Splice Detection

Documentation

Splice detection identifies tape splices, overlaps, and butt joints as they move through converting, printing, and coating machinery. Roll-2-Roll Technologies provides sensors that detect splices automatically—including transparent splices on clear webs—preventing splice-related damage to downstream equipment and ensuring splice-free product delivery to customers. Unlike standard photo-eyes that struggle with clear materials, our sensors detect the subtle density and thickness changes that indicate a splice.

The Challenge: Undetected Splices Cause Damage and Quality Failures

Splices are necessary to join rolls during production, but they create significant problems:

- **Equipment Damage:** Splices entering printing presses, laminators, or coating dies cause damage to expensive plates, dies, and doctor blades.
- **Customer Rejections:** Splices in finished product packaging create visual defects and structural weak points that fail quality inspections.
- **Clear-on-Clear Detection Failure:** Traditional photo-eyes cannot detect transparent splice tape on clear films—the most common scenario in flexible packaging.
- **Manual Flagging Waste:** Operators manually flag splices with colored tape, but flags are often missed or fall off, allowing splices to pass undetected.

The Solution: Automated Splice Detection with Material Intelligence

Roll-2-Roll splice detection sensors analyze the full width of the web, detecting density changes, thickness variations, and edge irregularities that indicate a splice.

How It Works

1. **Full-Width Scanning:** The sensor captures a 1D image across the entire web width
2. **Density Analysis:** Advanced algorithms detect the subtle density change where splice tape overlaps the web
3. **Edge Irregularity Detection:** Butt splices create edge disruptions that the sensor identifies instantly
4. **Automatic Flagging:** When a splice is detected, the system triggers reject mechanisms or marks the location for removal

Key Advantage: Detects clear-on-clear splices that defeat standard photo-eyes. Works on opaque, transparent, and porous materials without calibration.

Key Benefits

- **Prevent Equipment Damage:** Stop the line before splices enter expensive downstream equipment
- **Eliminate Customer Rejections:** Ensure splice-free product delivery by rejecting spliced sections automatically
- **Detect All Splice Types:** Identifies tape splices, butt splices, and hidden double-sided tape
- **Works on Clear Films:** Detects transparent splice tape on transparent webs—the "Holy Grail" of splice detection
- **No Manual Flagging:** Automated detection eliminates reliance on operators manually flagging splices

Applications by Industry

- **Flexible Packaging Converting** — Prevent splices from entering pouch making equipment. Protect printing plates and coating dies.
- **Label Printing** — Detect splices before they damage expensive flexo plates or digital print heads.
- **Battery Manufacturing** — Remove spliced electrode sections that create cell performance inconsistencies.
- **Medical & Pharma** — Ensure splice-free packaging for sterile medical devices and pharmaceutical products.
- **Film Extrusion** — Monitor rewind stations to detect splices in incoming rolls before they enter the extruder.

Related Solutions

- Edge Detection — Monitor web edge position
- Flag Detection — Detect flags and markers
- Surface Defect Detection — Detect holes, tears, and contamination