HMI/SCADA Software Increases Product Quality and Line Efficiency

Application Challenge

Quality is a primary concern for the McVitie's division of United Biscuits. At their plant in Tollcross, Glasgow, on the production line where United Biscuits makes their Rich Tea biscuits, they have a multi-zone oven that produces thousands of biscuits per hour. An operator with many years of experience governed the control of their multi-zone biscuit oven, and due to their great deal of skill, high-quality biscuits were produced. The question was how to translate the intelligence of more than 30 years experience into an automatic, high-performance process control system for this oven that is user friendly and could be retrofitted on the existing equipment.

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Progressive Manufacturers such as United Biscuits no longer employ "rip and replace" strategies when it comes to upgrading their automation capabilities. Instead, they choose to employ migration strategies that begin with maximizing the capabilities of their existing automation infrastructure and upgrading to the hardware and software needed to achieve their automation objectives. This applies as well to the machinery deployed in their plants and factories, with the challenge to United Biscuits being how to extend the life cycle of their assets by retrofitting this oven with state-of-the–art automation capabilities that positively influence its return-on-net-assets (RONA) and lower total cost of ownership (TCO).

Solution Deployed

The software selected for this application is ICONICS' GENESIS32 and was integrated by APD of Annan, Dumfriesshire UK. APD also provided on-site training for the operators and engineering personnel. The knowledge of the operators was documented and formulated into a set of rules for adjusting the oven control based on the quality of the biscuits exiting the oven. ICONICS engineers, working alongside United Biscuits' technical staff, developed a software system to execute the rules and automatically make operational control adjustments within the oven.

ICONICS' DataWorX32 acquires and manipulates the data, which is then accessed by the ICONICS' GraphWorX32 and a rules-based module. GraphWorX32 is also used to develop the operator screens. The rules-based module built into GENESIS32 then applies the rules developed from the operators and outputs the instructions, via ICONICS' ScriptWorX32, to the PLC. It is the PLC that controls the burners and temperatures in the oven zones based upon the information it has received. GraphWorX32 performs the HMI/SCADA functions of graphical visualization of data and process elements, which includes displaying the screens used to select what products are to be manufactured.


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Metrics and Results

For each individual product, there is a different set of rules to apply to the oven control. ICONICS' GENESIS32 makes this rules adjustment automatically for whichever product is selected. It also displays the rules that are being implemented in real-time. All rule modifications are password-protected, online through the operator's terminal. Having GENESIS32 integrated with the PLC provides the interoperability and connectivity required to gather and display information for Real-time Performance Management (RPM) of the oven. This helps United Biscuits' production management make essential operating decisions in real-time to increase plant performance based on the information that it gathers and displays. By utilizing these methods for control of the baking process, United Biscuits is now able to put into practice new ideas within the process itself to further improve their product and provide a competitive advantage over their competitors. The actual recipe for the fine control of the oven is top-secret to United Biscuits, but now they make a higher-quality biscuit and line efficiency has improved by 2.5 percent. United Biscuits feels that they have a control technology that gives them a competitive advantage in deploying innovative solutions.

ARC Perspective

ARC's research has found that the next generation of automation also recognizes that connectivity to each and every machine deployed by manufacturers such as United Biscuits is essential for an enterprise to achieve Operational Excellence (OpX). OpX drives the company towards "Consistently doing the Right Things Well" and reflects the principles of continuous improvement. OpX provides the methodology for implementing changes identified through Collaborative Production Management (CPM). Fact-based analysis drives consensus and improvement, which would be impossible without the real-time connectivity of machinery on the factory floor.

Real-time Performance Management
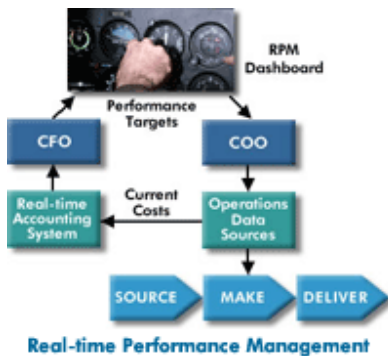
ARC has found that increased awareness of performance targets are extremely important to successful achievement of enterprise objectives. If Key Performance Indicators (KPIs) such as line efficiency are based on non-real-time information, or are themselves not dynamic enough to reflect changes in objectives, then the wrong outcome is very likely to occur.

Manufacturers operate in an environment that requires a pervasive exchange of information across all domains of the manufacturing enterprise. As manufacturers move into a global business climate that demands the integration of manufacturing operations and business systems, collaboration must move beyond hype and buzzword to become a commonplace reality. This path transcends applications and systems. Plant automation software such as GENESIS32 recognizes that each and every machine deployed by manufacturers provides a vital link to real-time data for the enterprise as a whole, which is especially critical with the move towards Real-time Performance Management (RPM) that uses dynamic performance targets to drive an enterprise to its optimum potential and competitive advantage. That is why the next generation of plant automation software such as GENESIS32 employs de-facto standards for network interfaces and languages, allowing for data exchange by utilizing standards such as OPC and XML.

Written by ARC Advisory Group, Thought Leaders for Manufacturing & Supply Chain