HINZ
A Rockwell Automation Company

San Diego County Water Authority
Rancho Penasquitos
Pressure Control / Hydroelectric Facility

The Client:

As part of the Metropolitan Water District, San Diego County Water Authority provides services to 26 local city authorities with more than 3 million residents in Southern California. In 2003 it completed planning and began construction of its largest hydroelectric facility located along a second San Diego aqueduct to serve as a distribution point between two reservoirs – Olivenhain and San Vicente. The purpose of this hydroelectric facility is to reduce the water pressure, control the water flow, distribute water along a second San Diego aqueduct, and to generate electricity for additional revenue.

The Requirement:

Hinz provided all electric enclosures and components for the PLC, HMI, SCADA communications and instrumentation devices including the control valves. Hinz also configured and commissioned the network communication with the Generator Control Devices, Motor Control Centers, backup Diesel Generator, Generator Exciter Controller and other control system components via Control Net, Field Bus and Modbus interfaces. Lastly, Hinz provided communication with the SCADA system via an Industrial Ethernet interface delivering information to and accepting commands from operations personnel.

The Design Solution:

Due to the complexity of the system and the multiple modes of operation, the control system needed to be robust and reliable. To ensure uninterruptible operation, Hinz provided fully redundant hot-standby PLC control, based on Allen-Bradley's ControlLogix series as well as fully redundant ControlNet modules to network with the PLCs. The flow control used six parallel streams, each containing 4 sets of automated control valves (total of 24 Control valves) with FieldBus communication capabilities. Hinz implemented the ControlNet to Foundation FieldBus interface linking devices with dual ControlNet ports for the redundant PLC network.

A Combination Generator Control Module, CGCM, was used to control the speed of the hydroelectric turbine and the paralleling switchgear controls to synchronize to the San Diego Gas & Electric electric grid.

An auto-dialer was used to automatically notify the appropriate personnel of any operational or maintenance alarms. Two PanelView Plus 1250 color touch screen panels were added in the generator room for additional control. Each panel was connected to a PLC using the Ethernet protocol with a private static IP address.

Many of the devices in this plant required Modbus communication including essential motor control centers, a 12kV generator switchgear power meter, a 12kV paralleling relay, a generator exciter control panel and the PLC for the backup electrical generator.

The PLC code was based on reusable master block structures with inputs and outputs enabling faster commissioning, troubleshooting and replication of the code.

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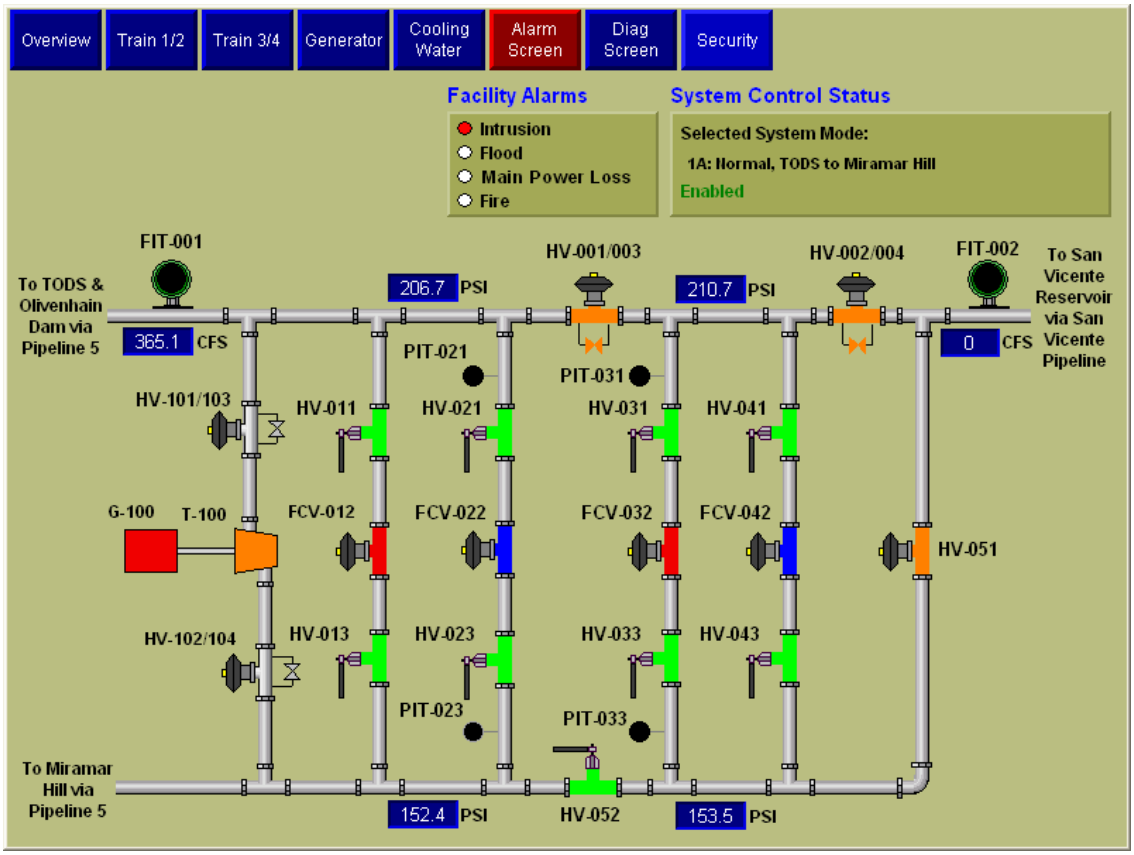

System Specifications:

- **Total field associated tags** – 2900; Total PLC program tags – 13,000;
- **PLC** – two A-B Logix5555 processors with 1.5MB memory; two A-B PLC 1757 system redundancy modules; five 10 slot ControlLogix Chassis
- **Communication** – five ControlNet redundant bridge modules; five ControlNet to Foundation Fieldbus conversion modules; one A-B 1756-DHRIO Data Highway Plus remote I/O connectivity module
- **Hydroelectric Turbine Electric Generator** – 5250kVA, 12kV, 3-Phase
- **Connectivity Protocols Used** – Ethernet (TCP/IP), DH+, Modbus, ControlNet, Foundation Fieldbus
- **Automated valves** – 24; Pumps-10; Electric Motors – 8
- **HMI** – two A-B PanelView Plus 1250 color touch screen panels
- **Remote Alarm Annunciation** – one AutoDialer
- **Redundancy levels** – PLC redundancy, ControlNet redundancy, Power Supply Modules redundancy (PLC and ControlNet-to-Fieldbus converters)

For further information or to contact a Hinz office near you, please check our website at:

www.hinz.com