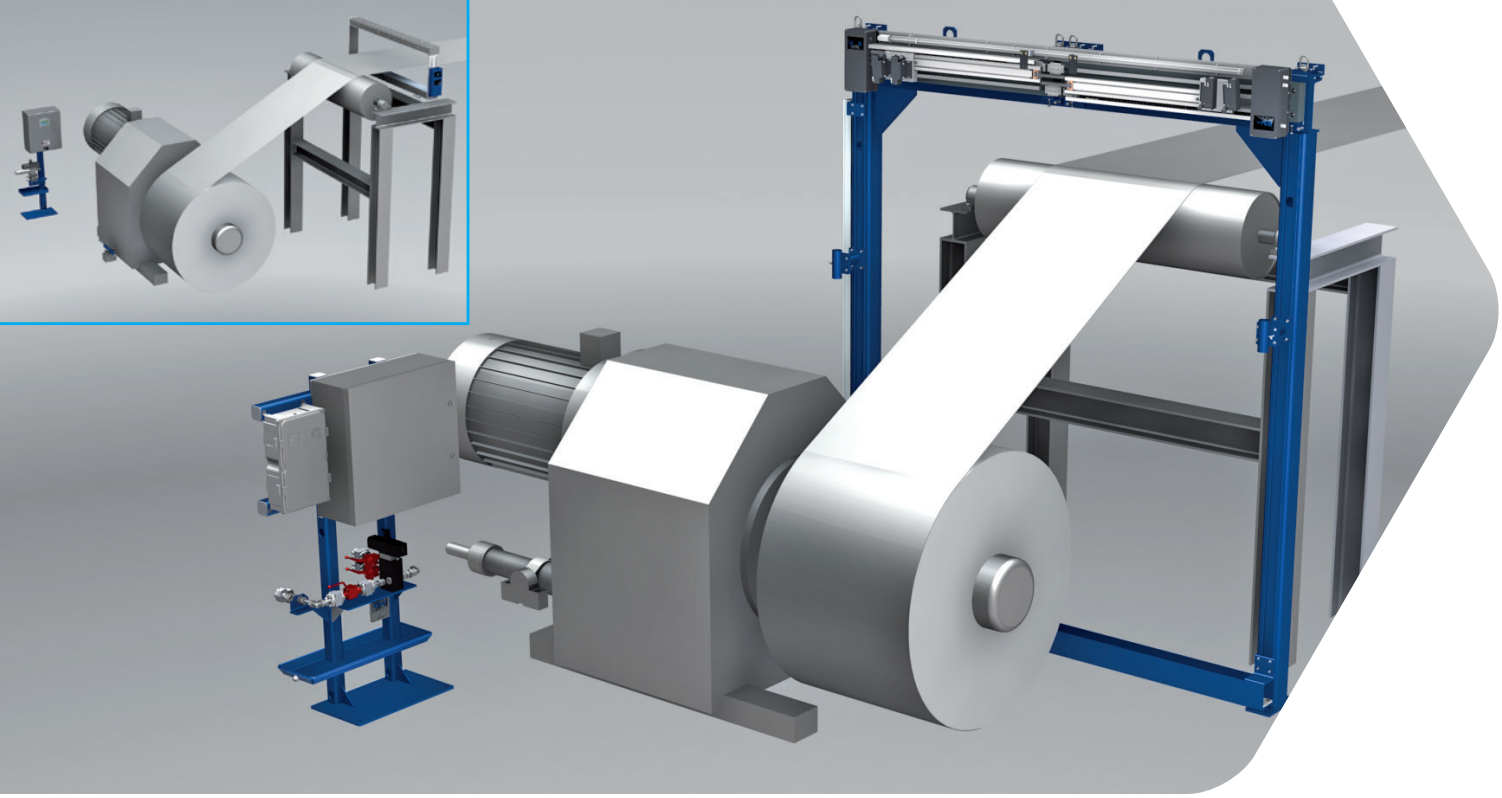
We control and optimise your continuous strip tracking and thus ensure the best process and product quality.

EMG - perfecting your performance



EMG Strip Guiding

As a rule, an EMG strip guiding system consists of a selection of components, such as sensors, electronics and actuators.



EMG Bandlaufregelung

Strip guiding on the uncoiler

Application / Function principle

If a strip centre or strip edge guiding system is provided on the uncoiler, the uncoiler moves the coil, from which the strip is being uncoiled, transversally to the line axis and thus acts against lateral deviation of the strip. Deviation of the strip from the reference position is detected by the sensing equipment and transmitted to the electronic control amplifier. The output of the amplifier continuously activates a servo valve which moves the hydraulic cylinder of the uncoiler accordingly, so that the uncoiled strip is returned to the position preselected on the sensing equipment. For control reasons, the sensing equipment should detect any strip deviation close to the uncoiler. The high-frequency alternating light sensing equipment, which is impervious to ambient light, allows a maximum distance between the receivers and the light source of 4 m.

For production lines with a side trimmer or slitter installed immediately downstream of the deflector roll, we can offer an alternative by coupling the uncoiler and the deflector roll mechanically or electro-hydraulically. This design has the advantage that a very high guide accuracy is achieved when using a high-precision measurement, for example the SMI-HE inductive strip centre measurement, or directly in front of the shear.

In lines where the distance to the trimming or slitting knives is greater, an additional steering unit should be installed upstream of the knives and connected to the uncoiler control system, see: High Quality Twin (HQT) system.

Modern fully automated lines, with coil handling equipment in close proximity to the mandrel, frequently leave insufficient space for the sensor, and it has to be positioned after the deflector roll (anchor point). Thus a time delay between the movement of the mandrel and an answer in the sensor is generated. This leads particularly at slow strip speeds to control loop instability.

By using a method patented by EMG which takes into account the strip speed which holds the mandrel in a position control loop a stable control system is possible (see little picture above).

EMG Strip Guiding

Strip Centring
on welding machines and strip joiners

Application:

In the entry area of continuous strip processing lines the tail end and the head end of two strips are joined together, this is carried out using welding or strip joining machines, depending on the material and gauge of the strip and on the line design.

Modern welding or strip joining machines include systems for fully automatic centring upstream and downstream of the welding or strip joining machine. Mechanical centring devices are mainly used but there is a high risk of damaging the strip edge.

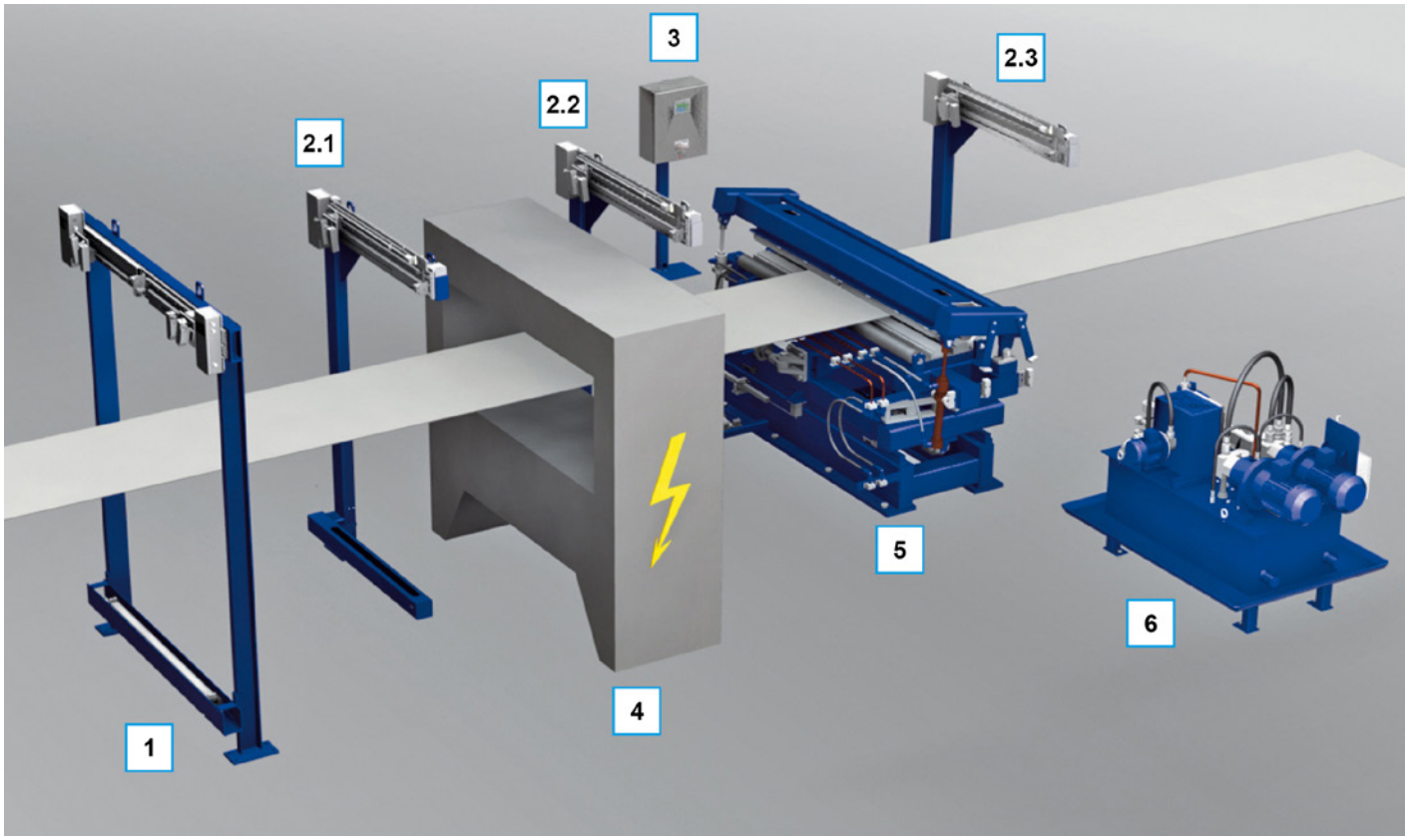
Functional principle:

The illustration below shows the space-saving EMG solution for the alignment of the passed strip end to the new strip head. It is very successfully used - especially for retrofitting.

The strip width for the passed strip and for the new strip is measured with the optical sensor system BREIMO [1] in front of the welding or stitching machine. In addition, the position of the head of the new strip is determined with the edge position sensor EVK [2.1] and additionally the angular position of the new strip is determined by taking into account the BREIMO values.

The centring of the passed strip in relation to the strip axis and angular position of the new strip is then carried out via a centring frame [5], which picks up and centres the strip with one or, in the case of thicker strips, with two clamping bars. The position and angular position of the passed strip is measured using two further EVKs [2.2] and [2.3].

The system can also be designed for bringing the strip head of the new strip in line with the strip tail end of the passed strip.



EMG Bandlaufregelung

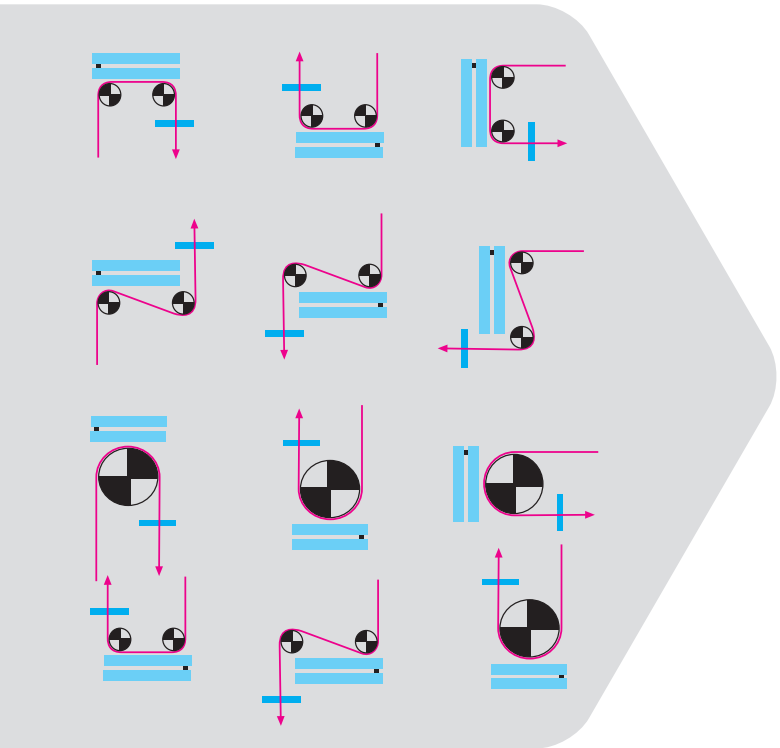
Guide Frames - Proportional Guide

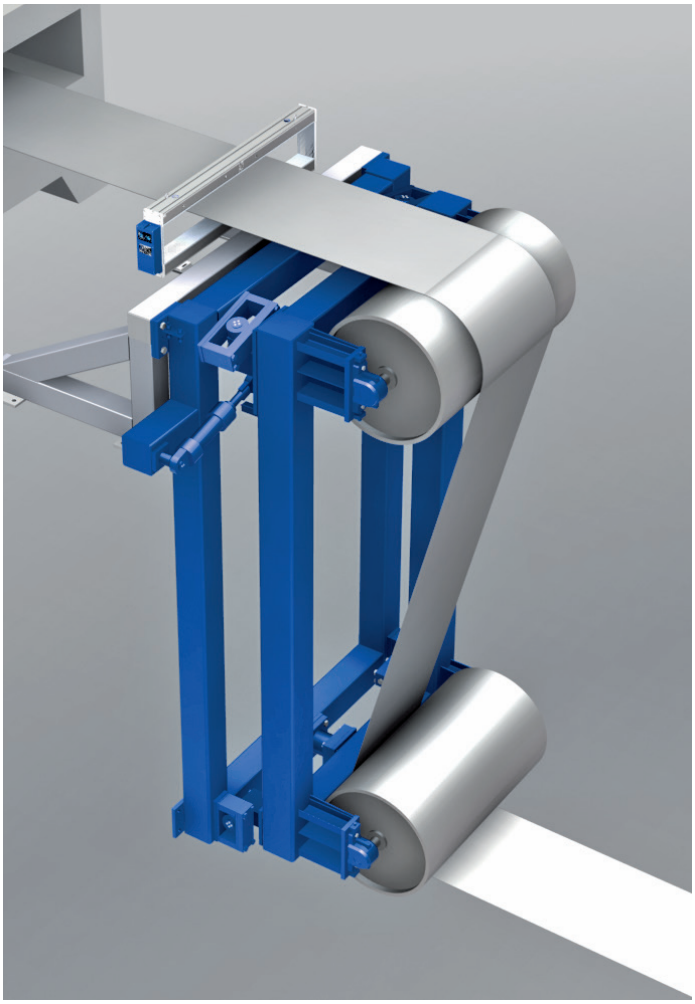
Application:
The two deflector rolls required for bridging strip pass line between accumulator and strip process section are used together with the SRD steering unit, which acts merely proportionally. This type of steering unit can be installed in tight line areas, as it only requires very short free entry and exit spans to the next deflector rolls.

Functional principle:
The strip centring effect is such that the steering unit rotates around a pivot in the plane of the incoming strip, whereby the outgoing strip is shifted laterally. If the incoming strip is misaligned, the correction cannot be seen on the steering unit rolls but the outgoing strip will be corrected to the predetermined point. Movement of the strip is corrected proportionally to the regulating distance of the adjusting frame - the incoming and the outgoing strip forms a right angle with the swivelling plane.

The maximum correction capability is determined by the distance between the incoming and the outgoing strip pass line level.

The maintenance-free inductive strip centre sensing system type SMI is installed immediately downstream of the steering unit.





EMG Strip Guiding

Guide Frames - Integral Guide

Application:

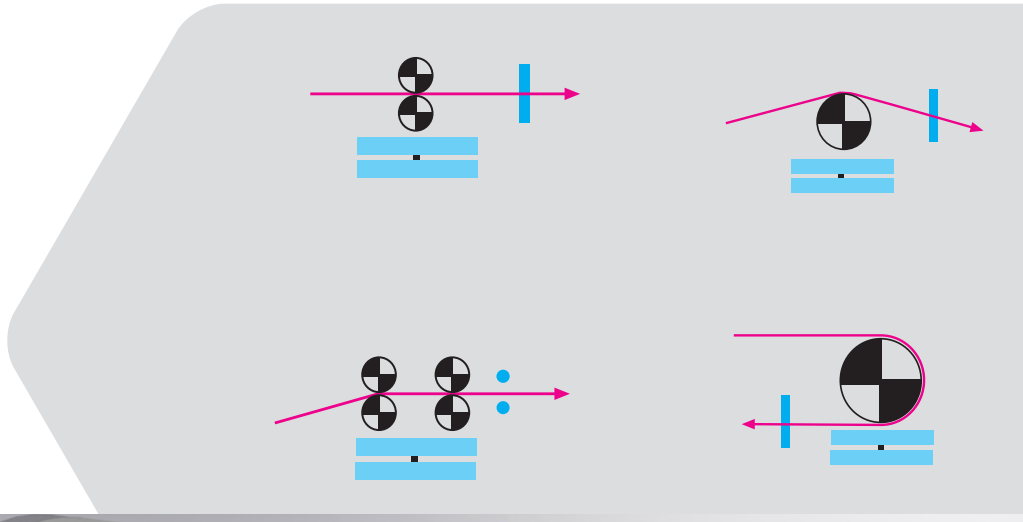
Integrally acting guiding rollers can be used if strip guiding is planned after a longer infeed section.

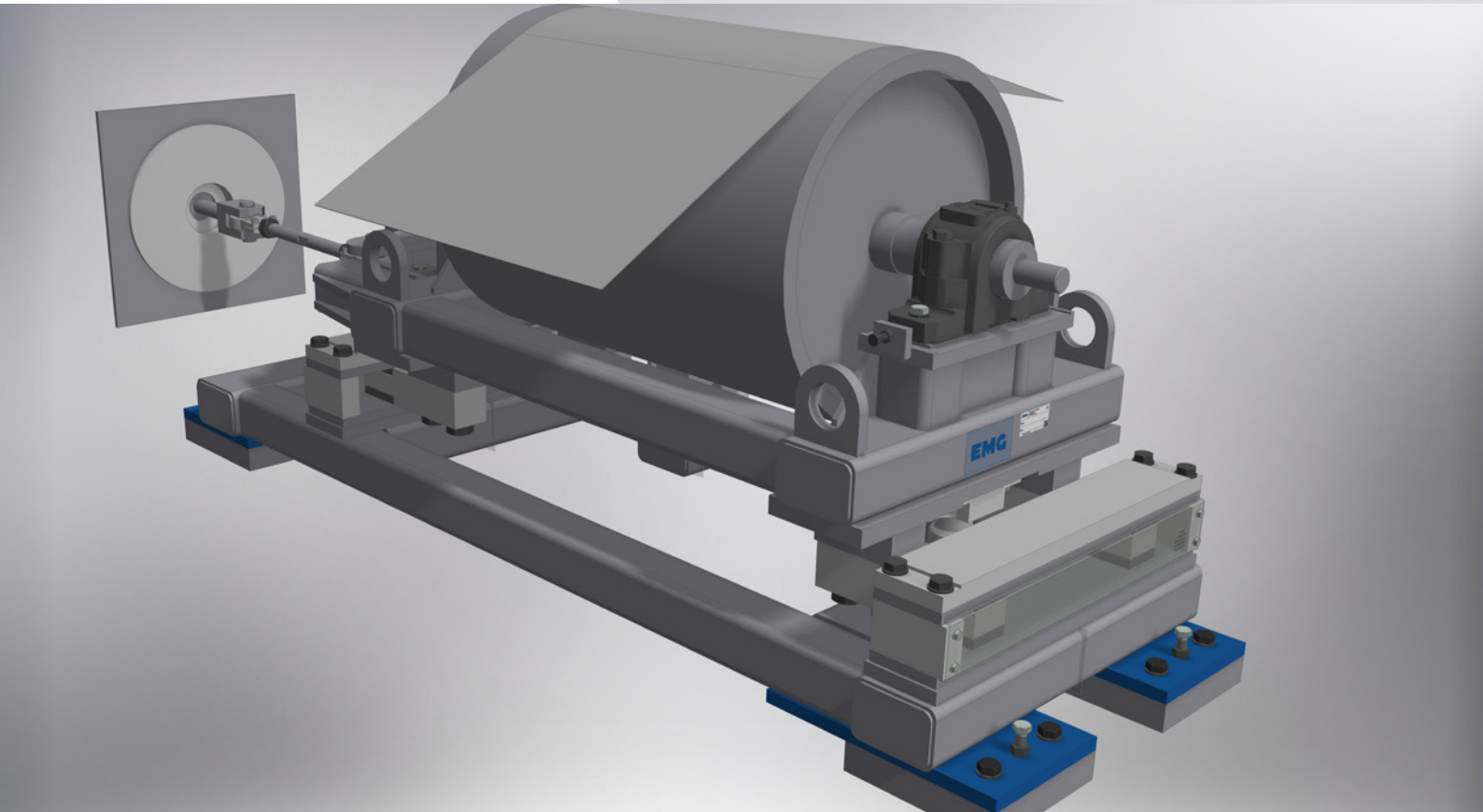
Functional principle:

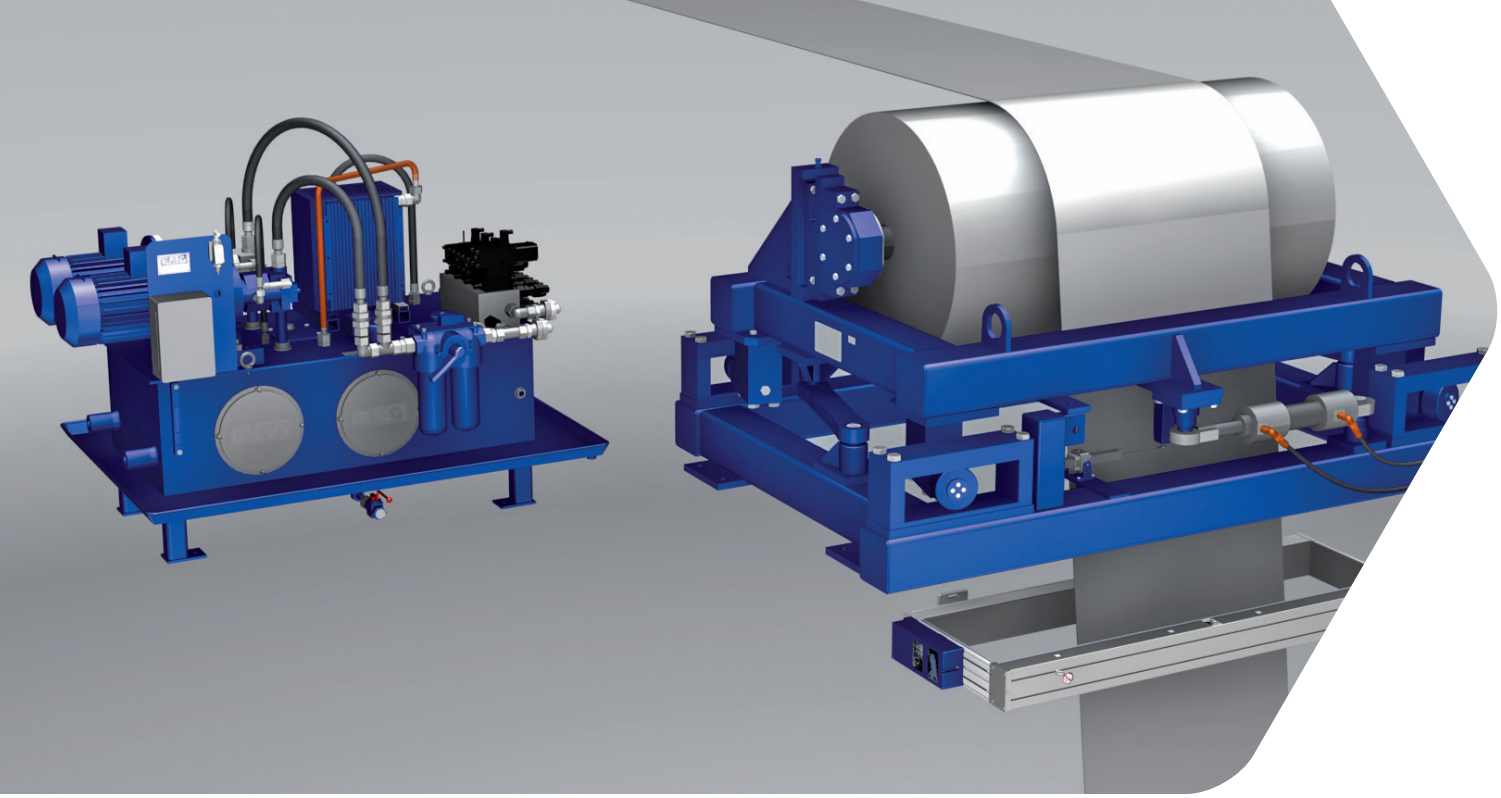
The rotating axis of the guide roll is vertical to the incoming strip direction. The angular displacement of the roll towards the incoming strip creates the steering effect. This wrapping effect at the steering roll keeps the strip in the centre position and is stopped when the roll axis and the strip axis of the incoming strip forms a right angle.

The lateral correction capacity of a pure integral steering guide is defined by the maximum rotation angle from the centre position and the strip entry span, which is partly influenced by the wrapping effect as precentering of the incoming strip.

With a pure steering guide, for example end pivot or centre pivot type frames, overshoot and oscillation of the roll may occur. For that purpose, the EMG electronic feedback system guarantees a stable operation without overshoot.







EMG Strip Guiding

Proportional integral steering guide

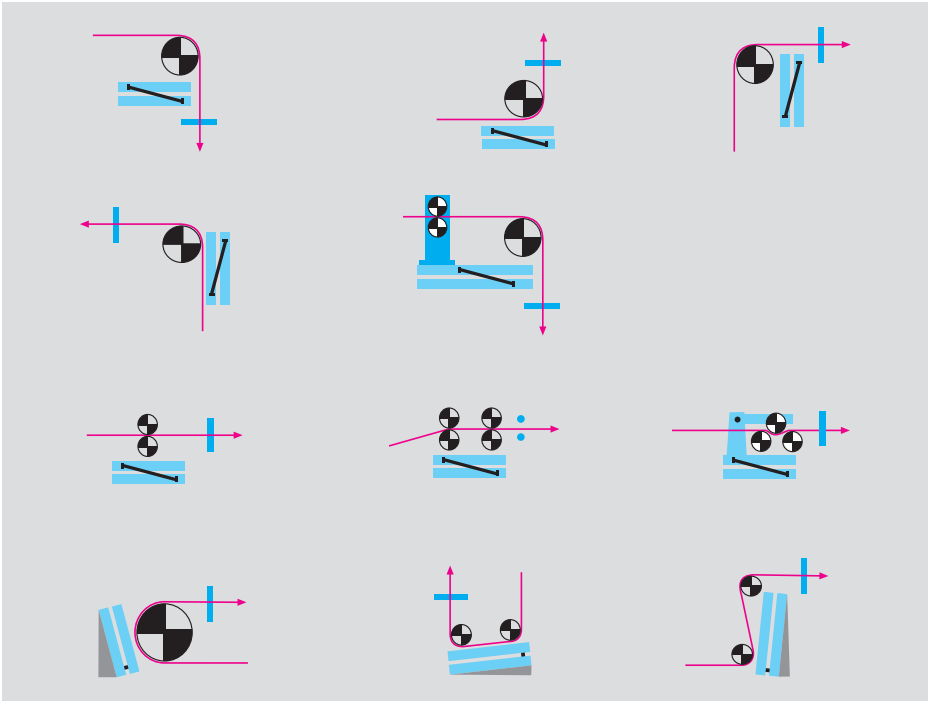
The function of the SRH steering unit is to feed the strip in a well centred manner into the strip accumulator.

Application:

Following travel over a long free strip entry span, major strip deviations may be corrected on a 90° deflector roll equipped with this guiding system, making use of the advantages of the wrapping effect. For the exit span, twice the maximum strip width is sufficient. In the case of long entry and exit span, the system can also be used together with a 180° deflector roll.

Function priciple:

The tilting frame with its deflector roll is guided by two steering levers so that a suitable combination of the angle between the strip and the roll axis (I portion) and lateral displacement of the strip (P portion) is achieved. In addition to obtaining the exact position of the strip at the exit, a centring effect is also achieved at the entry span.



EMG Strip Guiding

Guiding System High Quality Twin (HQT)

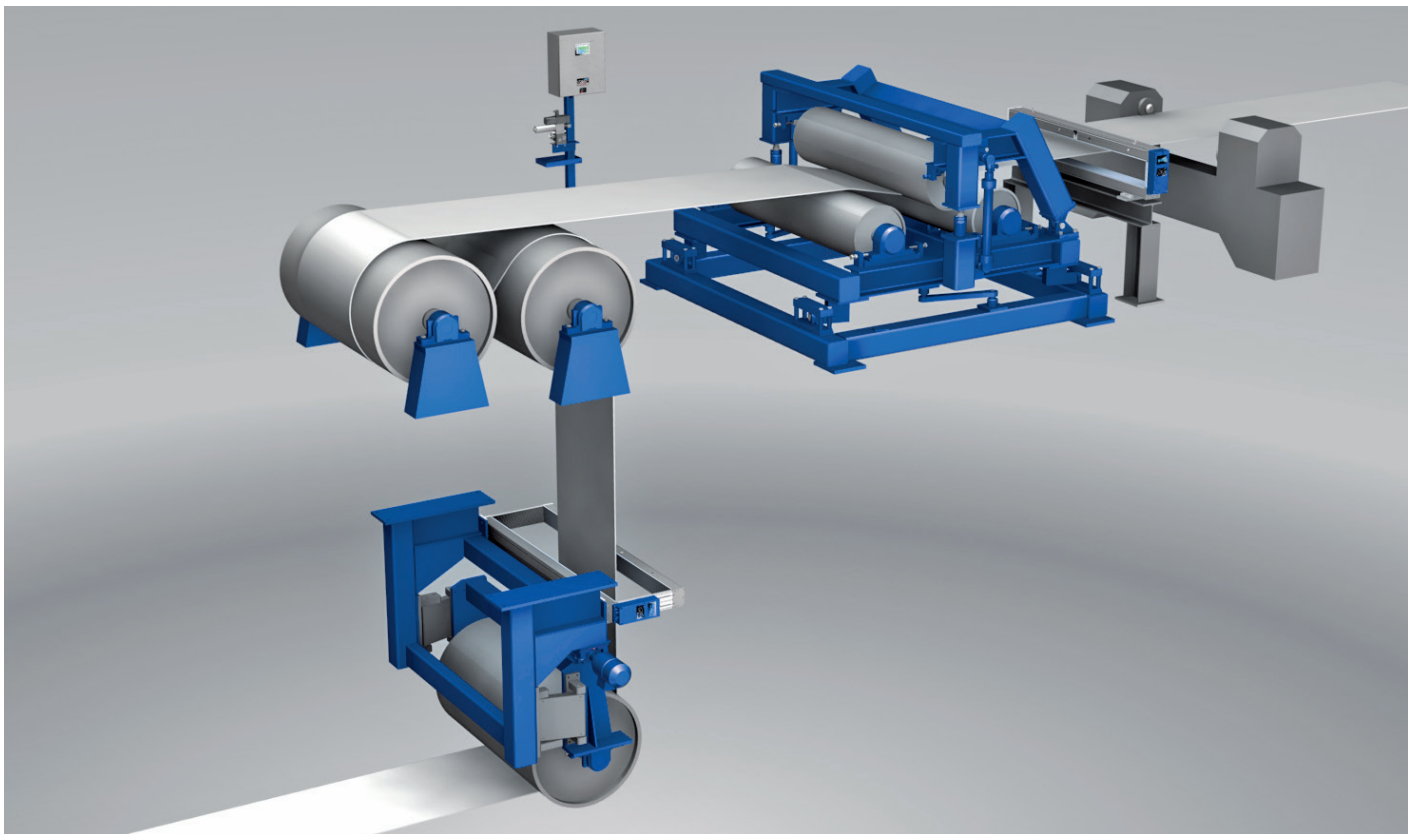
Application:
The HQT system is used where high-precision guiding of the strip is required, e. g. upstream of side trimmers or slitters. It is composed of two independent strip guiding systems, i. e. either guiding on the uncoiler together with the next steering unit or two strip guiding systems in a processing line.

Functional principle:
The first strip guiding system (rough guiding) corrects the incoming strip as far as possible. The second strip guiding system (fine guiding), which corrects subsequent slight deviations, is installed immediately upstream of the critical area.

Any strip deviation causes the fine steering unit to counteract and correct the strip. This movement is continuously monitored.

By taking into account the strip speed and distance between the two guiding systems a variable offset is generated and automatically fed back to the rough steering unit to offset the strip guiding position. This ensures a strip entering the fine steering unit very close to centre and nearly under 90° at the trimmer knives.

The fact that the second guiding system carries out only slight corrections makes the system suitable for use on installations where the strip entry distances are relatively short.



Strip guiding in front of a side trimmer with three-roll steering unit type SRHT

Application:

In the case of high strip tensions and/or thick strip it is recommended that a strip guiding system with a three-roll steering unit type SRHT is used for correcting strip travel without deflection of the strip. Achieving a good steering effect necessitates sufficient friction between strip and rolls. The degree of friction is determined by the roll diameter and the dive in position of the mid-roll.

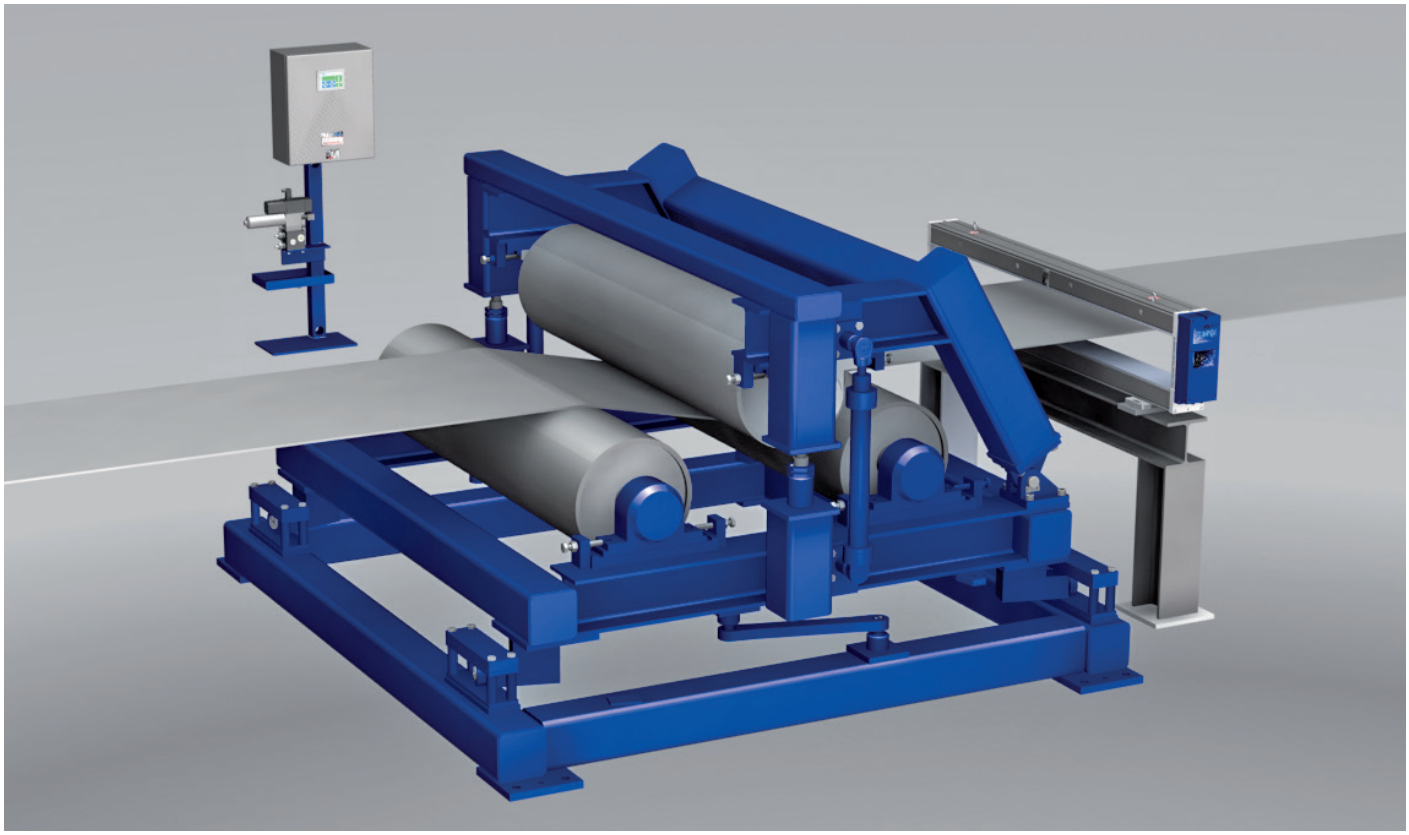
Functional principle:

The swivelling frame with the three rolls is guided by two steering levers so that a suitable relationship between the angle formed between the strip and the roll axis (I portion) and lateral displacement of the strip (P portion) is achieved.

In addition to obtaining the exact position of the strip at the exit, a centring effect is also achieved at the entry span. The application shown here with a very short entry distance can only be realised in combination with an upstream strip guiding system.

The most stringent requirements concerning exact guiding of the strip are imposed in the area of side trimmers.

On the one hand, the width of the edge to be cut off must be kept as small as possible, and on the other hand, there must be a defined minimum width to prevent the cut edge from tearing off. For exact sensing of the strip position, the high-precision inductive strip centre sensing system type SMI-HE as shown here or the HF alternating light measuring system, impervious to ambient light, is recommended.



EMG Strip Guiding

Strip guiding on the recoiler without a mechanical link

Application:

Strip guiding on the recoiler ensures coils with straight lateral surfaces, which prevents damage to strip edges during further transport and handling. To achieve this aim, strip edge guiding systems are generally used. Strip centre guiding systems are recommended when the strip is coiled with natural edges and when the strip will be centrally fed to further processing stages.

Since the strip does not always leave the processing area at the same point, the recoiler follows lateral strip deviation in order to ensure straight-edge recoiling.

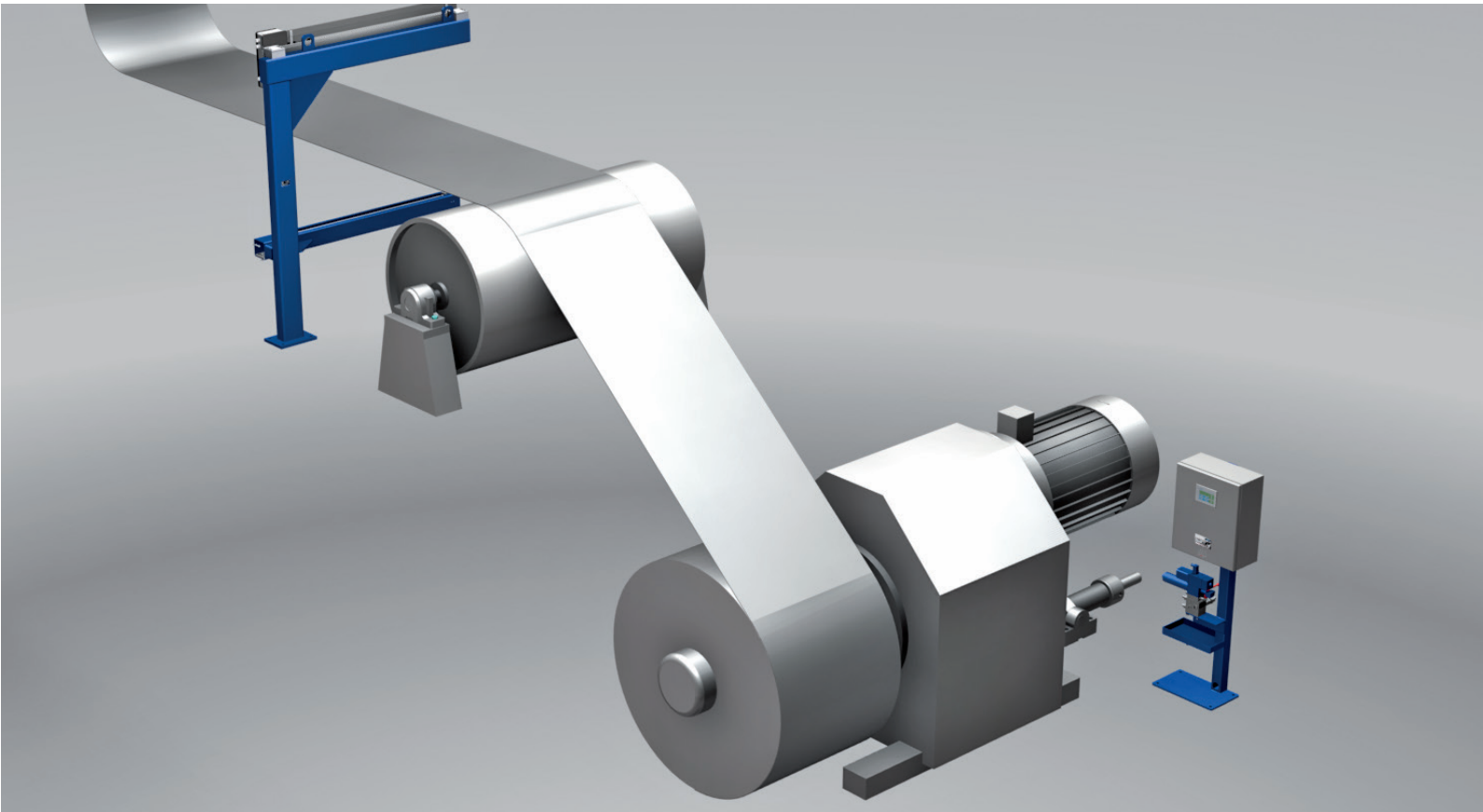
Functional principle:

Strip edge sensing systems for recoilers must always be installed in the immediate vicinity of the deflector roll and be connected to the movable part of the recoiler.

This connection may be mechanical or, as shown in this example, electronic synchronising of sensor and recoiler movement may be used.

In addition, it is of utmost importance that the strip does not slip or incline on the deflector roll. An adequate wrapping angle on the deflector roll and sufficient and stable strip tension must ensure that the strip closely follows the roll contour. Large roll diameters are recommended.

For the recoiling of strip with slightly thickened edges, which is likely to occur when applying a surface coating, the strip position controller is extended to generate a stagger winding pattern in the coil build up. A constant pattern of the coil edge is achieved when taking account of the recoiler revolutions and the strip thickness.



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