

Automated Electric Motor Dynamometer

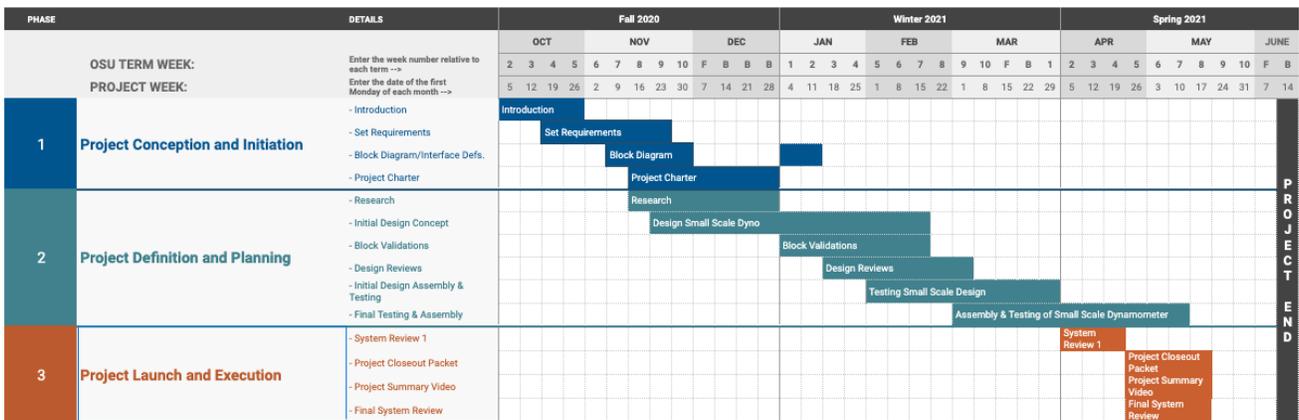
AEMD

Executive Project Summary

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AEMD ACTUAL PROJECT TIMELINE

PROJECT TITLE	Automated Electric Motor Dynamometer (AEMD)	COMPANY NAME	AquaHarmonics
PROJECT MANAGER	Alex Hagmüller, Max Ginsburg	DATE	5/16/21
TEAM MEMBERS	Ben Carlson, Jordan Brown, Ian Brysen Pagatpatan		



Project Overview

Manufacturer ratings of electric motors are notoriously inaccurate causing inconveniences in the design process of certain products. In many applications, an accurate speed-torque characteristic is needed to efficiently power a system (in our case, Wave Energy Converters, or WECs). The goal of this project is to design a device to measure real-time motor performance and display characteristics such as torque, speed, and efficiency across a broad spectrum of motor, drive and feedback sensor configurations. This will enable the team at AquaHarmonics to determine an ideal configuration to meet their specific design requirements for WECs in the near future.

Project Scope

The completion of this project resulted in the design of a small-scale AEMD model to ensure proper functionality and data acquisition of electric motors when testing various motor and drive configurations, this will serve as the basis for a larger scale AEMD that AquaHarmonics can work on handle more powerful motors in the future. The AEMD system has been designed featuring a MATLAB/Simulink user interface, a Simulink-Real Time display of collected data, Temperature Sensitive System Shut-Off, and a Dynamometer Post-Report showcasing motor-testing performance.

AEMD Development

As the development of the AEMD unfolded, our team worked closely with AquaHarmonics by holding weekly meetings to address any issues, manage equipment and track our project progress. Our goal was to have the small-scale model functioning properly and accurately characterizing motor parameters by week two of Winter Term. However, our project timeline fell behind due to gaining familiarity with the communication protocols and motor-drive signal communication. Despite this, the subsequent weeks of winter and spring term were spent designing, assembling, and testing the final small-scale AEMD design. In the final weeks of this project, project documentation began to capture the final AEMD product and elaboration on the journey from beginning to end. The actual project timeline is displayed below.

Lessons Learned in the AEMD

With the project timeline of the AEMD coming to an end, we have experienced a handful of lessons learned in each phase of the project: Project Conception and Initiation, Project Definition and Planning, Project Launch and Execution. In our project conception and initiation phase, an important lesson learned was the importance of developing a relationship within our team as the project began to unfold. Our team established a great foundation for communication and a collaborative/supportive environment, which ultimately led to constant project progress and updates throughout the development of the AEMD. In our second phase of project definition and planning, we understood the value in devoting time and energy in the design process and the documents associated with the AEMD such as the block diagram, the design of each individual block, and the implementation of these blocks. With a lack of experience in the equipment being used, we had a conceptual understanding of implementation thus proving our design documents useful but then faced the battle of how to properly implement our blocks in the AEMD. In our last phase of project launch and execution, the team environment we developed really facilitated the collaboration and willingness to meet project deadlines in a timely manner. Although our project didn't necessarily follow our project timeline, we were able to communicate what needed to be done and when we would be able to do that either as a group or individually thus never leaving room for uncertainty about our project. All in all, these lessons proved invaluable when working on an engineering group project and exemplified the ideal environment within a group really holds a key towards a project's success and the relationships within the group to achieve the goals and objectives along the way.