Global Perspectives

2500 Series®
Programmable Automation Control System

Observations on Best Practices for Maintaining Control System Reliability

By Robert Peck, Senior Vice President of CTI

Introduction

As Senior Vice President of Sales, I visit a lot of customer sites all over the world. Our customers are diverse in terms of geography, size, industry, manufacturing process, and control system complexity. The one commonality I find across most of these CTI customer sites is this: *although much of the installed base of PLCs was put into operation between 1995 and 2005, these systems have operated reliably for 20+ years*. That's remarkable longevity. But as these systems continue to age, what are our customers doing to ensure this reliable operation continues for years to come? How are they trying to achieve continued sustainability, and how can CTI help them?

When I'm on site with a customer, I ask them these questions. I'm always interested to hear about their practices for maintaining their PLC systems and how they think about ensuring the continued sustainability of these systems despite age, technological change and competitive pressures. While all of our customers have differing needs and situations, it's helpful to learn how they

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each balance their desire for reliability against their need to conserve capital. It turns out that most customers approach this challenge in one of three ways.

Three Different Approaches

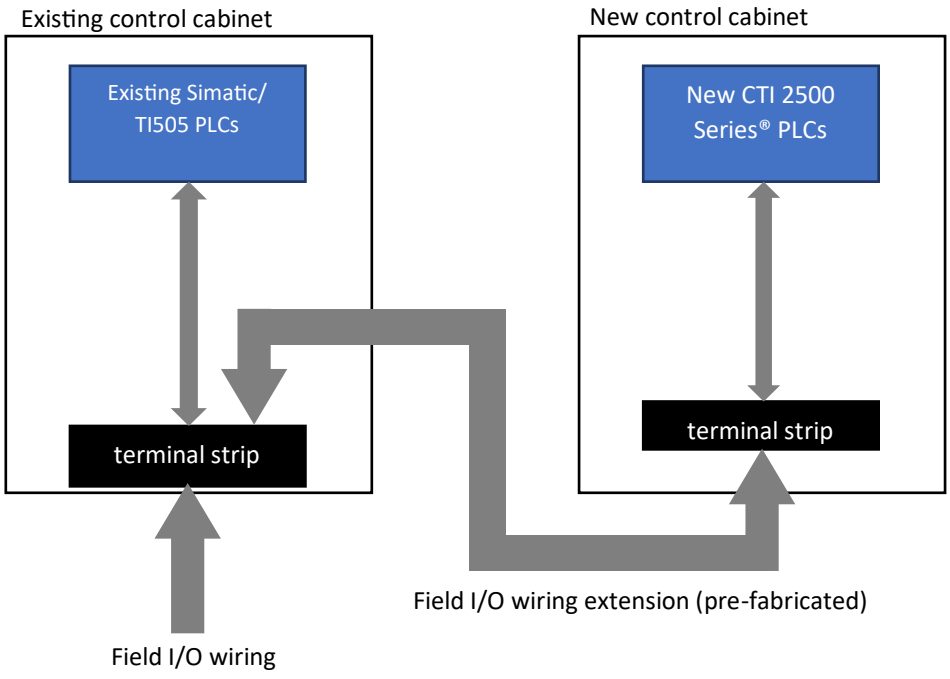
In my visits, I see three typical approaches:

1. Run It Until It Breaks — The "run it till it breaks" approach is more common than you might expect. You might think this approach would be imprudent, but in some situations, it has worked well for customers, and it is definitely conservative of capital. This approach is most common in seasonal and batch operations where (for various reasons) the operation can stand an occasional day or two of downtime. Customers employing this approach purchase a minimal set of the most critical spares and then rely on quick availability of replacement parts which CTI can normally supply from our factory stock, or from stock at one of our distributors.

2. Service Life Replacement — In this approach, customers settle on a "generally accepted service life" (typically 15 years), and then plan for a wholesale upgrade of the control components during a planned shutdown at the end of the aforementioned service life. This typically is done along with replacement of other major electro-mechanical components, so upgrading the control system becomes only one part of a "re-life" effort aimed at restoring the entire process to a "like new" condition.

   On a recent trip to Europe, I met with a customer whose plant produces refractory material and who has a project like this currently underway. Their existing control system has reached the end of the service life they determined it should have, and they are planning on replacing all control components. The customer is fabricating completely new control cabinets with the latest CTI 2500 Series components. These cabinets will be placed on the factory floor beside the existing controls. When that effort is complete, they will do a simple change over during shutdown using a "field wiring extension" as shown below.

   Of course, it would also be possible to make this upgrade by simply replacing the PLC equipment in the existing control cabinet, but in this case, they made the decision to go with an entirely new control cabinet.



3. Hybrid — the hybrid approach is a little more onerous in that it requires careful monitoring of system reliability, noting when there are process shutdowns due to PLC problems. When those shutdowns rise to a problem level, and particularly when those shutdowns have the signature of "wear out" failure, companies that follow this approach plan a partial or complete modernization of the PLC system.

What is this “signature” that indicates the beginning of problems associated with the end of service life? In a recent conversation with one of our customers in the air separation industry, I learned that they watch for “ghost faults” which look like the following:

a) Temperature or pressure readings which spike high or low for a few scans
b) Digital inputs which go in/out for a few scans
c) Failure of the PLC system to power-up properly after a planned shutdown
d) Re-occurring faults — especially if the problem jumps from rack to rack

When they see these kinds of faults happen, they begin planning an upgrade of the PLC system to replace the power supply, CPU, and I/O cards. And because CTI products are wiring-compatible and functionally the same as their existing Siemens modules, the shutdown time required to make the upgrade is minimal.

In addition to these “wholesale system upgrades,” they also pay close attention in all their systems to “early wear,” even when there are no ghost faults occurring. For example, they try to eliminate the use of relay modules, which have a fixed life, replacing them instead with solid-state digital output modules.

When they do have a planned major electro-mechanical upgrade of a plant, they include a PLC system upgrade as part of that budget. Normally, the cost of the PLC system is low compared to other components like motors, bearings, and compressors. And if the budget won’t support a PLC system upgrade, then they will increase their level of spares over time so that they have the materials available for a complete PLC upgrade in the future.

This hybrid approach, although it requires a little more work, is probably the best approach for conserving capital because it focuses on continued use of the existing system for as long as the reliability is good. This maximizes the return from that initial investment. Careful monitoring for signs of component failure is essential, however, in order to minimize the risk of unexpected shutdowns.

Summary

Regardless of which approach you choose, CTI has the solutions to not only preserve the reliability of your Simatic/TI 505 control system, but also to modernize it, adding new capabilities to make the process even better. And best of all, because CTI 2500 Series products are compatible with the older TI/Simatic 505 (and even 500!) systems, it is possible to both ensure the continued sustainability of your control system and modernize it without requiring any changes to your existing PLC programs or I/O wiring, without a lengthy shutdown, and at a low cost.

That’s what we at CTI call Smart Modernization™!

About Robert Peck

Robert is an electrical engineer who started his career as a programmer and design engineer before moving into management roles in engineering, product development and sales. Robert has been with Control Technology for over 28 years and is currently the Senior Vice President of Sales.

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Control Technology Inc.
5734 Middlebrook Pike, Knoxville, TN 37921-5962
Phone: +1.865.584.0440 Fax: +1.865.584.5720
www.controltechnology.com