# **Centrifugal Impeller Water Pump** TUS David Ryan, Emils Zitars, Dan Tighe, Dara Nagle

# Aim of the Project

The Aim of the project is to design, build and test a non-submersible centrifugal impeller water pump. The pump had to empty a 5L tank as quickly as possible

### Background

Water pumps were used throughout history to move water in irrigation systems for farming and for pumping fresh drinking water.

There are three types of impellers, Closed, open and semi-open and numerous positions that the inlet and outlet can be placed. Some variations are better suited for achieving high pressure and some are better suited for high flow. An open impeller is better for liquids with high viscosity for example.

**The Centrifugal Pump** 

(Radial-flow turbomachines)

(a)

or volute

(*b*)

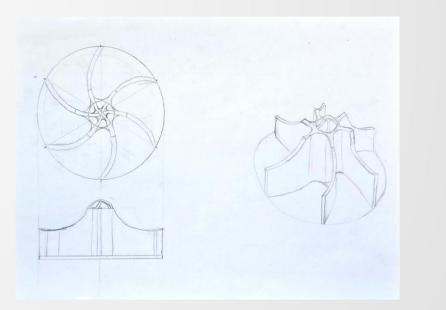


Figure 1: Initial Sketch of the impeller

This was the design we decided to use for the impeller and housing after several variations and changes were made throughout the weeks. It is a semi-open design with six curved vanes. These designs were then copied onto SolidWorks where improvements were made to both make the pump easier to manufacture and to improve efficiency. CAM models also had to be made for the impeller and base.

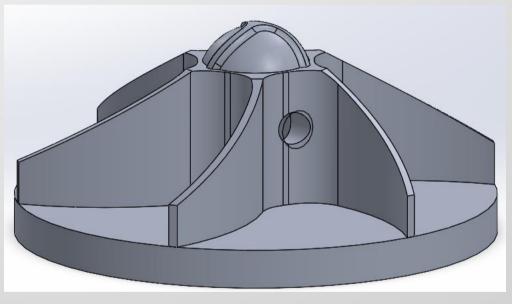
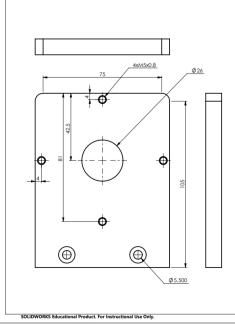
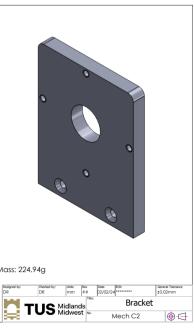
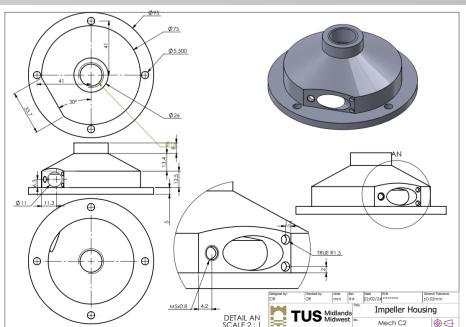


Figure 3: SolidWorks Model of Impeller

The SolidWorks models above show the final designs for our pump. Next drawings were made, and the manufacturing process could begin.







### **Design Process**

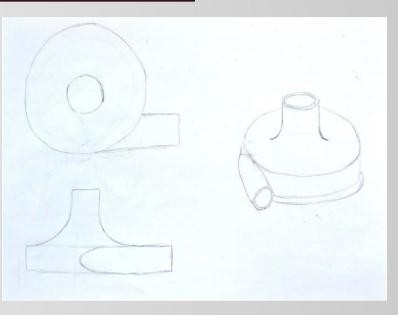


Figure 2: Sketch of Impeller Housing

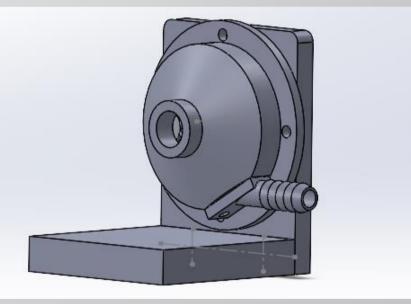
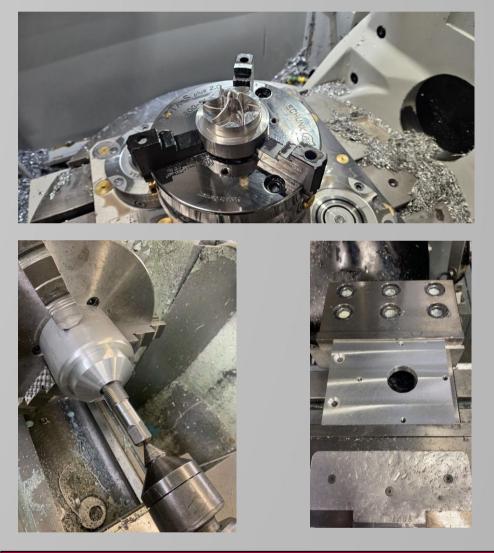


Figure 3: SolidWorks Model of Impeller Assembly

# Manufacturing

The manufacturing process took place in the workshop. For the impeller, it was first turned down to size in the lathe before the fins were cut on the spinner. The housing was also made on the lathe where it was turned down inside and out and the inlet hole was drilled and tapped. Then it was transferred to the mill where the rest of the holes were drilled, and the flat was milled onto it.



## Conclusion

At the time of writing this all components are fitting together as they should, and we are on schedule to have the project completed on time. Some redesigns had to be done throughout which was expected yet we were never under pressure to complete it due to the relatively simply yet effective design in comparison to other groups.