

The St. Lawrence Seaway Management Corporation

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Waterway into North America



16 locks (750' x 80') from Montreal to Lake Erie



VESSEL SELF-SPOTTING SYSTEM

Presentation to USACE

February 2012



**The St. Lawrence Seaway
Management Corporation**



System Description

- ❖ The Vessel Self-Spotting System (VSSS) measures the distance from the vessel entering the lock chamber to its final mooring position.
- ❖ This distance is available to the ship master via two display panels and through an automated marine radio transmission.
- ❖ The system is composed of one scanner assembly in each direction and two display panels.

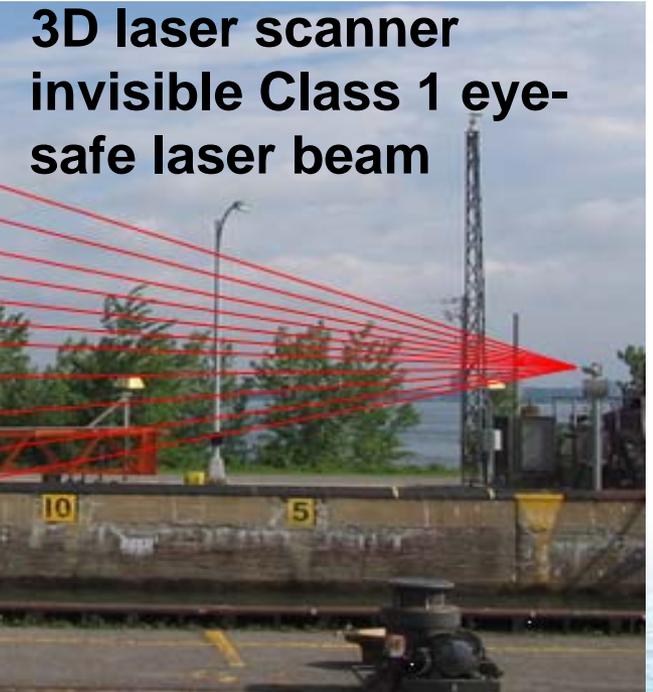
Technology



Large LED display panel



3D laser scanner
invisible Class 1 eye-
safe laser beam



Video

❖ On Youtube: http://youtu.be/s_kTvnFcae0

Project Objectives

❖ **Optimize lock cycle time**

- Reduce the lockage cycle time by 3 min: all lock personnel available for mooring operations sooner in the process.
- Cycle time savings are expected for 95% of the commercial transits.

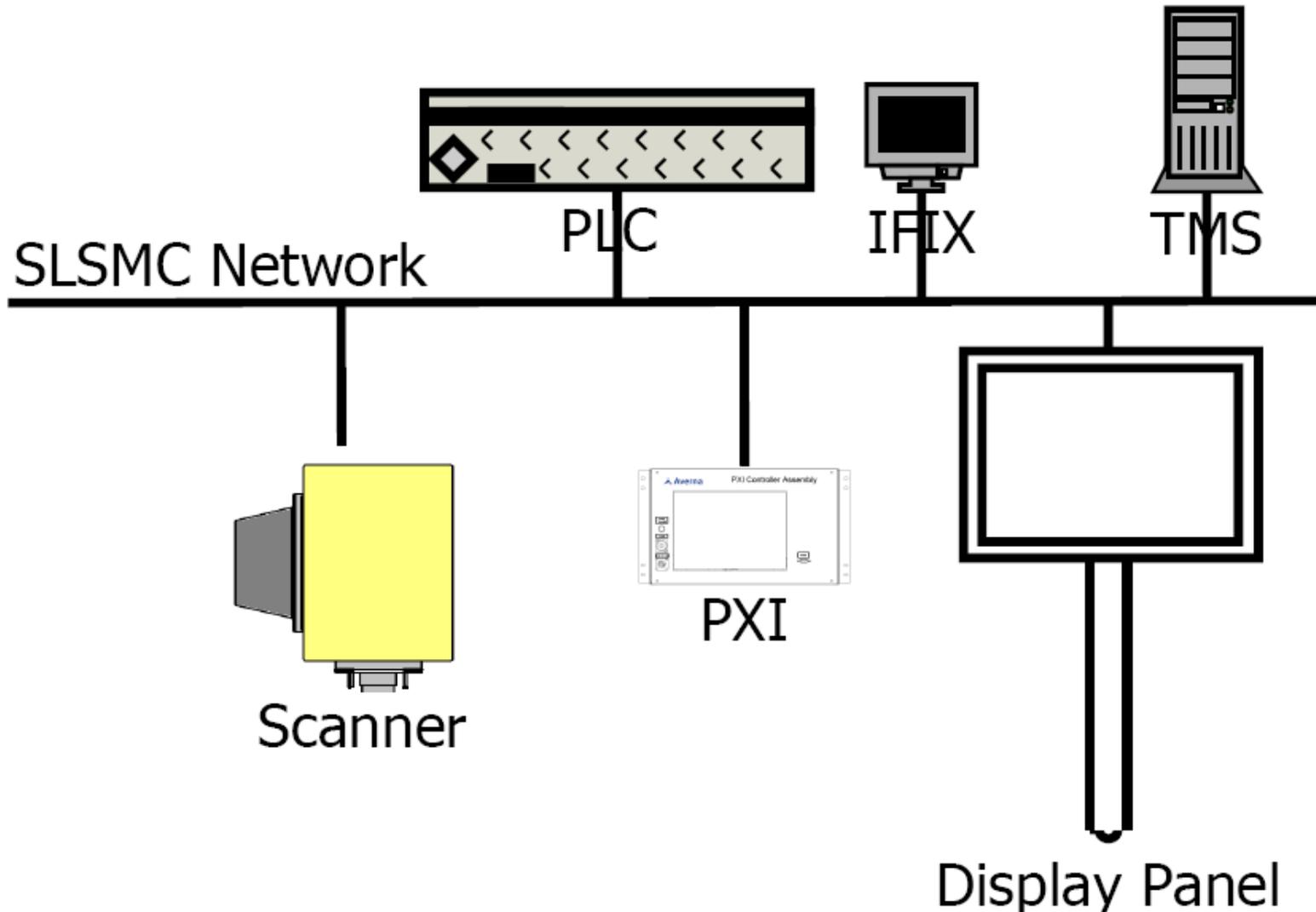
❖ **Lock automation**

- Set the stage for potential automation of the lockage process.

Features

- ❖ **Track ships with a 1 ft precision**
- ❖ **Large LCD displays for day / night**
- ❖ **Position provided over VHF radio**
- ❖ **Track ship movement during lockage**
- ❖ **Provide ship's position back to the lock PLC**
- ❖ **Adjustable vision algorithm**

Integrated into lock control system

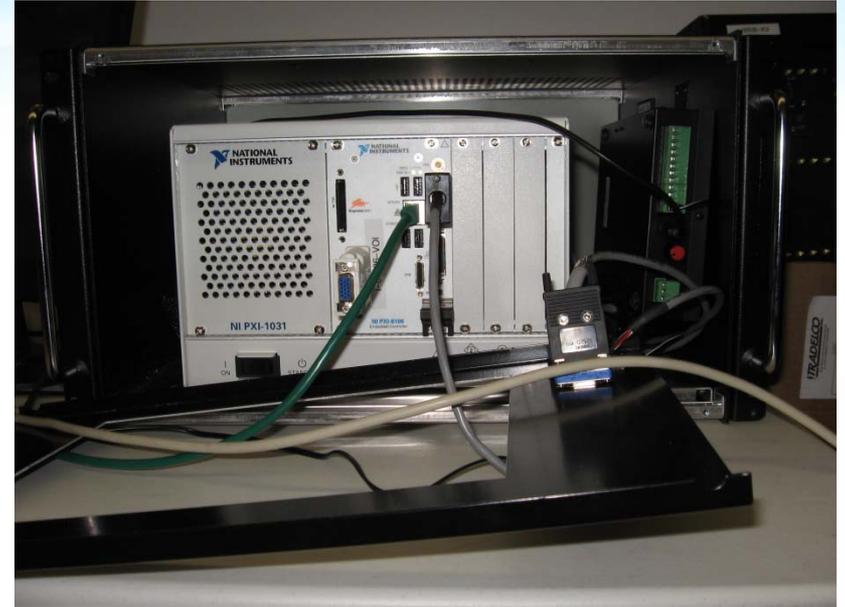


Components

- ❖ PXI (Main Controller)
- ❖ 2 x laser scanner, one for each direction.
- ❖ 2 x LED display panels
- ❖ VHF interface

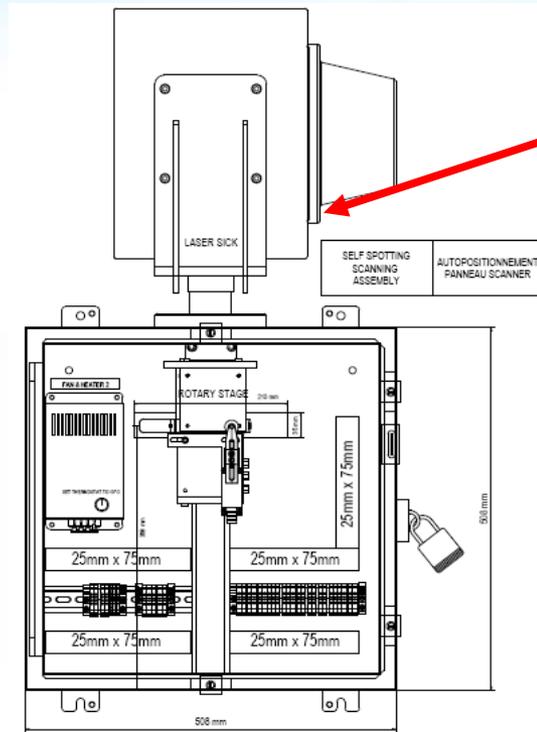
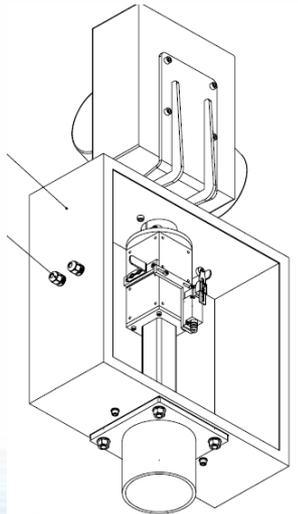
PXI

- ❖ Executes the software.
- ❖ Plays radio messages.
- ❖ Contains all data.
- ❖ Main controller.



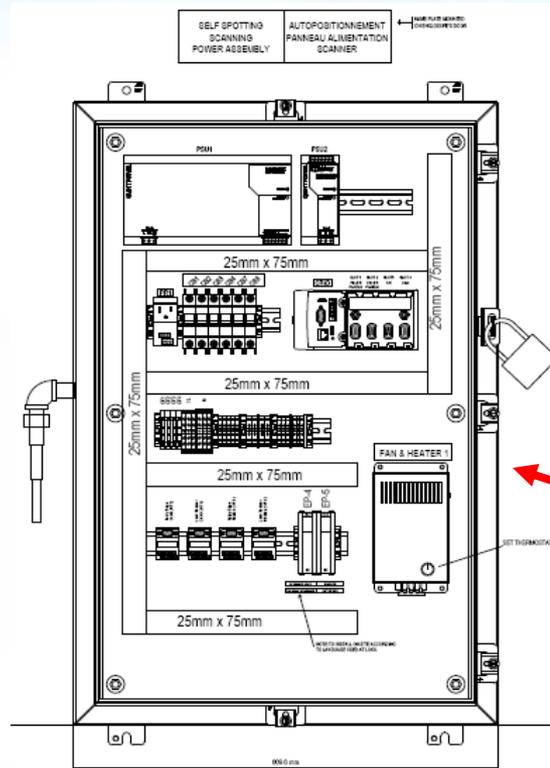
Scanner

- ❖ Laser
- ❖ Rotary Stage
- ❖ Limit Switch
- ❖ Heater



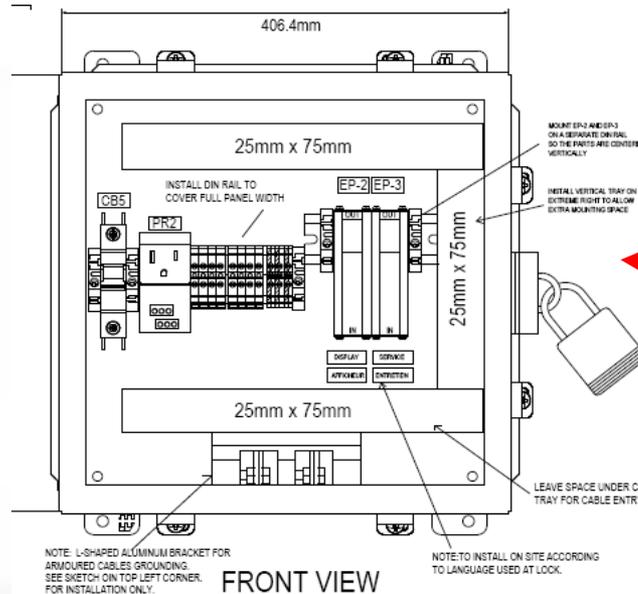
Scanner

- ❖ Communication
- ❖ Power supply
- ❖ Heater



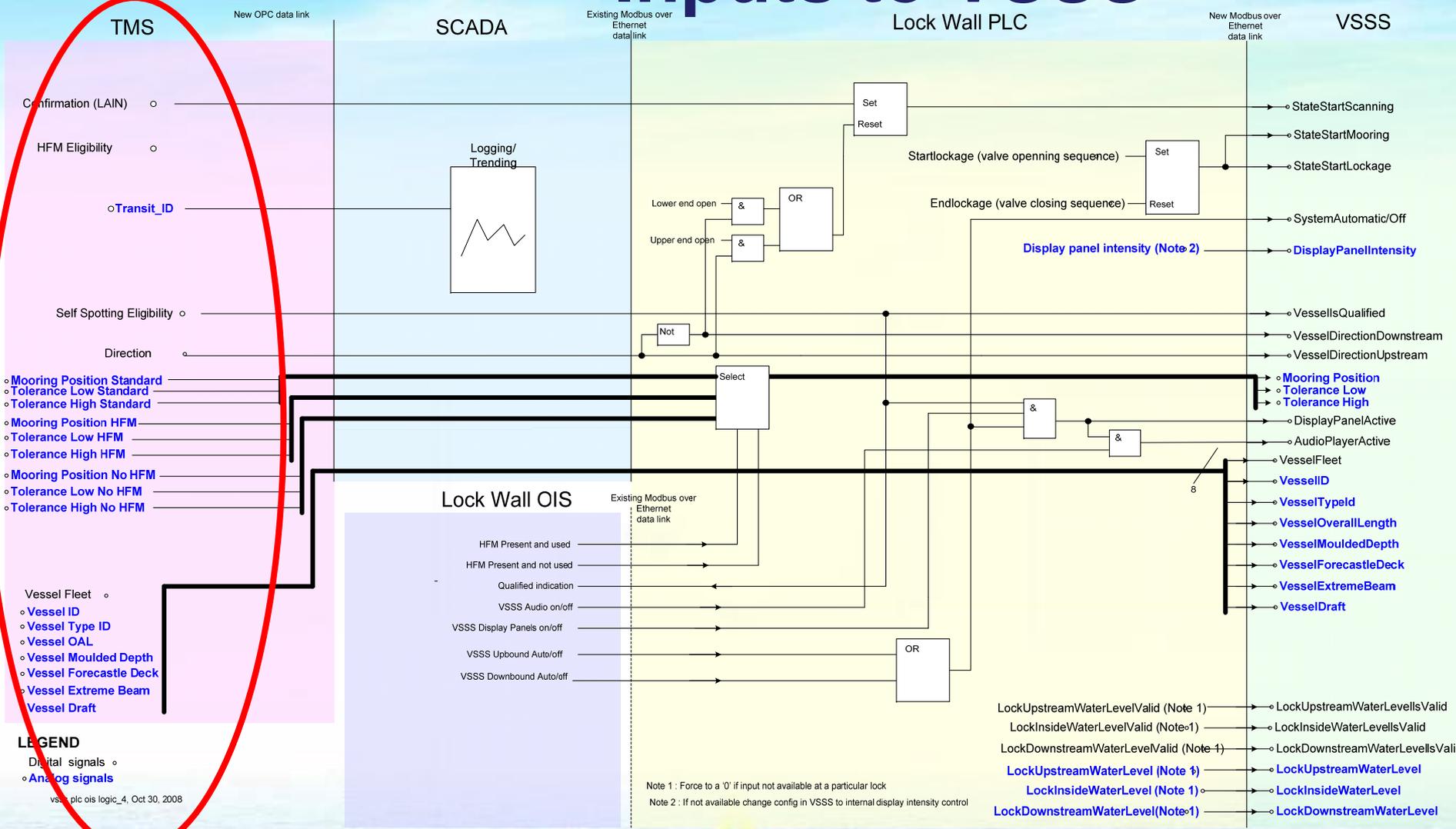
Display

- ❖ Display panel
- ❖ Interconnections box



Inputs to VSSS

VSSS - LOGIC OF INPUTS TO THE VSSS



LEGEND

- Digital signals ○
- Analog signals ◌

vss-plc ois logic_4, Oct 30, 2008

Note 1 : Force to a '0' if input not available at a particular lock
 Note 2 : If not available change config in VSSS to internal display intensity control

Inputs to VSSS

TMS

Confirmation (LAIN) ○ _____

Self Spotting Eligibility ○ _____

Direction ○ _____

○ Mooring Position Standard _____

○ Tolerance Low Standard _____

○ Tolerance High Standard _____

○ Mooring Position HFM _____

○ Tolerance Low HFM _____

○ Tolerance High HFM _____

○ Mooring Position No HFM _____

○ Tolerance Low No HFM _____

○ Tolerance High No HFM _____

Vessel Fleet ○ _____

○ Vessel ID _____

○ Vessel Type ID _____

○ Vessel OAL _____

○ Vessel Moulded Depth _____

○ Vessel Forecastle Deck _____

○ Vessel Extreme Beam _____

○ Vessel Draft _____

1. Trigger

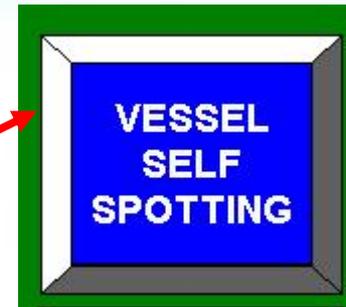
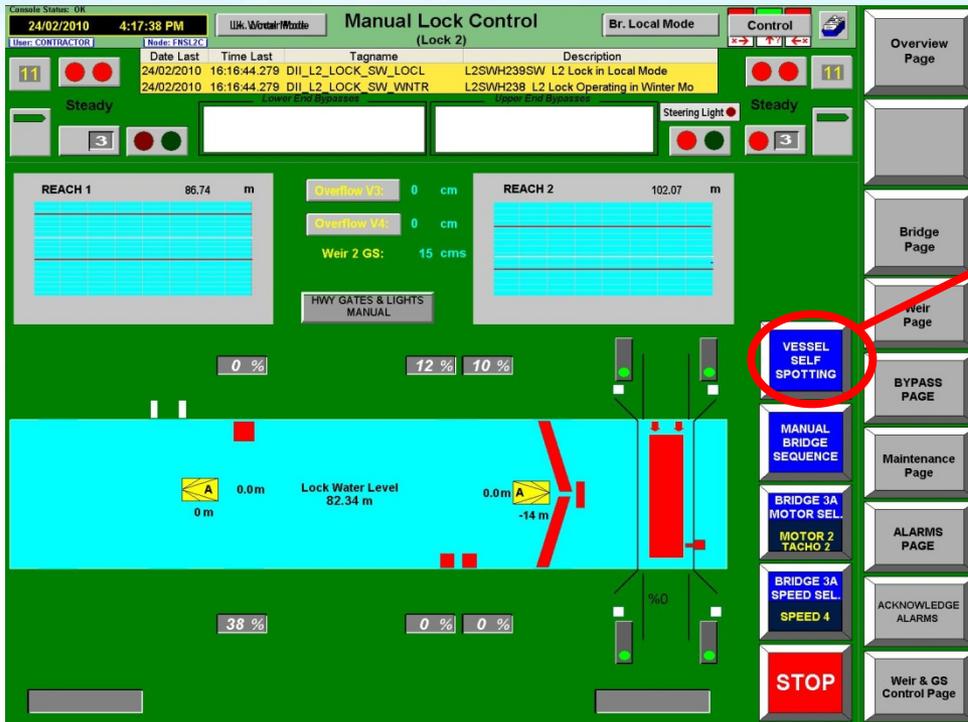
- LAIN (manual/automated)
- Self Spotting Eligibility
- Direction

2. Mooring Position

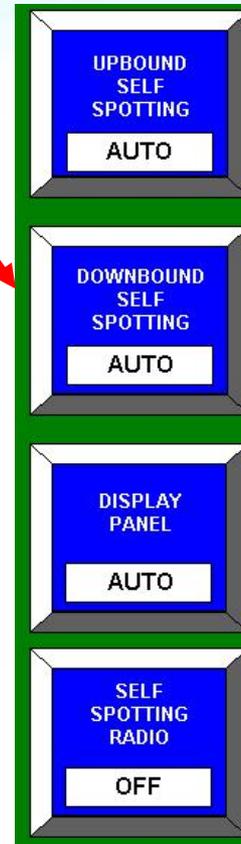
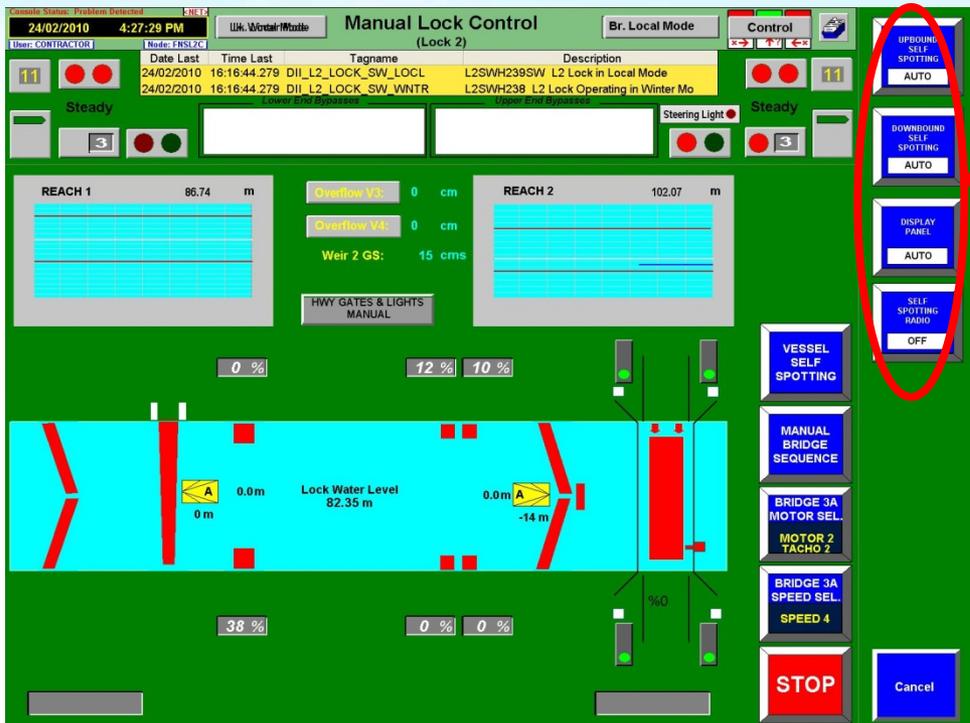
3. Vessel Info

- ID
- Type
- OAL
- Molded Depth
- Forecastle Deck
- Extreme Beam
- Draft

Operator Controls - HMI



Operator Controls - HMI



Upbound

- AUTO
- OFF

Downbound

- AUTO
- OFF

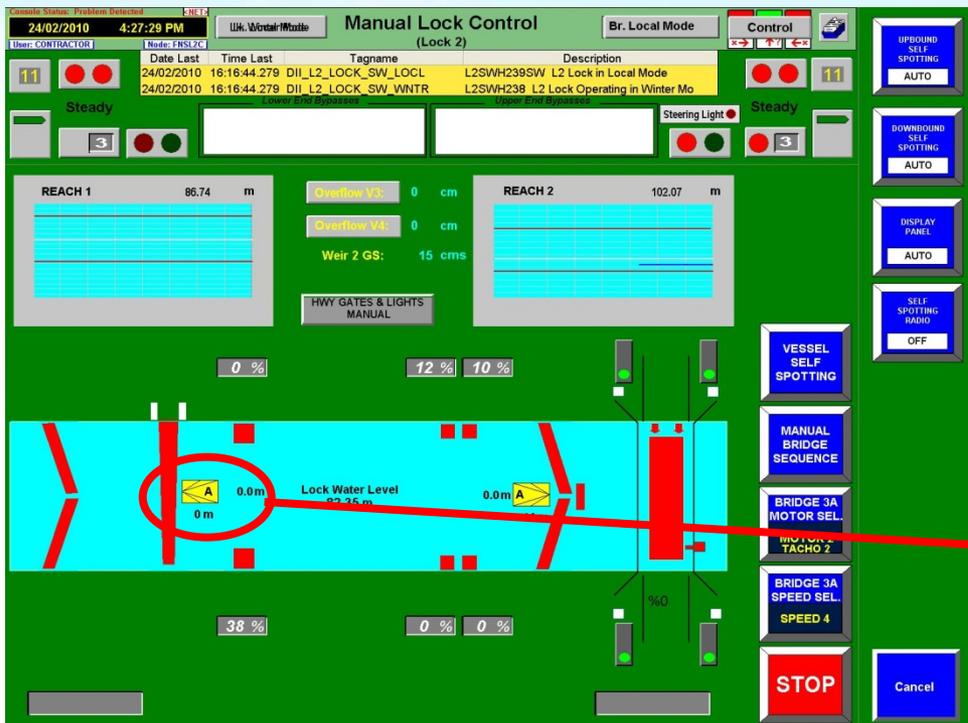
Displays

- AUTO
- OFF

VSS Radio

- AUTO
- OFF

Operator Controls - HMI

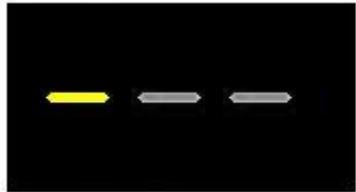
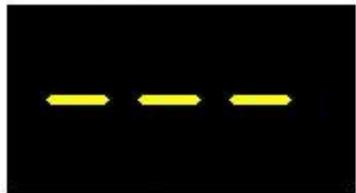


DISTANCE TO GO



FMP

LED Panels also provide System States



1. **BLANK**
 - System is OFF.
 - Vessel is NOT QUALIFIED.
 - System ERROR.
2. **SOLID BARS (Warm Up)**
3. **FLASHING BARS (Self Test)**
4. **ALTERNATING BARS (Ready)**
5. **FLASHING 999 (LAI n Entered)**

What the laser sees

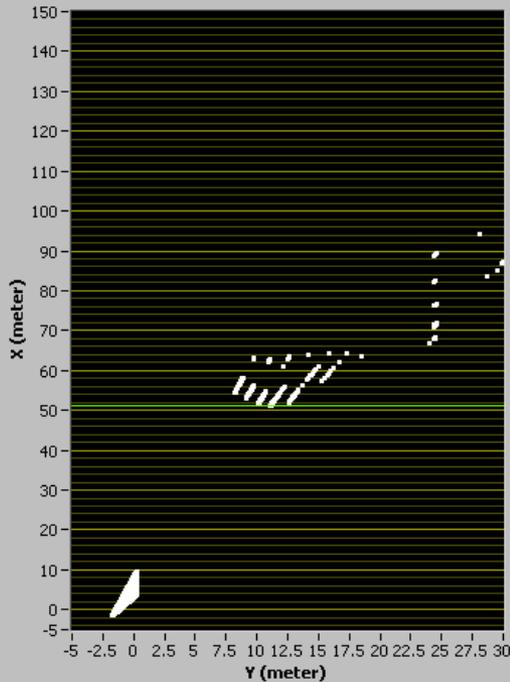


<input type="button" value="Downstream"/> Direction	<input type="text" value="51.0"/> Vessel Position (m)	<input type="text" value="0.1"/> Vessel Speed (m/sec)
<input type="button" value="Automatic"/> Mode	<input type="text" value="1.0"/> Vessel Distance From Mooring Position (m)	<input type="text" value="Welcome"/> Last Message Played
<input type="button" value="TrackEnteringVessel"/> State	<input type="text" value="1.0"/> Upstream Display Panel Value	<input type="text" value="French"/> Language
	<input type="text" value="1.0"/> Downstream Display Panel Value	

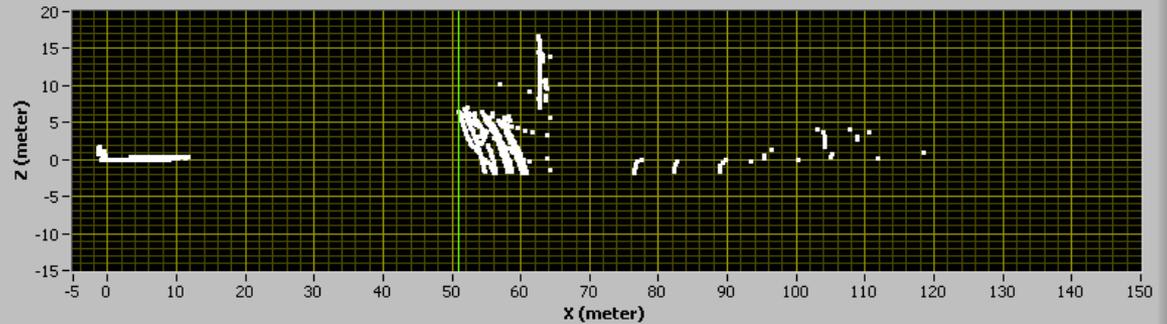


General **Graphics** Shared Variables PLC Variables

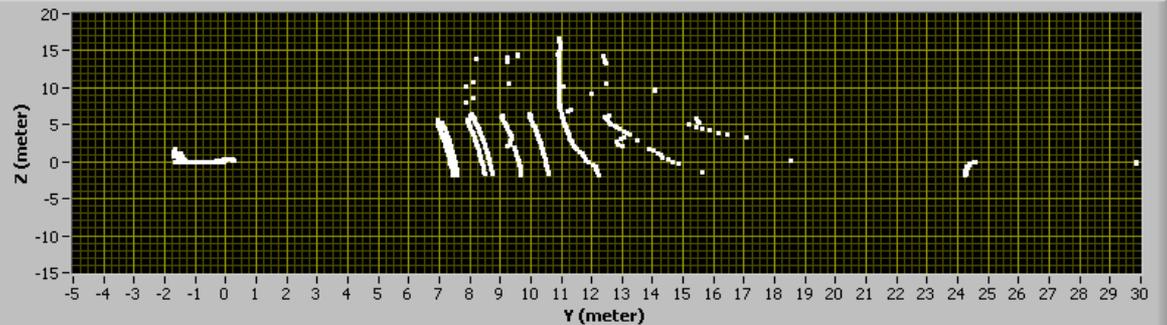
Top View



Side View



Front View



Activate Graph

Show Filtered Data

Cost for a full implementation

	Per Lock
VSS Components	\$ 180,000.00
Regional Engineering	\$ 15,000.00
Other Material (Excluding Network switches)	\$ 20,000.00
Installation	\$ 100,000.00
Total:	\$ 315,000.00

More Information ?

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