P11251 Preliminary Test Plan

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Project Advisor: William Nowak

Project Sponsor: Richard Kehn

1. Introduction

1.1. Team number 11251, is developing a side entry agitator test stand that allows the user to measure and calculate: axial and tangential components of fluid forces, torque, and impeller speeds involved on the impeller and shaft, incorporating a wide range of adjustable parameters. During the construction process of this highly innovative structure, many progressive tests need to be preformed to maximize team efficiency and allow extra time troubleshoot any issues as quickly as possible.

2. Scope

The sponsor has a test stand to measure loads from an impeller in a vertical orientation, but they do not have the ability to measure the loads from an impeller in a horizontal orientation. The side entry agitator test stand must be able to accurately measure the four load measurements identified by the sponsor. The load data must be correctly recorded and stored for further data analysis and for the evaluation/creation of design standards. Currently the method for defining the specifications is assumed using a crude factor to resist failure. The sponsor can greatly benefit from better understanding the science behind it and the effects on fluid forces from changes in the impeller's environment.

3. Test Strategy

3.1. Fluid Test: The fluid test will focus that the seal is watertight with reference to the tank and the shaft. This test will be preformed independent of the system.

3.2. Adjustability Test: The adjustability test will ensure that all components can move through their entire desired range of mobility. Subsystems will be tested independent of the assembled system.

3.3. Integration Test: This test will consist of taking the subassemblies and making sure the mating features lineup without the need for modifications. This test will be preformed once mating parts are received from the vendor and once features have been machined.

3.4. Calibration Test: The calibration test will not only test the features of the horizontal agitator test stand, but it will also test the feasibility of the identified calibration methods and the accuracy of our measurement devices.

3.5. Dry Static Test: The purpose of this test is to identify if the LabVIEW model is acquiring data from the test stand. Also, this test will determine if the test stand can hold a consistent zero reading without the dynamic changes.

3.6. Dry Dynamic Test: The purpose of this test is to ensure that the shaft does not reach its natural frequency and power measurements are being collected from the motor.

3.7. Wet Static Test: Once again, the purpose of this test is to identify if the LabVIEW model is acquiring data from the test stand. Also, this test will determine if the test stand can hold a consistent zero reading without the dynamic changes. This test also follows the fluid test and to ensure the system does not leak worse once it has been fully assembled.

3.8. Wet Dynamic Test: Now that the team is confident all subsystems are functional; a complete test will be preformed using an impeller with predicted force magnitudes for comparison.

3.9. Repeatability Test: After the team is certain data is being properly collected and processed, back-to-back tests will be preformed to test the repeatability of the stand's adjustability and data acquisition's repeatability.

4. Test Schedule

4.1. Fluid Test	**March 21-**	**April 01**
4.2. Adjustability Test	**March 28-**	**April 08**
4.3. Integration Test	**April 04-**	**April 08**
4.4. Calibration Test	**April 11-**	**April 15**
4.5. Dry Static Test	**April 11-**	**April 13**
4.6. Dry Dynamic Test	**April 13-**	**April 15**
4.7. Wet Static Test	**April 18-**	**April 20**
4.8. Wet Dynamic Test	**April 20-**	**April 29**
4.9. Repeatability Test	**April 29-**	**May 6**

5. Control Procedures

5.1. Reviews: The project team is responsible for a formal documentation of results following each test by the completion date identified.

5.2. Meetings: The team will meet at least once a week to discuss the progress of the components of the project and any concerns regarding dealines.

6. Responsibilities

Responsible Party	Listed Responsibilities
Kurt Lutz/ Project Manager	Responsible for project schedules and communication between group member and the sponsor, while constructing and troubleshooting the Axial and Tangential Measurement Structure in parallel. Each team member as a whole is responsible for system integration and system testing.
Dennis Beatty	Responsible for constructing and troubleshooting the sealing system and independent testing. Each team member as a whole is responsible for system integration and system testing.
Greg McCarthy	Responsible for constructing and troubleshooting the shaft/motor/impeller integration and independent testing. Each team member as a whole is responsible for system integration and system testing.
Daniel Geiyer	Responsible for constructing and troubleshooting the torque and RPM measurement system and independent testing. Each team member as a whole is responsible for system integration and system testing.
Joseph Bunjevac	Responsible for constructing and troubleshooting the physical stand and independent testing. Each team member as a whole is responsible for system integration and system testing.
Customer (Richard Kehn)	The sponsor is responsible for supplying the team with access to their facility during the assembly/testing phase. Also, the sponsor is responsible for providing the project with a room to setup the test stand for testing.

7. Deliverables

Deliverable:	Responsibility:	Completion Date:
Fluid Test Review	Dennis Beatty	April 1, 2011
Adjustability Test Review	Joseph Bunjevac	April 8, 2011
Integration Test Review	Team (Joseph Bunjevac)	April 8, 2011
Calibration Test Review	Kurt Lutz/PM	April 15, 2011
Dry Static Test Review	Team (Daniel Geiyer)	April 13, 2011
Dry Dynamic Test Review	Team (Greg McCarthy)	April 15, 2011
Wet Static Test Review	Team (Dennis Beatty)	April 20, 2011
Wet Dynamic Test Review	Team (Kurt Lutz)	April 29, 2011
Repeatability Test Review	Team (Daniel Geiyer)	May 7, 2011