Thread Counting

Documentation

Thread counting monitors individual threads, strings, or narrow webs as they move through textile, composite, and converting machinery. Roll-2-Roll Technologies provides high-resolution line scan sensors that count threads with statistical precision, measuring individual widths, spacing, and detecting missing threads in real time. Unlike mechanical counters or photo-eyes that provide only binary counts, our sensors deliver rich data analytics—width distributions, gap measurements, and quality metrics—essential for maintaining consistent textile and composite production.

The Challenge: Manual Thread Counting and Quality Blind Spots

Traditional thread monitoring creates operational inefficiencies and quality risks:

- **Manual Counting:** Operators manually count threads during setup—time-consuming, error-prone, and impossible to verify continuously during production.
- **Binary Counters:** Photo-eye counters detect "thread present/absent" but cannot measure thread width, spacing uniformity, or detect partial breaks.
- **No Statistical Data:** Without width and spacing measurements, manufacturers cannot detect process drift or predict quality failures.
- **Missing Thread Detection:** By the time a missing thread is noticed, significant off-spec material has already been produced.

The Solution: High-Resolution Thread Monitoring with Statistical Analysis

Roll-2-Roll thread counting sensors use line scan camera technology to create a one-dimensional image of the thread array, measuring each thread individually.

How It Works

1. **Line Scan Imaging:** The sensor captures a 1D image across the thread array
2. **Individual Thread Detection:** Advanced algorithms identify each thread edge and measure its width
3. **Gap Analysis:** The system measures spacing between threads
4. **Statistical Output:** Real-time statistics on thread count, average width, width distribution, and gap uniformity

Key Advantage: A single wide-area sensor (up to 960mm) monitors dozens of threads simultaneously, providing complete coverage without multiple individual sensors.

Key Benefits

- **Automated Thread Counting:** Eliminates manual counting during setup and changeovers
- **Width & Spacing Measurement:** Detects when individual threads are too wide, too narrow, or unevenly spaced
- **Missing Thread Detection:** Instantly alerts operators to broken or missing threads before significant waste
- **Statistical Process Control:** Width distribution data enables predictive quality management
- **Multi-Thread Monitoring:** One sensor tracks 5+ threads, strips, or narrow webs simultaneously

Applications by Industry

- **Carbon Fiber Manufacturing** — Count and measure individual tow widths during spreading. Detect gaps that reduce structural integrity.
- **Textiles & Weaving** — Monitor warp thread count and spacing. Detect broken threads in high-speed looms.
- **Narrow Web Slitting** — Measure multiple slit lanes simultaneously. Verify all strips are present and within tolerance.
- **Tape Manufacturing** — Count parallel adhesive strips. Measure width consistency across multiple lanes.
- **Composite Layup** — Monitor fiber tow placement. Ensure no gaps or overlaps in automated layup systems.

Related Solutions

- Web Width Measurement — Continuous width monitoring
- Edge Detection — High-precision position measurement
- Defect Detection — Detect tears, voids, and surface defects