How to Increase Data Reliability

Learn How an Appliance Transaction Module Increased Productivity and Data Reliability and Minimized Upgrade Costs for an Airfoil Manufacturer

Background

Turbine blades and vanes, or airfoils, provide lift, propulsion, stability or directional control in gas turbine engines used in aircraft and power generation systems. They’re vital components for safety and equipment performance.

Challenge

When PCC Airfoils needed to upgrade its OPC system that was causing reliability problems in the airfoil manufacturing process, they implemented an information-processing module that allows them to pass data easily between their controllers and SQL database servers. This article examines how they configured the system, and how the module has reduced errors and contributed to improvements in data reliability and system uptime.

PCC Airfoils manufactures precision airfoils used in aircraft and industrial gas turbines for power generation systems. Over time, the company has invested in several additions to its highly automated casting furnaces and investment casting processes, including robotic cells to increase productivity and assure consistently high quality.

Solutions

Services and Support

• Upgrade recipe download and production reporting to an existing system that includes ControlLogix®, PLC-5®, SLC™ MS SQL and RSView®32

Rockwell Automation® PartnerNetwork™ Program

• Encompass™ Product Partner Online Development Inc. (OLDI) designs and manufactures factory automation products to help manufacturers simplify data transaction, control and communications tasks
• The eATM module was enabled to pass data easily between controllers and SQL database servers, which has reduced errors and contributed to improvements in data reliability and system uptime

Results

Faster Data Exchange

• Between MS SQL database, ControlLogix and legacy PLC-5 and SLC PLCs
• Decreased data transmission time to under 100 ms per exchange versus approximately 20 seconds with previous system

Measurable Production Increases

• Increased manufacturing throughput on existing lines by 16%
• Reduced configuration time 75%
• System investment achieved payback in days

Encompass Product Partner

OLDI

online development inc
To download recipes, equipment instructions and upload report production within the system, PCC used a Microsoft SQL database connected to servers with OPC drivers to communicate to various Rockwell Automation solutions. These include Allen-Bradley® ControlLogix programmable automation controllers (PAC), SLC, CompactLogix™, and PLC-5 programmable controllers that control an assortment of components in the manufacturing process.

As the control system grew, however, the OPC-based drivers became problematic. Recipes were downloaded incorrectly, production reporting data was unreliable, and the system often crashed.

In addition, the existing OPC-based system used a collection of homegrown utilities that had been developed over the years and were causing downtime and inefficiencies. The company relies heavily on that data, and it was clear that they needed a new solution to resolve these issues. At the same time, PCC Airfoils needed to protect their investment in existing equipment.

PCC Airfoils investigated several modifications and alternatives to the OPC-based system, keeping in mind the reliability, performance, flexibility and ease-of-use required. They also wanted to minimize any hardware, software, installation and start-up costs while keeping the various installed legacy controllers.

**Solution**

The search was narrowed to an eATM appliance transaction module from Rockwell Automation Encompass Product Partner Online Development (OLDI). This module installs in an existing ControlLogix PAC, connecting to the other controllers via an existing ENBT module (see illustration) and to an MS SQL database through one of its Ethernet ports.

From the ControlLogix chassis, the eATM module exchanges data with the various existing PACs/PLCs used to control robots, furnaces and cleaning machines. Note that if this had been a new installation, PCC Airfoils could have connected the eATM directly using its built-in Ethernet ports or via Rockwell Automation bridge modules.

The eATM module is designed specifically for the ControlLogix PAC environment and supports a number of Allen-Bradley PAC/PLC product lines. For this application, it supports ControlLogix, CompactLogix, SLC 500 and PLC-5 controllers.

On the IT side, PCC Airfoils used an adapter for MS SQL, but could have used Oracle, DB2, Excel/Access or JMS messaging.

**Results**

Like all ControlLogix modules, the eATM module is designed for operation in rigorous factory-floor conditions with shock, vibration and temperature extremes. Unlike a PC, the module’s system is locked down to lessen security concerns such as viruses, hackers and unintended operation. It also does not require frequent software upgrades or maintenance.

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The eATM appliance transaction module installs in an existing Allen-Bradley ControlLogix PAC and connects to the Microsoft database via Ethernet. Using an ENBT module in the PAC, it exchanges data between the SQL database server and a variety of Allen-Bradley SLC and PLC-5 PLCs.
The module is designed to only do one thing: exchange data between computer systems and controllers. PCC Airfoils also liked that the module was easy to configure. In fact, most of their time in this project was spent not on the module, but in redeveloping the PLC/PAC logic and the stored procedures to interface with the robotic cells. Only 5% of the automation engineer’s time was spent configuring the eATM, which was simple – just point and click.

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The eATM module’s setup/configuration utility has an intuitive graphic user interface to simplify data exchange between the database and the controllers. The utility detects and shows all connected database and controller values, and provides an interface to select individual values, group them into meaningful projects, and set parameters for activating data transfer. That meant, with just a few mouse clicks, they could download a recipe, configure machine operation and receive production data.

The PCC Airfoils engineering team also used the failover function in the module to configure a separate location to store data if the connection between the database and the controller were interrupted. Using the module’s various communications capabilities, they configured an email alert in the event the database connection was lost. The eATM module was enabled to pass data easily between controllers and SQL database servers, which has reduced errors and contributed to improvements in data reliability and system uptime.

In addition, one of the challenges with the PC peripherals is legacy controllers. The ability of the eATM to connect to those controllers makes an enormous difference; it allowed PCC Airfoils to leverage existing controllers without having to buy new ones. The ability of this eATM to connect to those controllers and be scalable is priceless.

The results mentioned above are specific to PCC Airfoils’ use of Rockwell Automation products and services in conjunction with other products. Specific results may vary for other customers.