



A Rockwell Automation Company

## Prince Rupert Grain Ltd. Plant Control System Upgrade Phase I

### The Client:

The Prince Rupert Grain Ltd. terminal was opened in 1985 by Canada's six largest grain handling firms to improve the nation's ability to export grain and oilseed. The terminal is considered state-of-the-art and allows grain to be cleaned as fast as it is unloaded. It has an annual export capability in excess of five million metric tons: the highest of any grain cleaning elevator in Canada.

The primary commodities that are delivered to the

elevator are wheat, barley, and canola. There are by-products collected through the processing of the grain, such as grain screening pellets (GSP), feed screenings, mixed feed oats and associated commodities.

Prince Rupert Grain is focused on maintaining itself as the most technically advanced grain terminal on the West Coast.

### The Requirement:

The control system at Prince Rupert Grain Ltd. is based on a network of Allen-Bradley PLC 3 programmable controllers communicating over Data Highway. A VAX computer system handles goal planning, HMI status/control, and all regulatory and strategic control of the grain elevator. Plant-wide information is passed between the VAX system and the PLC 3 network to update equipment status, set points, and process information the system requires to perform. The AB PLC 3 has proved to be a fabulous work horse for its

time, however replacing defective PLC 3 equipment has become restrictive and costly.

A decision was made to upgrade the grain terminal's existing Allen-Bradley's PLCs to ControlLogix (CLX) on a one-for-one replacement. Hinz was requested to provide their conversion expertise between PLC 3 and CLX so that Prince Rupert Grain could migrate towards the latest developments in industrial automation.

### The Design Solution:

The control system upgrade will be phased in over a period of time depending on operating schedule. It was decided that Shipping #6 PLC will be converted first as this was the smallest program at 650 rungs of logic. The new PLC was required to perform seamlessly as the replaced PLC 3, interconnect with the existing PLC 3s on Data Highway and the VAX control system. The 1771 I/O was kept in place and integrated flawlessly into the new CLX platform over RIO.

The Shipping #6 PLC 3 had two routines – a main routine that handled the equipment and the subroutine which took care of equipment interlocking and status information to update the VAX/HMI system.

The main differences between the two platforms that need to be recognized are:

- Scan rates
- IO/Program Scan cycles

- PLC 3 Pointer Variable
- Complex Instructions

The new ControlLogix program incorporated the existing logic as well as added new logic required to weave the two different platforms together.

Messaging between CLX and VAX was achieved using mapping techniques over Ethernet/IP. Communication between CLX and the PLC 3 network required some creative planning since there isn't a suitable conversion card between DH+ and DH. The CLX to PLC 3 communication was done using the 1756-DHRIO module using an existing PLC 5 as a data server and a 1785-KA module to act as the DH+/DH bridge.

The installed CLX platform scanned at 1/5th the original scan rate while maintaining the integrity of the original program with the addition of feature-rich utilities to aid the end user.



A Rockwell Automation Company

## Prince Rupert Grain Ltd. Plant Control System Upgrade Phase I



### System Specifications:

- Allen-Bradley ControlLogix L55 Processor (x1)
- Allen-Bradley 1756-ENBT Ethernet/IP Module (x1)
- Allen-Bradley 1756-DHRIO DH+ Communication Interface Module (x3)
- Allen-Bradley 1756-CNB ControlNet interface Module (x1 for future inter-CLX communications)
- Existing Allen-Bradley Remote I/O rack and cards

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

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