swisslog

Member of the KUKA Group

CONDITION MONITORING

DO YOU HAVE YOUR WAREHOUSE UNDER CONTROL?

FEWER MALFUNCTIONS AND BETTER PROTECTION THANKS TO REMOTE MONITORING

System availability makes or breaks the productivity of an automated warehouse. Downtime caused by unscheduled system shutdowns not only lower efficiency, they can result in delivery delays and an explosive rise in costs, which, in turn, affects customer satisfaction. Swisslog's innovative Condition Monitoring solution is based on the idea of detecting and correcting system component changes caused by wear, excessive use and other potential causes as early as possible – ideally immediately after they arise.

SMART CONCEPT

The core tasks of the Condition Monitoring service include recording, analyzing and visualizing information in order to provide ongoing condition monitoring in the warehouse, including all taks, processes and warehouse components. State-of-the-art sensors, data collection methods, and optimization algorithms based on big data analytics are the cornerstones of our Industry 4.0 service portfolio that supports all Swisslog systems throughout their entire lifecycle.

Our innovative SynQ software platform offers all the software components required to achieve this. Business intelligence tools, such as Swisslog Cockpit Manager, Availability Manager, Event Manager and, at the core, our 3D real-time system visualization interface (SPOC), record the data generated by the system. They give employees in the control center an intuitive and accurate overview of all warehouse operations, indicate where the failure of individual components would impact the entire flow of goods, and are able to trigger proactive measures when needed. For example, if a bin in the high-bay warehouse shifts or a palletizing robot runs too hot, the system issues an alert before an incident arises.

The Condition Monitoring plug-in adds an important feature to the functionality of the SynQ software platform: It continually records the equipment condition by incorporating the measurement and analysis of physical values, such as distances covered, temperatures, energy consumption of individual elements and disciplines from state-of-the-art sensors into system reports. The

BENEFITS

Maximum availability

- Real-time analysis of error and throughput trends
- Faster error detection/correction
- Faster replacement of defective mechanical components
- Condition Monitoring to perform system maintenance based on the current condition

Lower costs, reliable budget

- Utilization of remaining service life of expensive equipment
- Equipment operation with maximum efficiency
- Scheduled mechanical maintenance at budgeted costs
- Historical trend analysis for inventory movements

Calculated costs

- Less downtime for critical equipment
- Ongoing system monitoring through an early warning system for malfunctions
- More reliable costs
- Basis for implementing completely new business and payment models (e.g. pay-per-use, pay-per-outcome)

collected infor-mation can then be used to identify vital elements that are prone to malfunctions and draw conclusions regarding the potential error rates of individual disciplines and entire logistics systems. Condition Monitoring allows control center employees to view the current system condition at any time, docu-ment the development of trends and evaluate failure risks. The goal is to turn the data and data analyses into decisions designed to improve the planning of operations and maintenance processes to prevent system failures caused by malfunctions and maintenance factors, especially those that occur during peak periods and are therefore particularly disruptive.

COST SAVINGS THANKS TO TARGETED MAINTENANCE

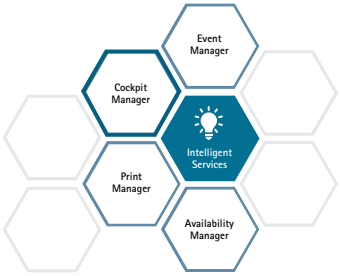
Swisslog Condition Monitoring allows you to view the current condition of your system at any time. Our solution ensures that your system runs at maximum efficiency across its entire lifecycle. Swisslog Condition Monitoring replaces the preventive or reactive maintenance and service strategy of the past. Instead of conducting routine checks at regular intervals and performing scheduled replacement of intact parts with a specific remaining service life, maintenance and spare parts provisioning occur precisely when the data indicates they are really necessary. This new approach to proactive maintenance and service offers enormous cost-savings potential because the service life of critical elements can be fully utilized.

CONDITION MONITORING POWERED BY SYNQ: A UNIQUE COMBINATION

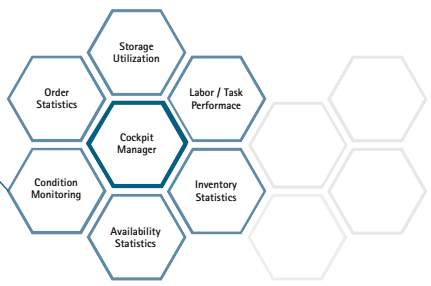
Condition Monitoring is a plug-in extension for the Cockpit Manager, an add-on to SynQ. Ideally, you use both software modules as part of our fully integrated SynQ warehouse management and material flow system in order to benefit from the entire bandwidth of our growing number of innovative business intelligence tools.

The Condition Monitoring solution uses the data collected by the hardware components using state-of-the-art sensors. Whether it is the energy consumption of a conveyor system, the deceleration path of a stacker crane, the number of movements of a shuttle or the temperature generated by the movements of a roller conveyor, our Condition Monitoring solution provides continuous and seamless evaluations of the condition of all components and disciplines in the warehouse.

Comparing the measurements and error events generated by the sensors and stored in the data cloud against predefined target values allows deviations to be diagnosed quickly and with pin-point accuracy. As a result, you can determine 24/7 whether your system operates flawlessly or whether there is imminent damage due to wear or excessive usage.

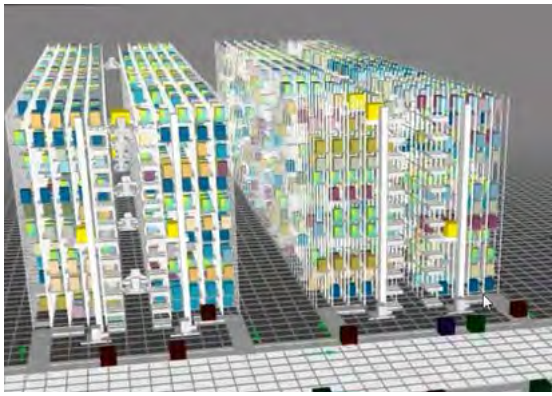


Condition Monitoring
Part of our Intelligent Services, Condition Monitoring is a plug-in for our Cockpit Manager.



COMBINABLE WITH EVENT MANAGER

Combined with the Event Manger SynQ add-on, Condition Monitoring allows logistics managers in charge of warehouse operations to initiate immediate error correction measures when a malfunction occurs. In addition, the system is able to address problems on its own, such as issuing an order to modify the storage and retrieval strategy. You can predefine a number of different emergency scenarios and event patterns in the Event Manager to avoid losing precious time for error correction when a malfunction does occur. In all cases, Condition Monitoring offers interoperability with our 3D real-time system visualization interface. Information about the condition of the system can not only be displayed as classic charts, but also directly on the system visualization screen as, for example, heat maps which highlight all critical elements. A number of other apps from Swisslog can be added to the chain of software modules. For example, the Report Manager can be used to generate a PDF report when a specific problem is detected. This report, in turn, is then e-mailed to the warehouse managers by the Event Manager. The result is effective reporting about all the errors that occur and the corrective measures that are initiated in response.



3D Real-time system visualization

CONDITION MONITORING WORKFLOW

1. **Collect**
   Data is collected down to the technical level and managed centrally by the system (energy consumption, temperature, x/y movement).
2. **Analyze**
   The Condition Monitoring system analyzes the data and processes it for decision-making and visualization.
3. **Decide**
   Based on predefined rules or thresholds, the Condition Monitoring system decides which condition a device is in.
4. **Intervene**
   Based on the system condition, the system knows which response is needed and initiates the corresponding action.

During data analysis, Swisslog differentiates between key performance indicators (KPIs) about throughput and error statistics which can be measured without special sensors, and enhanced KPIs based on sensor values. The Condition Monitoring plug-in offers predefined dashboards and KPIs for both categories.

KPIS ABOUT THROUGHPUT AND ERROR STATISTICS

- Average time to error correction
- Common errors (e.g. top 10 error statistics)
- Throughput of a specific warehouse component
- Downtime of a specific warehouse component
- Total number of system failures caused by malfunctions
- Total number of error events by warehouse component
- Mean time between failures (MTBF)

KPIS ABOUT MEASUREMENTS

- Elements above the maximum temperature
- Error frames on field bus
- Slewing distance covered by the crane
- Total distance covered by all elements
- Total driving time of all elements
- Energy consumption of all elements
- Energy consumption of the warehouse
- No-read rate of the scanner
- Reasons for TU rejection
- I-point performance report

CONDITION MONITORING IS CLOUD-BASED

Since Condition Monitoring generates large amounts of data, Swisslog offers this innovative concept as a cloud-based solution. All data is sent to the cloud using encrypted VPN tunnels. This cloud is private, i.e. only the owner and generator of the data has access. The latest IT security techniques are used to prevent unauthorized access to this data. An integrated failover concept – mirroring of the data on a second backup server – offers additional protection. Recovery mechanisms ensure that the data transferred to the cloud is never lost.

THE PATH TO INDUSTRY 4.0 BEGINS WITH CONDITION MONITORING

Condition Monitoring is just the beginning of a future dominated by Industry 4.0 technologies. It will allow Swisslog to provide maximum flexibility and viability across the lifecycle of our logistics systems – whether it is through modular system extensions, software updates or technology innovations such as add-ons that leverage the latest findings of our data scientists in order to optimize processes.

Building on Condition Monitoring, Predictive Maintenance Service will be the next building block of our Industry 4.0 concept. Predictive maintenance will be made possible by networking all automation sensors, integrating external data into the complete system and detecting correlations and behavior patterns. Our systems will send information not only about where a problem will occur but also about when and how it can be fixed proactively.

ABOUT SWISSLOG

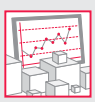
In today's competitive world, companies must be able to deliver the right orders to the right customers at the right time. Errors and delays in order fulfillment can have lasting negative impacts on a brand while maintaining high stock levels ties up capital and reduces flexibility.

As a full-service provider of automated intralogistics systems, Swisslog delivers everything companies need to optimize logistics from planning through implementation.

Our order fulfillment and inventory solutions enable companies to achieve the highest throughput at the lowest cost, efficiently handle large catalogs of SKUs, and accurately meet delivery demands and requirements.

DESIGN


Consult


Analyze


Plan Solution


Choose Solution

DEVELOP

Engineering


Integration


Installation


Ramp Up

DELIVER


Preventive Maintenance


24/7-Support


Optimization & Spare Parts


Moderni-zation & Expansion

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