Simplify Metrics Reporting

Standardized programming methods streamline setup and integration of performance measurement systems.

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Validating machine performance and making use of machine intelligence often is described as a simple and virtually "built-in" capability of many software tools available. However, this task is anything but simple because it requires mapping data to the control system. Because no consistent, standard format for coding control system data exists, software tools designed to capture metrics involve a time-intensive, manual coding process.

> Without a common coding methodology, inefficiencies are abundant.

To improve plant efficiency, manufacturers rely on machine builders to deliver equipment that can collect a range of performance and operating data. With accurate performance metrics, such as Overall Equipment Effectiveness (OEE), plant managers can identify problems and establish proactive strategies for driving improvements across the entire manufacturing process.

A programmer's primary challenge when mapping performance data is that there's no standard way to define the vocabulary and definitions related to machine states or event data. If you were to ask two engineers working on the same machine to define and describe the various machine states, you would likely get two different definitions and different terminology.

Other data setup and configuration challenges come from the lack of clear performance data specifications. For most machine builders, the conversation with customers often is limited and vague when discussing required performance metrics and how they're defined.

This can be a problem if the manufacturer has a specific, yet unspoken, expectation regarding failure modes, reject rates, cycle times, production counts, etc. If the machine builder discovers these issues after the machine is finished and delivered, changes are expensive and time-consuming to implement.

Whether a machine builder approaches each application from scratch or attempts to reuse machine code from a previous project, without a common methodology, inefficiencies are abundant.

Map to a Model

The best way to bring order and efficiency to the data-mapping process is by following industry standards. That's the intent behind new modular programming guidelines recently incorporated into the ISA-88

standard. The guidelines provide programmers with a broadly recognized and predictable machine-state model and standardized-data model to help ensure consistent machine design.

With the ability to reuse definitions, structures and lines of code, programmers can better leverage prior work. This is important as machine builders continue to assume more responsibility for designing information-enabled machines preconfigured and accurately coded with the operating and performance data that users need.

Commonality Equals Simplicity

The manufacturer also finds value in having standardized tools and programming concepts. Having the same program structure helps simplify maintenance and trouble-

>> Tips to Tapping In from Afar

Technologies such as EtherNet/IP give machine builders the ability to keep machines running, even when they're separated by thousands of miles. However, users dictate whether they want a remote access plan, and if they do, how it will be managed. To create the best remote access approach, machine builders should work closely with their customers to:

- **Ask the right questions about policy and technology.** Do manufacturers have a remote access policy? Does it include policies for partners? What requirements do machine builders need to meet?
- **Align technology-wise.** How would a technician funnel down the customer's infrastructure to its machine? Aim to comply with a customer's security policies, network addressing policies, network resiliency and segmentation policies.
- **Share specifics.** Let customers know what machine builders need to access and how frequently, and at what time of the day they need to tap in.

shooting. Information is consistent, and training is much more intuitive.

Standard programming methodology also helps simplify the setup and integration of the manufacturer's performance measurement software with the machine control system. With OEE and other performance parameters such as part counts, cycle times, and downtime reason codes already defined in the machine controller using standard data models, users no longer need to add custom code. This reduces complexity and accelerates start-up.

Even with machines built using a standard-state model and data model, all the performance metrics still need to flow from the machine controllers to a database and reporting system. To establish this connection, the user must define a plant model, set each event and state definition, and then manually navigate to and select each data point for uploading.

With potentially several hundred data points per machine needing collection, configuring each performance parameter in the analysis software is a complex and time-consuming task.

Configuration tools are available to help solve this problem.

Configuration Breakthrough

For example, a configuration tool designed by Rockwell Automation for use with its FactoryTalk® Metrics performance measurement system (www.rockwellautomation.com/go/tjmetrics) allows engineers to locate the user-defined data types programmed in the controller and easily configure the desired performance metrics in the reporting software. The tool can read machine data directly from a single machine, or from a supervisory controller that contains data from multiple machines.

Configuration tools meet a critical need for greater speed and simplicity in reporting system setup and installation.

As more and more machine designs incorporate standardized code, configuration tools meet a critical and growing market need for greater speed and simplicity in reporting system setup and installation. These tools provide several key functions:

- Identify all machines that will have data collected by the software.
- Extract all data from the machine controller that need configured.
- Map the selected communication topics to the work cells found in the software's plant model.

Configuration tools search and find the standardized data points within the machine control system and tells the software their location, definition and role. They can cut reporting system configuration time in half, and allow users to set up a model of the machine's data inside the software and reuse that model for each new reporting system installation.

The ability to configure the analysis software quickly gives machine builders fast access to a range of performance data needed to validate machine performance. They can benchmark the machine's performance in-house

>> Leverage Modular Programming Standards

In recent years, machine builders have begun to recognize fully the value of modular programming. Modular programming concepts provide machine builders with a common framework so programmers can spend more time adding value and functionality rather than deciphering terminology.

The power behind modular programming lies within the principles laid out in industry standards, including one of the most widely recognized and broadly adopted standards: ISA-88. New ideas and contributions to the ISA-88 standard are helping expand the concept of modular programming.

Case in point: The ISA-88 standard committee (SP88) approved and incorporated the OMAC (Organization for Machine Automation and Control) PackML. PackML provides a broadly recognized machine state model and standardized data model (PackTags) to help ensure that programmers are speaking the same language and using terminology consistently. This creates a predictable, reusable model when multiple programmers are involved during machine design.

Structured, reusable models help substantially reduce system integration time and costs for dedicated process and packaging equipment. Moreover, with a standardized look and feel of the programming and human-machine interface (HMI) graphic objects, it's easier for operators and software personnel to recognize operation functionality across applications and suppliers.

>> Partner Technologies Help Machine Builders

Many Rockwell Automation Encompass™ Product Partners provide configuration tools that provide machine design efficiencies. These referenced third-party suppliers include Add-On Profiles (AOP) with their Encompass products that allow machine builder designers to use an RSLogix™ 5000-based wizard from Rockwell Automation for fast, simplified setup of their control and information capabilities. Check out these technologies.

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as part of their factory acceptance testing (FAT) prior to shipping to their customer.

Once installed at the customer's site, any perceived performance issues now can be quantified through the analysis software and compared to the FAT benchmarks. The machine builder can do all of this remotely, provided the appropriate network infrastructure and security access has been established.

The ability to identify and resolve problems quickly and document key performance indicators (KPI) helps streamline commissioning and start-up. In many cases, these performance measurements go beyond what's required or expected in a typical machine validation process. This gives machine builders an important competitive advantage, plus the opportunity to add value to their equipment offering.

Standardized programming helps machine builders leverage their investment in complex equipment while providing their customers with programs that have the same look and feel, which translates into easier training.

The machine builder and manufacturer both gain — the OEM finds value in increased design efficiency and faster time to market, while the user benefits from simplified maintenance, faster troubleshooting and more seamless integration with performance measurement and supervisory systems. Together, they can reap the rewards of an information-enabled machine. □

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