Flag Detection

Documentation

Flag detection identifies defect flags, markers, and edge protrusions that indicate quality issues in roll-to-roll production. Roll-2-Roll Technologies provides intelligent sensors that detect flags automatically while ignoring normal web movement like flutter or wander—preventing false alarms that plague standard photo-eyes. The system triggers reject mechanisms or marks the location of the defect, ensuring defective material is removed before it reaches the customer.

The Challenge: Missed Flags and False Alarms

Manually flagging defects during production creates downstream problems:

- **Flags Fall Off:** Adhesive flags placed by operators often detach during winding, causing the defect to pass unnoticed to the customer.
- **Narrow Sensor Windows:** Standard photo-eyes with 10-20mm viewing areas miss flags when the web wanders outside the narrow detection zone.
- **False Alarms from Web Movement:** Traditional sensors trigger on normal web flutter or edge wander, creating nuisance alarms that operators learn to ignore.
- **Manual Inspection Failures:** Relying on operators to manually inspect and flag every roll is time-consuming and prone to human error.

The Solution: Intelligent Flag Detection with Motion Filtering

The Roll-2-Roll® Controller (or a 1DC Series sensor) processes the sensor image to separate true flags from normal web movement.

How It Works

1. **Wide Viewing Area:** Sensors with viewing areas up to 960mm detect flags even during significant web wander
2. **Flutter Immunity:** The system ignores short-duration events caused by web flutter or temporary edge movement
3. **Flag Length Threshold:** Operators set minimum flag length (e.g., 10mm) to trigger detection, filtering out noise

4. **Automatic Marking:** When a true flag is detected, the system triggers reject mechanisms or logs the defect location

Key Advantage: Intelligent filtering eliminates false alarms while ensuring no actual flags are missed—critical for high-value materials like battery electrodes or medical films.

Key Benefits

- **Eliminate Missed Defects:** Automated detection replaces unreliable manual flagging
- **No False Alarms:** Intelligent algorithms distinguish flags from web flutter and wander
- **Wide Detection Zone:** Captures flags across the full web width, even during movement
- **Automatic Defect Removal:** Triggers reject mechanisms to ensure defective material doesn't reach customers
- **Data Logging:** Records defect locations and timestamps for quality traceability

Applications by Industry

- **Battery Manufacturing** — Detect flagged electrode defects (tears, coating voids) to prevent defective cells from entering assembly.
- **Nonwovens** — Identify flagged areas where web breaks or contamination occurred during production.
- **Converting & Packaging** — Detect flags marking splice locations, thickness variations, or print defects.
- **Medical Device Manufacturing** — Ensure no flagged defects enter sterile packaging lines.
- **Film Extrusion** — Monitor rewind stations for flags indicating gels, contamination, or gauge variations.

Related Solutions

- Splice Detection — Detect tape splices and butt joints
- Surface Defect Detection — Automated detection of holes, tears, and voids
- Edge Detection — Monitor web position and edge quality