



THE CSL WHYALLA IS USED FOR ACCESS TO SHALLOW PORTS INSTEAD OF BARGES WHICH REQUIRE TUGS.



CSL WHYALLA CONTROL ROOM NOV 2012

CSL WHYALLA CONTROL ROOM DEC 2012



CASE STUDY 1

New Technology for Transhipping

To develop new HMI and PLC engineering tools to provide new technology so that they are substantially self-configuring.

Client: EMS-TECH Canada

Project Title: CSL- 'WHYALLA' (vessel) conversion

Background information

CSL Australia operates a highly specialised fleet of self-unloading vessels that handle a range of cargoes within coastal trades of Australia. 'CSL SAMS', recently renamed 'CSL Whyalla', is normally located at Whyalla in South Australia and handles dry cargo, primarily iron ore. Its role is a feeder vessel from a shallow port to larger vessels; this method of operation is referred to as 'transhipping'.

The 'CSL Whyalla' is used for access to shallow ports instead of barges which require tugs. This larger vessel operates autonomously.

The prime contractors, located in Canada, approached PB Automation to develop new technology for transhipping.

“ The hypothesis is that we can convert an existing dry loading vessel to incorporate new technology and automate the vessel's loading facilities. ”

Technical objective

To incorporate new technology and automate the vessel's loading facilities.

- This required huge changes to all the mechanical controls and the electrics used for loading the vessel. Our key objective was to create new development tools to provide electrical controls to effectively operate the new equipment for the specific vessel, but also for other projects.
- There are two key tools involved Human Machine Interface (HMI) systems incorporating visualisation facilities and within them Program Logical Controllers (PLC). We developed new HMI and PLC engineering tools to provide new technology so that they are substantially self-configuring.

- New mechanical facilities were installed by the ships owners including new motors with increased kilowatt ratings, new conveyors for bulk handling of iron ore, new and larger gates.
- PB Automation used our expertise to design and develop new control electrical systems primarily for HMI and PLC involving switch gear for the motors and field sensors for belt, gate and boom motions control.
- An important objective for the design of the HMI screens was to provide 'uncrowded' screens for all standard operations. This objective was met by minimising the visible (and actuated) information on the screens whilst still adequately informing the operators of important events and information.
- Key challenges to meet our objectives were to enable single entry of all relevant inputs and outputs in an environment where the requirements specifications were themselves evolving during the project.
This requires;
 1. Researching the specific user requirements
 2. Developing electrical designs to meet all the requirements of the new equipment
 3. Marrying up existing hydraulic equipment to work effectively with the new systems
 4. Incorporating alarms with sophisticated re-setting and override facilities
 5. Engineering of the required input tools.
- The single entry of information provides for consistency of names and terminology across project platforms thus reducing time required for Quality Control and re-work.
- It was particularly challenging to ensure that the information entered would be correctly converted to the various formats as required for the electrical design, PLC and HMI technologies.

New Knowledge

The development of new and improved HMI and PLC tools incorporating many new facilities not available to many major entities. These new tools allow for single entry of information after which it is available in different formats for the various technologies required for a project.

Investigation of Existing System

We made a physical inspection of the vessel and prepared a report on the state of the existing electrical and control equipment. Our advice was that this had to be fully replaced and the electrical controls re-developed from scratch.

Design

We developed many designs and re-designs for the Motor Control Centre (MCC) motor starters HMI and PLC.

The prime contractor in Canada used our electrical drawings to build the equipment in Canada and China at their cost. PLC connections according to our design were incorporated. We then developed software aspects of all the electrical controls, primarily HMI and PLC.

The development of the electrical controls included the integration of existing and new equipment into the overall design.

Development of a Tool to Automatically Create Alarm Messages

We are developing an integrated tool that creates alarm messages automatically for the HMI and the associated PLC software. This allows for information to be entered only once and the tool automatically creates the data to feed the information to both the HMI and PLC.

The tool;

1. Gives all the alarm messages in text and configuration for direct import into the HMI alarm system.
2. Automatically creates all the PLC software required to generate the alarms that are displayed on the HMI.
3. Creates all the check sheets for automatic development of the software and on site commissioning of the overall control system.



The 'CSL Whyalla' project has delivered outstanding performance levels, since commissioning in Dec 2012 and the system has been operating flawlessly.

Feedback from the operators of the system is that it is very user friendly and easy to use whilst providing all pertinent information and data.



David Fethers

Director - Technical and Fleet Operations
CSL Australia