



BETTER BELT INSIGHTS AND FASTER
REACTION TIMES

CONVEYOR DIAGNOSTICS & MONITORING

www.fennerdunlopamericas.com





Fenner Dunlop Conveyor Diagnostics

Our periodic & permanent monitoring and diagnostic solutions are best-in-class not only for the data rich insights that help you elongate the life of your belt, but also for their ease of use.

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Eagle Eye Advanced, BIRDSi, Flexi-Loop and Rip Ranger.

Diagnostics Features and Benefits

- Extended belt life, reduced down time and improved productivity.
- Around the clock protection.
- Prevents hazardous belt failures before they occur.
- Dedicated team of diagnostic engineers for support and service after the sale with a proven history of excellence.
- Periodic and 24/7 support contracts available to maintain your investment and protection.
- Comprehensive system training for each product offering.
- Extensive service offering including steel cord scanning with splice analysis, cover wear surveys, and X-rays to uncover hidden damage.
- All Diagnostic services are supported by our network of Fenner Dunlop Service centers.

PERIODIC SOLUTIONS



No Hardware Permanently Mounted to Conveyor



Hidden Damage X-Rays

Fabric or Steel

Our technicians use a Vidisco Digital X-ray Imaging machine to review and analyze internal steel cable and/or fabric damage.

The digital X-ray “generates” its energy only when it is needed. Any radiation created by the digital X-ray is less than your standard dental X-ray.



Ultrasonic Thickness Tester

Fabric or Steel

We use an ultrasonic tester to perform two different tests, depending on your operation needs:

1. **Spot Check:** Gathering enough data points to provide an average carry and pulley cover thickness for your records.
2. **Cover Wear Profile:** Gathering 20 data points per splice joint and then compiling into a fully analyzed report with cover wear and belt life projections.



20 data points per splice joint compiled into a fully analyzed report.





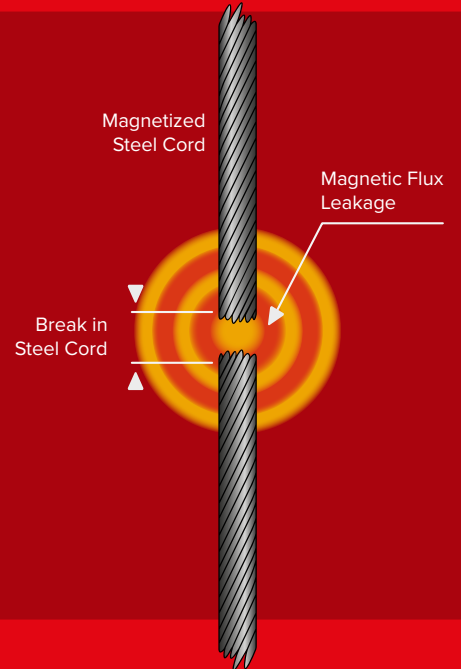
Steel Cord Scanning

(Cord Breaks & Corrosion)

We use a combination of devices to obtain a proper read on your steel cord damage, including:

- **Steel Cord Monitoring Array**
- **Permanent Earth Magnet Array**
- **Data Collection Unit**
(Converts to Digital)
- **Proprietary Software to help you analyze each data point**

Steel cord only

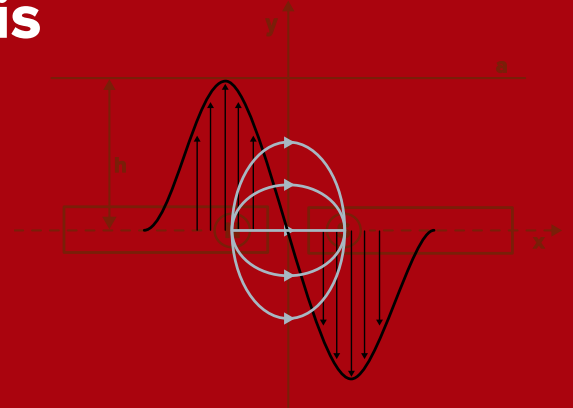


Magnetic Splice Analysis

(Failures & Elongations)

We evaluate your splice damage with MFL technology (Magnetic Flux Leakage occurs between 2 cords). The signals are captured and analyzed to determine splice layout and/or damage. This is often done alongside steel cord scanning.

Steel cord only



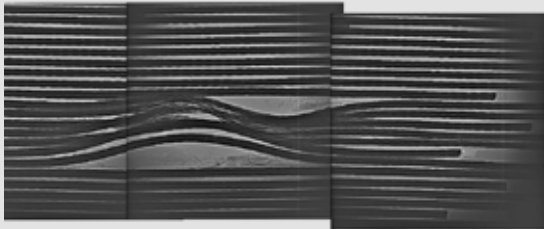
Periodic Monitoring Case Study

A valued mining customer of Fenner Dunlop had their quarterly steel cable manual scan with MFL and digital X-ray images.

We identified a massive increase in steel cable damage (largely due to a cut running the length of the belt that allowed several cables to start corroding) and a splice that had a vast amount of internal damage.

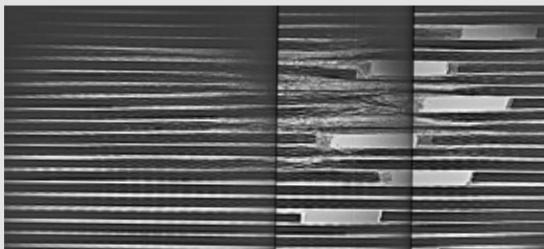
Our expert engineers organized the most pertinent analysis of the data in the summary portion of the report to assist the customer in understanding the problem. We did not just hand over 100+ pages of data that was collected and leave it with the customer to interpret on their own.

The X-ray found that the belt was on the verge of failure and the customer intermediately brought in a belt crew to fix it.



X-ray of 7 damaged cables pulled out of belt approximately 2.5 feet from right edge, near leading edge of splice.

Fig. 1

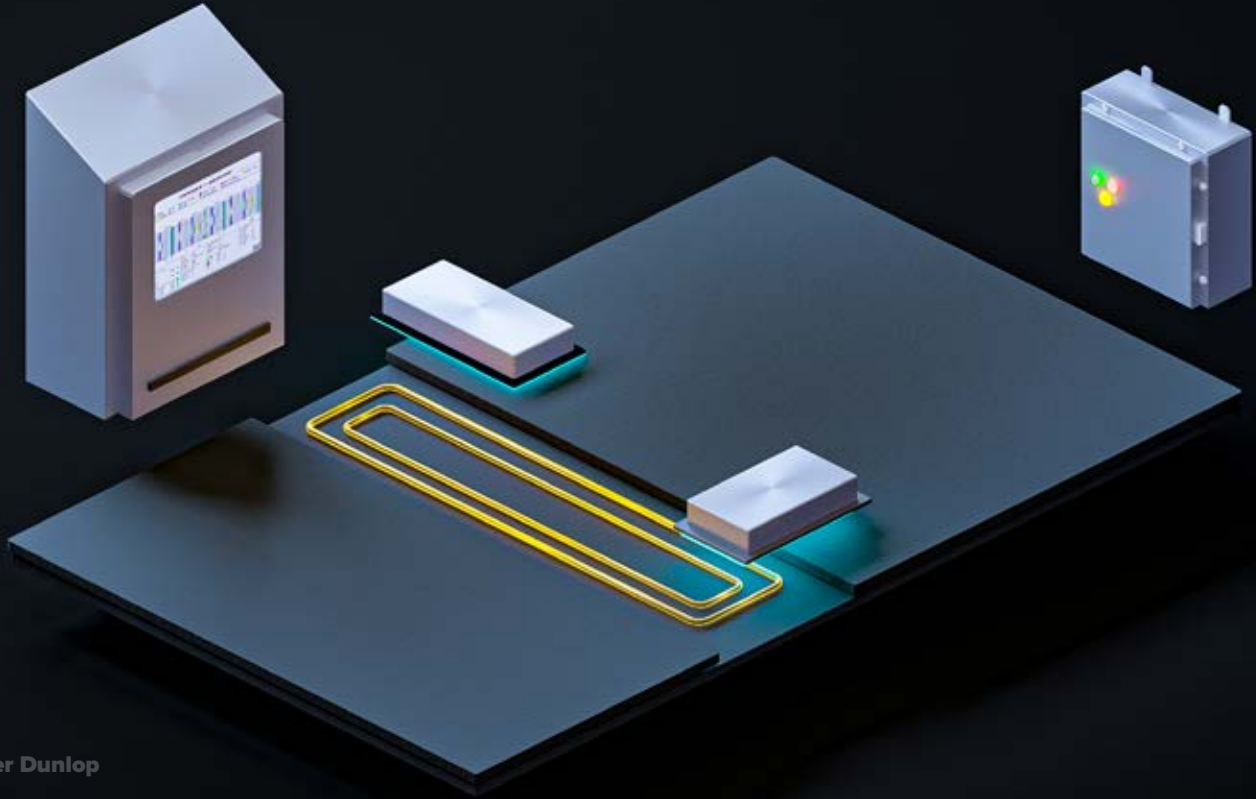


X-ray of 12 damaged/corroded cables approximately 1 foot from left edge in middle of splice.

Fig. 2







Fenner Dunlop

Flexi Loop

Advanced Rip Detection Technology



Patent-pending
fabric design



High performance
product

Most loop technology brands have one main flaw that affects your uptime and revenue: Material Fatigue — Several hours of down time as a result of numerous belt stoppages and the time required to install new loops. Fenner Dunlop's patent-pending Flexi-Loop™ Technology solves these common issues. Flexi-Loop™ is a robust product that offers **superior performance** and up to **2.5x better life expectancy** vs. typical loops.



How Flexi-Loop™ Works:

1. Belt rip detection systems use embedded inserts (loops or sensors) that pass detailed information from the sensors to the control system.
2. Loops are embedded into your conveyor belt and relay your belt's health back to the control system.
3. When a belt rip occurs, the loop signal is disrupted and the control system stops your conveyor belt.

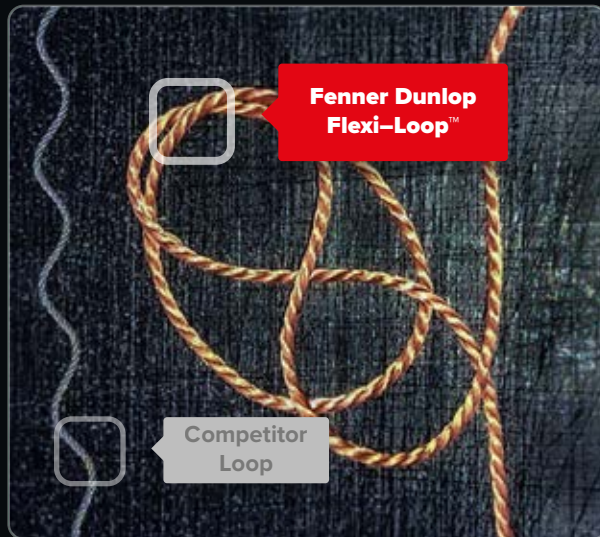
Competitive Test Results

Flexi-Loop™ outperforms in all categories

Fenner Dunlop is committed to offering a comprehensive line of safe, high performance conveyor belting products suited for the industry’s toughest applications. Over 150 years of research and development have gone into engineering and producing our conveyor belting products. In the laboratory, we test our products to destruction to ensure that our conveyor belts perform exactly as they are designed to do.

Multiple, dynamic tests on competitor loops’ steel material vs. Fenner Dunlop’s Flexi-Loop’s propriety material

Test Types	Competitor Loop	Flexi Loop	Flexi-Loop™ Advantages
Tensile Strength	2.2 kN	3.68 kN	67% Stronger
Pullout Test	1.21 kN	1.57 kN	30% Better Adhesion
1 Million Cycle Flex Test	400k Cycles	> 1 Million Cycles	150% Longer Life
Dynamic Conveyor Belt (with 45° Idlers)	NA	> 1 Million Cycles	Tested 5 Flexi-Loops with no failures <i>Did not test competitor loop</i>



Flexi-Loop™ is North American made.

The construction of the loop begins at our state-of-the-art weaving facility in Lavonia, GA. Production is then passed on to our Diagnostics Facility in Bluefield, VA. Flexi-Loop™ is then embedded into the pulley cover next to the fabric carcass during the curing step of the conveyor belt manufacturing process.

Distance From Sensor (in)	Comparison	
	Competitor Loop	Flexi Loop
2	100% ✓	100% ✓
3	100% ✓	100% ✓
4	99%	100% ✓
5	47%	100% ✓
6	13%	87%
7	0%	71%
8	0%	49%
9	0%	23%
10	0%	0%



PERMANENT SOLUTIONS

Conveyor System Equipped with Permanent Sensors and Controllers

HOW IT WORKS

When a signal is not received by the receiver because it has been interrupted (caused by a damaged detection loop for example) then the conveyor is immediately shut down in order to keep damage to a minimum. Having multiple detection locations is especially advisable on particularly long individual conveyor belts in order to provide the earliest possible warning. The simple equation is that the faster the conveyor belt is stopped then the shorter the length of longitudinal rip damage will be.



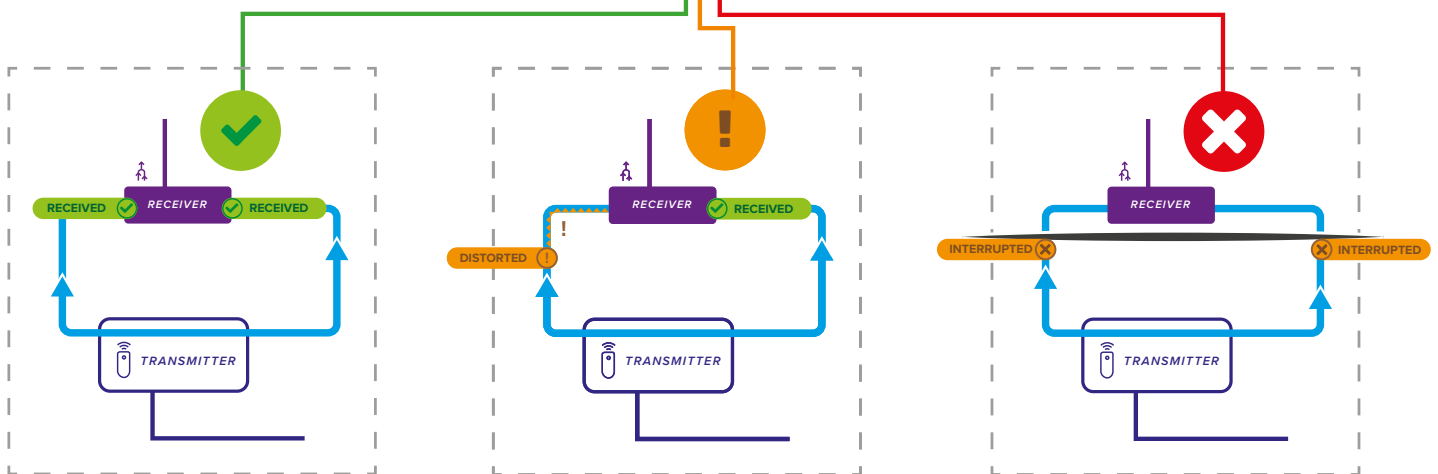
KEY TECHNICAL DATA

The Rip Ranger System specifications are designed for conveyors operating above ground. Systems for use with underground conveyors can be individually built to meet specific local requirements.

Belt Speed: Upto 7m/sec

Belt Thickness: Minimum 6 mm cover thickness – pulley cover preferred

Belt Type: Steelcord and Fabric



Fenner Dunlop RIP RANGER™

Protect your operation with rip detection technology

A conveyor breakdown can often involve huge costs, both in terms of repairs as well as lost productivity. When belts have to be replaced because of accidental damage then the financial implications can be disastrous. Although incorporating rip stop breaker plies will reduce the risk, Fenner Dunlop's Rip Ranger 'incident alert' technology will significantly reduce the extent (and cost) of the damage by switching off the conveyor as soon as a rip is detected.

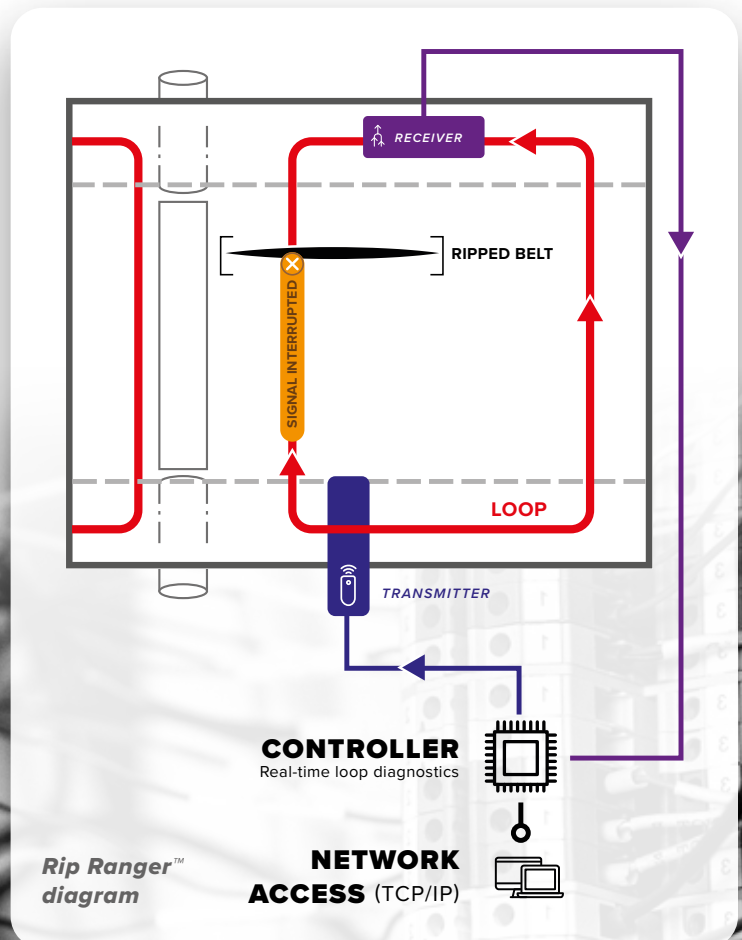
Components:

Transmitter, Receiver, Proximity wheel and Inductive Loops embedded at set distances in the belting.

Applications:

Any steel cord or fabric belting conveyor with risk of longitudinal rips.

- Reads up to 1,000 loops per belt with real-time loop diagnostics.
- Helps keep belt repair and replacement costs to a minimum.
- Minimizes lost production with automatic belt shut downs limiting the extent of potential damage.
- Additional remote units are available to create up to four monitoring stations.



EAGLE EYE *Most Complete **Steel Cord** Monitoring System*

The leading-edge of conveyor diagnostics with the latest breakthrough in the industry.

Eagle Eye Advanced is the most state-of-the-art combination steel cord condition monitoring and rip detection system available in the market. While the system provides proven 24/7 protection through seamless integration with the conveyor control, it also allows users on demand access to information about conveyor belt condition. Eagle Eye Advanced allows for the extraction of historical data to provide users insight on conveyor trends so predictive analytics can be a realization.

Components:

Steel Cord Condition Monitoring Array with precise Encoder feedback, Magnetic Array, RF Sensors to analyze Inductive Loops embedded at set distances in the belting.

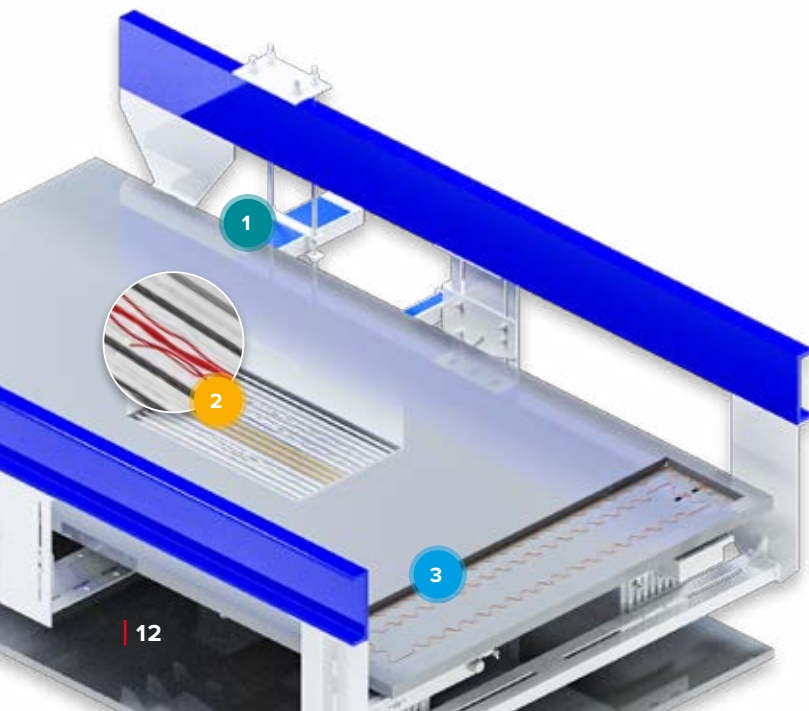
- 24/7 protection with steel cord condition monitoring, splice analysis, and rip detection.
- Advanced belt graphics to keep an eye on your investment in real time with the ability to select multiple view points and zoom levels.
- New multicore processing to couple technical belt data with an intuitive interface for simplified user interaction and experience.
- Historical data collection for cradle-to-grave analysis.
- Automatic reporting, extensive smart log messages and information filters.
- Remote connectivity to other devices such as smart phones, tablets and control room computers.
- User defined email and text message available.
- Superior internal diagnostics for ease of system maintenance.
- Proven Allen Bradley PLC processing for reliable conveyor protection and ease of conveyor control integration.
- Multiple rip detection locations can be added to create up to four monitoring stations.
- Custom engineered product to conveyor specifications manufactured in the USA at a certified Rockwell/Fenner Dunlop Facility.
- Mark events such as splices or damage events in specific locations along the conveyor for inspection or maintenance on demand or by schedule.



Upgrade your existing Eagle Eye Systems

Retrofit Kits are available to integrate with your existing Eagle Eye technology. Any existing Eagle Eye can be upgraded to our next generation system.

EagleEye® is fully customizable, scans any brand of belt and the ownership is for life.

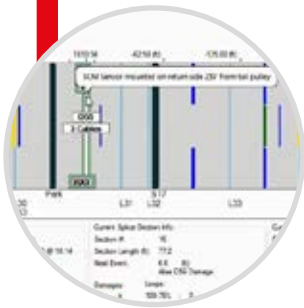


HOW IT WORKS

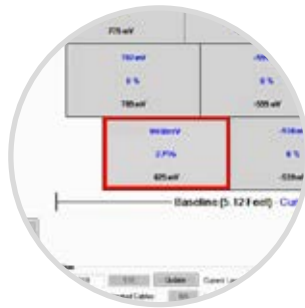
The system collects data from *multiple sensors* **1** to build a detailed map of events. Once the map of data is complete it continuously monitors each splice and *steel cord damage* **2** events for real-time changes and trends the data so the user is able to forecast potential issues through an intuitive interface. The system also continuously monitors *inductive loops* **3** at up to four points to ensure belting continuity and minimize risk.

INTELLIGENCE AT YOUR FINGERTIPS

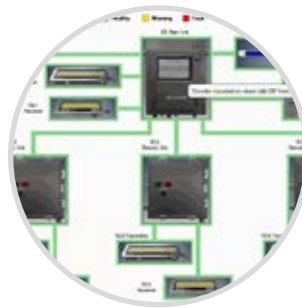
Eagle Eye Advanced makes it extremely easy to identify unexpected or developing belting problems quickly and pinpoint the failure area with precision. Also next generation internal diagnostics continuously monitors system hardware health and generates interactive troubleshooting steps to diagnose and resolve if a problem should occur.



Splice, damage and rip detection events are actively tracked as the conveyor stops.



Splice anomalies are easily quantified and located within the splice grid display.



System Overview allows a quick look at the health status of the system and each sensor.



List of troubleshooting steps for each fault.



New Interface

The new interface allows for additional processing power which enables Eagle Eye Advanced to collect, store and analyze historical data, and then provide improved performance trends as to how something might fail, helping you to have a more comprehensive understanding of the belt life. In addition, our new system offers increased connectivity, which can be accessed from any smart device including emails and a new texting feature.



Supporting access from mobile devices

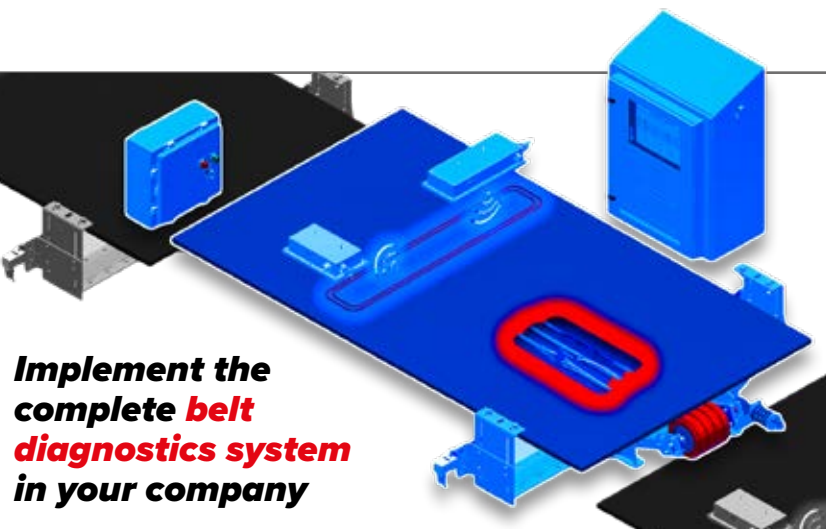
Join Satisfied Users

More than 100 companies use Fenner Dunlop's Belt Monitoring Solutions. **Join them!**

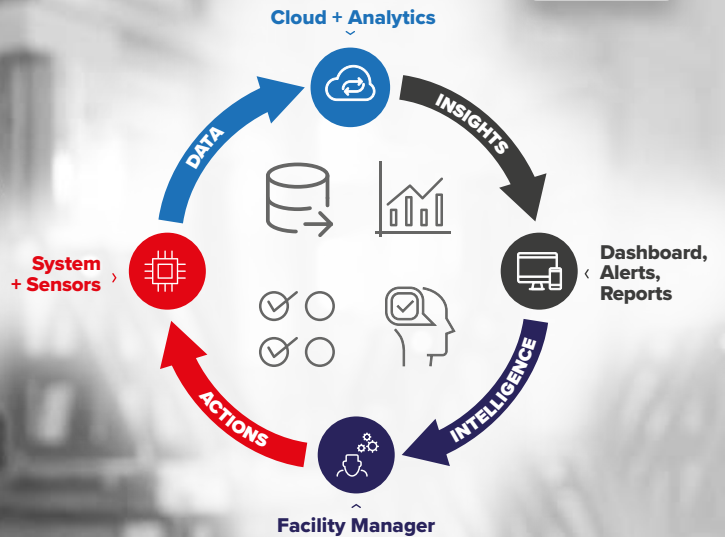
“ One of the biggest wins for us purchasing the Eagle Eye System is the technical support we have received. The Fenner Dunlop group have been excellent to deal with.



“ I attended a two day training on the system that gave me a very good understanding of the system and how to use it. The Eagle Eye System is a great system that does what it advertises.



Implement the complete belt diagnostics system in your company



REAL-TIME, REMOTE ACCESS TO YOUR BELT PERFORMANCE

BIRDSi is a premium online application that identifies potential issues before they create the need for larger, more time-intensive and expensive action.

Increase your belt reliability and up-time

- ✓ View current and historical belt health events and sensor status.
- ✓ Automatically monitor the status of all your conveyors, from a single dashboard.
- ✓ Send and view messages, as well as print the resolution needed.

YOUR YEARLY **BIRDSi**® SUBSCRIPTION INCLUDES:

- Instant access to the condition of your conveyor belt and the EagleEye® Advanced or Rip Ranger system from anywhere
- Identification of critical belt damage areas and trends in the system and belt health performance
- Ability to add notes and messages tied to each belt and system event

PLUS:

- Historical Information for each belt event, every day, from the beginning of your belt life to the very end. Events include what is happening to your splice(s), any damage to your steel cable, and placement / operation of your inductive loops. With our service you can access these anytime through your personalized control panel.
- Instant Alerts sent via SMS and/or Email (to anyone internally in your organization) for system warnings, belt trips, sensor faults, bypasses by the sensor or system, and parameter or other changes that are necessary to understand at a moment's notice.



Advanced PLC connected to internet



Ability to connect insights instantaneously to wherever you and your team need to see them



Login anywhere via computer or smart phone/tablet

To order your system or for more information, please contact diagnostics@fennerdunlop.com

TRAINING

Fenner Dunlop Diagnostics is proud to offer comprehensive training on our full range of solutions in various formats to meet the needs of your bulk material handling operation.

2-3 Day

Training Seminar with our Expert Engineers

and 1 Day

Hands On Field Training (During Install)



Here's what to expect:

- General physics of how the different sensors work
- How to determine where to place your sensors and equipment to provide the best protection
- Full wiring and connection details
- How to fully commission your system once it has been installed
- A full overview of the monitoring software
- In depth troubleshooting processes for hardware, wiring, and software (full access to systems and test conveyor)

Both training sets include a reference sheet document that covers the common features of the systems, how to change normal operation settings and how to quickly reset and troubleshoot issues.



Contact diagnostics@fennerdunlop.com for more information on our comprehensive training program.

Tough Belts for Tough Applications

Our goal is to extend the working life of your conveyor systems by providing safe, value-added and intelligent solutions through advanced monitoring systems, innovative inspection programs and superior service.



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Monitoring Solutions Sales



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