

# Online Condition Monitoring



## Product overview

The Online Condition Monitoring system can effectively monitor and report upon damage events & severity and changes to splice layout to prevent failures which would otherwise impact upon the safe operation of the asset and ultimately impact production. The system is capable of running unattended and reporting automatically the current condition of the conveyor belt. The system utilises sophisticated X-ray imaging and direct digital technology incorporating leading "fingerprint identification" software to process generated images, conduct intelligent identification and provide for timely and appropriate alarm notification of events as they are categorised.



## System Features & Attributes

### 1. Unattended operation

The unattended mode allows the system to automatically complete the entire detection process.

### 2. Remote operation

The equipment can be remotely activated through required protocols which allow the system to operate as directed thus alleviating operators from needing attend at a pre-determined times. Interruptions to the set parameters allow operators to manually obtain specific data including images to monitor equipment condition at any time. The furthest communication distance allowable is 120km.

### 3. Real-time display

The current conveyor belt operation condition is displayed in real time and can be accessed remotely.

### 4. Automatic identification

Frequency domain and Value domain transformations are used to conduct automatic analysis on the belt data. The software automatically identifies broken strands, cord corrosion, cord displacement, damaged / pulled splices, rubber tearing, etc for the entire belt length and classifies and presents the various defects in a convenient severity listing allowing users to target specific high priority events and carry out the required remediation.

### 5. Video playback

The software allows for playback of the entire belt length at an adjusted speed to allow operators the convenience of checking specific details. The inclusion to skip to a specific anomaly detected reduces the browsing time for customers.

### 6. Accurate distance measurement

The distance between any two points on the belt can be measured simply and the measurement can be as precise as 1mm.

### 7. Modular design

The equipment may be separated into four independent cabinets, which is convenient for packaging and transportation requirements. Hardware modularisation makes allows for convenient installation, commissioning, repair and replacement.

### 8. Convenient installation

Installation of the equipment only takes 2 hours under normal conditions. All site specific instructions will be followed through this process.

### 9. Simple operation

Upon successful installation and commissioning the system may be operated in either unattended or manual mode. Both modes are easily instigated requiring minimal input from the operator.

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## 10. Illustrated reporting

Upon completion of the detection process, the complete report can be generated with a single click the "report button", the software will automatically conduct sequencing of images, position, size and other information identified during this measurement process, and automatically generate an illustrated report.

## 11. Safety analysis report

Safety reports may be generated at the frequency determined by the client. Given a particular systems criticality and history it may be required to undertake analysis at the start of each shift or every 24hrs, week, or month, the frequency is determined and set by the user and can be changed to reflect current conditions at any time.

## 12. Accurate detection

The system allows for maximum protection for your asset through accurate detection and subsequent analysis and reporting.

## 13. Reliable protection

Enclosure protection grade of IP57; X-ray source leakage dose is greatly lower than the value range permitted by national standards, and the leakage dose within 5cm around the equipment is  $\leq 5\mu\text{Sv/h}$ .

## 14. Accurately detect joint movement

1. Utilise "fingerprint identification" technology, and measure Splice movement through image comparison;
2. After Splice movement has occurred, a vacuum within the rubber becomes evident at the cord ends, the image produced by the X-ray will identify these rubber voids and calculate the amount of Splice movement accordingly;
3. Utilize pixel data to calculate the Splice length and then measure the Splice movement amount. The above three methods can be independently applied and mutually verified, with multiple references.

## 15. Defect positioning

The system utilises pixel data to accurately position every identified defect and displays the positional information in the observation window and the report.

## 16. Strength calculation

Included within the evaluation of the belt condition combined with the international regulations found in GB/T9770-2013, provide for strength analysis for the belt which may be applied to determine criticality of the asset and action required to mitigate.

## 17. Automatic alarm

Continued analysis of the belt tension during normal operations combined with the evaluation of the international regulations found in GB/T9770-2013, the software can automatically set alarm limits taking into account the required safety factors and automatically provide for notification as the belt strength reduces to its lower limit.

## 18. Holographic storage

The collected belt data is stored on hard disk at the control interface using multi-thread and specialised disk operating mode. This facility ensures that the conveyor image stream when in playback mode is no different to those images seen through normal operation

## 19. High-magnification

The system utilises magnifier principles to conduct detailed observation of various defects, including split wire, rust, etc.

## 20. Build Flexibility

The equipment may be configured and adapted to suit various voltages and is dependent upon the particular application. Ethernet, optical, Camera Link and many other communication modes can be configured for the equipment, making it convenient for customers to select according to a particular situation.

## 21. Accurate collection

The detection hardware utilises an 0.8mm/0.8mm resolution rate which completely captures every detail of the conveyor belt.

## 22. Efficient algorithm

The use of sophisticated EM algorithms allows for accelerated calculation of required database parameters which greatly reduces the time required to process large data sets.

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## SPECIFICATION

Performance Parameter	System Operating Voltage	AC 1140/660/380/220/127v
	System Operating Current	<2A
	Belt Speed	0 – 9.6 m/s
	Belt Width	< 2.2 m
	Belt Gauge	<40/80 mm
	Communication Mode	Ethernet/Optical/Camera Link
	Communication Distance	<120 Km
	Protection Rating	IP57
	Resolution Rate	0.8mm x 0.8mm
	Minimum Cord Damage	1.6mm
	Minimum Splice Movement	3mm
	Detection Error	Horizontal<1cm Longitudinal <5cm
	Operating System	Windows XP/NT/9x/7/8
Work Environment	Environment Temperature	-50 C + 40 C
	Humidity	<95%
	Atmospheric Pressure	86 – 106KPa
Electrical Environment	Supply Voltage	AC127v sustainable fluctuation range 75% – 110%
	Input Operating Current	<2A
	Consumed Power	<255W