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Executive Summary

How to modernize your factory on your terms

Choose a retrofit/replacement path that matches production and budget requirements.

Outdated or insufficient automation systems and components can compromise competitiveness – yet many manufacturers fear the modernization process. This article can help determine how to modernize using a total systems approach or individual component replacement strategy with minimal disruption.

Underperforming automation systems can compromise productivity and profits

Downtime is a plant's No. 1 enemy. Just one minute of downtime can cost a plant unrecovered profits. That could be especially bad news for manufacturers that halted or curbed capital spending during the 2007-2009 recession and the years following.

Since 2011, capital investment has increased by just 0.7% per year.¹ The result: Many manufacturers are contending with outdated or insufficient automation systems and components that are compromising productivity, leading to unplanned delays and threatening manufacturing flexibility.

The message is clear: The time to modernize is now. But manufacturers may still hesitate to invest in their automation systems because they fear downtime during changeover, the need for more staff training, having to convert existing code or taking a hit to their budgets.

To avoid these challenges, manufacturers should seek automation solutions that have integrated functionality and are engineered to migrate seamlessly into future technologies to lower their total cost of ownership. These solutions should be based on a single engineering framework that seamlessly integrates controllers, distributed I/O, HMI, drives, motion control and motor management using a common database as well as integrated security, safety and diagnostics.



Why retrofit for the future?

Downtime is often a symptom of poor diagnostic capabilities. Many existing systems do not provide the type of transparency that plants need for predictive maintenance. This same level of transparency is also necessary for effective energy management and optimal plant utilization. Less-advanced automation systems also tend to be inflexible and cannot adapt to rapid shifts in customer demands.



For instance, if a manufacturer can't change over quickly to meet demand for a new sales order, it could face production and delivery delays. This lack of flexibility also makes it difficult to capitalize on new business opportunities. Less advanced existing systems may have reached maximum capacity or would require a significant investment to add capacity.

While it may seem like the least painful route is to upgrade components from a current vendor, it may not be the best option for manufacturers. Many vendors have dead-ended or are phasing out legacy hardware, and no spare parts are available. If parts are available, they might come at a premium. As parts reach obsolescence, oftentimes manufacturers will dramatically increase the price. Once the parts are completely phased out, private sellers may step in and sell them at an even higher cost. So a processor that originally cost \$4,000 eight years ago could be upwards of \$50,000 today.

Some vendors may offer more advanced versions of obsolete parts, but manufacturers may still need to convert their code to new programming software.

Manufacturers have two options when deciding to modernize their production: a total systems approach or individual component replacement.

A total systems approach

One of the replacement options available to manufacturers is a total systems replacement. This approach is suitable for manufacturers that want the full benefits of totally integrated automation – a necessary step to integrating your entire value chain, from design and engineering, to sales, production and service. Automation platforms based on an open system architecture offer maximum interoperability across all automation components. An integrated system ties the control system to key features, such as:

- Diagnostics, so users don't have to continually interrogate the system to obtain performance data. For example, if a plant experiences a supply voltage loss or overruns its current limit settings, the built-in module – with no additional programming required – will automatically report the information back to the controller.
- Security, which includes protective features in the actual hardware, not just the network. In the event that network security levels are breached, security at the controller levels adds another layer of protection. Plants can establish up to four levels of secure access with encrypted passwords.
- Safety, which is often overlooked in automation systems and has become an increasing concern in industrial facilities. Like integrated security features, the highest-performing automation systems include safety functionality in all the components, saving end users from additional programming requirements with add-on safety controllers. Automated validation also reduces bandwidth utilization across the network at each individual module.

A totally integrated approach is also ideal for manufacturers that are seeking additional production flexibility. Systems built on a single engineering framework allow plants to make on-demand changes to line volume, for instance, without rewriting code. That same common platform also improves engineering efficiency, thereby lowering design costs.

With a centralized portal, or project management tool, an engineer can view the entire line and all the devices operating on that line. The engineer can then make changes much more quickly to any issues that may impact communications or overall performance. This can result in savings of up to 30% in engineering time.

Individual component replacement

Total replacement may not be feasible for a variety of reasons, including significant investments in existing systems. Still, outdated or underperforming controllers and other critical components can negatively impact competitiveness.

Manufacturers should seek advanced automation components that can easily integrate with existing systems while providing additional functionality. A few examples of the integration

features that are important when replacing individual components include:

- Easy integration with existing assets. Native PROFINET, PROFIBUS, Modbus, Modbus TCP, TCP/IP and Open Ethernet protocols enable connections to existing controllers so that plants can share data via EtherNet/IP without any code modifications to installed controllers.
- Flexibility to support various network protocols, including PROFINET and EtherNet/IP. For example, modular, three-piece drives with multiple network compatibility allow users to replace the power module when it fails, instead of the entire control unit. This eliminates the need for network set-up after replacement.
- Easy-to-configure hardware and software, including add-on instructions for easy insertion.

High-performance automation components, such as drives and controllers, also should have built-in safety, diagnostics and communications functions to make integration with existing infrastructure even more seamless.



Doing nothing is not an option

Manufacturers have installation options when it comes to modernizing their automation systems with minimal downtime and effort. The risk of doing nothing, though, is significant. Consider that 40% of manufacturers have “little to no visibility into real-time status,” said Raj Batra, president of Siemens Digital Factory Division, during his keynote address at the 2015 Siemens Automation Summit.²

“Thirty percent spend as much as four hours a day searching for equipment and products on the plant floor,” he said. “And 50% only become aware of a problem after a breakdown occurs.”³

Automation solutions that provide systemwide transparency help plants avoid reactive maintenance and other inefficiencies that impact productivity. They also enable more informed decisions leading to greater flexibility and competitiveness.

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¹The Aspen Institute, Why is Capital Investment Consistently Weak in the 21st Century U.S. Economy?, April 2015

²Automation World, "The Race Toward Digitalization," June 25, 2015

³Ibid.