

FORTNA

White Paper Series

Maximum availability in the cross-belt sorter system



Abstract

Other than accuracy, one of the most critical parts of automated sorting systems is to have them constantly running. In order to achieve this, it is paramount to guarantee system availability, complete with predictive capability to detect possible failures.

The combination of developing the cross-belt sorter with high quality components and a simple yet intelligent system design can prevent failures and reduce maintenance expenses over the lifetime of the machine.

The HC-Loop cross-belt sorter system, with the integrated predictive maintenance capabilities, allows businesses to run as desired, with a reduced risk of compromising performance. The combination of software and hardware installed in the system prevents any undesired failures by providing real-time data of the system's normal operation. With this, the client can rely on consistent performance with no downtime and stable throughput.



Data acquisition

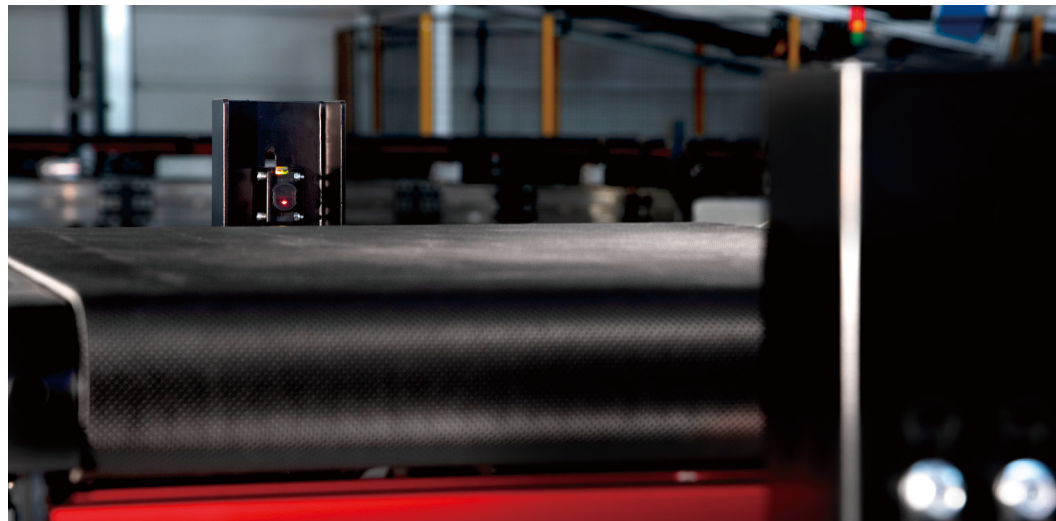
The possibility of gathering data on the HC-Loop is an intelligent approach to taking care of cross-belt sorter systems. The HC-Loop is equipped with an integrated Data Acquisition System (DAQ) in various parts of the machine, particularly along the track. The system allows for real-time detection of the sorter's correct status and predicts a range of potential future anomalies.

In order to provide consistent guidance, the DAQ & Predictive Maintenance system must learn the frequency spectrum of the machine under nominal operating conditions, which is achieved through a data acquisition campaign on both our in-house systems and partially on the installed system.

The track uses several sensors installed throughout the loop and in each cell. These sensors provide valuable information of the status of the sorter, such as abnormal vibrations or excessive thrust force. Thanks to the distribution of these sensors and the logic embedded in the system it is possible to identify exactly where the problem is located.

Ground and on-board sensors keep the system under control and constantly exchange data with the predictive maintenance tool which detects any kind of possible fault. There are three main parameters that the HC-Loop detects and controls:

- **Track through the data**, it is possible to identify the exact location of a possible anomaly. A warning is sent and the corrective maintenance procedure can be put in place.
- **Carrier shock detection** detects any possible obstacle or impact on the track.
- **Joint by measuring the tension between the carriers**, data can indicate the correct chain tensioning and any possible anomaly.



Control and safety

The information provided by the sensors enables to cross-check data with the thresholds provided by the instrumented cart to see if there is any failure point or area in need of attention.

In addition to monitoring vibration data in real time, the software has specific logic to trigger action in case vibration levels exceed a certain value, such as a safety shutdown. In other words, it is possible to reduce safety risk by improving asset reliability:

- Very low risk for the people working daily around the system
- In the unlikely event of a crash along the loop, the system immediately stops and identifies the event position

All this information can be easily seen in the user interface or on the cloud so the client can be sure at all times that the system is running normally. In a nutshell, the system uses sensor data to monitor vibration levels throughout the sorter to identify any possible failures.

Highlights



High availability

With the predictive maintenance system, you can rest assured that the cross-belt system will achieve 99.9% availability - virtually always ready to deliver throughput when you need it.



High control

Sensors located all along the track and in every single cell collect a broad range of information. The central control system recognizes any information that is not in the normal range and reacts immediately.



Cost savings

Reduced maintenance requirements thanks to constant monitoring of sensor data and high-quality components.

Availability first

Businesses cannot afford for mission-critical equipment like sorters to stop during operating hours, requiring that automated systems operate with no downtime. Always knowing system status is critical – for service assistance – to achieving this high level of reliability. Relying on system status data enables service organizations to help prevent sorter failure that can impair the entire operation.

The combination of sensors, software and data management is an extremely effective safeguard to eliminate system downtime. All technologies are optimized to work together to reach the best execution.

In the event a downtime incident happens, every single minute is important and can make a difference financially and for customer service levels. That is why your cross-belt sorter system has to ensure maximum uptime.



Low maintenance

Work windows are increasingly short and drive demand for improved service

It is always nice to have a system or machine that is easy to maintain, but it is even nicer when the routine maintenance to be performed is very limited. This is what the HC-Loop features aim to do. Other than the normal visual inspections the required periodic maintenance activity on the sorter is a few hours per year. This is thanks to the system intelligence and the high-quality components used, representing great savings to the host operation.

Conclusion

In an automated sortation hub with high throughput requirements, every minute of downtime matters. A small undetected failure can balloon in a major failure in the future, risking hours – or even days – of downtime to resolve the issue.

In order to have a stable system that can reliably meet throughput requirements, operations must identify possible failures to inform preventive service programs. By doing this you can ensure a long lifespan of the components and, therefore, the system. In other words, the availability of the system can be increased by:

- Controlling the system using real-time information
- Managing maintenance windows
- Early detection of problems to prevent unscheduled downtime

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