Pipeline Cleaning Comparative Testing

Overview
Galaxy Brushes manufactures cleaning brushes for the pipeline industry. They make "pencil brushes" using their patented design along with the industry standard "flat wire brush". They tasked the team with designing and building a test rig, generating a testing protocol, and determining the effectiveness of the two types of brushes in cleaning a pipeline.

Objectives
The team designed and fabricated a test rig that can compare the effectiveness of different types of pipeline cleaning brushes. The team also compiled test data using the rig and the testing protocol to determine which brush cleaned more effectively.

Approach
- The team met with the sponsor to determine the needs for the test rig, and how it could effectively model the conditions seen in a real world pipeline. A slurry was also decided upon by the sponsor and the team to mimic the conditions seen in a real world pipeline.
- With the objectives and needs determined, a test rig was designed and modelled in Solidworks. Standard parts were selected to purchase, and custom parts were dimensioned in a way to minimize machining time and cost.
- All of the components were purchased or fabricated so that he team could build the test rig shown in Figure 1 below.
- The team developed a standardized test protocol to both qualitatively and quantitatively compare the conditions and slurry thicknesses in the pipe before and after each test run.
- The team ran tests with both the pencil and wire end brushes. Once all of the data was compiled, the team averaged the results of different speeds to find out which brush was overall more effective at cleaning the pipe.

Outcomes
The team found that Galaxy's Pencil Brushes cleaned 5% better than the industry standard wire brushes. They also found that at low speeds of roughly 4 to 5 MPH, the pencil brushes cleaned over 20% better than the wire brushes.

The team also successfully gave Galaxy Brushes a working test rig and test protocol that can be used in the future and is easily customizable. This allows for the testing of new designs in shop and saves the sponsor time and money in the future.

Figure 1: Final Test Rig Designed and Constructed by Students