Remote Monitoring of Industrial Parts Washers

DESIGN DOCUMENT

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PMW Equipment
Mani Mina

Team Members/Roles
Katelyn Woltkamp | Team Leader
Neh Batwara | Webmaster 1
Bryan Adams | Webmaster 2
Mitch Conrad | Communication Leader
Nick Coduto | Key Concept Holder

Dec1607@iastate.edu

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1 Introduction

1.1 PROJECT STATEMENT

Industrial parts washers manufactured by PMW use PLC's for control units that allow customers to control and modify wash cycle parameters such as water temperature, pressure, high and low reservoir fill levels, in addition to cycle times for the washing rinsing and drying of the parts. Washer PLC's are used to control the speed of transport belts or carousels that deliver the parts to the wash cycles. Washer PLC's often need to share cycle time data with robots designed to load and unload parts going through the washer enclosure. PLC's can monitor pressure drop through system filters to notify operators when filter media should be cleaned or changed. Access to operating data from customer sites would be very useful to PMW engineers when customers have equipment field inquiries and are not able to trouble shoot problems locally. It is not infrequent that the customers wire pump motors in a configuration that has them rotating backwards and still operating at a significantly reduced pressure and flow rate. This could be diagnosed by the PMW engineers using PLC data.

1.2 PURPOSE

Our client does not have the resources to be able to constantly going to customer's sites to troubleshoot problems an check data readouts on the machine. By implementing a system that can monitor data and show results remotely to PMW they will be able to efficiently provide customer service to their customers without having to over extend their staff. This may also help them create a wider geographical range for clients because of their ability to troubleshoot from off site.

1.3 GOALS

1. Recommendations for one or two approaches with a proof of concept for the recommended system that might include embedded software for collecting data from the washer PLCs.
2. Provide a communication protocol that results in the key data being collected in a PMW database that the engineers can access.
3. Establish base-line analytics for the washers.
4. Develop a user interface that would be usable by PMW engineers, service techs and sales representatives.
5. Develop specifications, vendor recommendations and cost estimates for a preferred system.

2 Deliverables

Documentation and proof of concept demonstration of one or more alternative systems communicating over a simulated distance to illustrate the feasibility of the recommended approach.

3 Design

Include any/all possible methods of approach to solving the problem. Discuss what you have done so far. What have you tried/implemented/tested etc. We want to know what you have done.

Because the customer uses different suppliers for its PLCs which provide different products with different specifications we have been focusing in on creating a solution with Siemens' products. If we are able to create a solution that works well with Siemens' products then we will try and branch out to other suppliers and see how we can implement a similar system.

3.1 SYSTEM SPECIFICATIONS

The system must be able to be utilized whether the client is wireless or hardwired. It must also be able to withstand moisture (steam) and extreme temperatures because many of the washers are placed in environments that face these conditions. The system must also use the products/product lines that the customer is already using.

3.1.1 Non-functional

The data from the PLC should be shown in a clear manor so that someone can monitor the system and make adjustments.

3.1.2 Functional

The system should be able to allow the customer to remotely monitor the data that the washer is producing.

3.2 PROPOSED DESIGN/METHOD

We currently have two possible solutions to the customer's problem. We are looking in to two different types of PLCs, both produced by Siemens that would allow us to remotely monitor with the least amount of physical technology. The two ideas are laid out below.

1. Our first plan is to use the Logo 8, which was requested by the client. By using this type of PLC, the user actually has access to a web browser that is built in. With this being said, PMW would be able to access the Logo 8 remotely as long as they were able to gain access in to their customer's intranet.
2. Another similar option would be the S7-1200 which has similar capabilities to the Logo 8. This option can also be safety rated which could create a safer environment for those working around the washers.

We have had a slow rolling relationship with the client so there are still parts of the discovery process that we are working on. Now that we have a clear idea of what the customer's true goals are, we are moving in to the specifications of their project. Some questions we have recently asked include:

- What type and how much I/O are you currently using
- Is it possible to see a print out of the ladder logic – to understand the complexity of their program
- How many of your clients would allow you to access their intranet's

- What PLCs are you currently using – in both Siemens and Rockwell-Collins

3.3 DESIGN ANALYSIS

We have not put any of our designs in to testing yet. Because of the nature of our project, we need to have access to the washers and the PLCs which is not something that we can do without visiting the customer's site and/or ordering a plc for us to practice with. We are still in the discovery stage of understanding which product will work best for their needs and it is not efficient to order different PLCs and HMIs before we are sure because they are expensive pieces of equipment.

4 Testing/Development

4.1 INTERFACE SPECIFICATIONS

The final interface should be usable and show data relevant to that of a tech member from the client. A PLC must be included, as they are already incorporated in to the structure of the washers. All other specifications after that are subject only to our discovery process.

4.2 HARDWARE/SOFTWARE

The PLC and the washer will both be needed to test the project. Our customer will also need to have access to a computer/phone/tablet in order to remotely access the PLC by either intranet or through a cloud based process.

4.2 PROCESS

When our methods are finally tested we will need to work with the PLC from a remote location while it is attached to a washer or some simulated data and make sure that our client is able to see the data and troubleshoot what is going wrong.

5 Results

There are no results at this point. We are working towards testing a solution once we have a complete system. The nature of our product does not call for continual testing, rather very intense discovery and product knowledge.

6 Conclusions

In the past few weeks we have gained a much stronger relationship with our client and are developing a plan which will allow us to meet all of the needs we currently know about. As we get answer's that just leads us to more questions about the technology that is currently already in place. Our goals moving forward are to decide between our two plans based on information we hope to gain in the near future.

7 References

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