

EAGLE Technologies Group Relies on Advanced Data Management and Control Technology from Rockwell Automation to Streamline System Engineering

Standard engineering reduces design and installation time while making maintenance and troubleshooting easier

Much like the old song that detailed which bones are connected to which, there's an assembly process for putting together products, ranging from a simple cereal box to a fully loaded automobile. EAGLE Technologies Group, an OEM / Systems Integrator company, builds custom assembly and test systems for manufacturers and suppliers who make such products. No two systems are alike, and EAGLE serves a variety of industries ranging from automotive to consumer goods to pharmaceuticals. These systems are used by manufacturers to build and test their products. By incorporating testing throughout the manufacturing process, companies can ensure that each product meets its own strict quality specifications. Each testing station also logs the data, which helps track and minimize batch sizes in the event of a manufacturer's recall.

For example, an automotive manufacturer may use an assembly and test system to construct a rear differential for a car. The manufacturer introduces the raw steel to the system, which then automatically gauges the material, selects the interior components, gears, and shims and assembles them. Layers of data are added throughout the assembly process, even during the final phases of assembly: run-out testing, in-vehicle simulation tests, and final inspection. This tracked data is then downloaded to a database that stores part origination information. It is important for the manufacturer to capture every piece of data relating to how that part was built. In the event of a product recall, this information can help define the group of products that need to be recalled.

EAGLE was one of the first companies to bring this cost-effective system to market and set the standard for the amount of data that can be tracked, the accuracy of the data, the robustness of the data storage system, and the ease of retrieval. Through this data, EAGLE's customers can identify additional

areas of cost-savings, such as scrap reduction.

“The key here is being able to reprocess parts if they are misassembled rather than just throw them away,” said Mike Zimanski, project manager, EAGLE. “So we build the methodology of how to reprocess defective parts into our designs, which helps reduce overall scrap.”

One of EAGLE’s customers, a tier one automotive supplier, needed a new assembly system. This extensive system would consist of almost 800 linear feet of conveyor with approximately 20 automated work cells. The customer also had a tight timeline — it needed the new system in 28 weeks. Typically a system of this size can take up to 32 weeks to complete.

Though challenging, EAGLE felt it could meet the tight deadline on this project if it could reduce the engineering time. Each system is treated as an original. After all, custom design is one of EAGLE’s specialties. This meant that the new assembly and test line would be built, literally, from the ground up. EAGLE asked Rockwell Automation to review the system specifications and identify opportunities that would help it complete the system within the allotted timeframe.

Rockwell Automation reviewed the project parameters and realized it would be much easier to build the system using an industrial computer instead of the specified low-end human-machine interface. Rockwell Automation engineers met with EAGLE, where both reviewed the concept up-front and made sure the design would meet the customer’s needs, both now and in the future.

“We were tasked with building an extremely large and complex system that also would be capable of collecting an extensive amount of product information during the assembly process,” Zimanski said. “That’s why we sat down with Rockwell Automation engineers right away to review our options in terms of selecting the most effective communications, control and data tracking technologies.”

Working together with input from the customer, Rockwell Automation and EAGLE created a system that required a larger investment in hardware and software up-front, but would ultimately reduce the amount of time spent engineering the system. In essence, this project established a new engineering standard for EAGLE that it could apply to future system designs.

“Within six weeks we had created the entire system specifications outlining the specific type of data to be collected, how that data would be protected, and how it could be used,” said Zimanski. “Typically it would take us 12 weeks to produce specifications that were this complex.”

Connecting the parts to a software-based backbone

EAGLE integrated a number of Rockwell Automation products into the system. The system’s communications structure leverages Rockwell Software’s FactoryTalk[®] platform, which combines a flexible architecture with a common set of services and software modules to create a seamless information flow across the enterprise. The common language used to describe factory automation systems and manufacturing processes helps cut implementation times and achieve true interoperability among shop-floor solutions.

This data sharing ability came in handy during the project engineering, which took place in two separate facilities, using a VPN connection on EAGLE’s networks. With the FactoryTalk platform, Rockwell Automation and EAGLE could have all facilities developing online simultaneously.

EAGLE also applied Rockwell Software[®] RSSql[™] as a transaction manager, serving as the engine that moves data between the control system and the database. Rockwell Software RSBizWare[™] Historian[™] provides the production reports to the customer through Web-based reporting. These tools allow the customer to see part and process characteristics as they are happening. In addition, the customer can access current and historical information on machine performance through Rockwell Software RSBizWare PlantMetrics[™]. These reports help the customer

achieve the system's maximum efficiency, as well as identify problems before they fester into machine downtime.

EAGLE used five Allen-Bradley® ControlLogix® processors to control the system. With a system of this size, there would normally be a large number of network connections going into the processors, which can slow communications. To avoid this bottleneck, EAGLE used Rockwell Software RSLinx® Gateway to split the communications workload and used a single connector to each of the ControlLogix processors. Allen-Bradley Ultra™ 3000 digital servo drives and MP-series motors provide the new system with high-performance motion control functions with all servo programming performed in the controller – a step that eliminated the need for integrating additional motion software. The drives are connected via SERCOS interface fiber optic communications, allowing operators to receive real-time information about any changes in process characteristics, and adjust the drives accordingly.

Operators are able to view this data via 22 Allen-Bradley VersaView® industrial computers stationed throughout the system. Equipped with Rockwell Software RSVIEW® Supervisory Edition HMI software, the computers feature operator-friendly touch-screen displays with few moving parts, making them ideal for use in a variety of demanding plant-floor environments.

RSVIEW Supervisory Edition also gives users the capability to establish a centralized location for the screen design. EAGLE used this feature for its customer so each screen was delivered from a server rather than from a location on the computer. Additionally, RSVIEW Supervisory Edition's editing capabilities allow an administrator to edit screens while the system is running, thereby eliminating a major cause of downtime.

For enhanced operator safety, EAGLE added lifelines around the entire perimeter, and wherever operators enter a robotic cell, Allen-Bradley light curtains and motion cells are used to protect them

from the robot's moving parts. Every operator cell on the system is controlled by an Allen-Bradley safety relay that's networked back to a main safety relay, allowing a user to stop any one cell without halting the entire process.

Another key requirement of the system was the ability to integrate the customer's existing plant-floor equipment with the rest of the enterprise, including higher level databases and reporting systems. During the system design process, EAGLE worked with the customer's corporate IT division to add appropriate system security features that could be readily integrated into the facility. In addition, EAGLE was able to establish a T-1 line that allows it to link directly to the customer's plant, enabling it to remotely maintain and troubleshoot the system as needed.

Standard engineering adds flexibility to the system

EAGLE delivered the new system in 28 weeks, meeting the customer's quick turnaround requirements. With the standard engineering developed during the system's design, EAGLE now estimates it could create a similar system in even less time – approximately 22 weeks.

Standard engineering also was critical to reducing the system's design time. For example, controls engineering was reduced by about 12 percent for this system, a number that EAGLE expects to reduce even further, perhaps as much as 20 percent.

In addition to reduced design time, installation time also was significantly reduced by an estimated 10 days, thanks to the up-front engineering by EAGLE and Rockwell Automation. Another key benefit of the up-front engineering was that it allowed the customer to complete user training before the equipment was actually installed on site. The ability to put trained employees in place right away saved another 3 weeks in system deployment time.

With the success of this project, EAGLE is now quoting more systems that are more

flexible for its customers while continuing to meet its strict standards of quality. By standardizing with reusable engineering, EAGLE can provide its customers with a more reliable, higher-performing system at a lower overall cost.