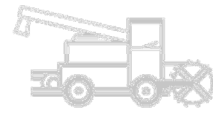
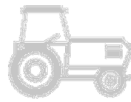


Customer Project Requirements

Customer Name	Example Customer	Date	10/19/2012
Project Name	Example Project	Designation	EP
Customer Contact	123-456-7890	John	Doe
Version No.	v1.0r0		



1. Background Information

1.1 History

[Brief description of the industry and its development]

The salting truck is used to spread large amounts of de-icer onto roadways during the winter season. The vehicle has a tank to hold the salt and an auger to keep the salt flowing to the pump which rotates the spreader underneath the truck.

1.2 Problem and Motivation

[Description of the problem this project aims to solve and why the project is worth solving]

The vehicle hydraulics were originally controlled manually by the driver with switches and levers, but a move to automation is desired so that the driver can focus more on the driving and has less room for mistakes during operation. A control system also allows for more complex and efficient de-icing methods. System and vehicle warning can also be detected and resolved more quickly with a mobile control system and display. The display would allow the driver to configure the truck to spread material in different modes based on weather conditions to improve efficiency. Also recent engine data and DM1 error messages could be logged onto the display.

1.3 Current Approaches

[Summary of present approaches if applicable]

2. Preliminary Requirements

2.1 Hardware list/third party devices

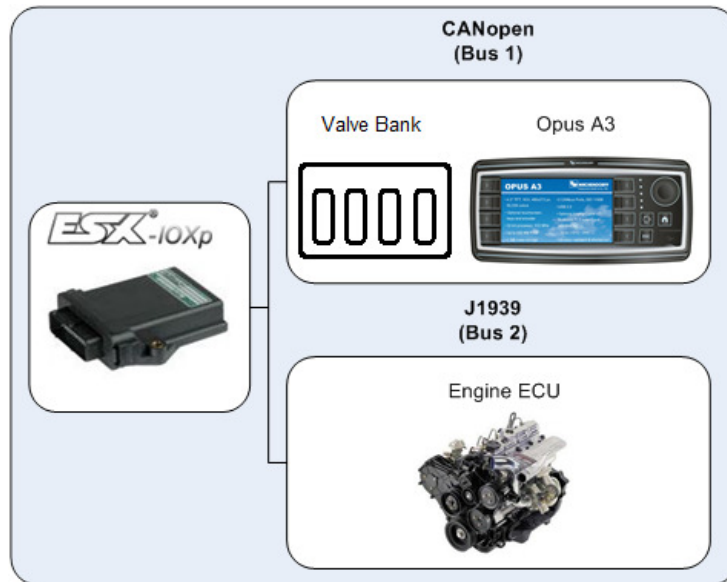
[List of all the different hardware components that make up the system]

1	ESX IOXp controller	11	
2	Wachendorff OPUS A3 display	12	
3	Pump speed pickup (encoder)	13	
4	Hydraulic Pressure Sensor 1 (Auger)	14	
5	Hydraulic Pressure Sensor 2 (Pump)	15	
6	Hydraulic Oil Temperature Sensor	16	
7	ESTOP switch (active LOW)	17	
8	Valve Bank	18	
9		19	
10		20	

2.2 System breakdown/layout

[Description of the application to be developed]

2.2.1 System Layout



2.2.2 Communication Specifications

[Protocol to be used, proprietary messages]

Communication between devices on the vehicle and the control system will be CANopen. Communication between the engine and the control system will be J1939. Engine speed, Engine Oil Temp, Engine Oil Level, and DM1 error messages will be monitored.

2.2.3 Application Behavior

[Interlocks, Subsystems description, Logic]

A small example of an application behavior list:

....

The system SHALL NOT operate in an ESTOP condition. The controller must detect this condition on its input and shut itself off.

When the operator presses the display button to engage salting operation, the control system SHALL check for xx, yy, and zz before operation can begin. If ANY of these conditions are present, the control system will remain idle until the conditions clear, at which point operation will be allowed to begin by pressing the engage button again.

The Auger SHALL ramp up to full speed over a period of 3 seconds. See the datasheet for the “turn on” and “max speed” current thresholds of the auger valve.

The system SHALL NOT begin salting operation if the hydraulic oil temperature is below XX degrees F. During this condition, the display SHALL show a red warning box on the diagnostics page indicating “LOW HYD TEMP”.

....

2.2.4 I/O List

INPUT	Name	OUTPUT	Pin
1	ESTOP Switch (Dig)	1	Valve 1 PWM
2	Pump Speed Pickup (Freq)	2	Valve 2 PWM
3	Hyd Pressure Sensor 1 (Current)	3	Valve 3 PWM
4	Hyd Pressure Sensor 2 (Current)	4	Valve 4 PWM
5	Hyd Oil Temp Sensor (Current)	5	
6		6	
7		7	
8		8	
9		9	
10		10	

2.2.5 Display Layout

The display SHALL have 5 pages total with a custom boot logo.

1 – Main/Home page: Navigate to other pages from here.

2 – Display Options: Set brightness and time here.

3 – Operate: Handle setting the different operation mode to be engaged here, as well as engaging the salting operating.

4 – Operator Config – The operator can configure the options for the different modes of operation.

5 – System Config – (PASSWORD PROTECTED) The manufacturer can configure current thresholds for the valves.

2.3 Schedule

[Timeline with customer expectations]

11/01/20xx – Vehicle to be ready for basic demonstration at trade show. Only J1939 comms with display must function at this time.

02/01/20xx – Vehicle to be ready for full testing at customer facility.

2.4 Document history

<< --- For STW use only --- >>

Date	Author	Notes

2.5 Notes

[Additional information not covered in the above sections]