



Continental Belt Monitoring Systems

Conveyor Belt Protection Devices and
Inspection Services



Continental

As a global leader in conveyor belt manufacturing, Continental conveyor belt solutions help to protect your investment, maximize efficiencies and prevent workflow interruption. We offer a wide range of monitoring systems to take your efficiency to the next level. With damage detection, wear measurements and cover damage mapping, Continental supplies you with important data to help keep your operation up and running.



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Conveyor Belt Diagnostic Technologies

Continental Conveyor Belt Monitoring Systems generate an overall picture of conveyor belt health. Our reliable belt monitoring tools can easily be adjusted to accommodate the typical changes that occur over the life of a conveyor belt. Easy to interpret belt condition reports are objectively generated by Continental's monitoring software.

THE RIGHT MONITORING SYSTEM FOR EVERY CONVEYOR SYSTEM.

- › Best-in-class sensor technology
- › Reliability and high quality data output
- › User-friendly graphical interfaces

Our web-based monitoring technologies can be accessed via an Ethernet network connection, making it available to multiple users. The user-friendly interface features easy to understand, on-demand reporting. Remote online technical assistance utilizing global experts is available with external system connectivity.



Magnetic Systems

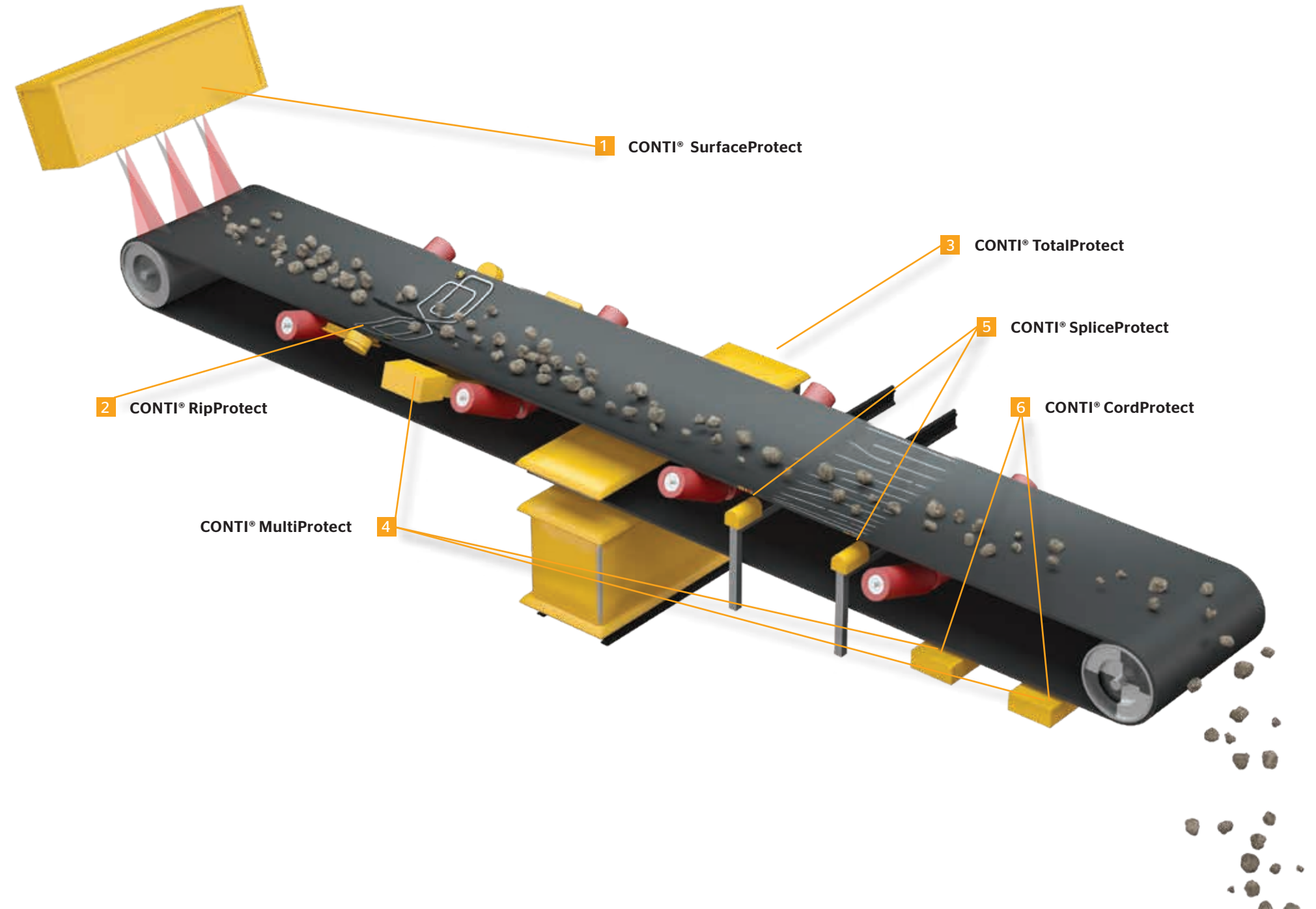
Premier steel cord monitoring that detects the magnetic properties of both the load bearing steel cord elements of the belt, as well as the embedded sensor components.

- › CONTI® CordProtect
- › CONTI® MultiProtect
- › CONTI® SpliceProtect
- › CONTI® CordInspect

Inductive Systems

Inductively monitors regularly spaced embedded antennas (loops) for damage generated by longitudinal rip events.

- › CONTI® RipProtect Plus



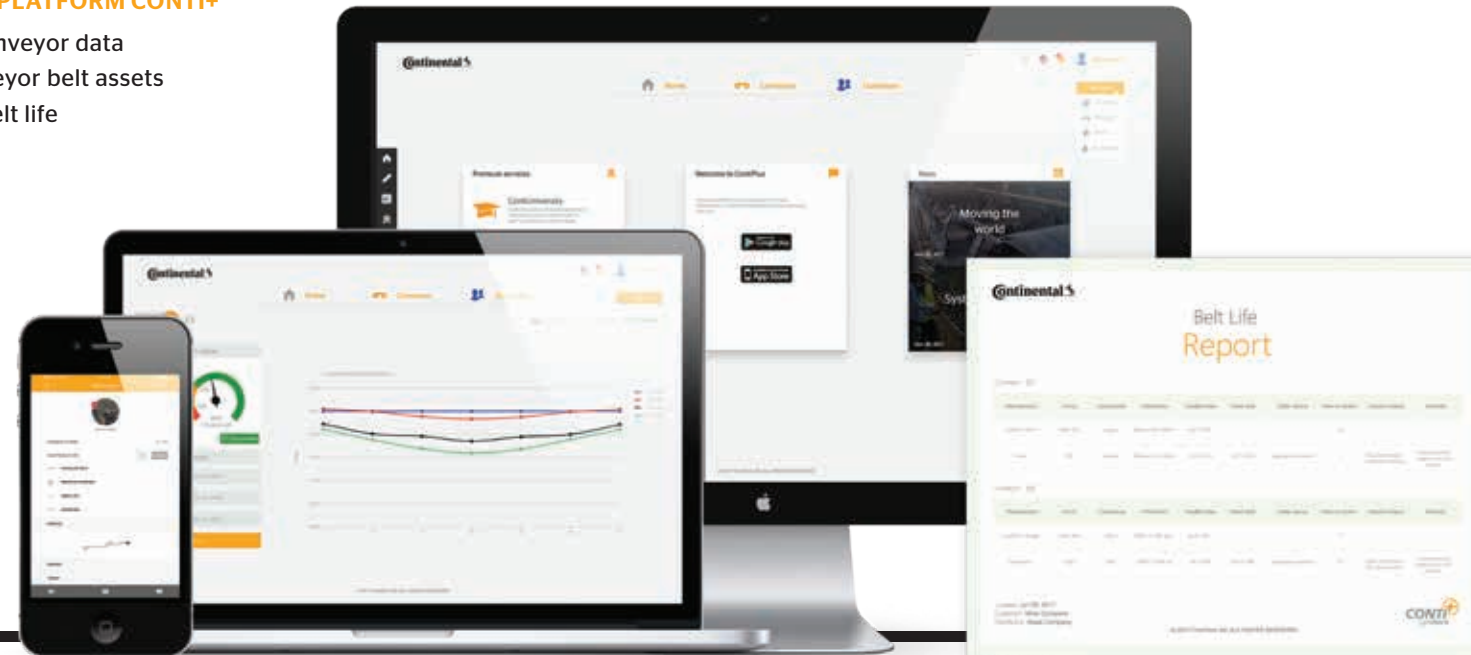
Predictive Maintenance with CONTI® Monitoring Systems

Industrial and mining applications move heavy loads that can be very abusive on conveyor belts. In addition to impact and abrasive effects of the material being conveyed, the conveyor belts are often subjected to conditions that cause damage, such as trapped material due to spillage, chute plugs, overloading, slip and other common issues. In these environments, keeping the belt running is crucial for economic efficiency and success. If there is a long-term shutdown of a critical conveyor system, the entire production chain often goes down, resulting in enormous financial losses.

CONNECTION TO OUR SERVICE PLATFORM CONTI+

- › Access current and historical conveyor data
- › Download reports on your conveyor belt assets
- › Predict or estimate remaining belt life
- › Upload pictures or reports
- › Generate savings reports

Check belt health status online



Innovative monitoring systems make it possible to determine the exact condition of a conveyor belt at any time. By monitoring belt health, it's possible to manage the belt's condition to ensure that the system runs trouble-free. Any detected issues while the belt is in operation are identified and prioritized for maintenance and repair by the system based upon the size and position of the damage. The system data can also be used as an aid to identify systematic issues that, when addressed by proactive system maintenance activities, will improve the belt's operating conditions. Prevention of belt degradation leads to longer belt life and potentially avoids catastrophic belt failure.

YOUR BENEFITS

- › Reduces risk of catastrophic belt failure
- › Minimizes downtime
- › Increases belt life
- › Increases belt efficiency
- › Monitors over entire belt life cycle

Cloud communication between the belt monitoring system and Conti+





CONTI® Protect Systems

Saving belts with early damage detection.

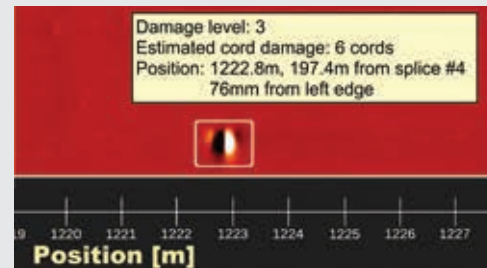


CONTI® CordProtect System

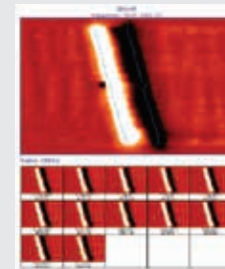
CONTI® CordProtect is a permanent magnetic system that monitors magnetized steel cord reinforced conveyor belts for cord damages and tracks changes in the splice structure.

KEY FEATURE

- › Cord damage detection
- › Belt splice monitoring



Cord Damage Detection



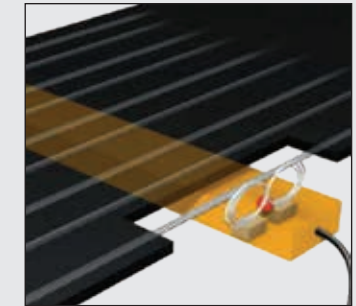
Belt Splice Monitoring

FUNCTIONALITY

- › Permanent magnet magnetizes steel cables in conveyor belt
- › At cable ends or breaks, the magnetic flux lines exit the belt surface
- › Sensor array maps belt's magnetic characteristics

Cord Damage Detection

- › User-defined alarm levels
- › Interactive display
- › Damage reports

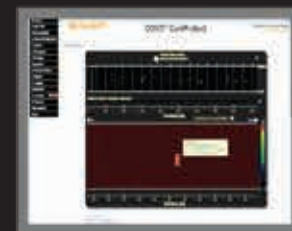


Belt Splice Monitoring

- › Magnetic image of splice
- › Chronological images of splice
- › Splice condition monitoring

TECHNICAL KEY DATA

- Belt Velocity: up to 10 m/s
- Belt Width: 600 mm to 3500 mm (standard)
- Belt Rating: ST300 - ST10,000
- Temperature: -40°C to 70°C
- Humidity: 20% to 90% RH Non-Condensing
- System Output: Normally Open Relays; Ethernet TCP/IP; Modbus TCP/IP (option Profibus)
- Input Power: 110/220 VAC ; 24 VDC Option Available
- IP Class: 65



APPLICATION FIELD

CONTI® CordProtect has been monitoring steel cord belts in mining and industrial applications since 2008. This reliable system is capable of detecting cord damage and prioritizing the damage based upon the size and location, while also monitoring for damage growth. By detecting critical damage, the issue can be proactively addressed before it becomes catastrophic, while avoiding a major unplanned maintenance event. Additionally, using the unique magnetic splice image of each splice allows for monitoring for change against its baseline data. By detecting splice degradation, these issues can be addressed during planned maintenance.

CONTI® MultiProtect System

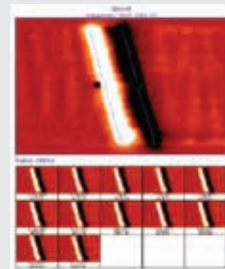
CONTI® MultiProtect is a permanent magnetic system that monitors equally spaced embedded magnetized rip inserts. When using the MultiProtect flat array, the system can monitor for steel cord damage and splice integrity. Troughed arrays monitor the loading point for rip detection. Special pipe belt application allows for the rip insert functionality to also be used for orientation/rotation.

KEY FEATURE

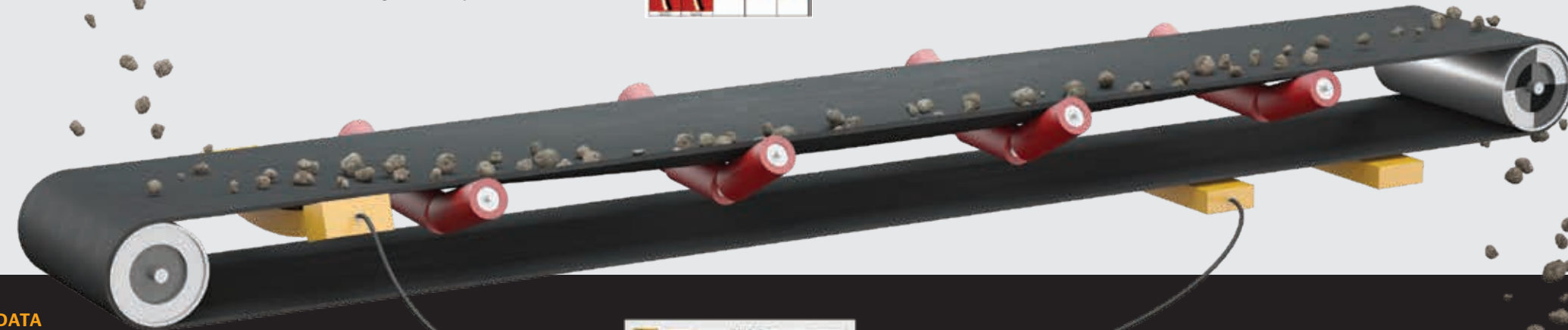
- › Cord damage detection
- › Longitudinal rip detection
- › Pipe belt position monitoring
- › Belt splice monitoring



Longitudinal Rip Detection



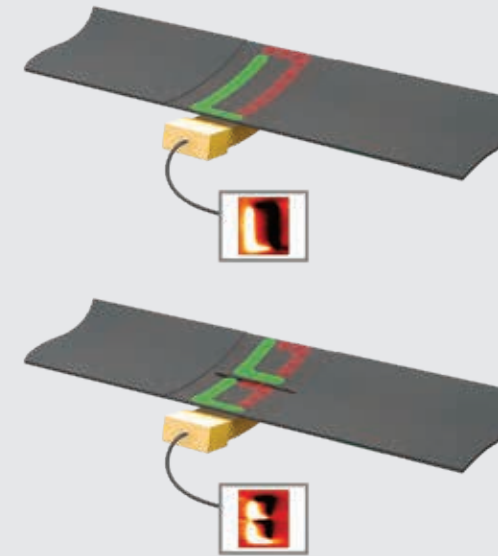
Belt Splice Monitoring



FUNCTIONALITY

CORDPROTECT + BELT RIP DETECTION

- #### Longitudinal Rip Detection
- › Durable embedded insert design
 - › Establishes rip insert map
 - › Monitors magnetic rip image

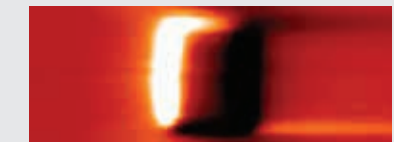


Pipe Belt Positioning

- › Rip insert imaged
- › Rip insert position detected
- › Pipe belt orientation monitored



Rip Insert Position Indicator



TECHNICAL KEY DATA

- Belt Velocity: up to 10 m/s
- Belt Width: 600 mm to 3500 mm (standard)
- Belt Rating: ST300 - ST10,000
- Temperature: -40°C to 70°C
- Humidity: 20% to 90% RH Non-Condensing
- System Output: Normally Open Relays; Ethernet TCP/IP; Modbus TCP/IP; (option Profibus)
- Input Power: 110/220 VAC ; 24 VDC Option Available
- IP Class: 65
- Wider is possible with custom design:



APPLICATION FIELD

CONTI® MultiProtect is utilized by mining and industrial steel cord belt customers to minimize the damage associated with longitudinal rips. By stopping the conveyor belt upon detection of a longitudinal rip event, the system limits the damage associated with these events and can save customers millions of dollars that would be spent on downtime, conveyor belt replacement, conveyor repairs and clean-up efforts. The magnetic rip inserts monitored by the MultiProtect system have an advantage over Inductive Systems, because the magnetic image of the inserts lets the operator know exactly where the damage has occurred. It's also flexible enough to filter out the damaged region, allowing for continued utilization of the undamaged portion of the rip insert. This patented technology has proven itself in the field, saving customers significantly in recent years.

CONTI® RipProtect Plus System

CONTI® RipProtect is a permanent radio frequency system that detects and minimizes longitudinal conveyor belt rips by monitoring the condition of a series of embedded inductive sensor loops.

KEY FEATURE

- › Belt rip monitoring with “inverted” figure “8” antennae
- › Optional antenna identification with RFID
- › Independent two site monitoring



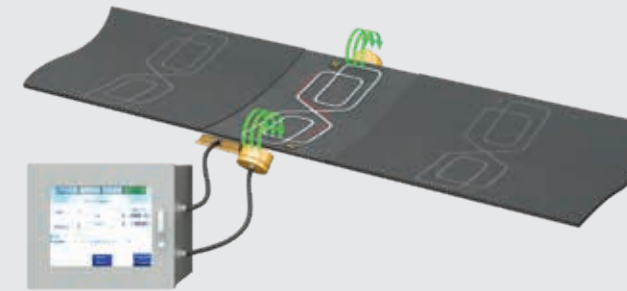
TECHNICAL KEY DATA

- Belt Velocity:* up to 10 m/s
- Belt Width:* 600 mm to 3500 mm (standard)
- Belt Rating:* All Fabric & Steel Cord Belts
- Temperature:* -45°C to 70°C (Detector Heads/Proximity Sensor)
- Humidity:* max. 95% Non-Condensing
- System Output:* Normally Open Relays; Ethernet TCP/IP; Modbus TCP/IP
- Input Power:* 10/220 VAC ; 24 VDC Option Available
- IP Class:* 67 (for field installed sensors)
- IP Class:* 65 (Control Unit)
- Wider is possible in custom design*

FUNCTIONALITY

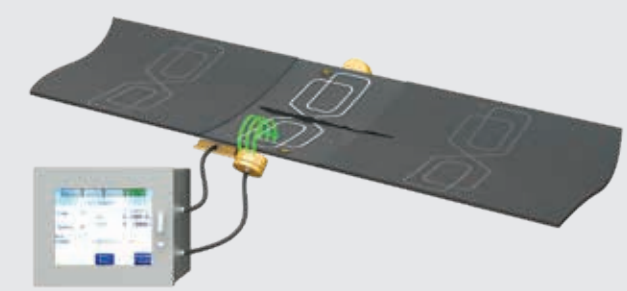
How it works

- › Transmit and receive radio frequency technology used to electrically couple through passing antennas
- › Transmitter induces electrical current in a good loop that the receiver detects
- › Processor tracks loop signal acc. to loop plan



When rip is detected

- › If a longitudinal belt rip occurs, the sensor loop wire is damaged or broken
- › Transmitter cannot induce electrical current in a ripped loop and no signal is coupled to the detector
- › Processor misses signal in loop plan and generates an alarm to stop belt



APPLICATION FIELD

This system has proven itself globally in just about every mining or industrial application that exists! This system is an inductive-based technology that monitors the integrity of conductive loop antennas that are embedded in fabric or steel cord conveyor belts at regular intervals. When a longitudinal rip occurs, the loop fails to conduct the induced current and the system generates a rip alarm when the antenna passes the system's detector heads. This system has been around for decades, but it has been continually improved with the latest technologies, including RFID technology and digital signal processing technologies.

CONTI® SpliceProtect System

CONTI® SpliceProtect is a stationary system that monitors the elongation of high-tension steel cord conveyor belts to avoid splice failure by measuring the distance between unique magnetic markers embedded in each splice.

KEY FEATURE

- › High resolution splice elongation monitoring
- › Splice identification with magnetic markers



TECHNICAL KEY DATA

Resolution of length measurement:	min. 0.4 mm - max 0.05 mm
Number of splices in the belt:	max.128
Belt Velocity:	0.5 to 8 m/s
Belt Width and Rating:	no restrictions
Ambient temperature limit:	-20°C to 40°C
Supply voltage:	100 - 240 V
Main frequency:	48 - 63 Hz

Humidity (non-condensing): 0% - 95 %

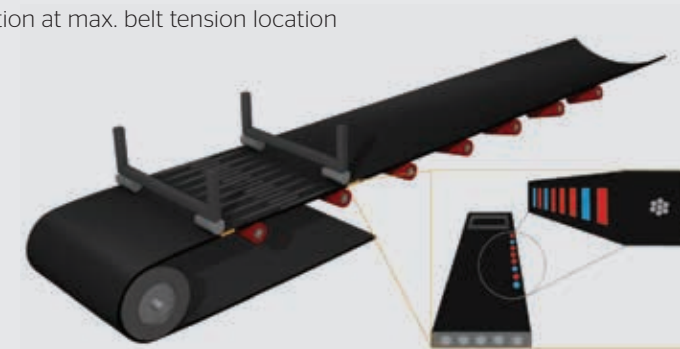
IP Class: 55 of cabinet, 65 of sensors

Central Unit: Industry PC with an EtherCAT interface

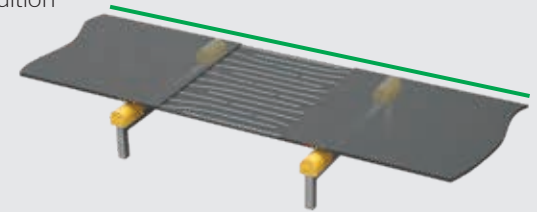
Output: Normally Open Relays; Ethernet TCP/IP; Modbus TCP/IP; Profibus optional

FUNCTIONALITY

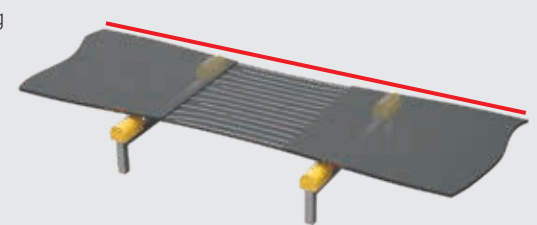
- › Magnetic markers identify each splice and indicate its current length
- › When magnetic markers pass sensor heads, belt speed, time and distance are tracked
- › Related to the operational belt tension, the splice lengthening is monitored
- › System stops conveyor in case of critical splice elongation
- › Installation at max. belt tension location



- › Normal conveyor belt splice in good condition
- › No variation in belt width
- › No anomalies



- › Elongated conveyor belt splice narrowing of the belt width in the splice
- › Cord heads out of position
- › More elongation of intermediate rubber in splice
- › Longer distance between magnetic markers



APPLICATION FIELD

Mining customers utilize SpliceProtect to monitor high-tension steel cord conveyor belts for irregular belt splice length changes. This system is a high-precision, magnetic-based technology that measures the distance of magnetic markers embedded into belt splices to monitor for critical splice lengthening. Steel cord belt splices tend to elongate during their operational lifetime, which could result in a catastrophic and costly belt splice rip. Specifically designed for inclined high-tension conveyors in hard rock mining applications, a SpliceProtect unit ensures operational safety.

CONTI® TotalProtect System

CONTI® TotalProtect detects and monitors everything from incremental damage to the belt surface covers up to potentially catastrophic damage due to pending splice failure or belt penetration by foreign material. TotalProtect works with x-ray technology.

KEY FEATURE

- › Belt cover damages, such as longitudinal cuts, cracks, grooves, etc.
- › Belt tracking
- › Damages of belt edge
- › Fastener damages
- › Opening and lengthening of splices
- › Excessive/abnormal cover wear
- › Insufficient belt cleaning
- › Cord misalignment
- › Cord damages and corrosion
- › Entrapment of foreign material

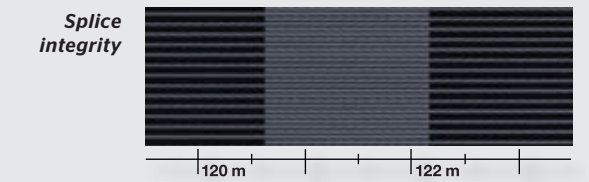
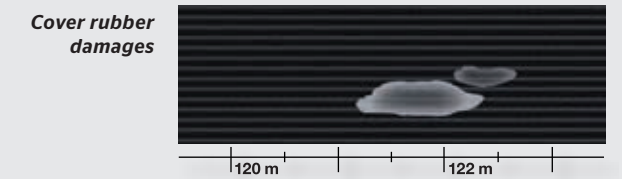
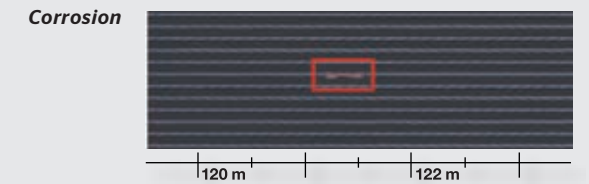
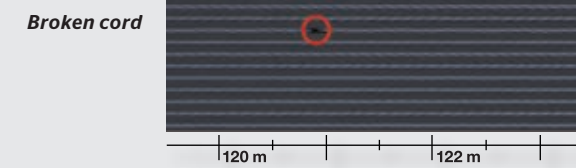
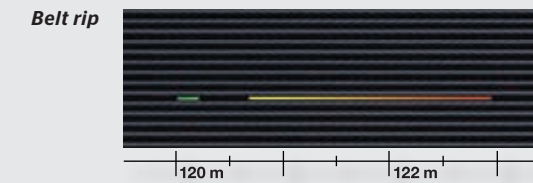


TECHNICAL KEY DATA

- Belt velocity: 6 m/s
- Belt width: any belt width
- Belt rating: all steel cord belts
- Operating temperature: -20°C to +50°C
- Resolution (depends on belt speed): longitudinal up to 2 mm - transversal up to 1.6 mm
- Supply voltage: 400 V / 60 Hz
- Current drawn: max. 36 A
- IP Class: 65

FUNCTIONALITY

- › X-ray tube transmits a radiation fan through the material being measured by detectors.
- › Depending on the absorption properties of the material, a part of the radiation is absorbed. The unabsorbed radiation component is picked up by the detectors and converted into electrical signals.
- › These electrical signals are evaluated by the visualization computer and depicted graphically.



APPLICATION FIELD

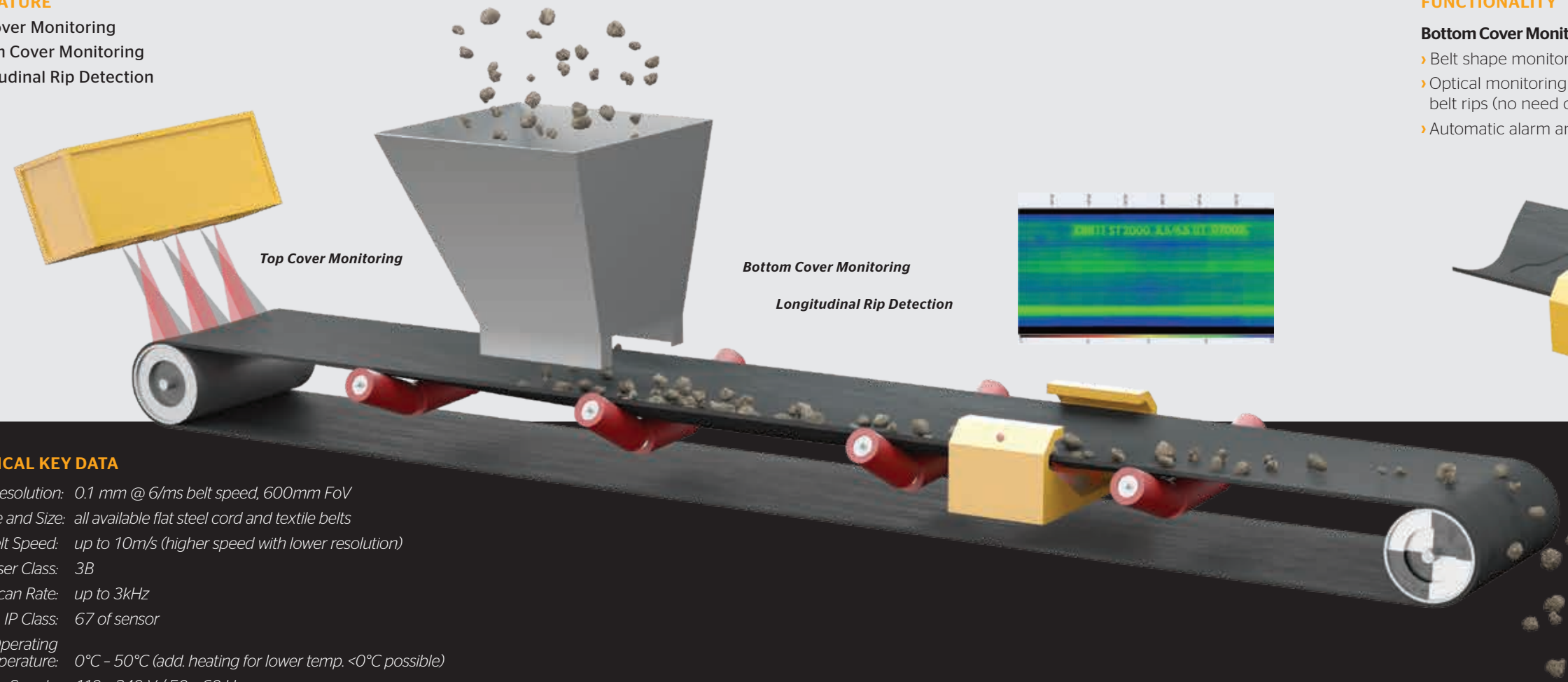
CONTI® TotalProtect is utilized by mining and industrial steel cord belt customers to minimize downtime. By stopping the conveyor belt upon detection of a damage (e.g., steel cord damages) the system limits the damage associated by these events and can save customers huge amounts of money that would be spent on downtime, conveyor belt replacement, conveyor repairs and clean-up efforts. The CONTI® TotalProtect continuously scans the conveyor belt's steel cords and rubber covers during normal operation. If a deviation from the original conveyor belt state is detected, the exact position and size of such defect is immediately signaled. The filter, indicating the size of the defects to be shown, will be programmed as per the customer's preferences. This technology has proven itself in the field.

CONTI® SurfaceProtect System

CONTI® SurfaceProtect is an online laser system that monitors the surface of the conveyor belt. The system evaluates the cover condition for cuts and gouges or large impact damage events. Data is analyzed and reported with the position and dimensions of all surface damages.

KEY FEATURE

- › Top Cover Monitoring
- › Bottom Cover Monitoring
- › Longitudinal Rip Detection



Top Cover Monitoring

Bottom Cover Monitoring

Longitudinal Rip Detection

FUNCTIONALITY

Bottom Cover Monitoring Unit

- › Belt shape monitoring
- › Optical monitoring for longitudinal belt rips (no need of rip sensors in belt)
- › Automatic alarm and belt stop

CONTI® SurfaceProtect is designed to scan the belt covers by triangulation principle

- › Use of profile sensors (line laser and optical sensor)
- › Laser line is projected on running conveyor belt surface
- › Laser line follows the real profile of the belt cover
- › Optical sensor records shape and position of the laser line
- › Software compiles laser data into a digital belt map
- › Digital map is analyzed with variable defect thresholds

Top Cover Monitoring Unit

- › High resolution, non-contact 3D measurement
- › Full or partial belt width cover scan
- › User-defined thresholds for damage detection
- › Large impact defects
- › Slit, cut and gouge events
- › Edge damage or misalignment
- › Splice surface control
- › Abnormal abrasion

TECHNICAL KEY DATA

Height Resolution: 0.1 mm @ 6/m/s belt speed, 600mm FoV

Belt Type and Size: all available flat steel cord and textile belts

Belt Speed: up to 10m/s (higher speed with lower resolution)

Laser Class: 3B

Scan Rate: up to 3kHz

IP Class: 67 of sensor

Operating temperature: 0°C - 50°C (add. heating for lower temp. <0°C possible)

Power Supply: 110 - 240 V / 50 - 60 Hz

Output: as per customer requirements

APPLICATION FIELD

Mining and industrial conveyor belt customers install SurfaceProtect to monitor the covers of the belt during operation. The system uses laser line profile sensors for scanning the entire surface of the belt. The recorded cover condition is analyzed online via smart image processing so that a large surface damage event such as abnormal abrasive wear or impact defects can be reported at any time. The conveyor belt surface is inspected automatically in hard-to-reach conveyor for all types of belts. The belt profile information can be used for various purposes such as remaining lifetime estimation of belt covers or as pre-analysis for manual belt inspection and repairs.



CONTI® Inspect Systems
 Periodic belt inspection “check-up” services.



CONTI® CordInspect Service

CONTI® CordInspect brings Continental technicians to your operation to conduct a cord and splice integrity scan. Then they deliver a detailed report of the findings to keep you running efficiently and give you peace of mind.

FEATURES AND BENEFITS

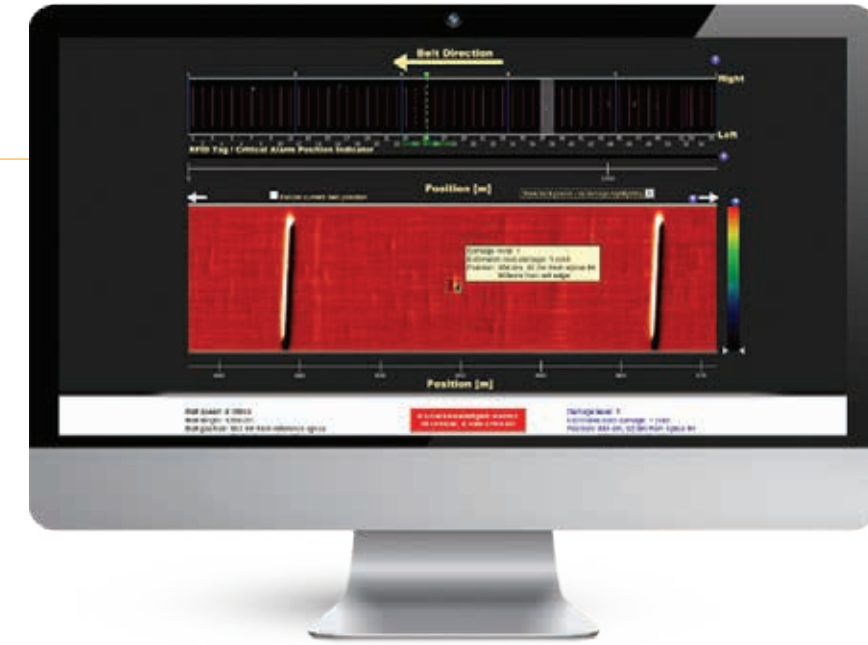
- › Experienced technical team is deployed to your site
- › Image-based system is mounted to conveyor
- › Belt is magnetized and data collected over entire belt length
- › Customer report with damage position and magnitude identified



APPLICATION FIELD

The CONTI® CordInspect scanning service for steel cord belts has been offered since 2008. This service detects cord damage and prioritizes them based upon size and location. The system can also provide indicators of damage growth based on a previous scan(s) of the belt. Customers have relied on this periodic scan technology to identify damage(s) to help them proactively address issue(s) to avoid major unplanned maintenance events. Additionally, the magnetic splice review of each splice can help to identify splice damages or changes to facilitate belt maintenance decisions.

SCAN DATA (DATA ANALYSIS)

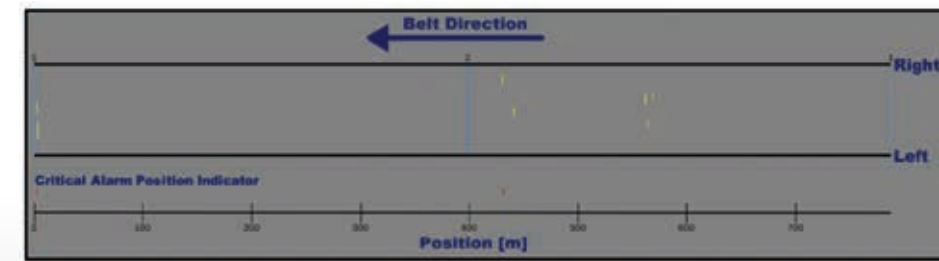


- › System developed and validated using x-ray technologies

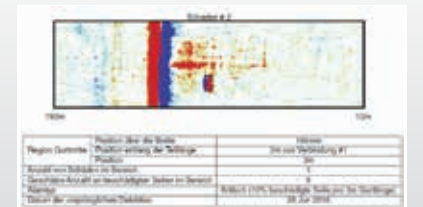


REPORT

- › Easy to understand damage summary
- › Detailed damage table
- › Individual splice and damage imaging



ID	Datum der Erstdetektion	Kennzeichnende Verbindung #	Verbindungs-ID	Längsposition dem Gurtabschnitt nach [m]	Querposition der Gurtbreite nach [mm]	Seil Level	Maßnahme
1	28 Jun 2016	1		2.5 → 3.1	356 → 483	4	Inspezieren & kleine Reparatur möglich
2	28 Jun 2016	1		2.9 → 3.4	77 → 255	8	Kleine Reparatur
3	28 Jun 2016	2		31.9 → 32.2	712 → 813	3	Inspezieren & keine Reparatur möglich
4	28 Jun 2016	2		42.3 → 42.6	331 → 432	3	Inspezieren & kleine Reparatur möglich
5	28 Jun 2016	2		163.4 → 163.7	483 → 585	3	Inspezieren & kleine Reparatur möglich
6	28 Jun 2016	2		165.6 → 166.0	204 → 280	1	Inspezieren
7	28 Jun 2016	2		170.3 → 170.6	534 → 585	1	Inspezieren

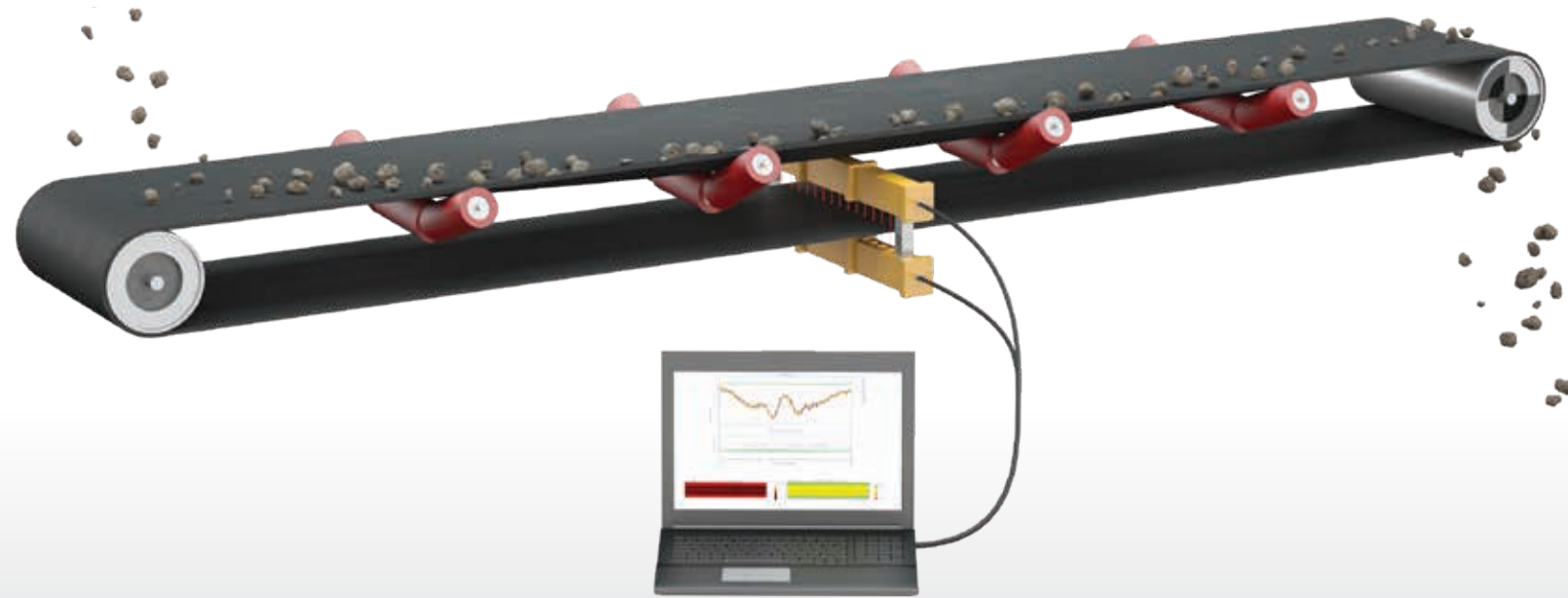


CONTI® WearInspect Service

CONTI® WearInspect uses laser-based sensors to measure overall-gauge (OAG). It displays a cross-sectional cover scan summary, segment gauge and percent wear data, as well as wear positions and identified magnitude in an easy-to-understand PDF report.

FEATURES AND BENEFITS

- › Experienced technical team deployed to site
- › Image-based system is easy to interpret and mounted to conveyor
- › Belt is scanned and data collected over entire belt length
- › Customer receives a report identifying wear position and magnitude of wear



APPLICATION FIELD

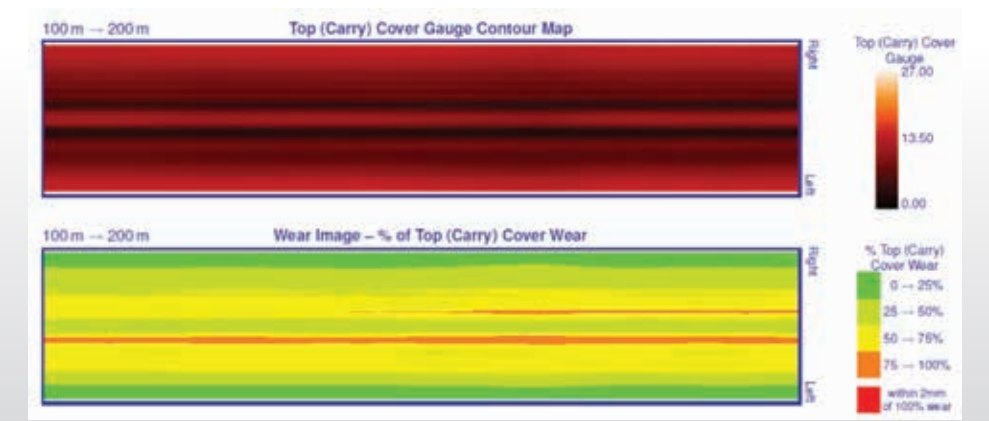
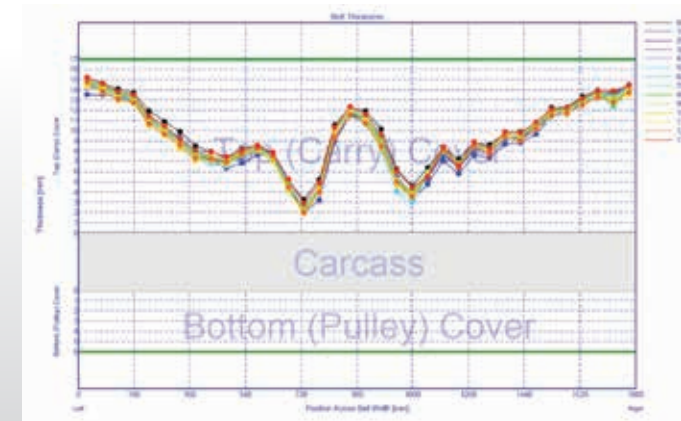
CONTI® WearInspect can be utilized on fabric and steel cord belts to measure the change in the overall gauge of the belt. The system can measure top cover wear by assuming there is no wear in the pulley cover of the belt, or use profile ultrasonic measurements of the pulley cover to better estimate the top or carry cover wear. The Conveyor Cover wear information can be used as a belt lifetime predictor, as well as to diagnose system related issues that are causing premature wear of the conveyor belt.

SCAN DATA (DATA ANALYSIS)



REPORT

- › Belt thickness profile over width of the belt
- › Cover gauge contour map and wear image
- › Information can be used to predict life of belt and to identify system-related wear trends that may be addressed to extend belt life



CONTI® SurfaInspect Service

CONTI® SurfaInspect is a mobile inspection system that utilizes continuous belt scanning to measure the cover surface topography of the conveyor belt. Scanning can be performed at full belt speed. CONTI® SurfaInspect then provides a compilation of digital 3D belt surface mapping and evaluates the cover surface condition using variable defect thresholds and cover surface damage.

FEATURES AND BENEFITS

- › Periodic belt surface scanning procedure
- › Continuous measurement at full belt speed
- › Compilation of a digital belt surface map
- › Detection of all cover damages
- › Evaluation of cover condition by multiple thresholds
- › Customer report with all relevant damage information
- › Support for investigation of systematic cover damages
- › Pre-analysis for belt inspections and repairs

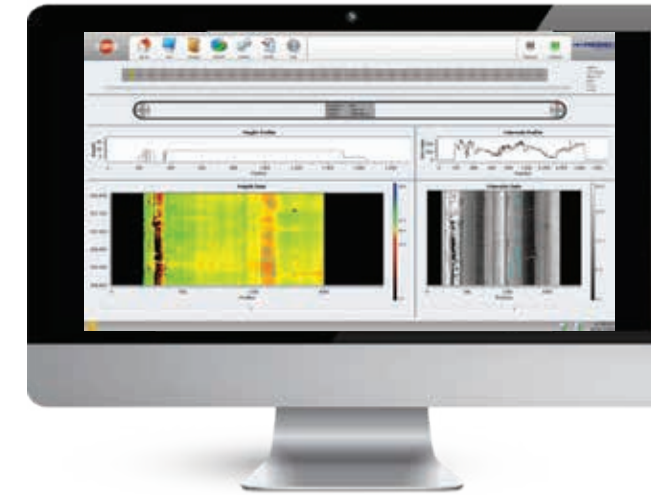


APPLICATION FIELD

CONTI® SurfaInspect can be used to scan the belt covers of any flat fabric or steel cord belts. Captured data can be automatically analyzed for belt surface condition fluctuations. Surface damage, such as impact or cut and gouge, can be seen in the digital belt map and can be inspected offline at any time. The results are used for belt wear estimation and as pre-analysis for cover repairs in advance of planned conveyor shutdowns. A belt surface scan can be done periodically to find systematic abnormal cover damage as early as possible for various industrial and mining belt applications.

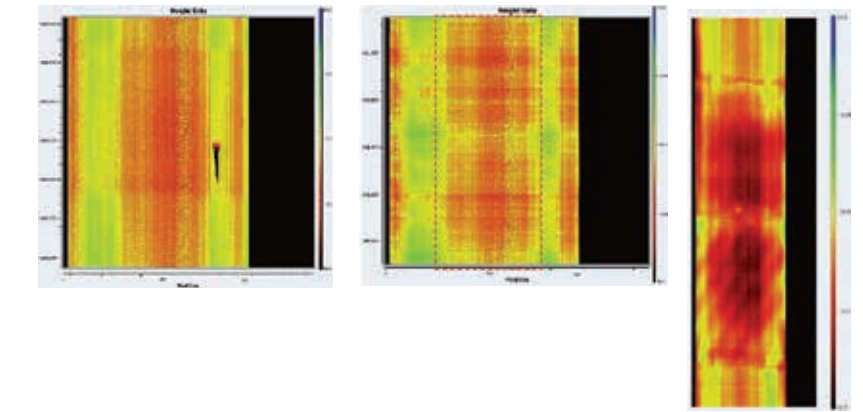
SCAN DATA (DATA ANALYSIS)

- › Recorded raw data is analyzed with different threshold levels, detections are marked in high and low intensity belt map



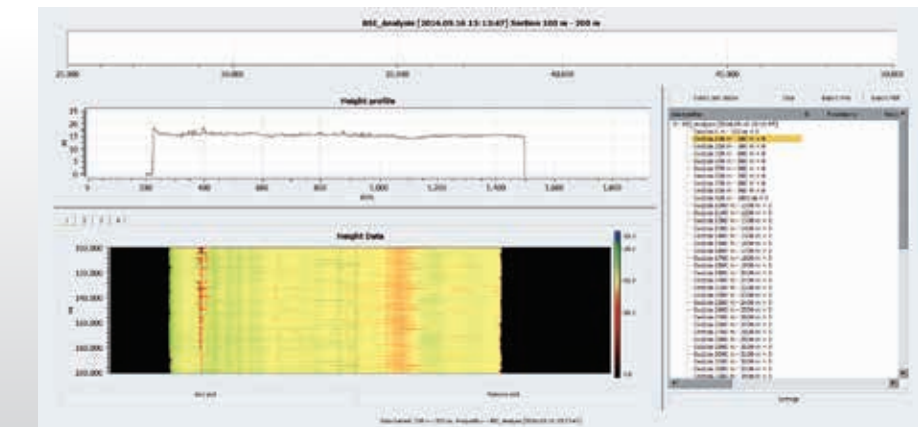
Detected cover damages

- › Local failure: cuts, large impact damages
- › Large-area failure: abrasion, long-distance grooves
- › Various: splices, markings, press stamps



REPORT

- › All detections are saved in a database with positional, dimensional and classification information





TAILORED FINANCIAL OPTIONS FOR PROTECT SYSTEMS

The following services are offered with our Protect Systems:

- › Training for Technicians
- › Customized Installation Options
- › Commissioning of Monitoring System
- › Remote Technical Support
- › Special Service Level Agreements
- › On-Site Troubleshooting



PURCHASE



« Acquisition Costs »
 «—————»
 «—————»
 Belt Monitoring System »



BENEFITS:

- › Catastrophic Risk Mitigation
- › Increased Conveyor Uptime
- › Online Error Diagnosis
- › 24/7 Conveyor Monitoring System
- › Increased Belt Lifetime
- › Predictive/Preventive Maintenance

LEASING



« Monthly Rates »
 «—————»
 «—————»
 Belt Monitoring System »



BENEFITS:

- › Catastrophic Risk Mitigation
- › Increased Conveyor Uptime
- › Online Error Diagnosis
- › 24/7 Conveyor Monitoring System
- › Increased Belt Lifetime
- › Predictive/Preventive Maintenance
- + No Capital Expenditure
- + Cost Transparency (fixed monthly rates)

PAY-PER-TON

We also offer individual Pay-Per-Ton solutions. Please contact us for more information.

ContiTech USA, Inc.

703 S. Cleveland-Massillon Road
Fairlawn, OH 44333-3023 U.S.A.
Phone: 1-800-235-8872
Email: conveyor@contitech.us

Your local contact

www.continental-industry.com/contactlocator

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