



Smart Modernization™

Control System Modernization:
Why Migrate When You Can Choose Smart Modernization?



ROCK SOLID PERFORMANCE. TIMELESS COMPATIBILITY.

The Automation Catch-22

You want to achieve the highest quality, most efficient and cost-effective plant operation possible. Your plant has an aging control system, but it still works well. What is the best path forward?

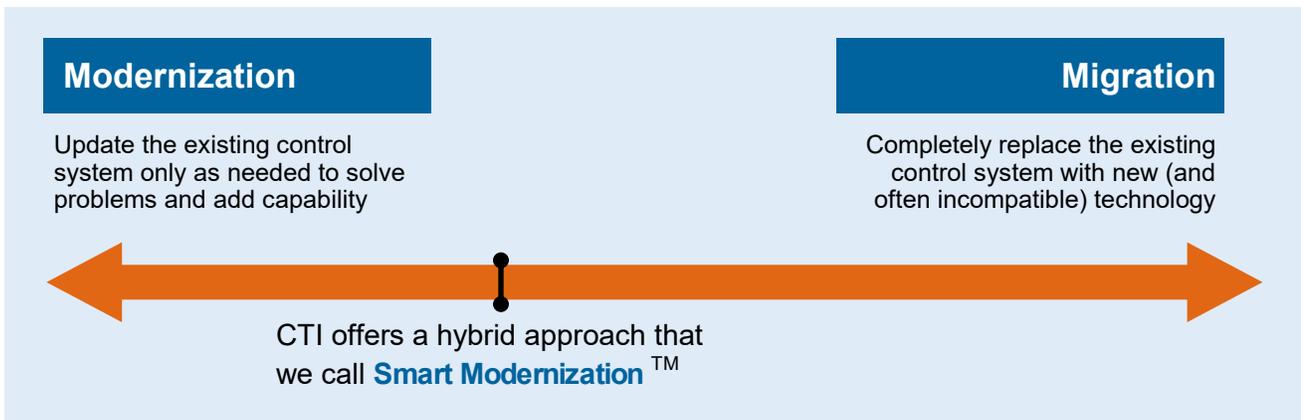
What to Do When:

- ▶ You are experiencing component failures that are resulting in unplanned downtime
BUT...your control system still performs well when all components are functioning
- ▶ You are having maintenance challenges due to cost and/or availability of spare parts and availability of engineering know-how
BUT...you have substantial investment in wiring, programming and certifying your existing system
- ▶ You have unmet capability needs (e.g., faster data exchange with HMI/SCADA)
BUT...plant shutdown to replace your existing system is both costly and risky



A continuum of options is available depending on need, tolerance for risk, cost sensitivity and time constraints

Modernization/Migration Continuum



“Staying with the current [control system] supplier is, in many cases, the easiest migration to perform...”

— “The Control System Migration Survival Manual,” ARC Advisory Group, March 2010.



Modernization versus Migration

When to Modernize

Has the existing platform become unreliable?

- ▶ Repairs are frequently needed
- ▶ Failures are often critical

Does the existing platform have the needed communications capabilities?

- ▶ Necessary data cannot be easily/quickly obtained
- ▶ Platform does not support necessary fieldbus protocols
- ▶ Platform cannot easily communicate with current/future SCADA system

Does the existing platform provide effective supervisory control?

- ▶ Existing HMI has limited display and control capabilities
- ▶ Platform has few, if any, options for remote monitoring and control

When to Migrate

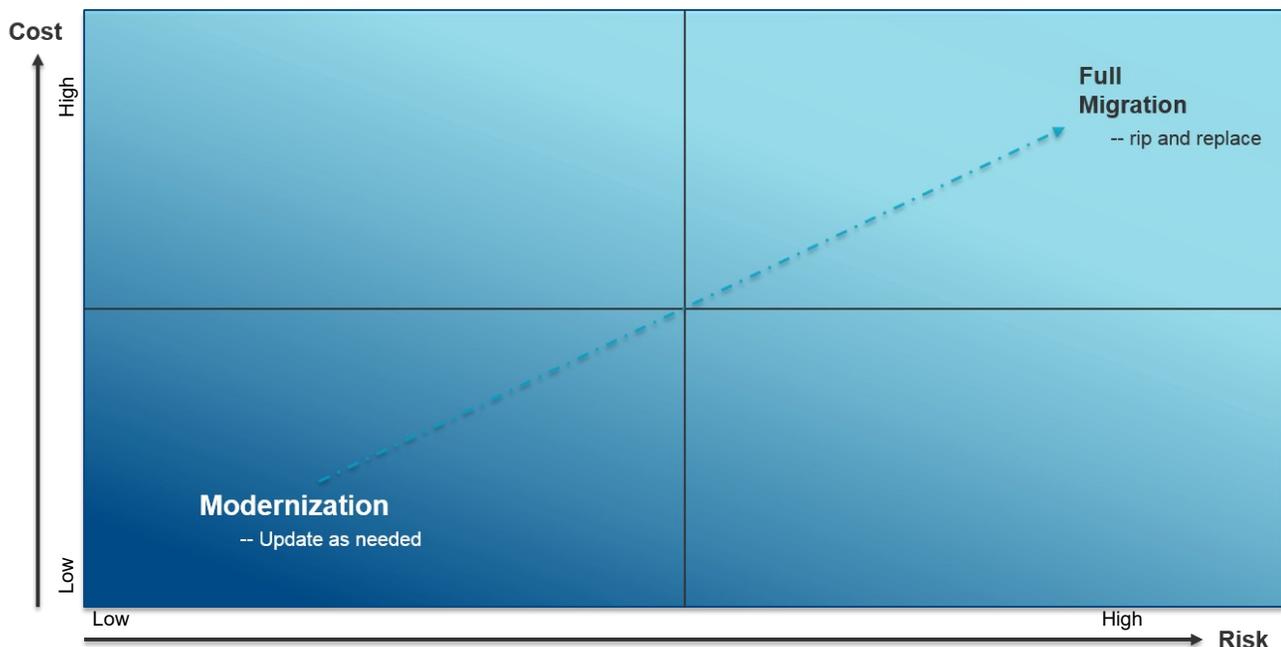
Is the existing platform obsolete?

- ▶ Spare parts are difficult to find/costly
- ▶ Support is unavailable/costly
- ▶ Necessary in-house expertise no longer exists
- ▶ Newer components are not backwards compatible

Does the existing platform meet the application requirements?

- ▶ Platform lacks necessary flexibility to react and adapt easily/quickly
- ▶ Platform cannot meet new functional requirements
- ▶ Expansion cannot be accomplished cost effectively

Modernization versus Migration: Evaluating Relative Cost and Risk



“One thing end users should take into account is the potential supplier’s ability to provide a solution that minimizes downtime and risk...”

— “The Control System Migration Survival Manual,” ARC Advisory Group, March 2010

Modernization/Migration Considerations

In deciding whether to modernize or to migrate, manufacturers should think through the following considerations:

Preservation of intellectual property

- ▶ Programming code
- ▶ Graphics, screens, monitoring tools
- ▶ Process documentation, certifications

Impact on current and future operations

- ▶ How much downtime/disruption is needed to implement changes?
- ▶ Will efficiency improvements result from the upgraded/new system?
- ▶ How much time is required to get back to equivalent efficiency of existing system?

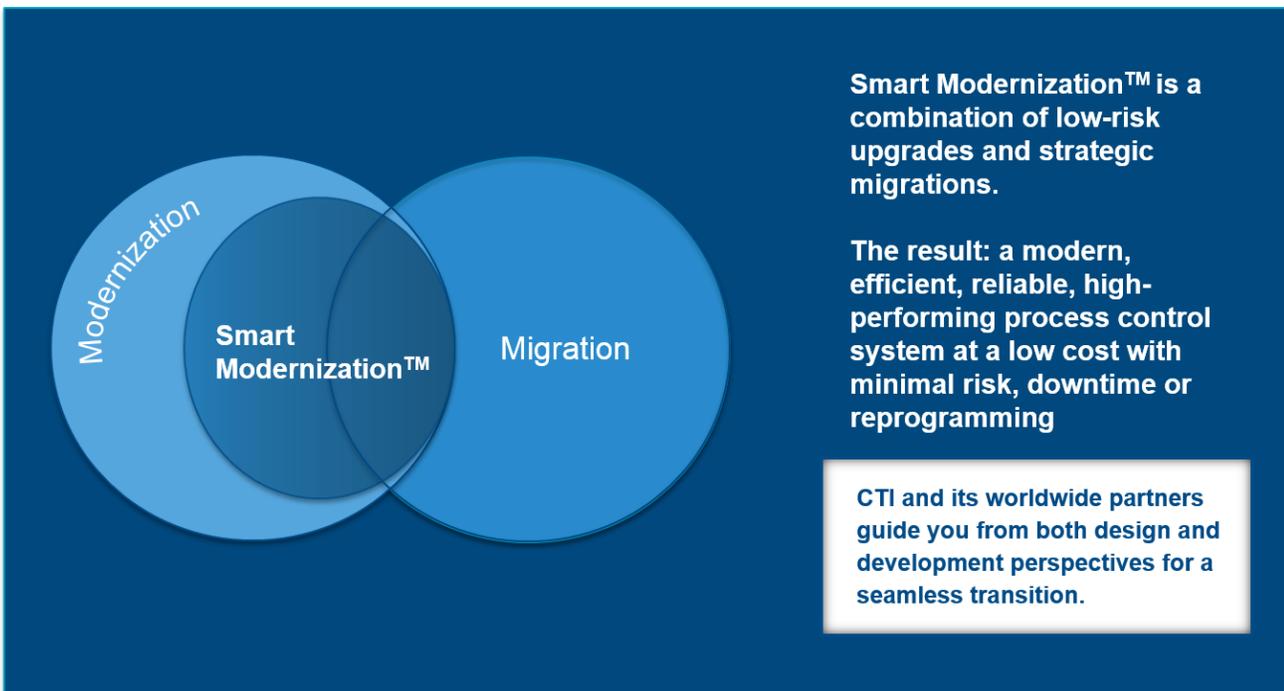
Cost

- ▶ New hardware and software
- ▶ Programming and re-wiring time
- ▶ Loss of production
- ▶ Retraining employees

Risk

- ▶ What is the likelihood of unplanned/longer-than-expected shutdown?
- ▶ What is the probability that the new process will perform as expected?

CTI's Approach: Smart Modernization™



- Smart Modernization delivers the benefits of a system migration without all the cost and downside risk
- Smart Modernization is a planned—often phased—approach to improve system reliability, performance, and capability at reduced cost and with minimal downtime, engineering, reprogramming and recommissioning
- Smart Modernization leverages and expands the existing automation system infrastructure
- Smart Modernization keeps the company's intellectual property intact so that operation and maintenance remain consistent resulting in minimal, if any, retraining and seamless operation for system operators and maintenance personnel



Smart Modernization™ for Simatic 505®/2500 Series®

STEP 1: Upgrade aging components with modern-day replacements while reusing existing application programs and engineering

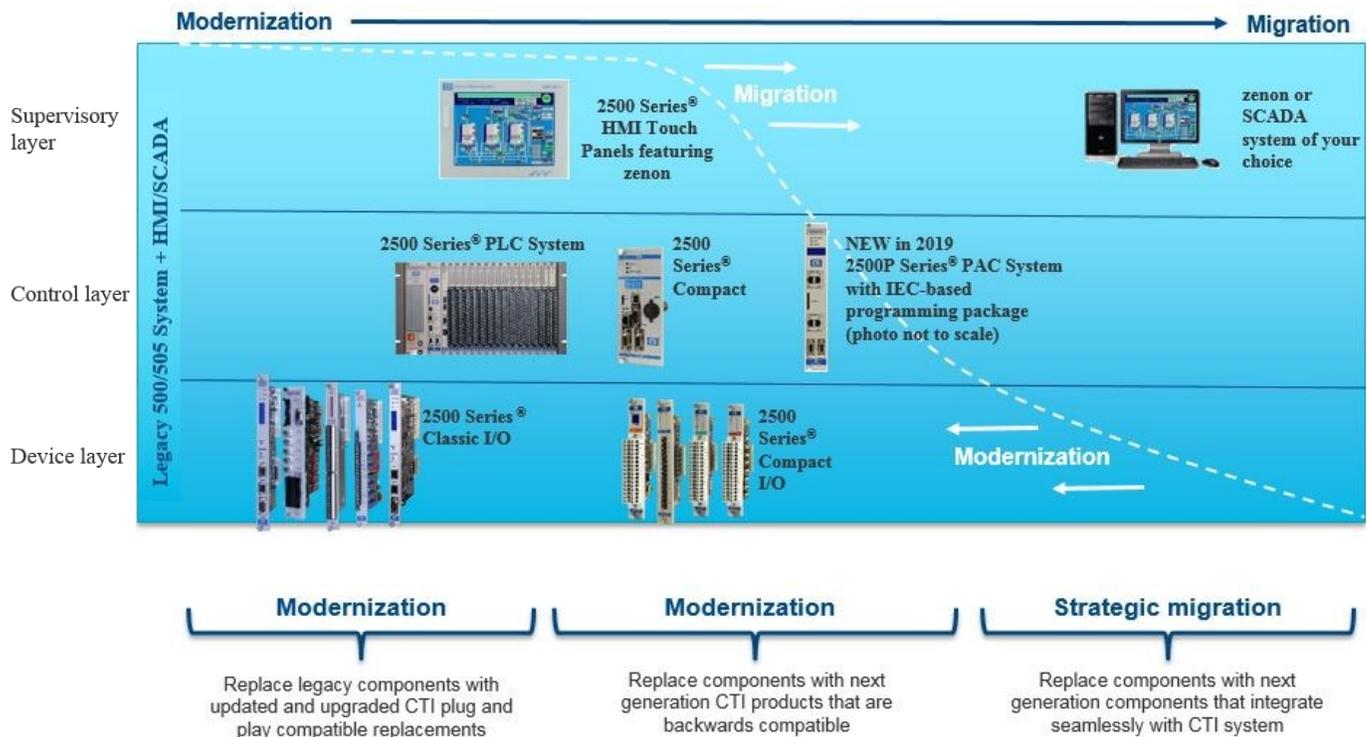
- ▶ All CTI CPUs are 100% compatible with aging TI/Simatic 505 CPUs*
- ▶ CTI CPUs are faster, have more memory and include an Ethernet port. CTI's upcoming series of CPUs features a new IEC 61131-compliant programming package for customers who wish to take advantage of additional programming languages, including Structured Text, Function Block Diagram and Sequential Function Chart
- ▶ New CTI Compact CPUs have all the performance of CTI's Classic CPUs but in a smaller, industrial form factor and are also 100% compatible
- ▶ CTI Power Supplies fit existing racks and work with both TI/Simatic 505 and CTI 2500 Series CPUs
- ▶ CTI I/O modules are wiring-compatible with existing 505 I/O, and like the 505 I/O they replace, have a track record of longevity, resilience, and reliability coupled with new features that maintain backward compatibility while adding innovative new capabilities
- ▶ Adapter products allow Smart Modernization of Series 500 Systems that can be in excess of 30 years old!
- ▶ Application programs written in TISOFT, APT and Workshop are able to run on CTI 2500 Series CPUs without any changes*

STEP 2: Enhance performance with new backwards-compatible advanced function modules

- ▶ The Ethernet Communications Coprocessor (ECC1) provides extremely fast response to HMI and SCADA workstations
- ▶ The Application Coprocessor (ACP1) is a general purpose advanced function module that is programmed with Workbench, CTI's new open standards IEC61131-compliant development system
 - Allows use of modern programming languages to add new functions to existing CTI 2500 Series and Simatic 505 controllers
 - Features a simple-to-use Ethernet-TCP Management interface that allows the user to develop customized Ethernet communications for communicating with a wide variety of third-party devices

STEP 3: Implement our zenon solution, a state-of-the-art HMI/SCADA system, while maintaining existing controls infrastructure

- ▶ CTI 2500 Series is especially designed to integrate seamlessly with zenon allowing customers to implement a powerful SCADA system without having to also replace their control system
- ▶ Customers are also free to implement the HMI/SCADA solution of their choice.



* CTI 2500 Series CPUs are 100% compatible with TI/Simatic 505 CPUs in all applications except for those using the XSUB instruction

Smart Modernization™ Customer Success Stories

Case 1: Printing Press Unable to Support DOS-based Programming

Customer was operating printing presses with 560/565 CPUs programmed in DOS-based TISOFT™ with Series 500 I/O (12 bases) on coaxial cable and a proprietary HMI. Both the coaxial I/O system as well as the 560/565 CPUs were obsolete and no longer supported. CTI developed a three-phase Smart Modernization plan:

Phase One — Upgrade Processors

- Replaced 560/565 processors using 4-slot bases with CTI 2500-C400 processors and Siemens® coaxial converters
- Converted PLC program to Workshop (Windows-based)
- Replaced proprietary HMI with CTC Interact® communicating to CET200BPU Ethernet port (integrator had done similar project previously using CTC)

⇒ **Total downtime: ~4 hours**

Phase Two — Upgrade I/O Communications

- Upgraded I/O communications using a 2500-RADP-RBC Profibus RBC in each Series 500 I/O base. Rewired coaxial cable to Profibus.

⇒ **Total downtime: 1 day**

Phase Three — Upgrade I/O

- Upgrade from Series 500 I/O to 2500 Series® I/O (Classic or Compact)

⇒ **Project is in planning stages**



Case 2: Air Separation Plant Baset by Slow SCADA Communications and Lack of Rich Data

Customer was operating a separation plant to produce industrial gases using Siemens® 555 PLCs programmed in APT, Siemens 505 I/O and PCS 3.12 SCADA. The SCADA system was slow and did not provide the richness of data that the customer desired. CTI developed a three-phase Smart Modernization plan:

Phase One — Migrate SCADA

- Replaced PCS 3.12 with zenon SCADA system employing redundant Dell servers with hot-swappable RAID drives and large-format dual monitors
- Used the CTI-developed APT tag/object exporter to automatically populate all the APT tags and objects into zenon
- Reproduced PCS screen and graphics configurations in zenon (per customer request)
- Exported PCS alarms and trend setting to Excel for quick verification of accuracy with new alarms and trends created in zenon
- Exported PCS graphics to text file to quickly verify proper tagging of all objects

⇒ **Total downtime: NONE** (concurrent operation with PCS allowed installation with no downtime)

Phase Two — Upgrade CPUs (Planned)

- Remove PCS System and upgrade 555 CPUs to CTI 2500-C400s

Phase Three — Modernize Programming (Planned)

- Convert PLC application to Workbench and upgrade to new CTI CPUs programmed in IEC-61131 programming language

Case 3: North American Customer Experiencing ET200B Performance Issues

Customer with multiple plants was using CTI 2500 Series® PLCs operating 505 I/O over RS485, plus Siemens® ET200B over Profibus. Aging ET200B units were becoming unreliable, and the customer sought a replacement.

CTI developed a Smart Modernization plan utilizing Compact I/O operating over Profibus



Phase One — Replace ET200B with Compact I/O

- Small size of Compact I/O allowed it to be installed in the same cabinet where ET200B was installed
- Profibus operation of Compact I/O required only minimal changes to the existing network configuration
- No changes to the PLC program

⇒ **Total downtime: Completed during a scheduled maintenance shutdown**

Case 4: French Cheesemaker Frustrated by Slow Update Times Over SINEC® H1

Customer operating a plant in France producing popular brands of cheese was using Simatic 505® PLCs and Wonderware® Intouch SCADA systems communicating over SINEC H1. Update times on Intouch had become very slow due to increased load on the Ethernet network. All PLCs were also communicating with each other over SINEC H1 which led to a very complex and difficult-to-maintain system.



CTI and its partner NAPA developed a Smart Modernization plan:

Phase One — Upgrade CPUs and Communications

- Replaced existing 505 PLCs with new CTI 2500 Series® Processors with no changes to the program
- Replaced H1 communications with standard Ethernet TCP/IP based on CTI 2500P-ECC1 cards for high-speed communication with Intouch and peer-to-peer between PLCs
- Implementing the entire peer-to-peer communications between 12 PLCs took only 1 day compared to several weeks of time using H1

⇒ **Total downtime: Completed during a previously scheduled weekend shutdown**

Case 5: Global Manufacturer Looking to Communicate to a New Injection Molding Machine and Improve Quality and Yield of Line

On an existing production line, customer replaced two injection molding machines that communicated to the PLC serially with a single new machine, but the existing PLC could not take advantage of the new machine's speed due to the slowness of the serial communications. Additionally, because of the bottleneck with the injection molding machine and difficulty accessing operational data, the line was one of the slowest in the plant and had quality control issues.

CTI developed a two-phase Smart Modernization plan:



Phase One — Upgrade CPUs

- Replaced existing 555 PLCs with CTI 2500-C400s
- No changes were required to the existing I/O or application program as CTI CPUs were able to run the existing APT program without any changes

⇒ **Total downtime: Completed during a scheduled maintenance shutdown**

Phase Two — Enhance performance with the ACP1 Advanced Function Module

- Added an ACP1 Application Coprocessor to communicate over Ethernet between the CPU and the injection molding machine
- Developed and tested a custom Ethernet protocol to replace the serial communications link

⇒ **Total downtime: Scheduled to be completed during the next scheduled maintenance shutdown**

⇒ **Result: Line as tested is now equal to or faster than other "more modern" lines and has comparable quality**

Smart Modernization™ is a Smart Solution

Smart Modernization can be a smart solution to a wide range of control system issues. The benefits of this approach are many:

- ▶ Low cost: no expensive re-wiring, re-programming, re-engineering, re-training, re-validating
- ▶ Low risk: reduce or avoid re-certifications and eliminate the risk that a brand-new process control system will take weeks, months or years to deliver the same or better output of the control system it is replacing
- ▶ Minimal downtime: little, if any, downtime is often required
- ▶ Preservation of intellectual property: reuse existing application programs
- ▶ Improve process quality
- ▶ Improve production capacity



**Smart Modernization delivers the Best Return on Investment
and the Best Optimization of your
Long-term Cost of Ownership**

The BLUE Platform

CTI 2500 Series® products are built on the BLUE Platform — CTI's seamless systems architecture. Products built on the BLUE Platform are engineered with a consistent design philosophy, a common operating system and common communications protocols and interfaces.

This approach ensures interoperability between various components of the system as well as between various product generations to deliver seamless operations, communications, and control; maximum efficiency with minimum process downtime; and greatly reduced engineering development time.

The BLUE Platform enables you to optimize ROI and cost of ownership and gives you peace of mind that investments in your controls system today will continue to yield benefits far into the future. CTI controls systems evolve right along with your operations.

Please feel free to contact us for more information.



For more information about Smart Modernization or for help with a Smart Modernization solution for your plant, please contact your local distributor or contact us at sales@controltechnology.com or on +1.865.584.0440