SIEMENS

PCT Engineered Systems, LLC

TIA Portal Application Awards – 2013
PCT Engineered Systems

Company Name: PCT Engineered Systems

Location of Application: Davenport, Iowa

Website: www.teampct.com

Key Business Activities: PCT provides engineering services, automation systems integration, and custom machine building worldwide. They continue to leverage themselves as a global leader in the design and implementation of BroadBeam industrial electron beam systems, which continue to grow in popularity as a fast, precise, cost-effective technology used for ink drying, curing, cross-linking and sterilization. Additionally, their award-winning Innovation Team has extensive experience in empowering American manufacturers to improve their operations through increased productivity, higher quality and improved safety.

Name of Application: Cooling Water Recirculation System

Description of Application: Electron Beam (EB) technology has enjoyed an enormous burst in popularity in recent years, as manufacturers continue to embrace its value as an environmentally friendly, energy-saving curing and crosslinking solution applicable across a myriad of industries. As a result of this newfound interest, PCT has experienced a substantial rise in orders for is cutting-edge BroadBeam™ EB systems. Since these water-cooled systems undergo rigorous and lengthy shop floor testing before being shipped to customers, PCT found itself consuming staggering volumes of water as it tested and condition these machines. Rather than simply resign itself to increasing water capacity to fulfill these water demands, PCT decided to "take the bull by the horns" and rethink the way they accommodated their water supply needs.

PCT recognized that their manufacturing facility required a high-volume, high pressure, flexible cooling water solution to replace its current undersized system. The new system needed to supply water across a variety of consumption levels, while requiring minimal investment, setup, supervision and maintenance. PCT determined that an optimal system would consist of three 50hp high-volume process water pumps, each controlled by independent AC drives, as well as two cooling water pumps controlled by soft starters. PCT's updated system now monitors water pressure, temperature and tank conditions to maintain the optimum cooling water supply to the production facility. At full capacity, the system can deliver up to 100 psi (+/- 5psi) at flow rates from 30 gallons per minute (gpm) to 600 gpm, depending on demand. The water is cooled using a plate and frame heat exchanger with 10 degree change capacity at full load and a 375 BTU/hr cooling tower.

What challenges led you to look at a new solution?

As mentioned, the cooling water system needed to supply enough cooled water to successfully meet PCT's growing demand on the production facility. Additionally, PCT anticipates further facility expansions in the near term, so it was important to implement a water cooling system that would be flexible enough to grow along with the increase in production. It was imperative that PCT's new system be able to regulate the amount of water delivered according to the production demand, as well as offer efficient and straightforward controls and diagnostics for fast, easy production team use and independent, automatic operation. In addition, since PCT is an OEM as well as a systems integrator, they recognized that any in-house installation must be executed quickly and efficiently so that PCT can focus on its primary business of customer service and machine production. Designing and implementing a new cooling water system 'from scratch' meant that a quick and versatile solution was necessary, with a design that accommodated optimally efficient design, manufacture, operation and maintenance.

What Siemens automation products were chosen for this project and why? The following Siemens products were used in the Cooling Water Recirculation system:

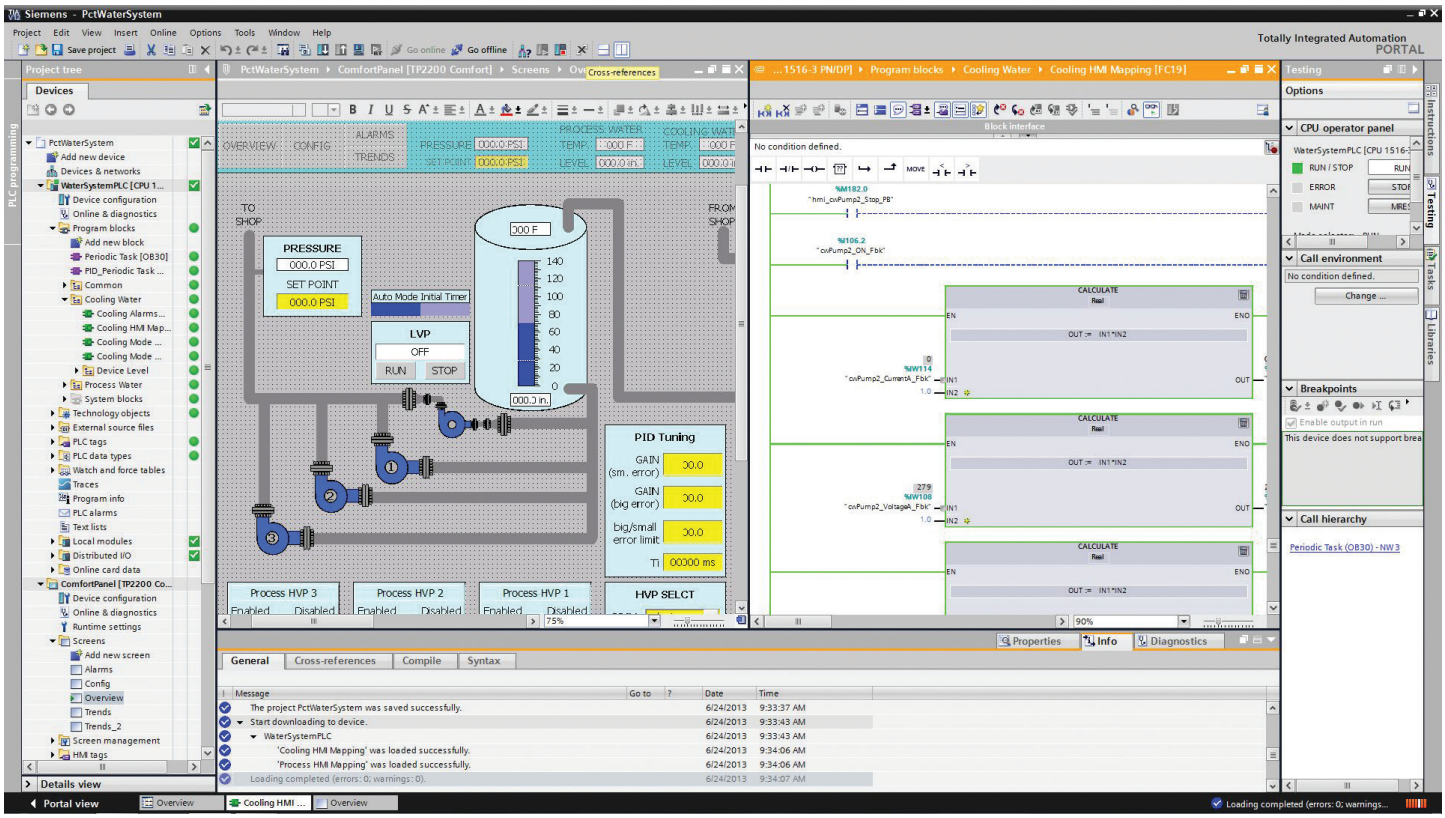
- S7-1516 PLC
- SINAMICS G120 AC Drives
- SIMOCODE Motor Controllers
- SIRIUS SoftStarters
- 22" Comfort Panel HMI

The S7-1516 PLC was chosen to control the Cooling Water System because it provided a familiar and intuitive programming environment through TIA Portal and because it offered some key features that made for quick assembly, commissioning and maintenance. In addition, the G120 AC drives were easily configured using StartDrive integrated into TIA Portal. Finally, the Comfort Panel provided a robust and highly responsive HMI that was easy to program and quickly provided the operator with critical pump and system data.

What features of the S71500 PLC and TIA Portal V12 addressed your project challenges?
PCT was able to use the innovative new features of the S7-1500 to decrease design and build time compared to other PLC models. The standardized terminal modules for the S7-1500 line of Signal Modules makes for a more efficient design and reduced costs of maintaining spare parts. The terminal modules multiple-position feature allowed for easy and fast wiring of the signal modules that contributed to the overall reduced build time, fewer wiring mistakes and easier troubleshooting. Finally, on-board, color display on the S7-1500 greatly helped in commissioning. The ability to quickly set the IP address, view and reset faults, and control the operating mode of the PLC without the need of connecting a programming terminal helped to reduce the amount of time needed to program and start up the system. Furthermore, the display allows for non-engineers to quickly diagnose and correct errors, maximizing up-time of the Cooling Water system and increasing overall productivity of the production center.

The TIA Portal v12 software also contributed to reduced programming time. The fully integrated environment of the PLC, HMI and drive programming through StartDrive allowed PCT to quickly and easily program, control and monitor important pump data. New programming features such as integrated data type conversion and easy online diagnostics also helped streamline the start up stage.

How has your business improved?
Previously, the undersized water system limited the volume of machines that could be manufactured and tested at any given time. Our improved Cooling Water system now supplies sustained levels of high-volume water to five extra production bays, empowering PCT to increase its overall production capacity by up to 50%. By incorporating Siemens control devices, PCT enjoys easy maintenance and programming tools that minimize the amount of time we spend operating and troubleshooting the system – allowing us to focus even more closely on building superior EB systems for our customers.


Siemens - PctWaterSystem
Totally Integrated Automation
PORTAL
Project tree
Devices
PctWaterSystem
Add new device
Devices & networks
WaterSystemPLC [CPU 1...
Device configuration
Online & diagnostics
Program blocks
Add new block
Periodic Task [OB30]
PID_Periodic Task ...
Common
Cooling Water
Cooling Alarms...
Cooling HMI Map...
Cooling Mode ...
Cooling Mode ...
Device Level
Process Water
System blocks
Technology objects
External source files
PLC tags
PLC data types
Watch and force tables
Traces
Program info
PLC alarms
Text lists
Local modules
Distributed I/O
Online card data
ComfortPanel [TP2200 Co...
Device configuration
Online & diagnostics
Runtime settings
Screens
Add new screen
Alarms
Config
Overview
Trends
Trends_2
Screen management
HMI tags
Details view
PctWaterSystem ▸ ComfortPanel [TP2200 Comfort] ▸ Screens ▸ Overview
Cross-references
OVERVIEW
CONFIG
ALARMS
TRENDS
PRESSURE
SET POINT
TO SHOP
FROM SHOP
000.0 PSI
000.0 PSI
000 F
000.0 in.
Auto Mode Initial Timer
LVP
OFF
RUN
STOP
PID Tuning
GAIN (sm. error)
GAIN (big error)
big/small error limit
TI
00300 ms
HVP SELCT
Process HVP 3
Process HVP 2
Process HVP 1
Enabled
Disabled
...1516-3 PN/DP] ▸ Program blocks ▸ Cooling Water ▸ Cooling HMI Mapping [FC19]
Block interface
No condition defined.
%M182.0
"hmi_cwPump2_Stop_PB"
%I06.2
"cwPump2_ON_Fbk"
CALCULATE
Real
EN
ENO
OUT := IN1*IN2
%W114
"cwPump2_CurrentA_Fbk"
%W108
"cwPump2_VoltageA_Fbk"
Testing
Options
CPU operator panel
WaterSystemPLC [CPU 1516-
RUN / STOP
ERROR
MAINT
Call environment
No condition defined.
Change ...
Breakpoints
Enable output in run
This device does not support brea
Call hierarchy
Periodic Task (OB30) - NW 3
Properties
Info
Diagnostics
General
Cross-references
Compile
Syntax
Message
Go to
Date
Time
The project PctWaterSystem was saved successfully. 6/24/2013 9:33:37 AM
Start downloading to device. 6/24/2013 9:33:43 AM
WaterSystemPLC 6/24/2013 9:33:43 AM
'Cooling HMI Mapping' was loaded successfully. 6/24/2013 9:34:06 AM
'Process HMI Mapping' was loaded successfully. 6/24/2013 9:34:06 AM
Loading completed (errors: 0; warnings: 0). 6/24/2013 9:34:07 AM
Portal view
Overview
Cooling HMI ...
Overview
Loading completed (errors: 0; warnings...


DR507
DR517
DR532
SINAMICS