Control Technology Incorporated

A Snapshot of CTI

- Years in business: 32
- History as a supplier of PLC products to Rockwell, Siemens®, Omron
- Main business: 2500 Series® Programmable Controller System: a 100% compatible replacement for Simatic® 505
- Global presence: offices in 22 countries, 125 employees in sales and support (including affiliates)
- Over 110,000 systems installed worldwide (CTI + Siemens®)
- CTI has installed over 120,000 product units worldwide
  - Over 19,000 ethernet connections
  - Over 45,000 serial connections
  - Over 1.3 million points of analog and digital I/O
  - Over 3,300 new 2500-Cx00 processors

CTI: A Brief History

Three Phases of Company Development

Startup

1980	Founded as a spin-off from Computer Concepts Corporation - from the dairy and meat packing process control industry
1983	First industrial products for TI and Allen Bradley
1985	1771-DB Basic Module (Allen-Bradley)

PLC Component Supplier

1990	Isolated analog and discrete modules for TI 500 I/O
1991	First TI505 I/O products
1995	2572 Ethernet Module
1997	Siemens® private labeled analog, discrete, and communications modules

PLC System Supplier

2000	SuperSavers I/O Modules
2001	Siemens® announces exit of 505® business
2002	2572-A Fast Ethernet Module
2004	I/O Bases and Profibus RBC
2005	RS485 RBC
2006	Series 500 I/O Adapters
2007	2500 Series® Processors
2008	Worldwide User Conference – Las Vegas USA
2009	CPU performance improvements & new instructions
2011	2500 Series® HMI

CTI Corporate Headquarters

- Corporate Offices
- Product Development
- Manufacturing
- Sales & Marketing
- Factory Hotline
- Product Training

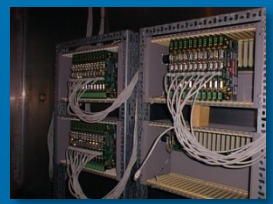
Factory Overview – Knoxville TN, USA


solder screen


component placement

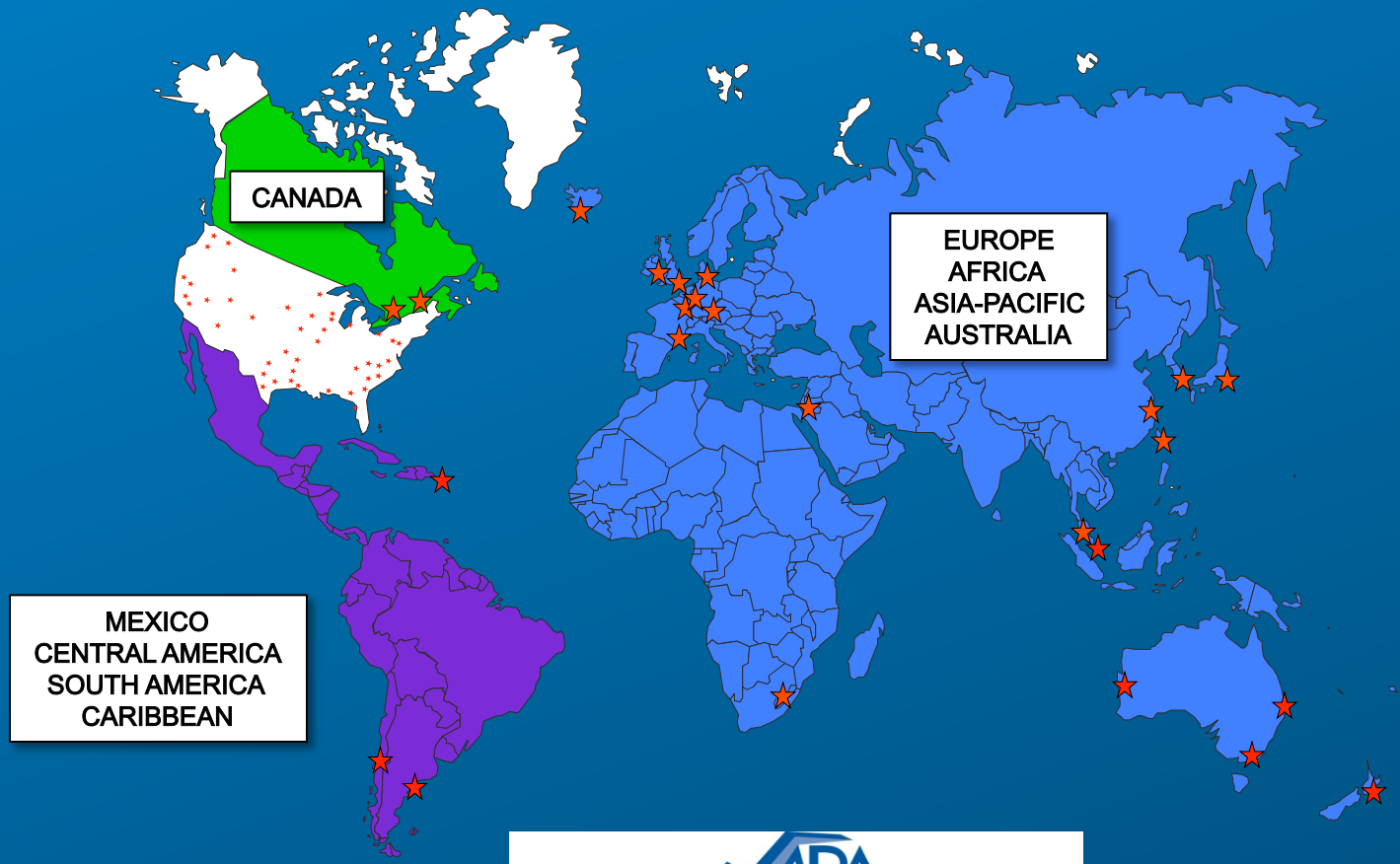

solder reflow


automatic test


100% industr

- Full industrial surface mount process
  - solder screen, component placement, solder reflow, automatic test, 100% industrial burn-in
- RoHS capable process (lead, mercury, cadmium, hexavalent chromium)
  - Special solders and solding process
  - Special coatings
  - Special paints
- Products Approvals CE, UL, UL-Canada, Class 1 Div 2
- Quarterly audits and certification by UL

Global Distribution & Support Locations



Master International Distributor

What is the 2500 Series® System?

- New PLC system based on Simatic® 505
- New design based on current technology
- Compatible with your existing Simatic® 505 installations
  - Interchangeable software
    - Same programs and programming tools as your Simatic® 505 systems
  - Interchangeable hardware
    - Simatic® 505 modules can be used in 2500 Series® Systems
    - 2500 Series® modules can be used in Simatic® 505 Systems
    - I/O modules are direct replacements with no wiring changes
  - Simatic® 505 and Series 500 remote I/O networks are supported

Project Highlights - USA

Control Technology Inc
Introduction to CTI and the 2500 Series® System


CTI 2500 Series™ System
Application Highlight

Application Highlight:
Replacement of TI560/565 with CTI 2500-C300 on Heidelberg-Harris M1000B Web Printing Press

In Wells, Maine, USA, Spencer Press produces a variety of products including catalogs, press-pasted booklets, free-standing inserts and self-mailers. The company was acquired by RR Donnelley in 2005.

Due to continued issues with maintaining the TI 560/565-based control system on its M1000 press, the company in 2007 contacted Goss International, who acquired Heidelberg's web press and high-volume postpress business in August of 2004. Goss, in turn, contacted CTI regarding the use of our new 2500 Series™ processor in replacement of the 565.

Figure 1 M1000B Printing Press

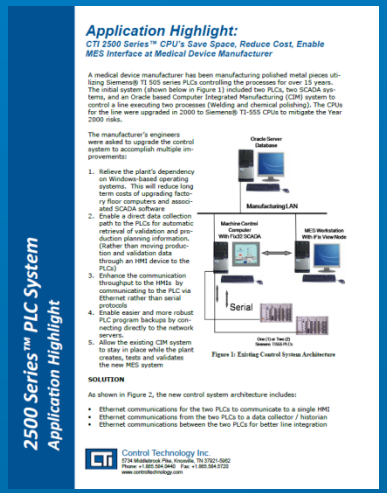
Existing Control System Design
The existing control system used on the M1000 press employed a TI560/565 processor with remote I/O connection over coax to thirteen Series 500 I/O bases. Spencer felt that they could continue to maintain the Series 500 I/O systems for a while longer, but wanted an immediate replacement of the controller and upgrade of the programming software to PLC Workshop.

I/O Bases
I/O Channel A
I/O Channel B
TI 560/565 Controller

Figure 2 Existing Control System

Spencer Press

Printing press upgrade of 565 CPU and coaxial I/O to 2500-C300 with new RIO system


2500 Series™ PLC System
Application Highlight

Application Highlight:
CTI 2500 Series™ CPU's Save Space, Reduce Cost, Enable MES Interface at Medical Device Manufacturer

A medical device manufacturer has been manufacturing polished metal pieces utilizing Siemens® TI 505 series PLCs controlling the processes for over 15 years. The initial system (shown below in Figure 1) included two PLCs, two SCADA systems, and an Oracle based Computer Integrated Manufacturing (CIM) system to control a line executing two processes (Welding and chemical polishing). The CPUs for the line were upgraded in 2000 to Siemens® TI-555 CPUs to mitigate the Year 2000 risks.

The manufacturer's engineers were asked to upgrade the control system to accomplish multiple improvements:

1. Relieve the plant's dependency on Windows-based operating systems. This will reduce long term costs of upgrading factory floor computers and associated SCADA software
2. Enable a direct data collection path to the PLCs for automatic retrieval of validation and production planning information. (Rather than moving production and validation data through an HMI device to the PLCs)
3. Enhance the communication throughput to the HMIs by communicating to the PLC via Ethernet rather than serial protocols
4. Enable easier and more robust PLC program backups by connecting directly to the network servers.
5. Allow the existing CIM system to stay in place while the plant creates, tests and validates the new MES system

Oracle Server Database
Manufacturing LAN
Machine Control Computer With iTools2 SCADA
MES Workstation With iFix ViewNode
Serial
One (1) or Two (2) Siemens TI555 PLCs

Figure 1: Existing Control System Architecture

SOLUTION

As shown in Figure 2, the new control system architecture includes:

- Ethernet communications for the two PLCs to communicate to a single HMI
- Ethernet communications from the two PLCs to a data collector / historian
- Ethernet communications between the two PLCs for better line integration

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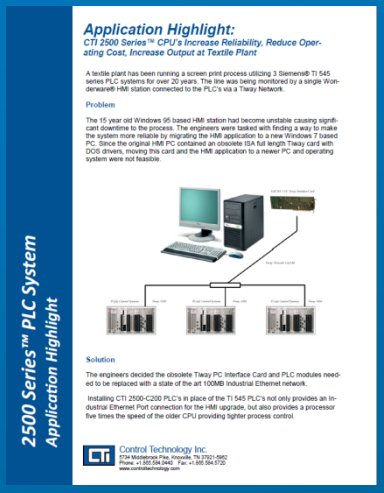
Medical Device Manufacturer

Upgrade 555 to 2500-C200 and iFIX SCADA


2500 Series™ PLC System
Application Highlight

Application Highlight:
CTI 2500 Series™ CPU's Increase Reliability, Reduce Operating Cost, Increase Output at Textile Plant

A textile plant has been running a screen print process utilizing 3 Siemens® TI 545 series PLC systems for over 20 years. The line was being monitored by a single Wonderware® HMI station connected to the PLC's via a Tiway Network.

Problem

The 15 year old Windows 95 based HMI station had become unstable causing significant downtime to the process. The engineers were tasked with finding a way to make the system more reliable by migrating the HMI application to a new Windows 7 based PC. Since the original HMI PC contained an obsolete ISA full length Tiway card with DOS drivers, moving this card and the HMI application to a newer PC and operating system were not feasible.

Solution

The engineers decided the obsolete Tiway PC Interface Card and PLC modules needed to be replaced with a state of the art 100MB industrial Ethernet network.

Installing CTI 2500-C200 PLC's in place of the TI 545 PLC's not only provides an Industrial Ethernet Port connection for the HMI upgrade, but also provides a processor five times the speed of the older CPU providing tighter process control.

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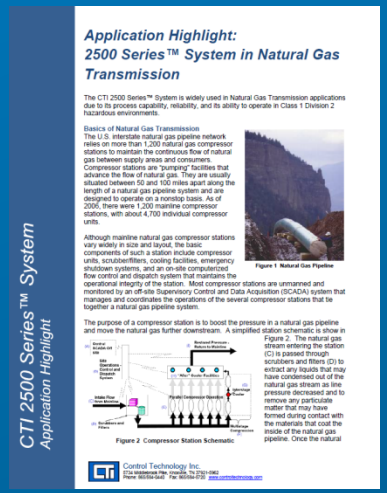
Textile Manufacturer

Upgrade 545 and TIway to 2500-C200 and Ethernet-based SCADA


CTI 2500 Series™ System
Application Highlight

Application Highlight:
2500 Series™ System in Natural Gas Transmission

The CTI 2500 Series™ System is widely used in Natural Gas Transmission applications due to its process capability, reliability, and its ability to operate in Class 1 Division 2 hazardous environments.

Basics of Natural Gas Transmission
The U.S. interstate natural gas pipeline network relies on more than 1,200 natural gas compressor stations to maintain the continuous flow of natural gas between supply areas and consumers. Compressor stations are "pumping" facilities that advance the flow of natural gas. They are usually situated between 50 and 100 miles apart along the length of a natural gas pipeline system and are designed to operate on a nonstop basis. As of 2006, there were 1,200 mainline compressor stations, with about 4,700 individual compressor units.

Figure 1 Natural Gas Pipeline

Although mainline natural gas compressor stations vary widely in size and layout, the basic components of such a station include compressor units, scrubbers/filters, cooling facilities, emergency shutdown systems, and an on-site computerized flow control and dispatch system that maintains the operational integrity of the station. Most compressor stations are unmanned and monitored by an off-site Supervisory Control and Data Acquisition (SCADA) system that manages and coordinates the operations of the several compressor stations that tie together a natural gas pipeline system.

The purpose of a compressor station is to boost the pressure in a natural gas pipeline and move the natural gas further downstream. A simplified station schematic is show in Figure 2. The natural gas stream entering the station (C) is passed through scrubbers and filters (D) to extract any liquids that may have condensed out of the natural gas stream as line pressure decreased and to remove any particulate matter that may have formed during contact with the materials that coat the inside of the natural gas pipeline. Once the natural

Figure 2 Compressor Station Schematic

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Natural Gas Pipeline

Engine control, turbine control, gas & flame detection, overall station control at multiple compressor stations on natural gas pipeline

Project Highlights - Europe

Control Technology Inc
Introduction to CTI and the 2500 Series® System


2500 Series™ PLC System
Application Highlight

Application Highlight:

FrieslandCampina Cheese in Rijkevoort replaces 555-1104 with CTI 2500-400 to gain additional memory for process expansion

FrieslandCampina is the largest dairy company in the Netherlands. Millions of Dutch consumers eat and drink their products and moreover many of the dairy products are exported to countries on every continent of the world.

In the Netherlands the milk is processed into virtually everything that can be made with milk. This includes popular western consumer products like pasteurized milk, yoghurts and custards. Also consumer dairy products for the export are made, such as condensed milk and milk powders.

The Netherlands is FrieslandCampina's primary location for the production of cheeses and butter products as well as a wide variety of ingredients used in the food and the pharmaceutical industries.

The Project

An existing cheese production line is controlled by three 555 CPU's and a PCS™3 Process Control System.

The memory of one of three CPU's was completely filled up and more memory was needed. Changing to a different PLC system was not an option due to cost. The CTI2500-400 CPU offers 3Mbytes of memory compared to the 2Mbytes in the 555-1104. After a successful test result, FrieslandCampina decided to change the process over to a CTI 2500-C400 CPU and later to change to another Scada system.

Upgrade Result

The APT® program was loaded into the new CPU. On the PCS™3 system, RBE was switched off by setting the time to zero. Now all the alarms are polled continuously, but since the new CTI CPU is about two times faster in scan time no update differences were noticed. To address to 3M memory they will use the CTI 3110 3M Memory Object for APT®. All investments in application development over the years were saved. Having new CTI CPU's in place and with the upcoming new Windows based APT® replacement product from FasTrak SoftWorks Inc. (currently in Alpha Testing), Campina has an excellent base for the future.

The system integrator who is responsible for the installation and new changes is Actemium, Veghel.

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CTI 2500 Series™ System
Application Highlight

Application Highlight:

Air Liquide Selects CTI 2500 Series™ for Upgrade of Nitrogen Generation Plant

With more than 40,000 employees in 75 countries, Air Liquide is the world leader in industrial and medical gases. The company offers innovative solutions based on constantly enhanced technologies and produces air gases (oxygen, nitrogen, argon, rare gases...) and many other gases including hydrogen.

At a nitrogen generation facility in France for "L'Aerospatiale" (the European aerospace leader belonging to EADS group), AIR LIQUIDE's engineering division "FLOXAL" selected CTI 2500 Series™ for upgrading the automation of its systems. Among the criteria that AIR LIQUIDE used in making the selection were:

- Minimum or no change to existing process software and SCADA system
- Long-term availability of support and spares
- Minimum downtime for the upgrade
- Competitive cost

A nitrogen generator extracts nitrogen from the air using "cryogen" technology, meaning distillation at very low temperatures. The chemical, metal and electronic industries use nitrogen in their processes and are the main users of these generators. Air Liquide owns the generators and is in charge of both their operation and maintenance. These units are installed at Air Liquide customer sites worldwide. Complete autonomy of our systems is a key requirement, as installations must be able to be stopped and restarted without any local human intervention. These installations are supervised using a remote data acquisition system.

Control System Design

The control system design uses two "cabins", the compressor and the "hot skid" where after compression, the air is filtered and purified. After the filtration, the air is distilled at very low temperature in a "cold box" in order to separate the nitrogen molecules. The electrical cabinets are integrated in the "hot skid" in order to improve the control of the process.

Air Liquide installed a new control system using CTI 2500-C100 CPU together with CTI DI, DO, and 8in/4out analog modules. The first commissioning was done in July 2008 at L'Aerospatiale. The customer was particularly impressed with the speed and quality of the upgrade process. Only a few hours of downtime was required and there were no significant problems.

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05/DEP08


2500 Series™ PLC System
Application Highlight

Application Highlight:

Refuse Bag Manufacturer Upgrades Obsolete PM550 Controller to 2500 Series™

Powerpack is a Belgian-based manufacturer of waste & refuse bags and also produces all kinds of industrial films. Due to its high quality products, its respect for its partners, and recognizing the fact that the company's responsibility is to operate with due concern for the general environment, Powerpack has become the main supplier in Belgium for many municipalities, cities and communities. With established master customers in the Netherlands, France and Germany, Powerpack has evolved into the European Grocery Retail Market as well.

The Project

An existing bag production lines was controlled by a Texas Instruments PM550 process controller that went down due to a hardware problem. The information about the setup of the line was not available completely and therefore a new PLC was needed supporting also the same instruction set.

Prodek, the Benelux CTI distributor supplied a new 2500 Series™ processor and I/O. With the support of Cuyten Maintenance Services, a local systems integrator, the new processor and I/O was built into the existing cabinet. A VPU200 was used to recover the program from the old system, and it was converted for a CTI 2500-C200 using PLC Workshop. All the PM550 instructions are available in the CTI 2500 Series™ Processor – only some special functions needed an adjustment. The conversion changed existing references of CR's into C's, C memory changed into K memory and Special Functions into S memory.

Upgrade Result

Since the CTI 2500-C200 covers the instruction set of the PM550, it was possible to convert the program without knowledge of the production line. In a few days the system was rewired and the software was converted. Some settings that were adjusted by switches and read out by displays, are now controlled by a small operator panel. The performance has been increased and the customer is very happy with the new CTI 2500-C200 processor. A short training on how to troubleshoot with Workshop and how to use the operator panel completed the conversion.

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09MAR2010


CTI 2500 Series™ System
Application Highlight

Application Highlight:

Plating Plant Upgrade - Replacement of Simatic® 555 (with SIFLEKS® software) with One CTI 2500-C400 (with new OptiGalv® software) Achieves 50% Improvement in Throughput

In Hjørring, Denmark, Danish company Georg Jensen A/S operates a facility producing gold plated accessories for Easter and Christmas.

Existing Control System Design

The original design of the plant used 35 plating containers serviced by 4 cranes to move the product through the plating process. The control system was based on a Simatic® 555 with FIX32 which acted as master controllers for the process. With the old SIFLEKS® system the through was 8-10 hangers per hour.

Proposed Control System Upgrade

To allow the plant to achieve much more capacity, CTI 2500 Series™ System Integrator Manor Group Automation ApS proposed an upgrade of the 555 PLC with a single CTI 2500-C400 processor and new APT®-based control program, Optigalv®. The upgrade also included a new iFIX HMI system and speed change from 9.6Kbaud to 19.2Kbaud on the Profibus network used to control the cranes and other I/O.

The main PLC gives orders to each crane, one instruction at a time, based on plating container status, product type, and crane availability. Because of the complexity of the calculation, it formerly took about 2 seconds to compute each move. With the 2500-C400, this time has been reduced to about 45msec.

Upgrade Result

The plant is running today with the new system, OptiGalv®, on CTI 2500-C400 PLC and iFIX. Siemens® S7-200 PLC's continue to control the internal operation of each crane, but all other I/O for pumps, valves, motors, levels, and temperatures is controlled by the CTI processor over Profibus. A test made in June 2009 shows a system performance 15-17 hangers per hour – nearly double the previous performance.

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09/AUG09

Campina (dairy)

Upgrade of 555 CPUs to 2500-C400 using APT®

Air Liquide

New installation with 2500-C100 and CTI I/O

Powerpack (plastics)

Upgrade PM550 to 2500-C200 and CTI I/O with no program changes

Jensen A/S (plating)

Upgrade 555 to 2500-C400 and APT® - achieves 50% more throughput

Project Highlights - Asia

Control Technology Inc
Introduction to CTI and the 2500 Series® System


2500 Series™ PLC System
Application Highlight

Application Highlight:
Automotive Exhaust Components Manufacturer Upgrades Laser Cutting Process to 2500 Series™

In Ningbo, China, Tajco Group (Grinsted, Denmark) produces exhaust extensions for the global automotive industry. In 2007 Tajco switched from Siemens® S7-300 to CTI 2500-C400 controllers in their plating operations. The latest upgrade to CTI processors is in the laser cutting and welding operations using a Trumpf laser.

Three laser systems are installed, one for 2-D cutting, one for welding and one for 3-D cutting, but only one can be active at a time.

The cutting and welding operations are performed through coordination of XY positioning equipment, robots, and the laser.

CTI System Integrator Manor Group Automation ApS installed a CTI 2500-C200 and a small UniOP panel to provide this overall coordination of the process, using a combination of standard I/O and Profibus. The control program was implemented in APT®, because the modular program nature of APT® made it possible to very easily extend the program to operate other robots.

Communication with the XY positioner is accomplished using 64 digital I/O's, and the Laser & Robots are controlled from Profibus. The extremely fast scan time of the C200 PLC (2-7ms) made possible the use of handshake telegrams to keep synchronization between the PLC and Laser.

Overall benefit to the customer from the project was an increase in throughput made possible because of the high performance of the CTI 2500 Series™ Processor.

Future projects at this plant will include installation of a 2500-C400 for operating the new flash chrome line. On completion of that project, CTI PLCs will be running the Degreaser, the Bright Chrome Line, the Waste Water Line, the Trumpf Laser Robots line, and the new Flash Chrome Line.

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Tajco (laser cutting)

Upgrade of S7-300 to 2500-C400 for increased throughput


2500 Series™ PLC System
Application Highlight

Application Highlight:
Chang Chung Petrochemical—Replacement of Simatic® 545/555 with CTI 2500-C400 and Redundancy

The Chang Chung Petrochemical Company (Taiwan) is the second largest chemical producer in Taiwan, in business for over 60 years. They operate multiple manufacturing sites in Taiwan and China. The Chang Chung control strategy was based on TI PM550 and TI-545/555/565 systems and used CVU10000 for visualization. This equipment was employed in their resin, epoxy, copper foil , H2O2 , and PBT production.

CTI distributor Long-Lite Ind Eng Co in Taiwan replaced the existing Simatic® 545/555 controllers to CTI 2500 Series™ controllers to provide a quick and cost-effective upgrade with no need to change any programs. The system used for CTI 2500-C400 processors and 2572-A TCP/IP modules networked with WinCC SCADA systems. The upgrade resulted in more reliable operation and improved efficiency.

Future projects will convert additional 545/555 systems to CTI, add a layer of CPU redundancy, and migrate all the system I/O from Siemens® 505 to CTI 2500 Series™

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Chang Chun (chemical)

(1) Upgrade of 545/555 to 2500-C400 and SCADA

(2) New installation with 2500-C400 and 2300 points of I/O


2500 Series™ PLC System
Application Highlight

Application Highlight:
Nantong Cellulose Fibers—Replacement of Simatic® 565 with CTI 2500-C400

Nantong Cellulose Fibers Co., Ltd is one of the leading cellulose fiber manufacturers in China. They have 3 factories located at Nantong, Guangzhou, and Kunming, supplying cigarette filters to all of Asia.

Existing Control System

NCFC has five existing production lines which were controlled by Siemens® 565 processors and WinCC SCADA systems connected over Ethernet.

Proposed Expansion

For the new expansion project NCFC elected to migrate to CTI 2500 Series™ processors rather than upgrade their systems using Siemens® PCS7. Long-Lite Ind Eng Co, CTI distributor in china, upgraded the NCFC 565 controllers into CTI 2500-C400. In addition to the processors, the expansion included eight new I/O bases, upgraded Workshop programming software, and training.

Upgrade Result

CTI 2500 Series™ processors have been operating the plant with no problems for three years. NCFC is planning further upgrades using CTI products, including new redundant CPU solutions.

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NCFC (cellulose)

Upgrade five 565 to 2500-C300 and eight new I/O bases, new programming software


2500 Series™ PLC System
Application Highlight

Application Highlight:
CJ Biotech Co—Replacement of Simatic® 545/555 with CTI 2500-C400

CJ is a leading global Biotech company. Due to high quality products needs, CJ migrated their process controller from Simatic® 545 controller into CTI 2500-C300 & C400 for their existing production line and new expansion projects.

The new expansion project are using CTI C300/C400 CPU and CTI new I/O operating by Ifix HMI system cover all the fermentation process. Long-Lite Ind Eng Co, CTI distributor in China, provided all the CTI system and process control panel, including the pneumatic system.

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CJ Biotech (fermentation)

Upgrade 545's to 2500-C400, new I/O bases, new iFIX SCADA

Project Highlights - Asia

Control Technology Inc
Introduction to CTI and the 2500 Series® System

CTI 2500 Series™ System
Application Highlight

Application Highlight:

Plating Plant Upgrade - Replacement of Two S7-317 with One CTI 2500-C400 Achieves 90% Improvement in Throughput

In Ningbo, China, a plating facility produces exhaust components for the global automotive manufacturing industry. Built in 2006, the plant includes a plating operation which applies nickel-chrome plating to the formed exhaust components.

Existing Control System Design

The original design of the plant used 200 plating containers serviced by 6 cranes to move the product through the plating process. The control system was based on two Siemens® S7-317 PLCs with WinCC which acted as master controllers for the process. These PLCs communicated, in turn, with S7-315 PLCs on each crane. Although the plant was designed for 3M pieces/yr, it had never exceeded 1.3M due to memory and performance limitations in the control system.

Proposed Control System Upgrade

To allow the plant to achieve its design capacity, CTI 2500 Series™ distributor Automation ApS proposed an upgrade of the S7-317 PLCs with a single CTI 2500-C400 processor and new APT-based control program. The upgrade also included a new iFIX HMI system and reorganization of the Profibus network used to control the cranes.

The main PLC gives orders to each crane, one instruction at a time, based on plating container status, product type, and crane availability. Because of the complexity of the calculation, it formerly took about 2 seconds to compute each move. With the 2500-C400, this time has been reduced to about 60msec.

Upgrade Result

The plant is running today with the new system, OptiGalv ®,on CTI 2500-C400 PLC and iFIX. The Siemens® S7-315 PLC's remain to control the internal operation of each crane, but all other I/O for pumps, valves, motors, levels, and temperatures is controlled by the CTI processor over Profibus. Because of the higher speed and memory of the 2500-C400 (specifically the 2M capability for APT programs), the speed of the system has been substantially improved.

A further software optimization, planned for installation in August 2008, is expected to further increase the throughput to 3.3M pieces/yr. Using the 3M APT processor object now available from CTI, the system has good capability for continued process and speed improvements.

Control Technology Inc.

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Plating Plant (auto)

Replace Siemens D7-317 with 2500-C400 and APT®

CTI 2500 Series™ System
Application Highlight

Application Highlight:

Semiconductor Company Upgrades Obsolete Siemens® TI505 PLC to CTI 2500 Series™

One of the world's leading manufacturers of advanced semiconductor solutions performs assembly and test operations at a site in Singapore. This site supports supports fabrication from plants in the United States, Europe, and Asia.

Existing Control System

Within the Singapore site, there are nine Siemens® TI505 systems, each operating multiple remote I/O bases over RS485 and Profibus. Each system is responsible for different processes; however, all the processes are interrelated and all processes must operate 24/7.

The existing systems communicated via Ethernet using 505-CP2572 to a Wonderware SCADA. These systems have previously been changed from using Tisoft to PLC Workshop for programming their PLCs, due to the advantage of communicating via Ethernet to the PLCs.

Because the facility must maintain 24/7 operation, they could not afford to take high risks for major changes in process and SCADA software – which often require long downtimes for troubleshooting and testing. Changes in process control hardware and software must instead be made during the annual maintenance shut down which provides only about 12 hours for all necessary changes.

Proposed control system with CTI 2500 Series™

In order to meet the requirement set by the manufacturer, Region Distributor and Automation Partner, Sermax had proposed to upgrade existing 545-1106 and 505-CP2572 units with CTI. Because 2500 Series™ system supports the same instruction set as the one used in the Siemens® TI505, no changes in the program logic were required. And because 2500 Series™ supports the same Ethernet protocol used on 505-CP2572, no changes were required for the SCADA system.

Upgrade Result

The first CTI 2500 Series™ CPU was installed in the Singapore site in December 2009. The installation went smoothly, requiring less than 2 hours of migration time. As a bonus, the upgraded system now has two Ethernet ports (1 on 2500-C200 and 1 on 2572-A) which provide higher throughput and redundancy. Although Sermax was present at startup to handle any problems, there were no PLC program or communication errors when the plant was restarted. The customer was very satisfied with the migration due to these factors:

- No or minimal changes to process software and SCADA System
- Driver compatibility with predecessor Siemens® TI505
- Long term availability of support and spares
- Competitive cost

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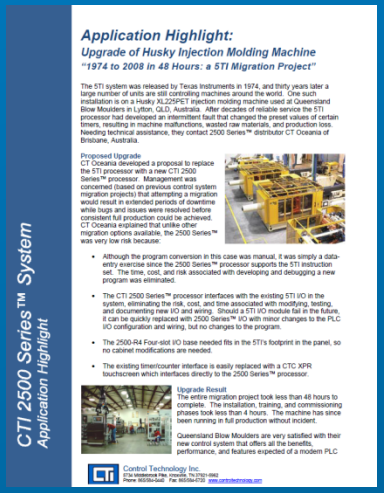
Semiconductor Plant

Upgrade nine 545 processors to 2500-C200 with no changes in program or SCADA, and only 12 hours downtime



CTI 2500 Series™ System
Application Highlight

Application Highlight:

Upgrade of Husky Injection Molding Machine

"1974 to 2008 in 48 Hours: a 5TI Migration Project"

The 5TI system was released by Texas Instruments in 1974, and thirty years later a large number of units are still controlling machines around the world. One such installation is on a Husky XL225PET injection molding machine used at Queensland Blow Moulders in Lytton, QLD, Australia. After decades of reliable service the 5TI processor had developed an intermittent fault that changed the preset values of certain timers, resulting in machine malfunctions, wasted raw materials, and production loss. Needing technical assistance, they contact 2500 Series™ distributor CT Oceania of Brisbane, Australia.

Proposed Upgrade

CT Oceania developed a proposal to replace the 5TI processor with a new CTI 2500 Series™ processor. Management was concerned (based on previous control system migration projects) that attempting a migration would result in extended periods of downtime while bugs and issues were resolved before consistent full production could be achieved. CT Oceania explained that unlike other migration options available, the 2500 Series™ was very low risk because:

- Although the program conversion in this case was manual, it was simply a data-entry exercise since the 2500 Series™ processor supports the 5TI instruction set. The time, cost, and risk associated with developing and debugging a new program was eliminated.
- The CTI 2500 Series™ processor interfaces with the existing 5TI I/O in the system, eliminating the risk, cost, and time associated with modifying, testing, and documenting new I/O and wiring. Should a 5TI I/O module fail in the future, it can be quickly replaced with 2500 Series™ I/O with minor changes to the PLC I/O configuration and wiring, but no changes to the program.
- The 2500-R4 Four-slot I/O base needed fits in the 5TI's footprint in the panel, so no cabinet modifications are needed.
- The existing timer/counter interface is easily replaced with a CTC XPR touchscreen which interfaces directly to the 2500 Series™ processor.

Upgrade Result

The entire migration project took less than 48 hours to complete. The installation, training, and commissioning phases took less than 4 hours. The machine has since been running in full production without incident.

Queensland Blow Moulders are very satisfied with their new control system that offers all the benefits, performance, and features expected of a modern PLC

Control Technology Inc.

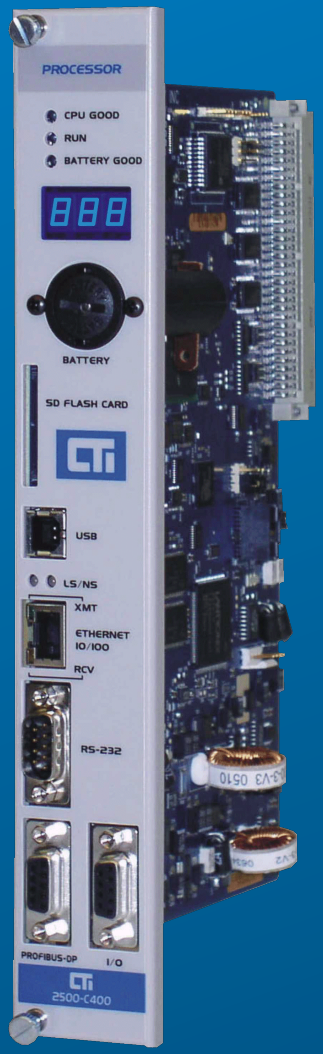
QLD Blow Molders

Upgrade 5TI processors to 2500-C200 with no program changes and only 4 hours downtime

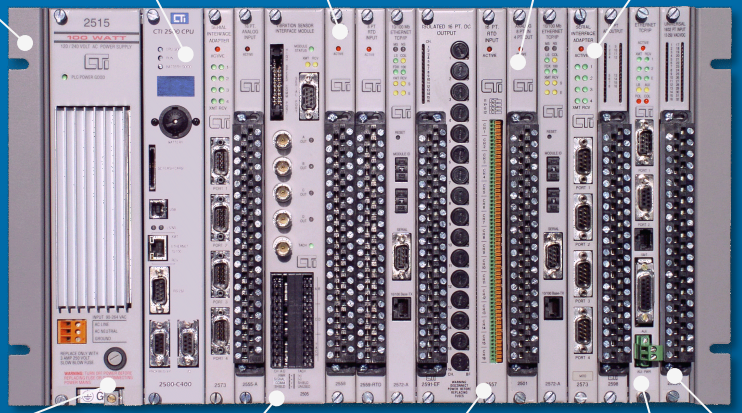
2500 Series® System

Worldwide Support

- Global support organization
  - USA support (Knoxville, TN)
  - South America support
    - Buenos Aires (Argentina & Brazil)
    - Santiago, Chile
  - European support
    - Nice, France
    - Copenhagen, Denmark
    - Amsterdam, Netherlands
    - Dublin, Ireland
    - United Kingdom
    - Belgium
    - Germany
  - Africa support (Johannesburg, SA)
  - Asia-Pacific support
    - Brisbane, Melbourne, Perth Australia
    - Taipei, Tainan Taiwan
    - Shanghai, China
    - Seoul, Korea
    - Singapore
    - Malaysia



2500 Series® System Components



Digital I/O
(21 products)

CPU (4 products)
RBC (2 products)

I/O Base
(4 products)

Analog I/O
(6 products)

Communications
(3 products)

Power Supply
(4 products)

Vibration
monitoring

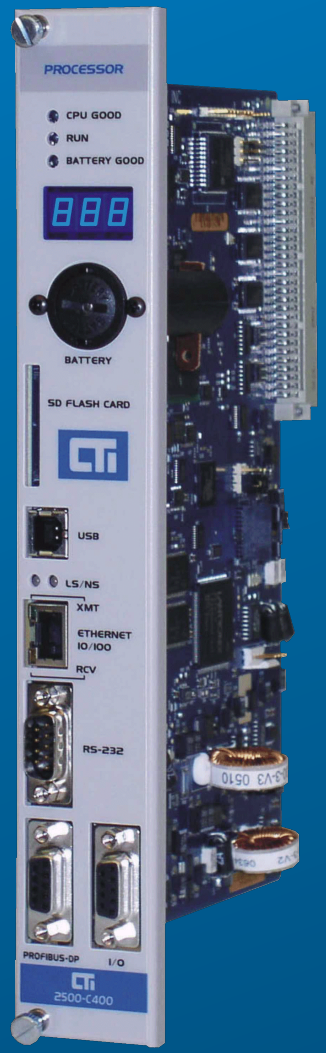
Temperature Input
(6 products)

Special I/O
(4 products)

Ethernet
(3 products)

2500 Series® Processors

	2500-C100	2500-C200	2500-C300	2500-C400
Memory	128K	256K	512K	3072K
Digital I/O	1024	2048	8192	8192
Analog I/O	1024	1024	8192	8192
Loops / Alarms	16 / 32	64 / 128	512 / 512	512 / 512
SFP / SFS	64 / 64	1023 / 1023	1023 / 1023	1023 / 1023
Ethernet	Yes	Yes	Yes	Yes
Remote I/O	No	Yes	Yes	Yes
Profibus	No	Yes	Yes	Yes
SD card	Yes	Yes	Yes	Yes
USB	Yes	Yes	Yes	Yes
Replaces	545-1103* 545-1105*	545-1101 545-1102 545-1104 545-1106	555-1101 555-1103 555-1105	555-1102 555-1104 555-1106



* If Profibus-DP annex card is installed, a 2500-C200 must be used

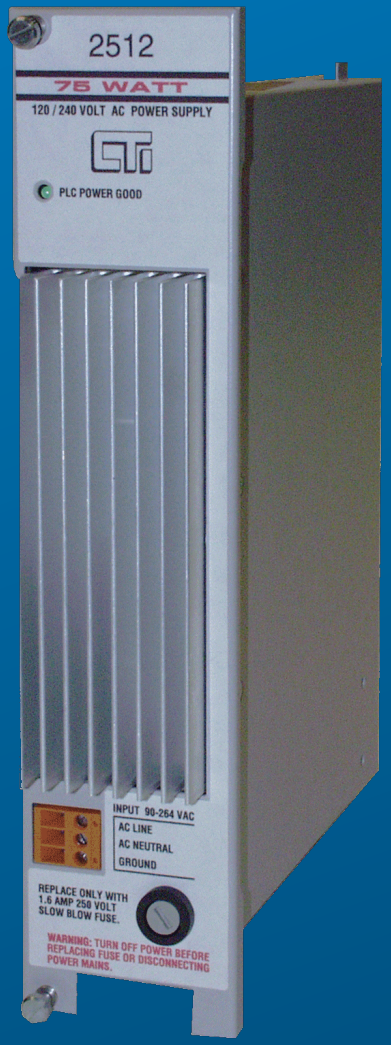
Bases

	2500P-R4	2500P-R08	2500-R11-A	2500P-R16-A
I/O Slots	4	8	11	16
Compatible with	505-6504	505-6508	505-6511	505-6516

Power Supplies

	2512, 2512-A	2515	2513
Output	75W	100W	75W
Input	90-264 VAC		20-30 VDC
compatible with	505-6660 505-6660A/B*	505-6660 505-6660A/B*	505-6663-A

(*) 2512-A is required if redundancy mode is used



Remote Base Controllers

	2500-RBC	2500-RIO-A
Interface	Profibus-DP	Remote I/O
Compatible with	505-6870	505-6851

Digital Input Modules

	2588-8	2589-A / 2589-B
Channels	8	32 (or 16 or 8)
Login	8 input	32 input (or 16 input)
Isolation in Groups of	2	32pt login: 4 or 8 (selectable) (16pt login: 4) (8pt login: 2)
Voltage rating	11V to 250V AC or DC (selectable by group)	
Compatible with	505-4008-A, 505-4108(*), 505-4208-A, 505-4308, 505-4408-A	505-4008-A, 4016-A, 4032-A, 505-4108(*), 4116(*), 4132(*), 505-4208-A, 4216-A, 4232-A, 505-4308, 4316-A, 4332, 505-4408-A, 4416-A, 4432-A

(*) Compatible if used in 12 VDC application or above.

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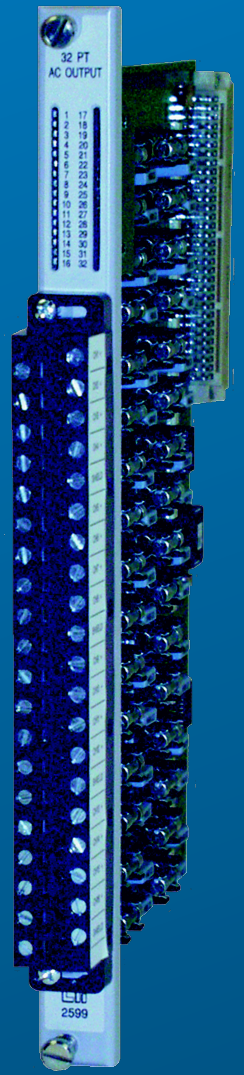
Introduction to CTI and the 2500 Series® System

DC Output Modules

	2596-8	2596	2597
Channels	8	16 (or 8)	32 (or 16 or 8)
Type	Sourcing		
Isolation in Groups of	2	16pt login: 4 8pt login: 2	32pt login: 4 or 8 (selectable) 16pt login: 4 8pt login: 2
Voltage rating	11VDC to 125VDC		
Current rating	2A per channel	2A per channel, 32A per module	
compatible with	505-4508 505-4708	505-4516 505-4716	505-4532 505-4732

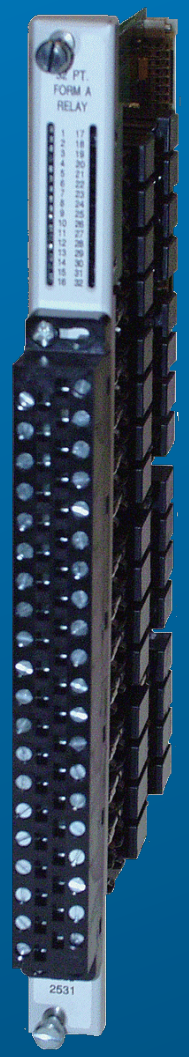
AC Output Modules

	2598-8	2598	2599
Channels	8	16 (or 8)	32 (or 16 or 8)
Isolation in Groups of	2	16pt login: 4 8pt login: 2	32pt login: 4 or 8 (selectable) 16pt login: 4 8pt login: 2
Voltage rating	11VAC to 240VAC		
Current rating	2A per channel	2A per channel, 32A per module	
Compatible with	505-4608 505-4808	505-4616 505-4816	505-4632 505-4832



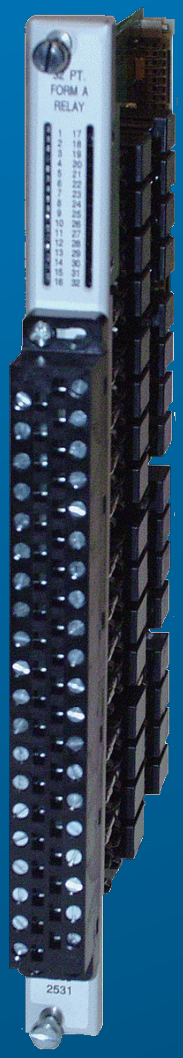
Relay Output Modules

	2534	2532	2531
Channels	8	16	32
Type	Form-C	Form-A	Form-A
Voltage rating	12VDC to 30VDC, 12VAC to 250V AC		
Current rating	4A per channel, 32A per module	4A per channel, 8A per group, 32A per module	
compatible with	505-4908	505-4916-A	505-4932-A



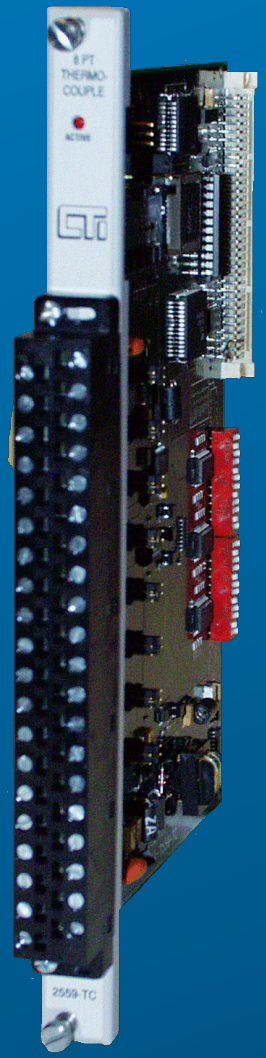
Analog Modules

	2558	2562	2501
Channels	8 input	8 output	8in / 4out
Ranges	0-5V, 0-10V, 0-20mA, 4-20mA, unipolar and bipolar, selectable by channel		
Resolution	16 bits	12 bits	16 bits input, 12 bits output
Update time	4msec		7msec
Compatible with	505-6108-A 505-6108-B	505-6208-A 505-6208-B	505-7012 505-7016



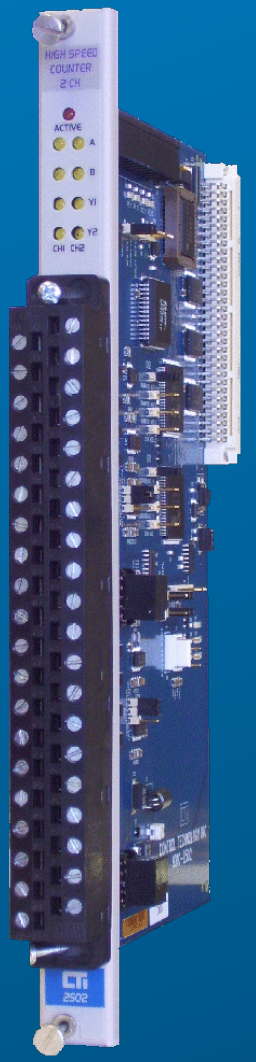
Temperature Modules

	2559-TC	2559-RTD
Channels	8 thermocouple input	8 RTD input
Ranges	J, K, T, E, R, S, N, and mV	100Ω, 200Ω, 500Ω platinum, 120Ω nickel, 10Ω copper
Update time	9msec	
compatible with	505-7028-A	505-7038



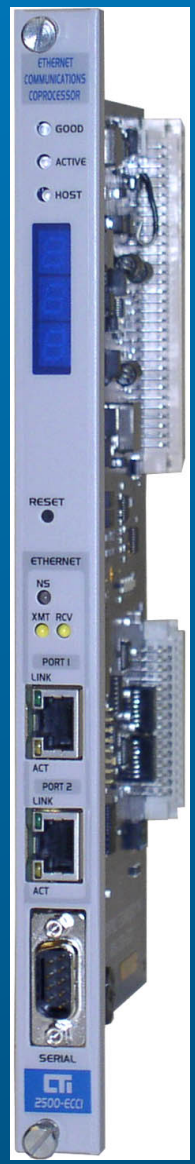
Counter Module

	2502
Channels	2
Counters (per channel)	One 16-bit
Count Inputs (per channel)	2
Control Inputs (per channel)	2
Outputs (per channel)	2
compatible with	505-7002



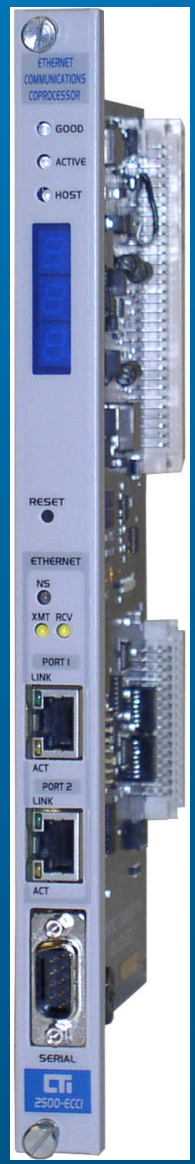
2500P-ECC1 Ethernet Communications Coprocessor

- Advanced Ethernet communications solution for CTI 2500-Cxxx Processors
- CAMP (CTI ASCII Messaging Protocol)
  - Server and Client (includes multicast)
  - Allows communication with 2572, 2572-A, and 2500 Series® Processors, HMI which support CAMP (or OPC)
- Open Modbus (Ethernet)
  - Modbus Server
  - Modbus Client
- Network Data Exchange
  - Shares with other 2500P-ECC1 and CTI HMI panels
  - Publish/ Subscribe Model
  - Publish based on change in value



2500P-ECC1 Ethernet Communications Coprocessor

- High performance connection from PLC to HMIs
- Client/Server connection to legacy PLCs with 2572/2572-A
- Flexible Network Data Exchange to multiple PLCs with 2500P-ECC1s
- Connection to Open Modbus devices using client or server
- All with no programming

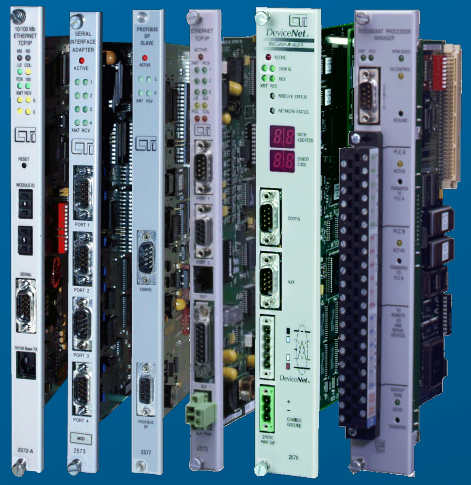


2572-A Fast Ethernet Module

- Direct 100Mbit connection using RJ45
- More throughput (2X – 3X) than 2572
- Enhanced PLC access
- New additional protocol support (Modbus TCP and Ethernet/IP
- Web server access for diagnostics and configuration
- Enhanced event logging for troubleshooting
- DHCP with module ID
- Flash upgradeable

And many other solutions . . .

- Vibration monitoring
- Analog and digital I/O with individual isolation between channels – 11 products
- TTL inputs & outputs
- 16-point analog and temperature input modules
- Specialized counter modules
- Ethernet (4 solutions), Profibus-DP, Modbus, DeviceNet™
- Processor redundancy

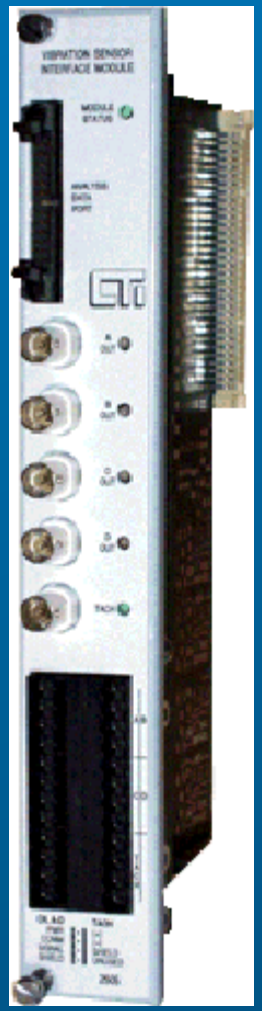


Product Spotlight

Vibration Monitoring

2505 Vibration Sensor Interface Module

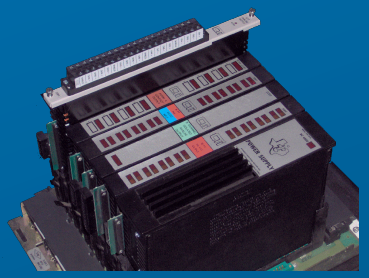
- 4 transducer channels + tachometer channel
- Each transducer channel supports proximity, velocity, or accelerometer transducers
- Reports RMS and peak vibration to PLC, along with speed
- Monitors and reports alarm conditions

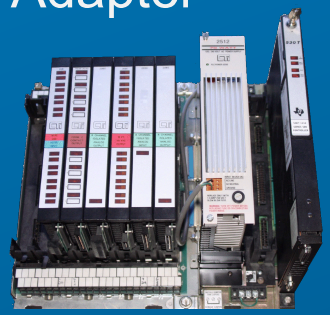


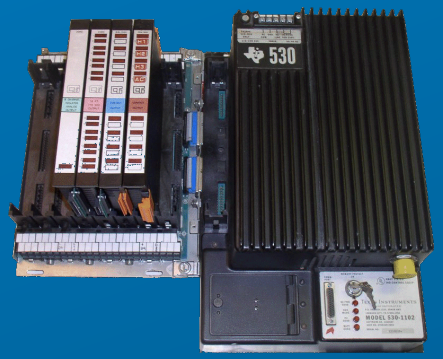
Product Spotlight

Upgrading TI Series 500 Systems

- 2500-IADP I/O Adapter
- 2500-PADP Power Supply Adapter
- 2500-RADP RBC Adapter
- 2500-ADP1 Analog Wiring Adapter
- 2500-ADP2 Discrete Wiring Adapter
- 2500-R4500 Adapter Base







Control Technology Inc
Introduction to CTI and the 2500 Series® System

Product Spotlight

Redundancy & Backup Solutions – Remote Bases

- Redundant RBC

- Redundant power

- Redundant power & redundant RBCs

Product Spotlight

Redundancy & Backup Solutions – Processors

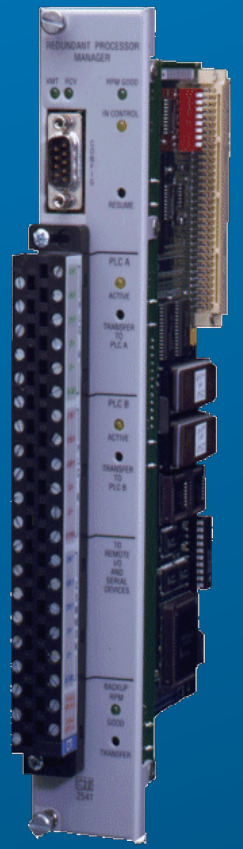
- Redundant power with one CPU

Product Spotlight

CPU Redundancy

2541 Redundant Processor Manager

- Allow use of two 2500 Series® CPUs in a redundant backup configuration
- I/O is connected to the control PLC using relay contacts
- Both PLCs see the inputs all the time
- 2541 monitors both PLCs and switches the I/O to the backup PLC in case of fault
- Critical data is written to the backup PLC
- No change in outputs when switching from primary to backup



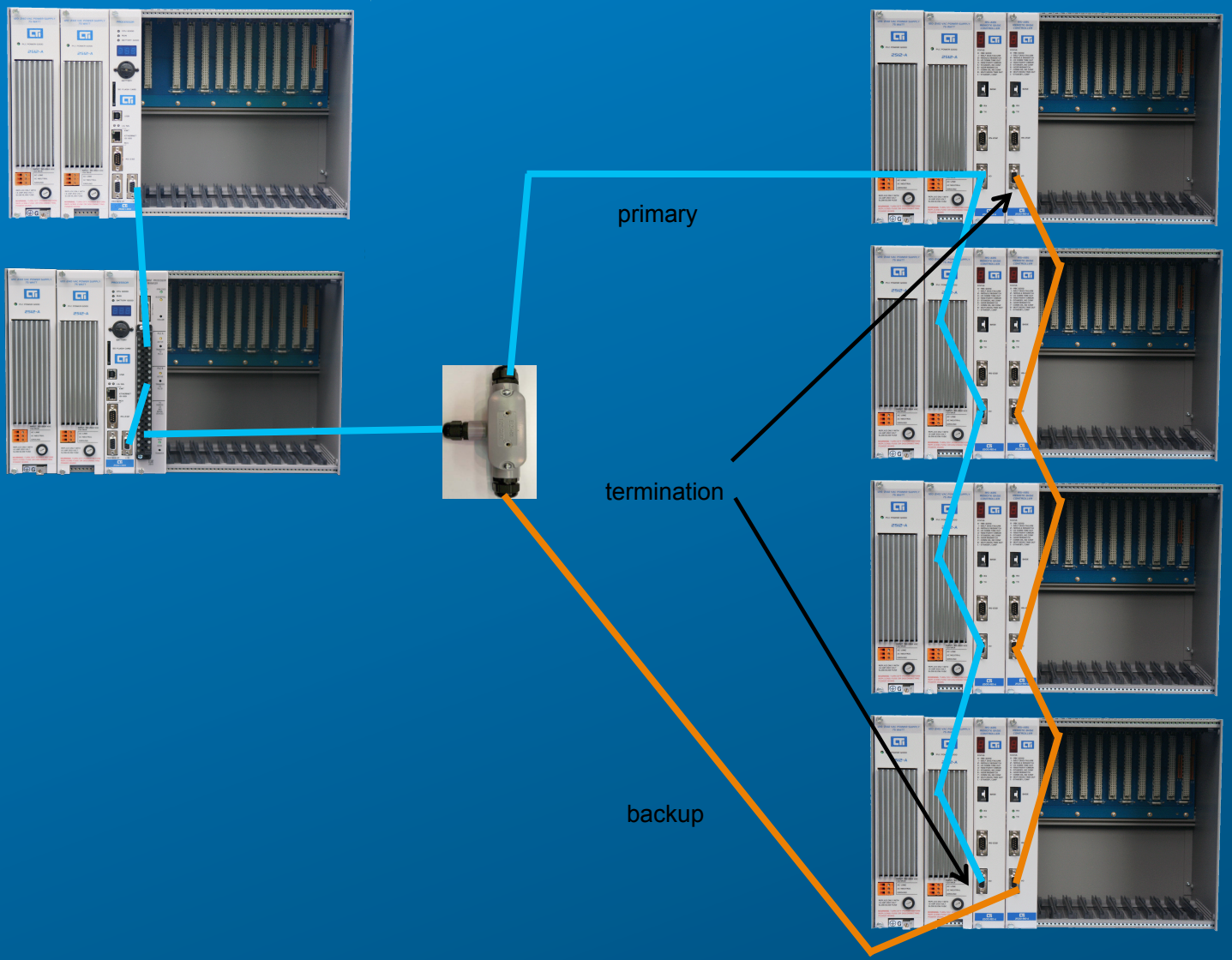
Product Spotlight

Redundancy & Backup Solutions – Processors

- Redundant power & redundant CPUs using Redundant Processor Manager

Backup CPU with Redundant RBCs

Using independent cables to RBCs



Product Spotlight

Conformal Coating

- Conformal coating protects against moisture, fungus, dust and corrosion caused by extreme environments

- Should be used especially if the environment has levels of H2S, SO2, CL2, or NO2 in concentrations above the following levels:
  - H_2S >10 ppb
  - SO_2 >1000 ppb
  - CL_2 >2 ppb
  - NO_2 >125 ppb
  - ppb = parts per billlion

2500 Series™ System
Corrosion Protection

2500 Series™ Products
Conformal Coating Option

In response to the ever-increasing performance demands of modern electronic circuits, circuit board densities continue to grow and component lead spacings continue to shrink. Because these geometries are so small, the susceptibility of circuits to adverse effects of corrosive environments in industrial settings is higher than it was only a few years ago. Much smaller defects are now capable of causing failures.

At the same time, environmental concerns and regulations worldwide have prompted manufacturers to convert their electronic assembly processes to reduce or eliminate the use of lead. Unfortunately these same lead-based compounds were a major component in improving the resistance of the finished products to corrosion in certain kinds of environments.

In recognition of these industry changes, and in an effort to offer an even better product to certain 2500 Series™ System installations, we now offer a conformal coating option on our 2500 Series™ products.

Conformal Coating FAQs

What does the conformal coating do for me?
Conformal coating protects the circuitry from moisture, fungus, dust and corrosion caused by extreme environments. It also reduces possible damage from handling during construction, installation, and use.

How do I know if I should order conformal coating?
If you're worried about the effects of dust, moisture, and corrosion, particularly if the environment where your equipment is installed has levels of H_2S, SO_2, CL_2, or NO_2 in concentrations above the following levels:

H_2S >10 ppb
SO_2 >1000 ppb
CL_2 >2 ppb
NO_2 >125 ppb
ppb = parts per billlion

If my modules are conformally coated, can they operate in a wet environment? No. The conformal coating improves the resistance of the product to severe environments. It is not intended to be a waterproof coating.

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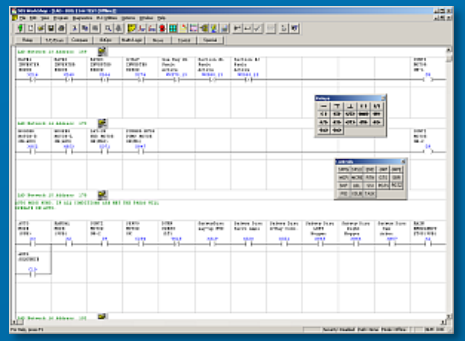
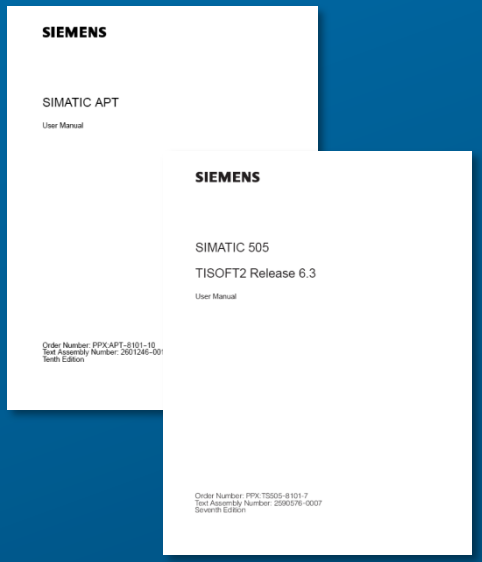
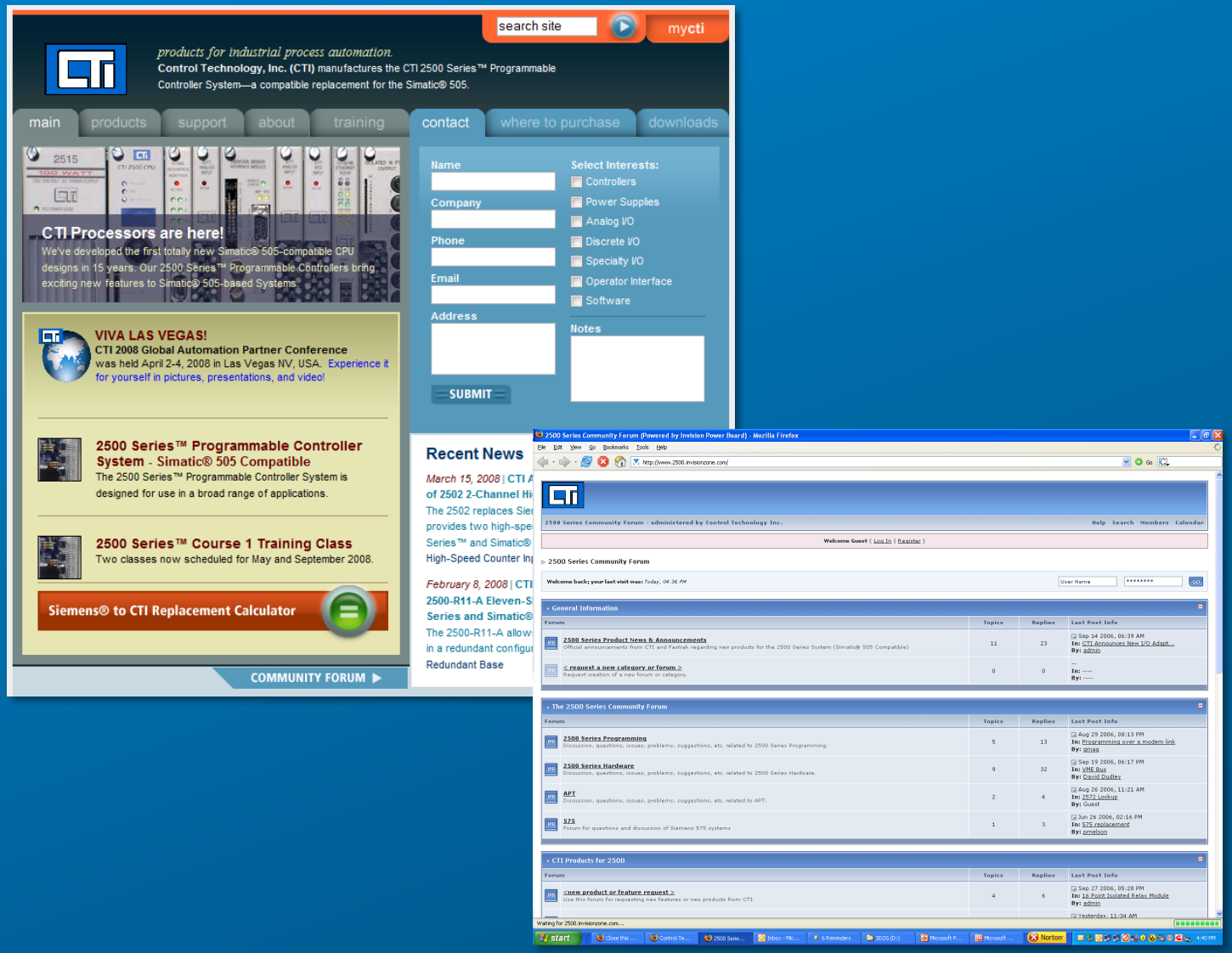
2500 Series® Programming Tools

- PLC Workshop Suite™
  - Primary programming platform
  - Runs under Windows
  - Includes integrated Profibus configurator
  - Ongoing development and enhancement
  - Current version 4.60 includes new instructions
- APT®
  - Enriched programming platform for process control
- TISOFT™
  - DOS-based legacy platform





Web Site and Community Forum



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Introduction to CTI and the 2500 Series® System

Thank You!