Conveyor Condition Monitoring
Increase uptime, decrease damage, plan repairs, avoid disaster
Monitoring the condition of a system not only improves its reliability, but also decreases maintenance costs. With a conveyor belt condition monitoring system in place, your plant will reduce unscheduled maintenance, downtime and stockpile size requirements as well as increase belt lifetimes.

Yellotec offers two cost-effective steel cord belt inspection systems, BeltWatch and BeltView, originally designed and developed by Westplex. These systems will identify and monitor steel cord defects, surface damage, splice deterioration and tracking deviations in real-time preventing serious problems.

Our systems provide the option for either continuous (permanently installed) or periodic (mobile) monitoring of your belt, notifying you immediately of impending major failures.

Benefits:
- Early identification of potential failures
- Reduce correction and repair costs
- Reduce down time
- Extend maintenance periods
- Extend belt life

Avoid costly belt failures with fault identification and tracking
The belt monitoring system captures measurements and images (optional) from different sensors; records all belt events including splice deterioration, cord corrosion, cord breaks, edge breaks, tracking/width deviations, rips and tears. The sensors may be shaped to match the belt troughing profile on either the load or return side of the belt.

Features:

- Continuous detailed tracking and belt-width measurement.
- High-resolution whole-belt magnetic scanning, with defect recording.
- Flat or troughed belt sensor assemblies.
- Flexible and powerful communication options.

- More than 30 types of condition readings, including splice deterioration, rips, cord break size and width, tracking, transverse defect distribution, etc.
- Accurate and immediate location of defects and changes in belt condition.

- Multi-priority condition alarm outputs.
- Long term defect and splice condition trending.
- Inspection records of all defects.
- Automated report generation.
Magnetic Sensors:

The steel cords in the belt are magnetised as the belt moves over the magnetiser, magnetising each cord with alternating poles. The system sensor detects changes in this magnetic field as the belt passes. Defects and breaks are characterised by a single discontinuity in the magnetic field.

The use of a multiple channel (up to 72 channels – unmatched in this field) magnetic sensor generates a high definition (HD) magnetic image of the belt condition.

The measurements are analysed individually as well as compared to a baseline/reference condition. Alarms are generated if readings approach set limits, or shows significant change. Three alarm levels may be defined, depending on the criticality of the measurements.
Surface Imaging*:

For periodic inspection of the belt surface, high resolution images of the belt surface at splices, breaks, rips and tracking/width locations can be automatically acquired. This powerful tool identifies belt surface damage that can cause structural damage, for example:

- Punctures in the rubber, allowing water entry to the steel cords, causing corrosion.
- Belt cover separation and damage at splices.
- Rips

Tracking:

The system’s tracking sensors (two precision ultrasonic sensors) are mounted on each side of the belt. These sensors continuously measure the distance between the sensor and the belt edge. Tracking offset (side to side movement) and belt width are calculated from these measurements.

Belt Speed:

Belt speed is calculated by measuring the rotational speed of an idler.
A complete BeltWatch system consists of two main software packages:
1. The field unit or data acquisition software, and the
2. Operator or display/reporting software.

The operator software includes multiple data display options, alarm and status screen as well as modules used for real-time data analysis and trending such as RipFinder and SpliceMinder. The reporting module also forms part of the operator package.

Optionally, the BeltWatch system may include software for acquisition and analysis of visual camera data from the load surface of the belt.

The BeltView system includes all of the software/modules as described for the BeltWatch system, but optimised and adapted for use in a mobile system.

**RipFinder**
A proprietary software module employing algorithms designed and optimized to automatically analyse real-time data streams from different sensors (magnetic, width, visual) to quickly identify the occurrence of signature patterns indicative of belt rip.

**SpliceMinder**
Similarly SpliceMinder analyses different data sets acquired from new and existing splices continuously comparing measurements and values against baselines and real-time trends automatically identifying splice quality, condition and deterioration rate. It will automatically alarm on belt tears, pulled cords, necking, splice distortion and mis-alignment.
BeltWatch is a permanently installed monitoring system that continuously provides detailed analysis of the condition of a conveyor belt.
System Schematic:

- Operator Console
- Remote Viewing Consoles
- Alarms Status
- Internet Access
- TCP/IP
- Wireless LAN
- LAN Cable
- Fibre Optic
- GSM
- Internet

- Control Room
- SCADA Server
- OPC

- BELT 1: Sensor Assembly 1: Magnetic Tracking/Width Speed/Distance
- BELT 2: Sensor Assembly 2: Magnetic Tracking/Width Speed/Distance
- BELT 3: Sensor Assembly 3: Magnetic Tracking/Width Speed/Distance
- BELT 4: Sensor Assembly 4: Magnetic Tracking/Width Speed/Distance

- Field Controller 1
- Field Controller 2
- Field Controller 3
- Field Controller 4

- Local Alarms 1
- Local Alarms 2
- Local Alarms 3
- Local Alarms 4

- Optional: Portable Belt Surface Imager
BeltView

BeltView is a portable condition monitoring system that can be used for periodic inspection of multiple steel-cored belts.

The conveyor inspection system combines the power of a high resolution computer-based visual inspection system with the diagnostic ability of a multi-channel magnetic sensor system. It enables comprehensive measurement of a conveyor belt, detecting both surface damage, buried steel cord faults and tracking errors.
## Specifications

<table>
<thead>
<tr>
<th></th>
<th>BeltWatch</th>
<th>BeltView</th>
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</thead>
<tbody>
<tr>
<td>Number of magnetic sensors across belt</td>
<td>Up to 72</td>
<td>Up to 72</td>
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<tr>
<td>Sensor spacing</td>
<td>At 31.25mm intervals across the belt</td>
<td>At 31.25mm intervals across the belt</td>
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<tr>
<td>Belt width</td>
<td>Up to 2000mm</td>
<td>Up to 2000mm</td>
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<tr>
<td>Belt length</td>
<td>Up to 35km</td>
<td>Up to 35km</td>
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<tr>
<td>Surface inspection image resolution</td>
<td>Smaller than 2mm</td>
<td>Smaller than 2mm</td>
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<tr>
<td>Allowable Belt speed variation during measurement</td>
<td>Up to +/- 10%</td>
<td>Up to +/- 10%</td>
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<tr>
<td>Defect and splice length measurement accuracy</td>
<td>Better than 5mm</td>
<td>Better than 5mm</td>
</tr>
<tr>
<td>Belt speed</td>
<td>Up to 7m/sec</td>
<td>Up to 7m/sec</td>
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<tr>
<td>Field processor, magnetic sensor, camera, tracking sensor and speed sensor environmental protection</td>
<td>IP67</td>
<td>IP67</td>
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<tr>
<td>Operating temperature range</td>
<td>-10 to +40 Deg C</td>
<td>-10 to +40 Deg C</td>
</tr>
<tr>
<td>Data storage</td>
<td>Removable SATA III hard disks</td>
<td></td>
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</tbody>
</table>

### Other features

- Accurate belt speed measurement, using magnetic or optical sensors on idlers
- Ultrasonic or visual tracking measurement, with an accuracy better than 5 mm
- Optional periodic use of a high resolution camera for surface damage inspection, with a high-intensity light.
- Accurate belt speed measurement, using magnetic or optical sensors on idlers
- Ultrasonic or visual tracking measurement, with an accuracy better than 2 mm
- High Intensity rugged White LED Line Light.
- 2048-pixel GigE Line-scan camera.
- Ruggedized Computer housing.
- A portable inspection frame mounts the magnetic sensor, camera, line-light, speed and tracking sensors. The inspection frame slides into permanent guides on each belt to be monitored.
Yellotec is a products, service and training provider in the following specialist fields:

1. Complete solutions for the implementation and management of Condition Based Maintenance.
2. Remote Diagnosis of Vibration Analysis.
3. Full on-site C&BM services, ranging from single individuals to complete department.
4. Oil Analysis Laboratory Services.
8. Training in all specialist areas of Condition Based Maintenance
9. Direct agents for Flir Systems (Sweden) and Prüftechnik (Germany).