White Paper

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3 Steps to Effectively Manage the Plant Floor Network

PANDUIT®

Introduction

The manufacturing plant floor is a complex environment with plenty of physical resources to measure and manage, ranging from large drives and motors to smaller components such as sensors and batteries. It is common for facilities to have a preventive maintenance program in place for these high-wear items that is based on certain measurements, but what about the plant floor network? How can this important asset be measured?

Plant floor Ethernet networks have become a critical link between manufacturing and automation systems, and business systems, and the standard communication link between automation devices. Two essential needs accompany the growth and standardization of Ethernet within automated facilities—first is the need to offer controls and operations teams an awareness of what devices are attached in each location on the Ethernet network, and second is how these devices are performing. It is important to monitor and measure device performance to properly manage the overall health of the plant floor network. This white paper explores three best practices for determining what to measure so management and operations can effectively and efficiently run the entire industrial network.

Step One: Understanding the Importance of Key Performance Indicators

The first step to adequately managing the plant floor network is to determine the factors that need to be measured, then consolidate the list to determine which items are the most crucial to organizational goals and the health of the systems. These essential measurements are known as key performance indicators (KPIs). A KPI is a quantifiable measurement a company uses to determine how well it meets its operational and strategic goals. KPIs are unique to the organization and based on each department's expected performance to ensure the entire organization is successful. Several combined measurements could equal a single KPI.

The basic characteristics needed to establish an effective KPI include:

- Easy to understand
- Measurable
- Actual (up to date)
- Not many in number

Source: ***http://www.measurebusiness.com/the-choice-of-kpis-in-bsc-implementation.htm***

Step Two: Developing Key Performance Indicators

To develop the most effective KPIs, organizations should first have well-defined goals and established benchmarks in place. One common way to begin is to explore the overall equipment effectiveness (OEE) in an organization to identify the percentage of planned production time that is productive. To determine an organization's OEE score, observe the ratio of fully productive time to planned production time, noting that scheduled downtime is not included in this equation. Figure 1 illustrates the industry standards for separate manufacturers.

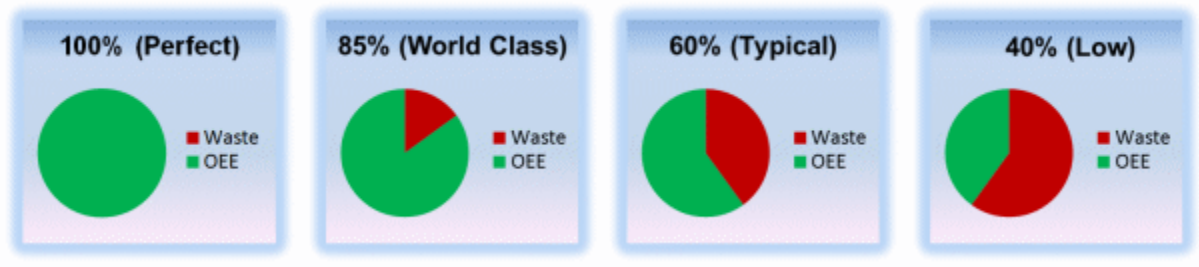

Figure 1. Understanding an organization's OEE score is important for making improvements and for identifying problems in the production line.
Source: http://www.leanproduction.com/oee.html

With the emergence of Industrial Ethernet turning disparate systems into a connected plant, world-class producers realize that they must account for uptime of the industrial network infrastructure as a key driver of OEE. With this realization, management at these organizations are seeking to change how they run their operations.

For example, for the plant floor network infrastructure, many organizations have a break/fix mentality, so when there is network downtime, it has to be addressed immediately to get the plant running again. This directly results from reviewing KPI data for a segment of the plant, (e.g., a machine or a cell) that does not necessarily address the interconnected nature of today's industrial operations. This is a crucial practice for companies where incidents on the industrial network impact plant production. Instead of searching for an interruption on a cell or machine where the impact is obvious while the root cause may be obscure, a more effective approach might be to observe the performance of the overall industrial network infrastructure, and its interactions throughout the various machines on the plant.

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To establish a KPI that will help an organization move towards the ideal 100% network uptime, operations should first decide which devices within the industrial network are required to run constantly, such as the human-machine interfaces (HMIs), programmable logic controllers (PLCs), input/output (I/O) controllers, industrial switches, and drives that, if taken down, would stop production. Figure 2 illustrates the many types of devices that can be included in a single industrial network.

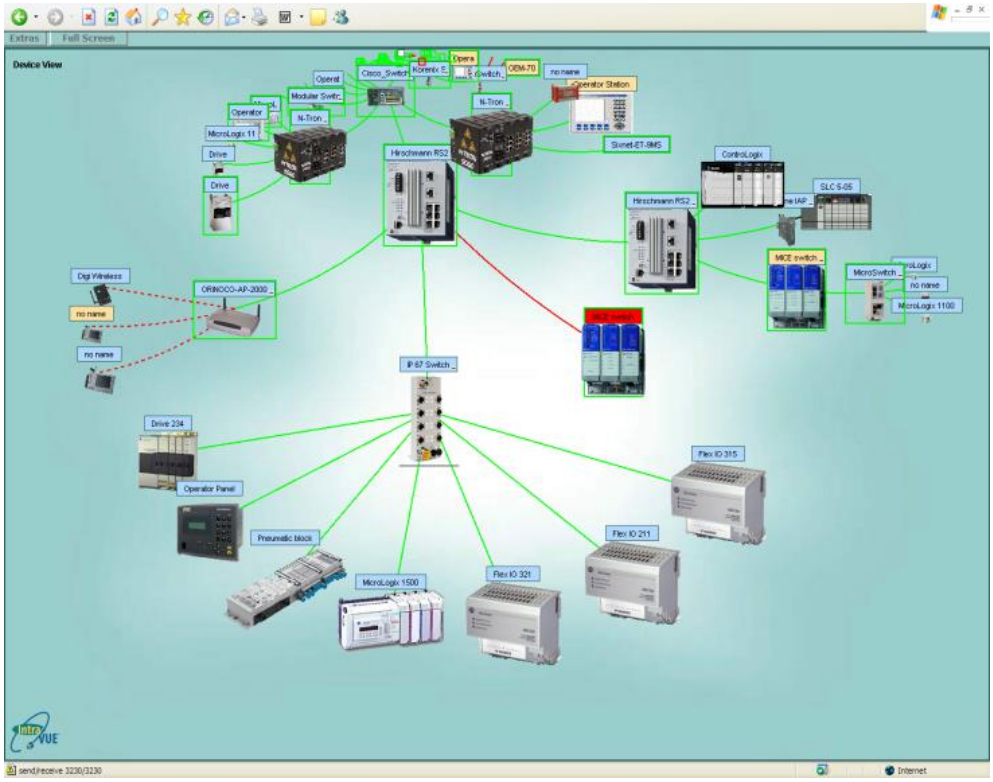

Figure 2. This schematic illustrates the many devices and connection points that can be included in an industrial network.

Next, it is important to establish which network events to record and which events will trigger an immediate alert. While all network events should be recorded, alerts might only be triggered if the network capacity drops below a specific threshold. It is important that this threshold is not a full “break” of the network that results in downtime. Finally, organizations need to determine a time frame, such as daily, where key operations and controls management will review network reports. Using this approach, controls and operations managers can see trends in the network over time and can identify when the network is operating even slightly below target efficiency. These issues will not cause a noticeable problem with the network, but they can be early indicators of future network issues.

Step Three: Making Informed Decisions Based on KPI Data Reports

For any business, having data to make informed decisions is vital. Often, continuous improvement is overlooked in an organization because it is difficult to provide data that shows the benefits of the improvements versus the costs. For a plant floor network, available data to show where degradation is occurring and where improvements are needed to appropriately manage the network and output of the plant is key. For example, the network KPI can show that although network uptime is still above goal, the number of events occurring on the network is increasing rapidly, pointing towards network instability. Exploring this data may show an intermittent connection to a critical I/O module that can be identified and resolved quickly, even before failure.

This information can help controls and operations management justify the expense of capital improvements needed for proactive maintenance instead of relying on a reactive maintenance approach. To gather the appropriate data, a tool is needed that can easily show controls and operations management a snapshot of the industrial network's health based on the pre-determined KPIs. Controls and operations management can remotely observe the KPIs using an easy-to-understand, web-based interface. Tools such as the new KPI report feature in IntraVUE™ industrial network and visualization software by Panduit allow management to make informed, data-driven decisions by providing visibility into how the network is performing (Figure 3).

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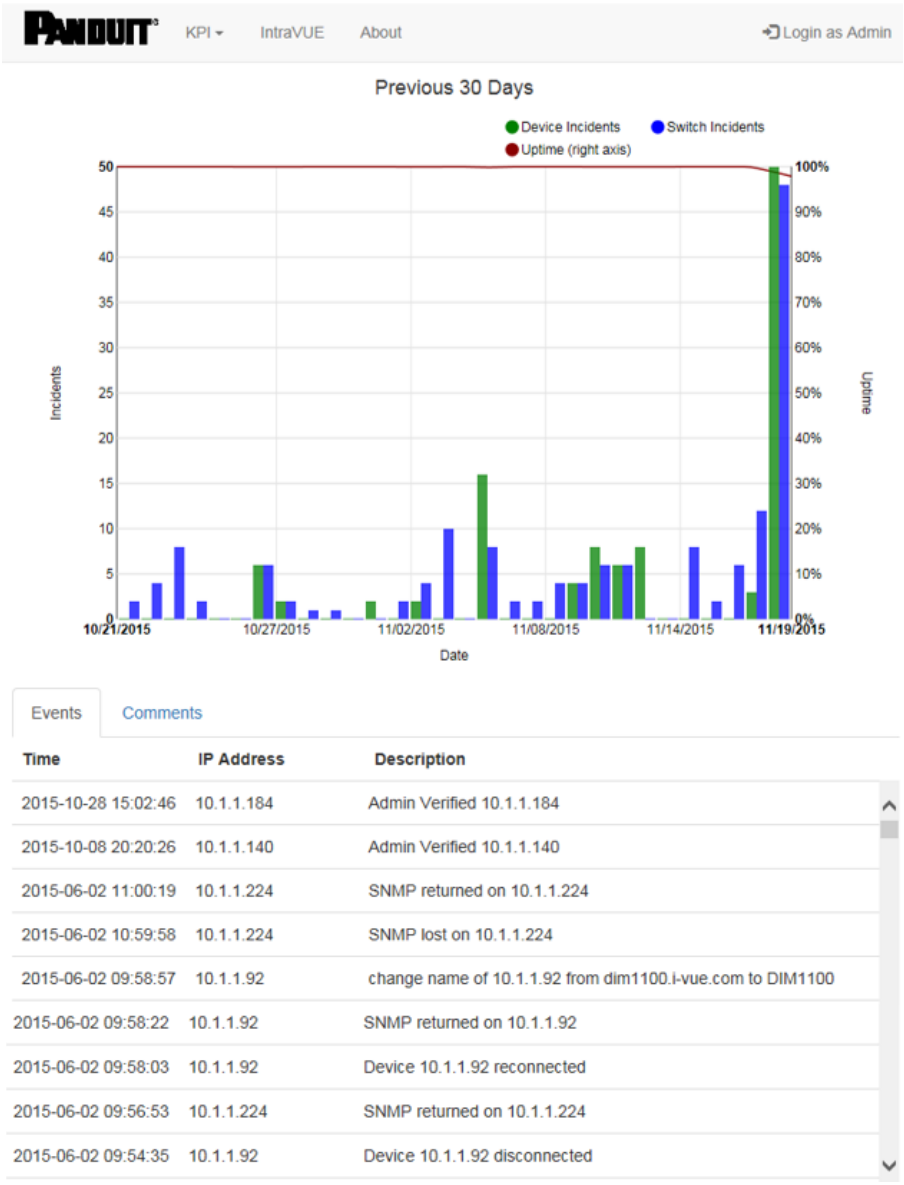

Figure 3. Summarized 30 day KPI report.

Reducing Plant Downtime by Properly Managing the Industrial Network

The devices that comprise the industrial network within an automation system are a key asset to the success of the plant output, which drives profitability for manufacturers. Proper metrics for industrial network infrastructure performance allow controls and operations teams to make informed data-driven decisions to manage network uptime and

mitigate the cost of unplanned disruptions. This simple shift from a reactive to a proactive approach to manage the industrial network can drive improvements in time-to-resolution of separate downtime events by as much as 75%, while providing objective measurement on the uptime of important devices to drive improvement in overall plant effectiveness.

References

[1] *Source*: http://www.measurebusiness.com/the-choice-of-kpis-in-bsc-implementation.htm

[2] *Source: http://www.leanproduction.com/oee.html*

Resources

For more information on how Panduit can help increase the plant-level awareness of your industrial network or to request a live demonstration with a Panduit Industrial Automation expert, visit www.panduit.com/intravue or email iai@panduit.com.

Simplifying Robust Network and IoT Deployment

Panduit is a world-class developer and provider of physical infrastructure solutions that improve reliability, security, and safety of Industrial Automation Infrastructure systems while reducing deployment and operating costs. Working with industry leaders, Panduit helps bridge the gap between IT and Controls Engineers by providing optimized building-block architectures for connecting enterprise, industrial networks, and control systems.

Panduit is simplifying robust industrial network deployments, providing our customers confidence and peace of mind through our enterprise, data center and industrial automation expertise, tools, and comprehensive offering.

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