



A Rockwell Automation Company

## Colonial Pipelines/Robicon/JTG Technologies Four Station VFD Synchronous Transfer

### The Client:

Colonial Pipeline Company is an Atlanta based company that transports refined petroleum products to businesses and communities throughout the Eastern United States via its 5,519 miles of pipeline. Colonial transports gasoline, home heating fuel, diesel, aviation and military fuels and delivers an average of ninety-five million gallons per day.

Robicon Canada Limited is manufacturer of electronic based power equipment and system solutions. JTG Technologies is an Edmonton owned and operated business that specializes in pump station and VFD (Variable Frequency Drive) related work.

### The Requirement:

Regional growth and development are straining existing energy supplies in Tennessee, Virginia and North Carolina. To alleviate this growing energy crunch, Colonial Pipeline are expanding its service to these areas. Colonial is installing new pipeline, increasing the size of motors used to pump product and installing new pump stations with sophisticated control systems that allow for safe and efficient operation.

Hinz, along with ASI Robicon and JTG Technologies, had been asked to provide Colonial Pipeline with control, protection, and monitoring capabilities for four new pump stations.

The new pump stations all contained two units and provisions had been made to allow for the addition of up to two additional units as the need arose.

An ASI Robicon Variable Frequency Drive (VFD) was installed at each of the above stations to allow motor soft starts and speed control. Colonial also required that two or more motors be run simultaneously on the VFD. Having multiple units operating on the VFD simultaneously allowed Colonial to reach a maximum pumping pressure in a shorter amount of time. This could lead to more product being shipped and intensive use of the VFD.

### The Design Solution:

Hinz was asked to engineer the VFD sync transfer control system for the four new stations. Hinz was asked to provide the detailed design; synchronous transfer control equipment specifications; procurement of the control system components; synchronous transfer programming that allows for multiple motors to be simultaneously started on a single VFD; in-house and factory testing; field support; on-site commissioning, documentation and training for the VFD transfer control system.

The Robicon Perfect Harmony VFD with NextGen Control was installed at each station. The VFD and associated control equipment reduced mechanical strain on the motors, allowing for precise speed control and allowing Colonial to sequentially start large motors or simultaneously start large motors without exceeding local utility flicker limits.

Colonial selected an Allen Bradley ControlLogix Programmable Logic Controller (PLC) as the platform to be used to control the stations. This platform was standard for Colonial and they had found it to be reliable and cost-effective. Hinz wrote the VFD transfer program and included the ability for operations to either run all motors simultaneously on the VFD or to run motors individually on the VFD – allowing operations to have tight control over the shipments. Hinz configured the communications to allow the PLC to communicate with a remote I/O rack, the ASI Robicon

VFD controller, station PLC and a Human Machine Interface (HMI). Colonial selected an Intellution HMI to allow operations to easily view and control the process.

Hinz is worked closely with ASI Robicon, JTG Technologies and Colonial's three project managers to ensure that the project ran smoothly.

The four stations are located in remote areas in the U.S. Colonial will supply internet IP remote access routing to the sites. Program modifications and monitoring could then be performed over the internet without shutting down the station or spending days of travel time.

Preliminary testing of the PLC and VFD took place at the Robicon factory in Pittsburgh. This testing allowed Robicon, Hinz and Colonial to finalize and test all aspects of the synchronous transfer program. This factory testing was intended to reduce on-site commissioning time.

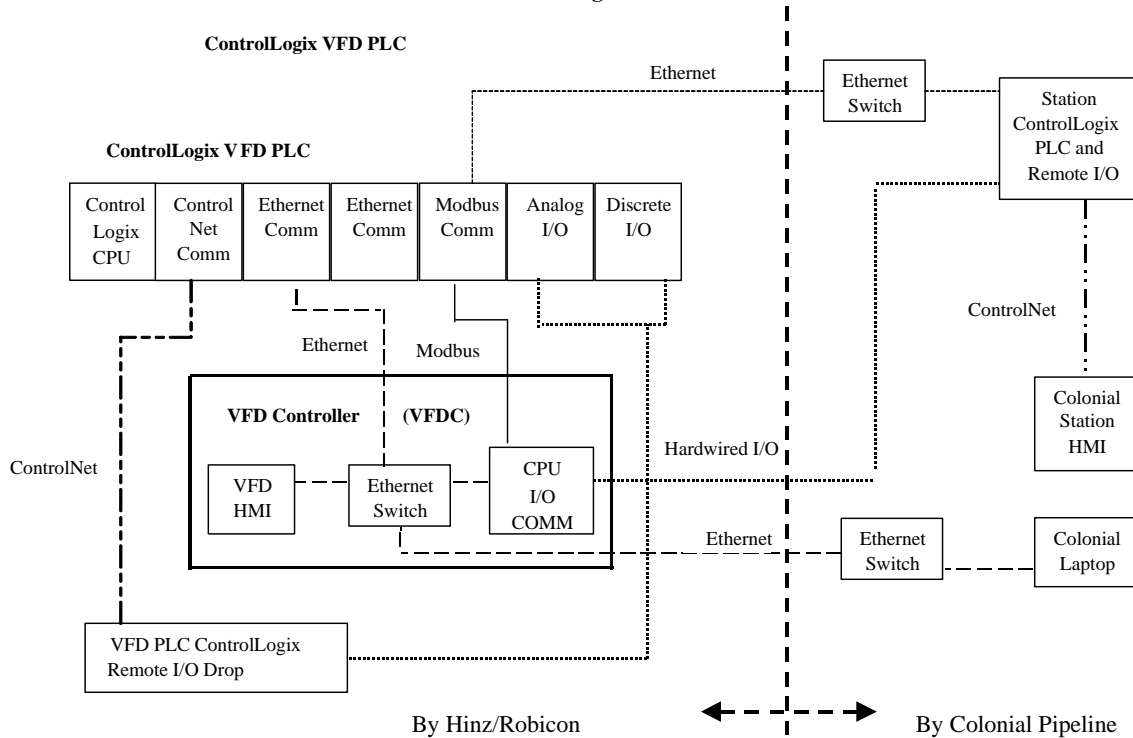
Hinz commissioned the synchronous transfer program on-site. Commissioning consisted of testing all alarm points and ensured that the program operated as intended. Testing performed ensured that all motor-pump combinations could be transferred to/from the VFD and to/from bypass, and that multiple units could be run simultaneously on the VFD.



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**Colonial Communication and Control  
Block Diagram**



### System Specifications:

The Robicon Perfect Harmony Next Gen voltage sourced variable frequency drive (VFD) is used to ramp up the motor-pump combinations on site.

An Allen-Bradley ControlLogix programmable logic controller (PLC) is used to control the VFD transfer activities.

A remote rack of ControlLogix I/O is utilized to provide additional control and a provision for future motor additions.

Communications between the ControlLogix controller and remote I/O rack are via ControlNet.

Some analog and control signals between the VFD and VFD PLC are Modbus Serial.

Essential signals between the VFDC, VFD PLC and the Station PLC are hardwired to prevent any safety issues that could result from a loss in communication.

Colonial provided the Station PLC, Station remote I/O and station HMI.

Communication between the VFD Controller (VFDC) and the VFD HMI are via Ethernet.

The VFD PLC and Station PLC communicate using Ethernet over an Ethernet switch.

The use of Ethernet switches also allows Colonial to access the system via a laptop whenever a technician is on site.

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

[www.hinz.com](http://www.hinz.com)