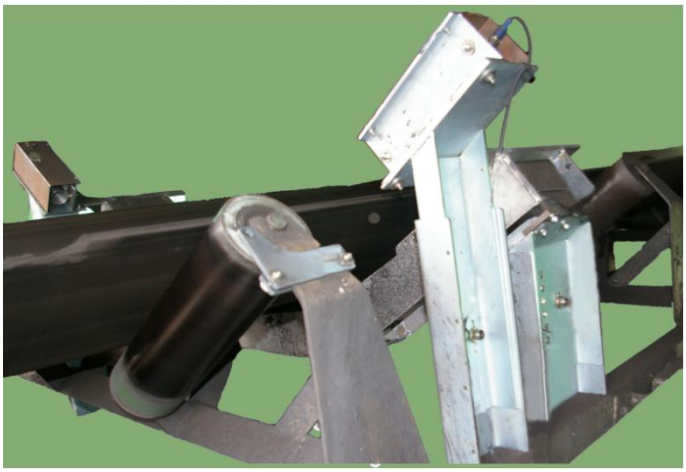
- BeltWatch –

Conveyor belt condition monitoring system

BeltWatch **is a permanently installed monitoring system that continuously monitors the condition of a conveyor belt.**

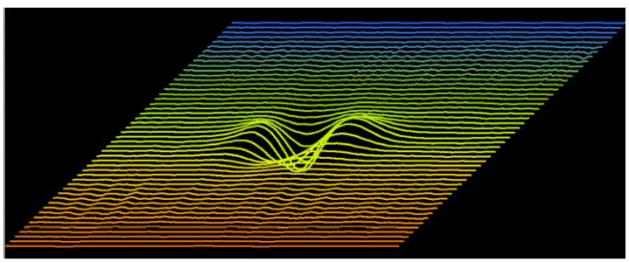


BeltWatch is a cost effective steel cord conveyor belt inspection system that provides enormous benefits to operators of conveyor belts. By identifying and monitoring steel cord defects, surface damage, splice deterioration and tracking errors before they become serious problems, ***BeltWatch*** reduces unscheduled maintenance, downtime, stockpile size requirements and increases belt lifetimes. The condition of the belt is monitored continuously, providing immediate alarms of impending major failures, such as splice failure, belt tears, etc.

BeltWatch features:

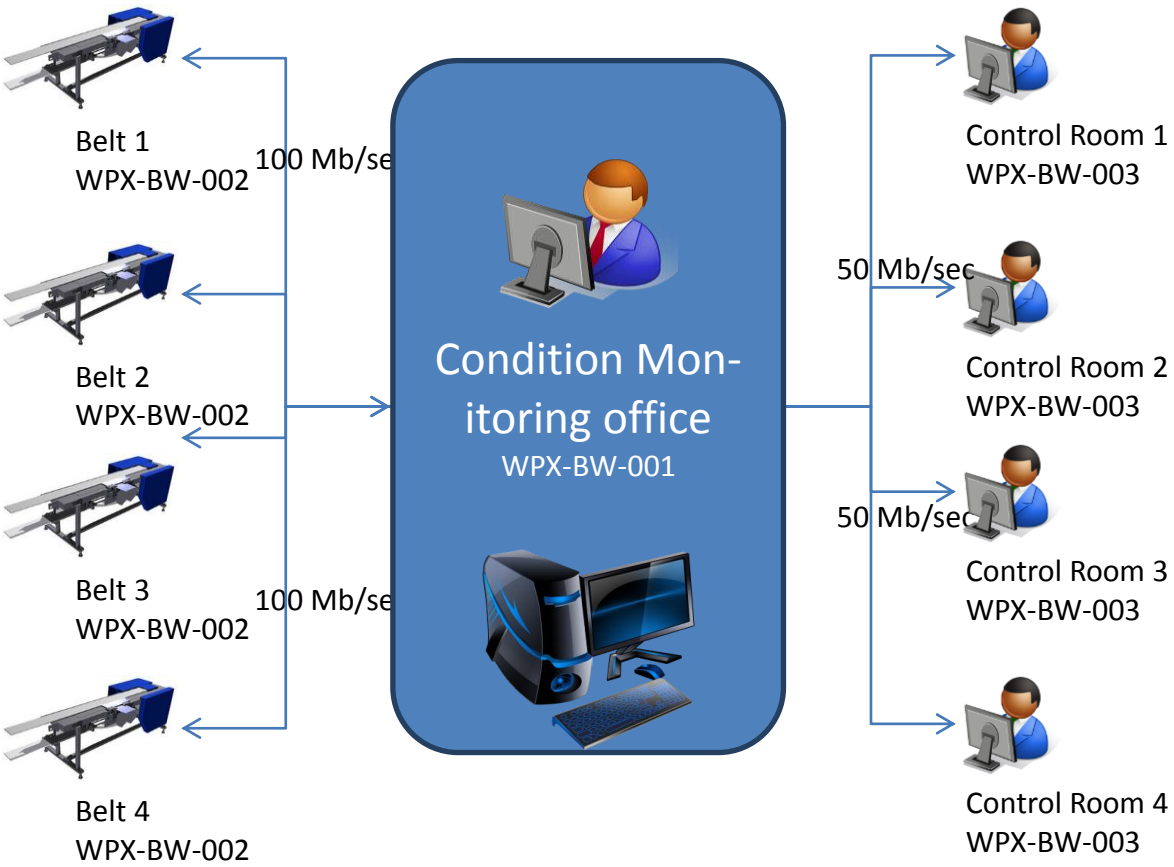
- Complete continuous detailed tracking and belt-width measurement.
- Continuous high-resolution whole-belt magnetic scanning, with defect recording.
- Periodic high-resolution surface imaging of defects (optional).
- Accurate and immediate location of defects and changes in condition of the belt.
- Automatic report generation.
- Long term defect trending.
- Multi-priority condition alarms.
- Inspection records of all defects.
- Simple and powerful facilities for comparison of magnetic, visual and tracking records with previously acquired records.
- Automated belt stop at pre-determined positions.
- More than 30 types of condition readings, including splice deterioration, cord break size & width, tracking, transverse defect distribution, etc.

Magnetic signature of a defect:



System Configuration:
System Architecture and operation
BeltWatch is an expandable system that uses a combination of high speed data link between the Field Processor and the Operator Console and existing LAN wide area networks for other personnel such as managers to view the operation of the belt remotely.
The Field Processor captures data from the Field Sensors and analyses it, streaming the data to the Operator Console in real time.
The Operator Console is the operator interface where alarms are manages and set up and the streamed data is processed, observed and stored. The Operator Console consists of the interface unit and a database.
Remote Consoles log into the database and receive near real time data of the belt. Access is given to reports generated by the Operator.
The architecture layout is shown in Image 1 below.

Image 1: architecture layout

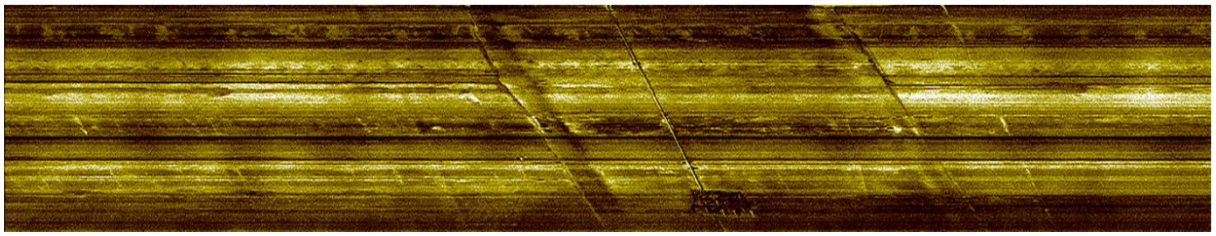


a) Field Equipment
The magnetic sensor, speed and tracking sensors are permanently installed on a curved or flat section of the conveyor belt, and are connected to a nearby Field Processor unit. The Field Processor acquires and analyzes the speed, magnetic signatures and tracking data, and continuously compares the latest readings against limits and previously recorded reference readings. The Field Processor is equipped with digital outputs for local alarm indication. A camera system can be periodically connected to the Field Processor to acquire high resolution surface images of defective areas.

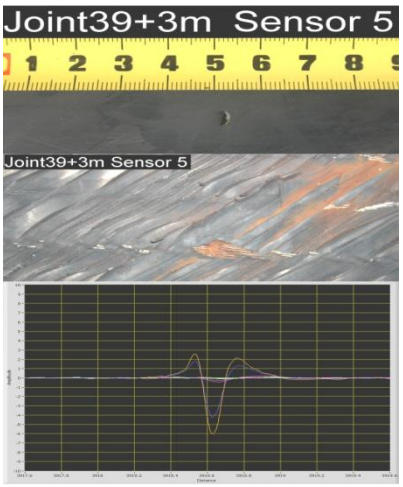
b) Control Room Computer

Field Processor communicates with a Control Room computer that continuously displays and records magnetic signatures, tracking and alarm and image information in tabular and graphic format. In addition, the Control Room computer provides automatic report generation and long-term defect trending displays.

Splice image. Belt speed: 4m/sec

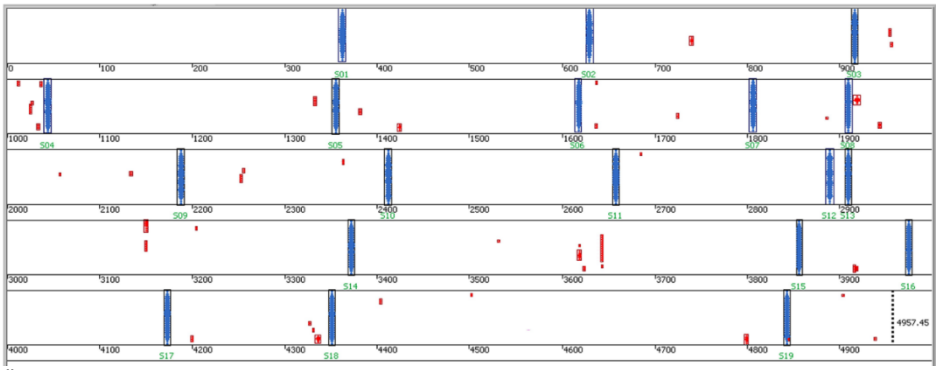


Surface puncture, resulting in corrosion, with magnetic signature



Specifications:

- Number of magnetic sensors across belt: Up to 64.
- Belt width: Up to 2000mm.
- Belt length: Up to 35km.
- Surface inspection image resolution: smaller than 2mm.
- Accurate belt speed measurement, using magnetic or optical sensors on idlers.
- Allowable Belt speed variation during measurement: up to +/- 10%.
- Ultrasonic or visual tracking measurement, with accuracy better than 2 mm.
- Defect and splice length measurement accuracy: better than 5mm.
- Belt speed: up to 7m/sec.
- Field processor, magnetic sensor, camera, tracking sensor and speed sensor environmental protection: IP67.
- Operating temperature range: -10 to +40 Deg C.
- Optional periodic use of a high resolution camera, with a high-intensity light.



'Speckle' defect diagram

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