Metal Processing

Industry Application

Overview

Coil coating, steel, and aluminum processing involve heavy, rigid webs in harsh environments defined by oil, vibration, and impact. Roll-2-Roll delivers robust sensing capable of managing the extreme physical characteristics of metal strips. With **environmental robustness** and a **Vision System in a Sensor Package** design, our sensors reduce maintenance and downtime while fitting where bulky C-frames cannot.

The Engineering Challenge

Metal processing combines heavy mechanical forces with difficult optical properties.

- **Camber:** Metal strips often have a "banana" curve. This creates immense lateral forces. Measuring this camber in real-time is crucial for steering the uncoiler.
- **Reflection (Glare):** Polished metals reflect light like a mirror (specular reflection), blinding standard optical sensors that rely on diffuse reflection.
- **Physical Durability:** Sensors must withstand accidental impact from heavy strips and operate in oily environments.

The Roll-2-Roll Technical Advantage

We combine rugged hardware with smart optical filtering and **installation advantages**.

- **Reflective Surface Handling:** Roll-2-Roll's Spatial Filtering technology manages specular reflection effectively. It ignores the glare and locks onto the scattering from the edge, ensuring stable guiding on polished aluminum or steel.
- **Abrasive Environment Ready:** Because the sensor uses 1:1 optical magnification and advanced algorithms, it can be mounted further away from the web (up to 3 inches in some cases) to avoid damage from abrasive metal strips or web flutter.
- **Wide Sensor Range:** With sensor widths up to 960 mm, the system can measure strip curvature (camber) continuously without mechanical tracking or motorized positioners.
- **One-Sided Mounting:** In vertical accumulators or annealing lines where two-sided frames are impossible to mount, the Roll-2-Roll one-sided sensor mounts easily to the machine frame.

Key Applications

1. Camber Detection

Using wide-range sensors to measure the strip curvature (camber) continuously. This data drives the uncoiler to pivot and compensate, preventing telescoping rolls and side-wall damage.

2. Vacuum Coating Operations

Roll-2-Roll® sensors are robust enough to operate inside vacuum chambers, making them ideal for metal coating or metallizing processes where standard sensors fail. Ideally suited for accumulator & annealing lines.

3. Strip Width Measurement

Used for measuring the width of metal strips during converting or manufacturing. The **Linear Optical Technology** provides distortion-free imaging for repeatable validation of the final product width.

Supported Web Guiding Solutions

Heavy-duty control for high-tension metal processing.

- **Center Guiding:** The preferred method for coil processing. Two sensors track the strip edges to keep the coil centered entering the furnace or coating head, regardless of width variations.
- **Unwind & Rewind Guiding:** Hydraulically or electromechanically shifts the heavy uncoiler/recoiler to ensure the strip feeds straight and winds perfectly, preventing telescoped coils.
- **Edge Guiding:** Used for edge trimming operations where the strip must be positioned precisely relative to the knives to minimize scrap.

Technical Comparison

The "Scanner vs. Laser Pointer" Analogy: Comparing an Roll-2-Roll Sensor to a standard photo-eye is like comparing a flatbed scanner to a laser pointer. Glare from polished metal blinds a standard photo-eye (laser pointer) like a mirror reflecting into your eye. The Roll-2-Roll sensor (scanner) uses spatial filtering to "see through" the glare, focusing only on the scattered light from the physical edge of the strip.

- **Glare:** Blinds standard optics. Roll-2-Roll uses **Spatial Filtering** to ignore specular reflection.
- **Mounting:** Requires heavy C-frames. Roll-2-Roll uses **One-Sided Beam Mounting**.
- **Camber:** Difficult to track with narrow sensors. Roll-2-Roll's **Wide Sensor** tracks full movement.
- **Durability:** Standard sensors are fragile. Roll-2-Roll is built for **Harsh Environments**.