

Design Matrix of Chain Drive Apparatus

Objective:

- To develop an accurate and reproducible Power Curve of a Tidal Turbine by designing and fabricating a testing apparatus.

Method:

- Began with creating a design matrix of the qualities the apparatus must possess.
 - Ease of Mounting to Dynamometer
 - Sensitivity in Shaft – Reduction of Frictional Losses
 - Hydrodynamics of Apparatus – Turbine Mounted behind Keel
 - Strength and Vibrational Resistance of Keel
 - Collects Power and Drag Data
 - Survivability
 - Accessibility of components
 - Manufacturability
 - Cost

Preliminary Designs:

Chain Drive Connection

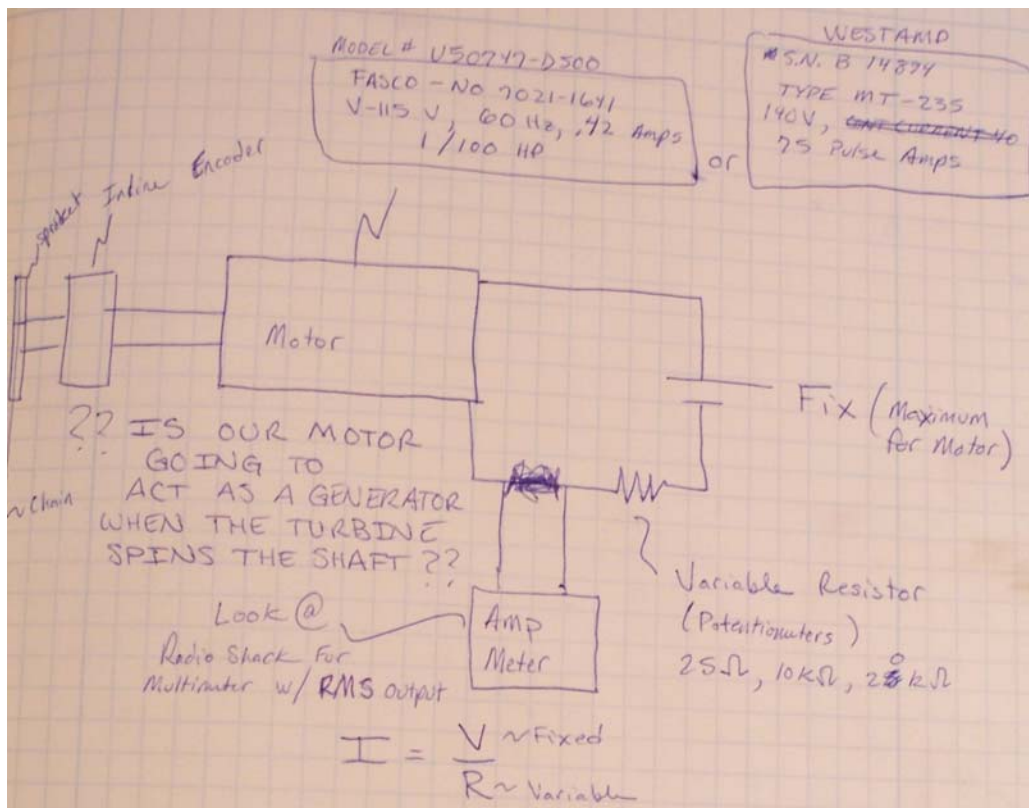


Figure 1: Motor Assembly on Dynamometer

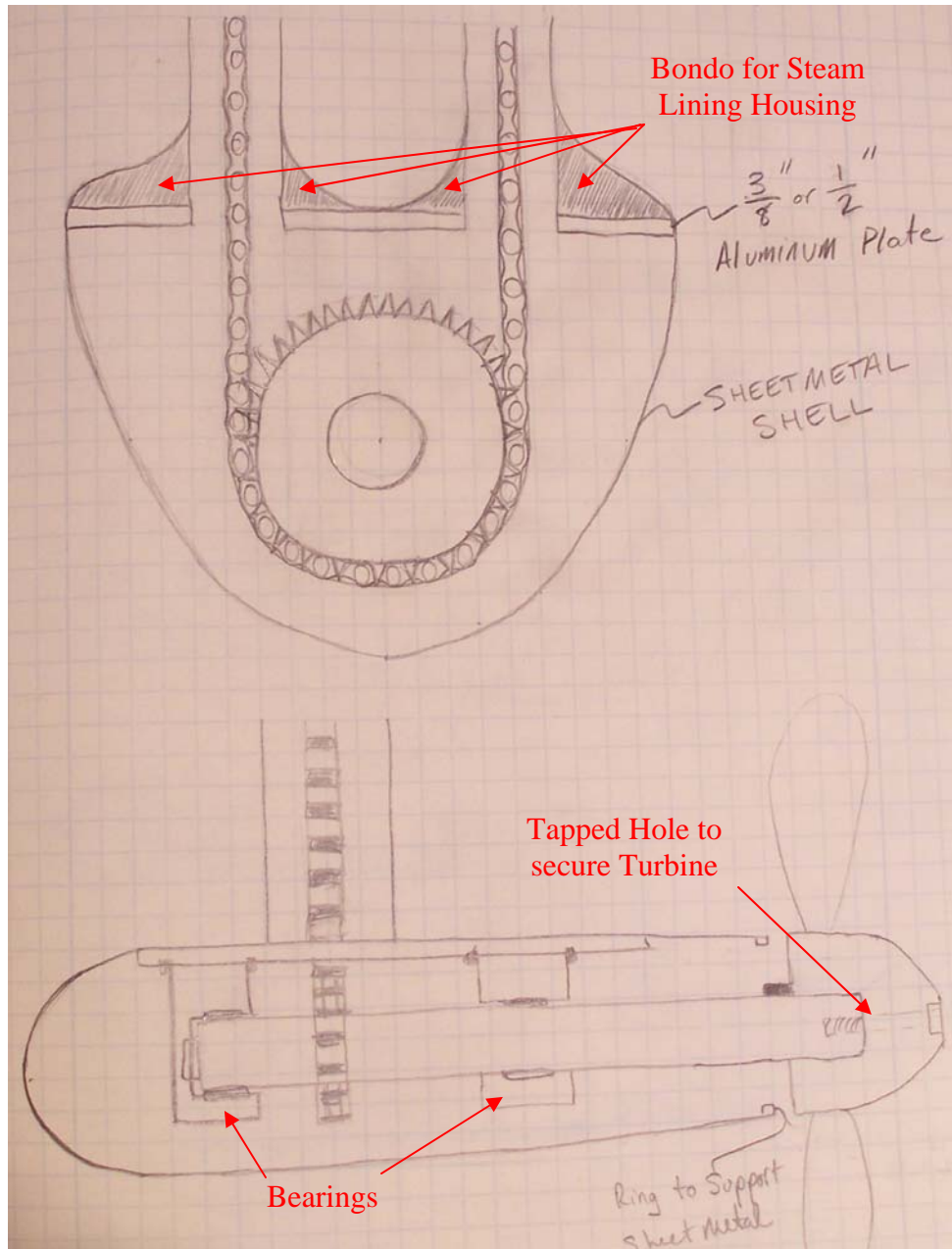


Figure 2: Underwater Housing of Chain Drive

A chain drive was used for its high efficiency (91-94%) in transferring energy from one rotational shaft to another. This allows for the electrical components to be above the water along with not having high tolerances in aligning the sprockets on the shafts. We chose a 1:1 gear ratio to begin testing, however if the speeds of the turbine is different from the expected calculations we will resize a sprocket to optimize the speed of the shaft for the instrumentation. The turbine is also downstream of the keels due to the change in the flow's velocity profile as the water passes through the blades of the turbine. This will reduce vibration from irregular flow passing over the keel, enable us to capture the velocity profile after the turbine, along with allow us to setup a series of turbine apparatuses.