



A Rockwell Automation Company

El Paso Corporation - Colorado Interstate Gas Cheyenne Expansion Project

The Client:

El Paso's interstate transmission system spans the nation, border to border and coast to coast. The nationwide pipeline system is consolidated into three regional operations.

The Western Pipeline group consists of El Paso Natural Gas Company and Colorado Interstate Gas Company and is headquartered in Colorado Springs, Colorado.

Colorado Interstate Gas (CIG) is a major transporter of natural gas in the Rocky Mountain region. The Colorado Interstate Gas system is connected to nearly every major supply basin in the Rocky Mountains as well as production areas in the Texas Panhandle, Western Oklahoma, Western Kansas and Wyoming.

The Requirement:

Hinz was asked to provide new Wonderware InTouch HMI and ControlLogix PLC control systems for a new natural gas compressor facility at El Paso Corporation's existing Cheyenne Compressor Station located in Northeastern Colorado. In the expansion project, two new compressors were installed to increase capacity on the CIG 5C-24" pipeline. A Solar Taurus centrifugal compressor (CG-7601) was

installed as a booster compressor on the 5C-24" pipeline and included a station bypass. A CAT/Ariel reciprocating compressor (CG-7501) was installed to compress gas from the CIG 5A-22" and/or 5B-24" pipelines into the 5C-24" pipeline. Station equipment included filter-separators, ultrasonic flow meters, and a gas after-cooler.

The Design Solution:

Hinz was asked to engineer electrical and control systems for the Cheyenne Plant Expansion, including Wonderware HMI and Allen-Bradley ControlLogix PLC programming.

The Wonderware HMI was used as the primary interface for monitoring and controlling all station and compressor functions. Ethernet was used to connect the HMI to the WAN, Station PLC, CG-7501 PLC, CG-7601 PLC, and the AC power monitor. A dedicated ControlLogix PLC was used for station control. The Station PLC was used to control the yard valves, ESD system, mainline filters and auxiliary station equipment. In addition, the Station PLC was used to calculate the mainline gas flows based on AGA 9 calculations. Remote Flex I/O and VFDs were used for station control and were connected to the PLC via a dedicated ControlNet network.

A dedicated ControlLogix PLC with local OIT was used to control compressor CG-7501. The CAT engine was packaged with an ADEM III controller and MIDS interface that is monitored by the Unit PLC using a serial Modbus connection. Control of the engine was hardwired from the PLC to the MIDS interface. The Unit PLC controls the Ariel compressor, unit valves, jacket water cooler, gas after cooler and unit fuel gas

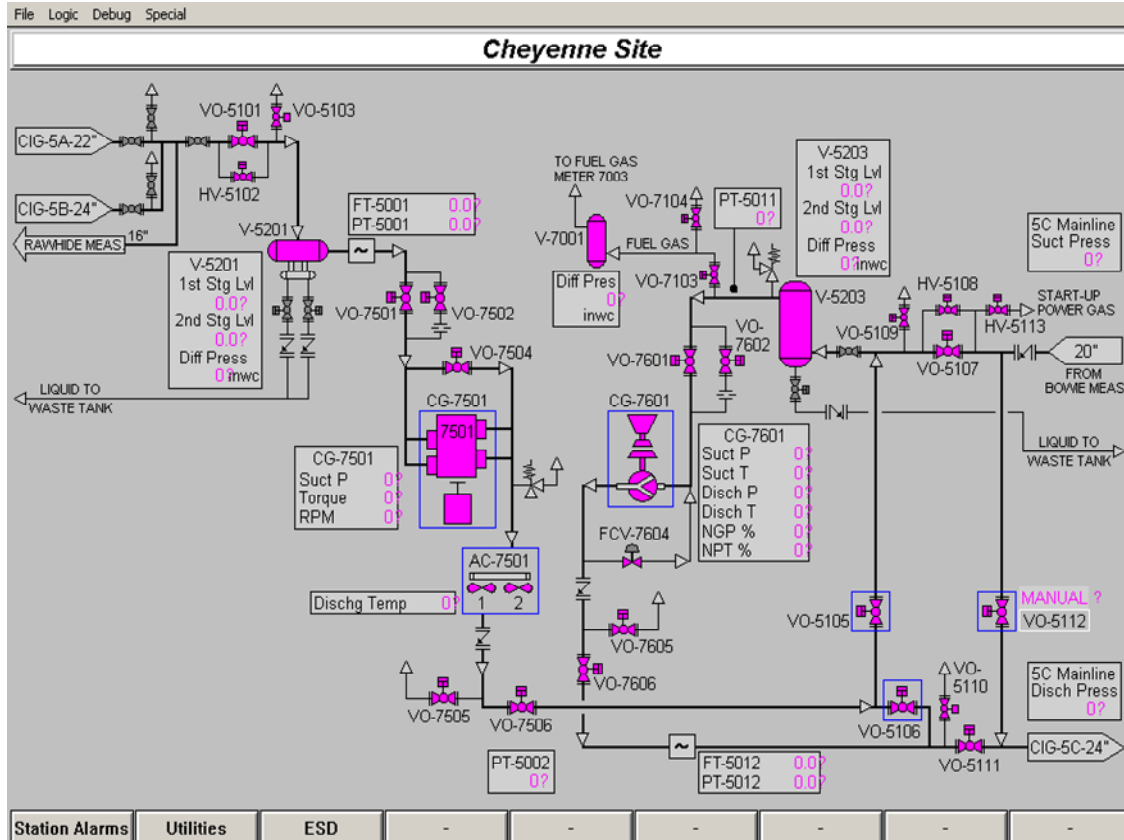
calculations. Remote Flex I/O and VFDs were used for unit control and were connected to the PLC via a dedicated ControlNet network. A Fisher ROC and Daniel GC were used for calculating the total fuel gas flow and accumulations. The ROC also controlled a single tube switching valve on the first of two orifice meter runs. The utility power was monitored by an Allen-Bradley multifunction meter with Ethernet connectivity. The metered data was polled by the HMI for display only.

Typical HMI and PLC functional requirements were used and applied in the control system design in accordance with El Paso standards. Valves equipped with open and close limit switches were monitored by the PLC. Valve status was indicated on the HMI through dynamic color change of the graphic symbol. Valves equipped with operators were remotely controlled by the HMI through PLC logic. Valve fail alarms were generated in the PLC and indicated on the HMI. Control valves were regulated by PID controllers in the PLC. Variable frequency drives (VFD) were controlled by the PLC via the ControlNet network. Typical PLC VFD data included speed command and feedback, start/stop command, running indication, and alarm status.



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System Specifications:

- (1) Station SCADA Node, Wonderware InTouch
- (2) ControlLogix 1756-L55 PLC with Chassis
- (1) ControlLogix 1756-L50 PLC with Chassis
- (2) ControlLogix 1756-ENB Ethernet Module
- (2) ControlLogix 1756-CNBR ControlNet Modules
- (6) 1794-IE8 Flex I/O 8-ch Analog Input Modules
- (4) 1794-IF6I Flex I/O 6-ch Analog Input Modules
- (3) 1794-OF4I Flex I/O 4-ch Analog Output Modules
- (7) 1794-IB16 Flex I/O 16-pt Discrete Input Modules
- (5) 1794-OB8 Flex I/O 8-pt Discrete Output Modules
- (2) 1794-OW8 Flex I/O 8-pt Relay Output Modules
- (5) 1794-IRT8 Flex I/O 8-ch RTD Input Modules
- (2) 1794-IJ2 Flex I/O 2-ch Frequency Input Modules
- (6) 1794-ACNR Flex I/O Communication Modules

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

www.hinz.com