

Senior Design Project Description

Company Name	<i>Powertec Industrial Motors</i>	Date Submitted	<i>7/9/2020</i>
Project Title	<i>Design and Development of Electric Motor Design Software (PIM_ELEC)</i>	Planned Starting Semester	Fall 2020

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		Electrical	2
Computer	2	Systems	1
Other ()			

Company and Project Overview:

POWERTEC Industrial Motors, Inc. was started in 1987 and is based in Charlotte. The company quickly established itself as an innovative motor and drive manufacturing company delivering products to customers with critical application requirements in industries such as mining, marine and space application. Engineers, product/system designers, end users and original equipment manufacturers covering a diverse range of industrial applications and niche markets rely on the performance of the brushless motors produced by POWERTEC. This project is partially supported by a grant from the NC Manufacturing Extension Partnership through a sub-grant to the Industrial Solutions Lab at UNC Charlotte.

POWERTEC manufactures a wide line of brushless motors from fractional to over 700HP. Our PacTorq and Ferrite Motors provide very high efficiency and performance, and much smaller size, when compared to DC motors or induction motors. POWERTEC produces NEMA-standard frame configurations with multiple options and/or we can customize an existing motor or motor design to your exact specifications.

Some product examples:



During the course of designing products for critical service applications, our engineers have developed many tools for modeling motor performance characteristics. These tools have been created through various methods available at the time. The outputs of these design tools can be quantified and explained with formulas. More visual and flexible method for using these formulas is required. The objective for this project is to design and develop tool enhancements that allow the output to be reviewed in terms of charts or prepared graphs that can exported and shared.

Project Requirements:

Over the years Powertec has perfected formulas and analysis methods for motor design validation. However, these tools are very technical and are generally only usable by dedicated specialists. We want to share the data and methods we have with a broader group of users. To do this, the tools need to be made easier to use and much more visual through graphical and other visual display techniques. This includes formulas known in the industry and historical data collected for motor design functions.

Expected Deliverables/Results:

- The produced program would be able to use historical windings and magnetization records to produce motor power curves both for internal and external use.
- These would have several fields for data labeling and notes to clarify the graph.
- These charts would also need the ability to switch between SI and imperial units.
- These charts would have the option to select and graph dependent variables versus independent variables.
- The program would be able to display 2D (or 3D if possible) images of stator and rotor for a given motor.
- The produced program would include a database having design templates and an interactive interface to allow new design data to be entered for a new or modified winding.



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- The program would incorporate some computational capability to perform a series of simple computational tasks for new or modified windings, stack lengths, etc.
- The data would have several known constants that can be modified via inputs.
- Output data can be exported into excel or other CSV file
- User Manual

Disposition of Deliverables at the End of the Project:

Program, source code and User Manual to be delivered to company after Expo.

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

- Interest in electric motor design
- Interest in developing user friendly computer tools for making very technical models more easily understood.