Metal Processing

Industry Application

Overview

Coil coating, steel, and aluminum processing involve heavy, rigid webs in harsh environments defined by oil, vibration, and impact. R2R 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 R2R Technical Advantage

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

- **Reflective Surface Handling:** R2R'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 R2R 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 accurate 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 R2R 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 R2R 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. R2R uses **Spatial Filtering** to ignore specular reflection.
- **Mounting:** Requires heavy C-frames. R2R uses **One-Sided Beam Mounting**.
- **Camber:** Difficult to track with narrow sensors. R2R's **Wide Sensor** tracks full movement.
- **Durability:** Standard sensors are fragile. R2R is built for **Harsh Environments**.