OPTO 22

SNAP I/O and Soft Logic Control Largest Cold Storage Facility in Southeastern U.S.

Introduction

The largest and most modern cold storage facility in the Southeastern United States uses Opto 22's Snap I/O and OptoRuntimePC soft-logic controller to control and monitor the refrigeration systems. Running on Microsoft Windows NT, OptoRuntimePC uses exactly the same control program as any of Opto 22's hardware controllers. The controller is programmed using Opto 22's FactoryFloor flowchart-based software, featuring integrated human-machine interface (HMI), trending, and data logging functions. A shared, common database is used, eliminating programming errors and speeding up development time.

Flowchart Software

OptoControl flowchart software, part of Opto 22's FactoryFloor suite of industrial automation software, allows different aspects of the total automation project to be programmed separately and independently. This technique makes better use of available resources and permits several programmers to work on a project simultaneously. The individually developed tasks, called *charts*, are then merged into a single program, loaded into the controller, and optimized for the best possible performance. The use of the simple flowchart programming approach yields better results in a shorter time frame than other automation products.

Tri-County Refrigeration

Tri-County Refrigeration, Inc. of Miami, Florida is the refrigeration contractor. Tri-County is a full-service contracting and engineering company, specializing in the areas of food and agriculture refrigeration. Founded in 1984, Tri-County now employs 18 full-time personnel. Emilio Brown, president of Tri-County, surveyed dozens of systems before choosing Opto 22's FactoryFloor and SNAP I/O for the job. Coming from a programmable

logic controller background, this was Brown's first Opto 22 project.

The short timeline for the project made it difficult for Brown to attend formal training before beginning his program. "Grabbing a package cold, it took a while, especially since I was also running all the other phases of the company." As he got deeper into the project, Brown said, "I was amazed at what I could do with the Opto 22 system. The more I use Opto, the more I love it!"

Aero Floral, Inc. of Miami, operates the 152,000 square-foot facility, a receiving and cold storage clearing house for fresh flowers imported by air from other countries. Combining the latest technology with established refrigeration practices and procedures, the facility is a model of efficiency. Receiving, Customs, USDA clearing, and storage are all handled in a single facility.

Distributed Intelligence

In the engine room, five 250 horsepower compressors and the associated evaporative condensers are controlled and monitored by Opto 22's modular SNAP I/O

hardware. Distributed intelligence, found on each of the eight 64-channel I/O units, allows critical safety and operational decisions to be made locally, increasing system performance and reducing demands on the communications system and on the central processor. Programmable functions called event/reactions execute logic at the I/O level. They monitor critical parameters such as oil and refrigerant pressures and temperatures. Event/reactions can make corrections or shut down the system without main processor intervention, the entire process taking place in less than a millisecond.

For energy efficiency, each of the five compressors has three stages of loading, providing exactly the amount of cooling required by the system. The control system also balances the run time of the various compressors by alternating the lead/lag relationships of each controller to ensure equal run time for all the units.

Suction and discharge temperatures and pressures, oil pressure and temperature, compressor staging and sequencing are all monitored, controlled, and trended for each compressor and for each storage area. Temperatures are read by 100-Ohm platinum RTDs and transferred as 4–20 mA signals for increased noise immunity. Most other parameters are also transferred as 4–20 mA signals. All parameters are converted to appropriate engineering units by the I/O unit brain, and transmitted to the controller upon request.

For efficiency, the same 170° Fahrenheit high-pressure refrigerant that cools the evaporators is also used in the defrost cycle for the evaporators.

Product Flow

The storage facility has 12 climate-controlled zones in which temperature and humidity are maintained with a two percent tolerance. PID loops, resident on the distributed SNAP brains, perform control functions independent of main processor communication. Product flows from the 30,000 square-foot receiving area to one of the three 20,000 square foot sub-coolers where the flowers are cooled quickly to slow down the flowers' metabolism. Remaining in the 22° F sub-cooler for three hours, the temperature of the product is quickly reduced from a possible arrival temperature of 65° to a safer 38° to 40°. Product then moves to one of the 60,000 square-foot main storage areas where it is stored at 32° F, awaiting further distribution.

Product is currently moved manually, although computer-controlled conveyors will be added in the next few months. The multi-tasking capability of Opto 22's FactoryFloor software makes the simultaneous control of refrigeration, climate, and material handling not only possible, but easy. The open-ended architecture can always be expanded by adding additional I/O units and controllers.

About Opto 22

Opto 22 manufactures and develops hardware and software products for applications in industrial automation, remote monitoring, and enterprise data acquisition. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's SNAP systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, or electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel. Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability. Opto 22 products are sold through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-OPTO or visit our Web site at www.opto22.com.

Opto 22 • 43044 Business Park Drive • Temecula, CA 92590-3614 • Phone: (951) 695-3000 • (800) 321-OPTO • Fax: (951) 695-3095 • www.opto22.com

Inside Sales: (800) 321-OPTO • Product Support: (800) TEK-OPTO • (951) 695-3080 • Fax: (951) 695-3017 • E-mail: sales@opto22.com