10/6/2017

Team 05: High Speed Motor Test Stand

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Chapter One: EML 4551C

1.1 Project Scope

Danfoss is tasking Team 05 with designing a system that can measure motor efficiency at standard operating speeds for motors inside various Danfoss Turbocor compressors. Team 05 will determine the best way to measure output power for efficiency calculations and the best way to couple the motor shafts for operation at high speeds. They will design and implement a safety shield in order to maintain safe operating conditions while testing the system.

Only the Danfoss facility will use the motor testing system. The assembly line will not use the system to test each compressor; instead, the research and development team will utilize it. The stakeholders include Danfoss, research, and product development.

1.2 Customer Needs

Danfoss Turbocor research and development team requires a high-speed motor testing system capable of measuring the power output and efficiency of the Turbocor compressors. The system will operate at a range of 13,000 to 40,000 rpm. Improvements are to be made to the existing system based off need when testing. The system will have a stand since the current motor testing system sits on the floor. It will also need some sort of structure surrounding the entire system for safety purposes. Finally, the team will select and add a torque transducer to the test stand to accurately measure the efficiency of the compressor.

Appendices

Appendix A: Code of Conduct

Mission Statement

The Danfoss High Speed Motor Test Stand Team is dedicated to work together in a positive environment through the entirety of this project. Each team member will always be respectful and professional with other team members. Each member will utilize his or her strengths in order to contribute as much as possible to this project.

Team Member Roles

Team Manager – Emily Simmons

The Team Manager will ensure that each team member is aware of his or her responsibilities through every stage of the design project. She will also make sure that all members are completing assigned tasks in a timely manner. The Team Manager is responsible for editing each deliverable before the submission deadlines. This includes all reports, presentations, and any other documents required by the project. Once the Team Manager has edited a deliverable, she will be in charge of submitting it on time. Lastly, the Team Manager will always inform the other team members of the project's progress.

Lead ME – David Balbuena

The Lead ME will be in charge of the technical part of the project. This includes data analysis, programming, and any calculations that need to be done. The Lead ME will be held responsible for these tasks even when the work is done by another team member. In the event that another team member does any calculations, the Lead ME will thoroughly check their work for correctness.

Design Lead & Communication Liaison – Jacob Quigley

The Communication Liaison will be the main contact between the senior design team and the sponsor. The responsibilities of the Communication Liaison are but not limited to ensuring that the wants and needs of the customer are well understood, ensuring that the sponsor is aware of the current state of the project, and providing the sponsor with feedback and answering/ finding the answers to any questions that may come up.

The Design Lead will be tasked with creatively designing a mounting stand for the torque transducer and its connections. The Design Lead will also ensure that the safety of the test stand is improved. All parts will be made by the Design Lead taking into account the machinability and cost of the process. All part drawings will be done by the Design Lead, and he will schedule drawing reviews with all team members before any submissions or purchases.

Financial Planner – McLaren Beckwith

The Financial Planner will be responsible for the supervision of the project's budget as well as maintaining a record of all of the relevant team purchases. All expenditures must be reviewed by the financial planner for approval. Pending approval, the planner is responsible for analyzing alternative products and verifying that the order is satisfactory. Once the transaction is complete, a record of the purchase must be created and maintained by the planner.

Web Designer – Charles Daher

The Web Designer will be in charge of creating the template for the 2017 High Speed Motor Test Rig website. He will update the website as necessary with information describing the project, project deliverables, and sponsor and team member information. He will make sure that

the website is easy to navigate, esthetically pleasing, and always up to date with the project's progress.

Organizational Chart

Team Member Names	Team Member Roles					
	Team Manager	Lead ME	Design Lead	Communication Liaison	Financial Planner	Web Designer
David Balbuena		✓				
McLaren Beckwith					✓	
Charles Daher						✓
Jacob Quigley			✓	✓		
Emily Simmons	✓					

All Team Members:

- Contribute equally
- Listen and be open-minded to others' ideas
- Provide constructive feedback
- Deliver on commitments

Communication

Communication between team members will be done in person on Tuesdays and Thursdays in class, through a group messaging app called GroupMe, and on Google Drive when preparing presentations and papers that we will all collectively be collaborating on. If a member of the team is having difficulty with communication, (i.e. not responding to messages/ not doing

their part) Jacob and/or Emily will be tasked with trying to effectively communicate the task at hand. If this is a continuous problem, it will be addressed with Dr. McConomy.

Communication between the senior design team and the sponsor at Danfoss will be done mostly through the Communication Liaison, Jacob. Verbal communications between Jacob and the sponsor pertaining to the project will be relayed to the team members using GroupMe. The Communications Liaison will also handle all emails and will be responsible for sharing the information to all group members.

Team Dynamics

Each team member will have their own responsibilities during the project. They are in charge of making sure their portion of the project is progressing in a timely manner and are ultimately responsible for making sure it is completed by the specified deadline. One of the most important things is that a team member should communicate with the team if they are having difficulty completing a task.

Ethics

The team will be adhering to the National Society of Professional Engineers' Code of Ethics. Team members are required to model their behavior to the highest standard of honesty and integrity for the benefit of the client, the team and the profession.

Dress Code

During presentations, team members will be expected to dress in business formal attire. Client meetings will be held in business casual attire. There will be no required dress code for routine team meetings. All dress code expectations are subject to change with a unanimous team decision.

Weekly and Biweekly Tasks

Weekly meetings will be held between team members during class time. In these meetings, the group will make sure all the team members are up to date on the progress of the project. Project updates and any new information will be discussed here. At least one meeting per week with all team members will be expected with strict attendance. The team will communicate with the sponsor biweekly, either in person or through Jacob Quigley. If needed the team will plan for more meetings depending on the project direction.

Decision Making

All decisions will be made together as a team. Ideally, in the event that two group members disagree, an intelligent conversation would be had including all team members, leading to a resolution. If there is still a disagreement, a vote would be taken amongst team members. We have an odd number of group members so this should solve the issue. In the unlikely event that only a certain amount of team members could vote and it resulted in a tie, the tiebreaker would go to whoever is leading that discipline. For example, if it were a discrepancy on the background color of the webpage, Charles would have final say since he is the Web Designer.

Conflict Resolution

If the team members have any discord, the following steps will be employed:

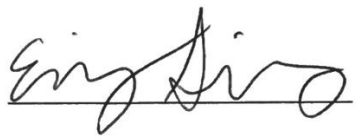
- Ideas will be discussed with all members to analyze the pros and cons.
- The leader of each department will decide what the final result will be.
- If needed, the team manager will intervene.
- Instructor will facilitate the resolution of conflicts.

Amendment Process

This code of conduct can be amended only if all team members sign off on the amendment.

Statement of Understanding

By signing this document, the members of the Danfoss High Speed Motor Test Stand Team agree to the code of conducts and understand its principles.

Name	Signature	Date
Emily Simmons		09/21/17
David Balbuena		09/21/17
McLaren Beckwith		09/21/17
Jacob Quigley		9/21/17
Charles Dahm		9/21/17