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The WILLIAM STATES LEE COLLEGE *of* ENGINEERING

Senior Design Project Description

Company Name	*Charlotte Pipe and Foundry*	**Date Submitted**	*12/04/2020*
Project Title	*Design of a Motor/Gear Maintenance Alert Device* **(CP_ALERT)**	**Planned Starting Semester**	Spring 2021

Personnel

Typical teams will have 4-6 students, with engineering disciplines assigned based on the anticipated Scope of the Project.

Please provide your estimate of staffing in the below table. The Senior Design Committee will adjust as appropriate based on scope and discipline skills:

Discipline	Number	Discipline	Number
Mechanical	3	Electrical	2
Computer	1	Systems	
Other ( )			

Company and Project Overview:

For over a century Charlotte Pipe and Foundry Company has been manufacturing pipe and fittings exclusively in the USA, employing 1,400 loyal, hard-working Americans. Today they manufacture the industry's broadest range of standard and specialty DWV products, including cast iron and plastic pipe and fittings.

Charlotte Pipe is headquartered in Charlotte, NC, and has seven plant locations across the United States.

Cast Iron Foundry – Charlotte, NC

Charlotte Pipe produce a full line of service and extra-heavy cast iron soil pipe and fittings from 2" to 15," and double-hub pipe from 2" to 6". We also manufacture a full line of hubless pipe and fittings, from 1 ½" to 15". In addition to these standard products, the casting facility does custom castings for a wide variety of customer products.

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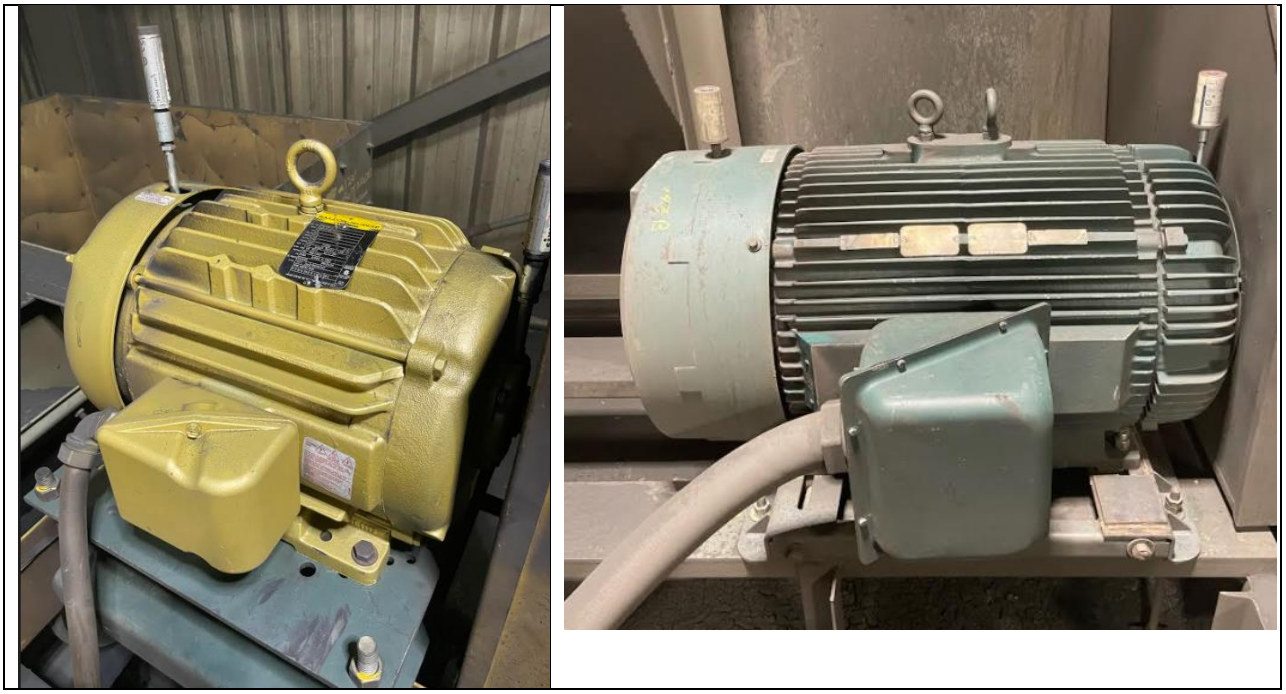
As a heavy industrial manufacturer, Charlotte Pipe has an enormous number of motors and bearings. This project scope is related to the maintenance activities for this equipment.

Project Requirements:

Many operations within Charlotte Pipe involve motors and bearings. Some examples are shown in the photos below:



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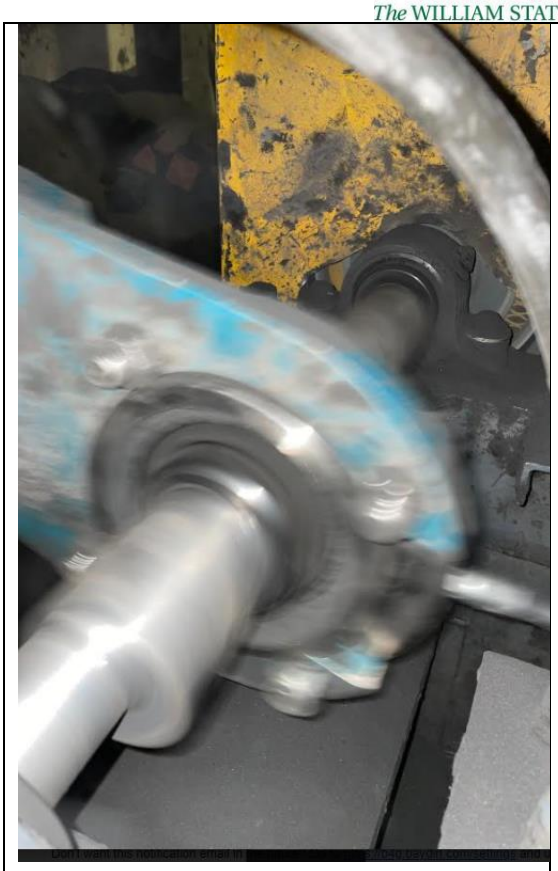

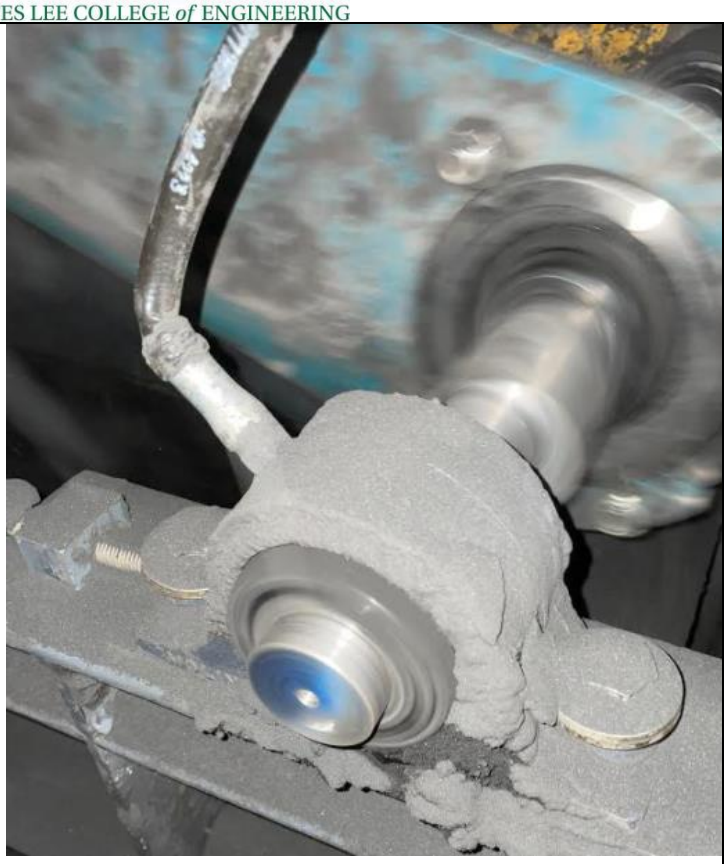

In a foundry operation, it takes a long time and copious amounts of energy to get many of the furnace and casting operations started. Because of this, unplanned outages from motor or bearing failure can be very costly. Currently, motors and bearings are inspected on a planned schedule that can involve weekly, monthly, quarterly or annual inspections where the frequency of inspection is based on the equipment value and impact of an unplanned outage. The objective of this project is to design and prototype a device or tool that can be used to predict failure of motors and pumps so they can be serviced on a planned basis before they fail. This design must be something that is cost effective given the large number of motors and bearings that are at the site.

Expected Deliverables/Results:

- Device or tool that can determine when a pump or bearing is close to failing
- Will prototype the design on a narrow set of selected equipment with the ability to scale to a broader set.
- Must be cost effective considering the number of motors and bearing that exist in the plant

Disposition of Deliverables at the End of the Project:

Hardware developed is the property of the Industry Supporter. The work product will be displayed at the last Expo then immediately handed over to the supporter unless arrangements have been

made to deliver at a future date.

List here any specific skills, requirements, specific courses, knowledge needed or suggested (If none please state none):

- When not required to be virtual, Design Reviews are planned to be a Charlotte Pipe's Charlotte location.
- Project will require travel to Charlotte Pipe's Charlotte location.
- Foundry operations can be hot, loud and typical of a very industrial operation. PPE and safety practices are critical and must be followed strictly when on site. Students must be aware of these conditions and committed to being careful and safe when doing on site data gathering and testing.