



A Rockwell Automation Company

Explorer Pipeline/Willbros/Robicon Twelve Station VFD Synchronous Transfer

The Client:

Explorer Pipeline Company provides transportation services for petroleum products. Explorer operates 1400 miles of pipeline across five states from a central dispatching office in Tulsa, Oklahoma.

Robicon is a Subsidiary of High Voltage Engineering Corporation. Robicon Canada Limited is a manufacturer of a diverse range of electronics based power equipment and system solutions.

The Requirement:

Current and planned increases in the production of petroleum products in the U.S. have caused Explorer Pipeline to expand its operations. This expansion required the engineering of twelve remote stations to control the pipelines. Seven of the new stations were to be added along the 28-inch line and five new stations were to be added along the 24-inch line. To provide for future production increases the new pump stations will be built to accommodate three pumps with the intention of adding the third pump at a later date.

The pipeline business required precise speed control of the petroleum products being transported. The best way

to regulate speed is through the use of variable frequency drives (VFDs). However, the cost of providing a VFD per motor is prohibitive. To reduce the cost a VFD synchronous transfer program was required to allow a single VFD to operate all three pumps as required. This was accomplished by starting the first motor on the VFD ramping it up to 60Hz, and activating breakers such that the motor was switched over to utility power and the VFD was free to start the next unit. This procedure was repeated until the required number of units were running. The last unit to start remained on the VFD at variable speeds to control to a pressure set point.

The Design Solution:

Hinz provided the detailed design; sync. transfer control equipment specifications; procurement; synchronous transfer programming; in-house and factory testing; field support; on-site commissioning and documentation for the VFD transfer control system. The Robicon VFD based pump station control systems provided Explorer with control and monitoring capabilities for the twelve remote stations.

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

The synchronous transfer program PLC chosen was an Allen-Bradley ControlLogix to comply with the Explorer standards. Hinz wrote the VFD transfer program and configured communications to allow the PLC to communicate with the local I/O, remote I/O rack, VFD controller, station PLC and station HMI. Hinz worked closely with Explorer to ensure that interconnections

between the VFD transfer control provided by Hinz and the general station control provided by others went seamlessly.

The twelve stations are in remote areas in the U.S. Hinz installed modems at each site to allow program monitoring and modifications over the phone line. This allowed for quick changes without hours or days of travel time.

Preliminary testing of the PLC and VFD occurred at the Robicon factory in Pittsburgh. This testing allowed Robicon, Hinz and the client to finalize and test all aspects of the synchronous transfer program. This factory testing reduced on-site commissioning time.

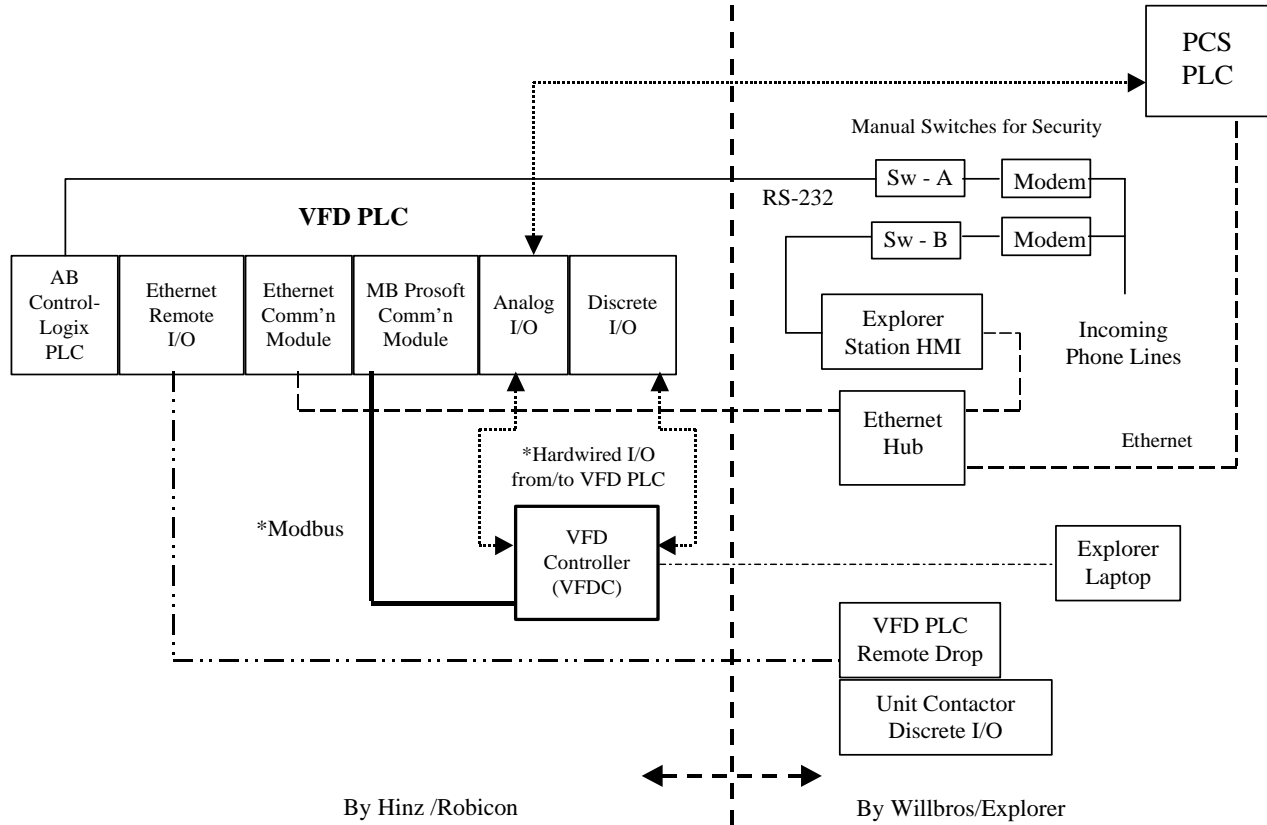
Hinz commissioned the synchronous transfer program on-site. Commissioning consisted of testing all alarm points and ensuring that all motor-pump combinations could be transferred to/from the VFD and to/from bypass. When commissioning concluded the stations were placed into active service.



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VFD PLC Communication and Control Configuration Block Diagram



System Specifications:

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

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

Control between the VFD and VFD PLC were hardwired. Analog signals are sent via Modbus (RS 485).

Explorer provided the PCS PLC and station HMI.

The VFD PLC was able to utilize data in the remote rack via an Ethernet link and communications between the VFD PLC and the station PLC and HMI were also established via Ethernet.

US Robotics modems were used for remote dial – in.

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

www.hinz.com