

Liquid Electrical Sensing System for Railroad Lubricant Tank

Norfolk Southern Corp.

Design Team 8

Interview Guide

George P. Ballios – Lab Coordinator / Presentation Prep

Michael W. Dow – Webmaster

Nicholas T. Vogtmann – Document Prep

Craig M. Zofchak – Manager

Dr. Virginia M. Ayres – Facilitator

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Opening

Hello. This is George Ballios, Michael Dow, Nicholas Vogtmann, and Craig Zofchak. We are involved in Michigan State University's Electrical and Computer Engineering Senior Design Capstone and working with Norfolk Southern in designing a unique liquid level sensor for the Wayside Top of Rail System.

Introduction

The Wayside Top of Rail (TOR) system distributes lubricant material from its 100 gallon storage tank via a mechanical pump. The design of an isolated sensor, located in the Electronics cabinet, will monitor the liquid level in the storage tank to prevent pump failure from air entering the pump. When the liquid level reaches the lowest acceptable position, the lubrication system must cease function until the tank is replenished. The level of liquid is calculated from data received through an ultrasound transducer and cavity resonance in the audible range. The sensor must provide the system's status locally with the option to expand the accessibility through remote communication.

Transition

In order to grasp the task at hand, we wanted to ask you a few questions that we have gathered from our ideas and to better understand the specification and to be able to design up to Norfolk Southern Standards.

Opening Question

How do you believe the Wayside TOR system will be evolving technologically, physically, and environmentally?

Key Question 1

How accurate does the measurement of liquid need to be to understand trends?

Probe 1: If the rate of measurement was to change, how drastically would the accuracy change?

Probe 2: How often would the tank need to be measured without sacrificing important data points, given average track usage?

Key Question 2

What types of components are in place in a working electronics cabinet of the Wayside TOR system that could cause problems with Ultrasound or audible noise?

Probe 1: How efficient is the electronics cabinet in outside sound of a train or other ambient noises?

Probe 2: Where on the Wayside TOR would it be impossible to attach an Ultrasound transducer, audible input, or communication antenna?

Key Question 3

What form of remote communication does Norfolk Southern already have that we could integrate any fluid level data?

Probe 1: How far would the information need to travel and how widespread are the communication receivers?

Probe 2: What other additional data should be sent that would be helpful to someone seeing this data?

Ending

With the ideas that we just discussed, what topic is the most important to you in the completion of this task?

If the cost of this project is going to exceed the amount that you have laid out for us, is there an idea that could be taken away on the final project? If no, is there the opportunity of additional funding?

Summary

To confirm what we have talked about, the most important idea we have discussed is... followed by... and ending with...

Close

From this discussion, we not have a firm grasp on what you have planned for us to accomplish and what is expected of us. We all thank you for your time and will be in contact with you in the upcoming weeks. Feel free to contact us at any time, regarding new information and ideas.