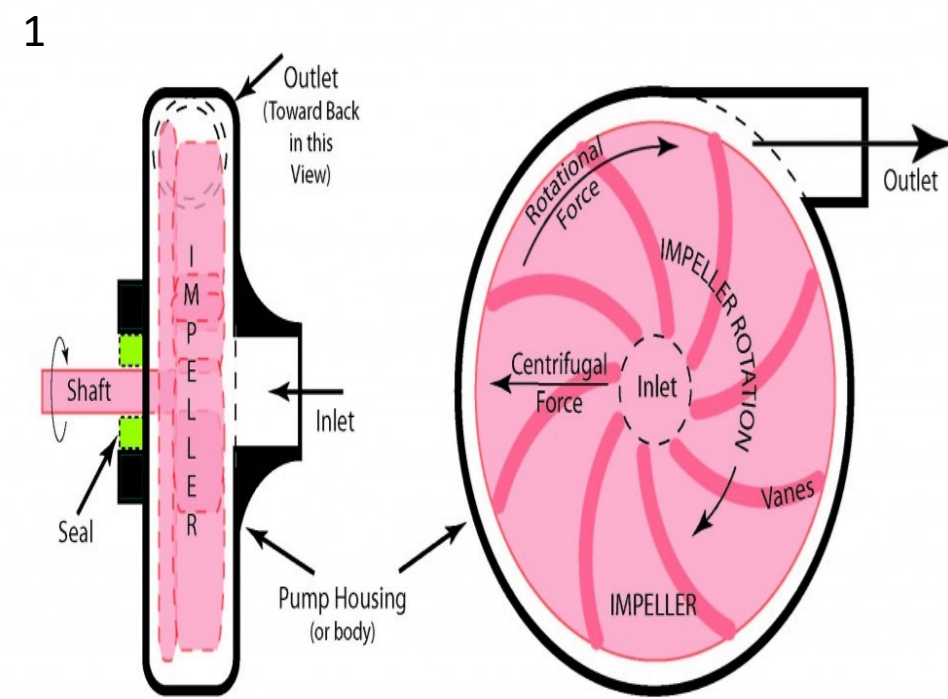


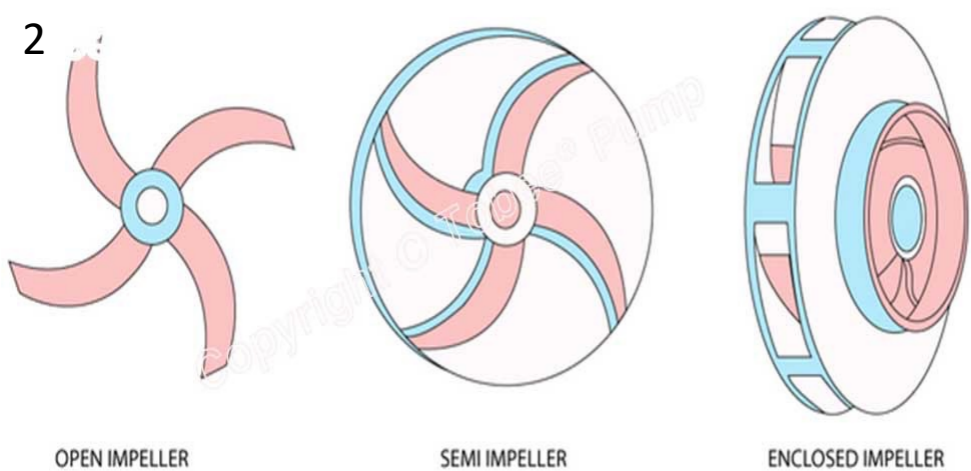
Aim of the Project

The aim of the project is to design and manufacture an Impeller Water Pump. The Impeller must be 55mm in diameter and we must test its capabilities by recording the time it takes to empty a 5-litre tank.

Background



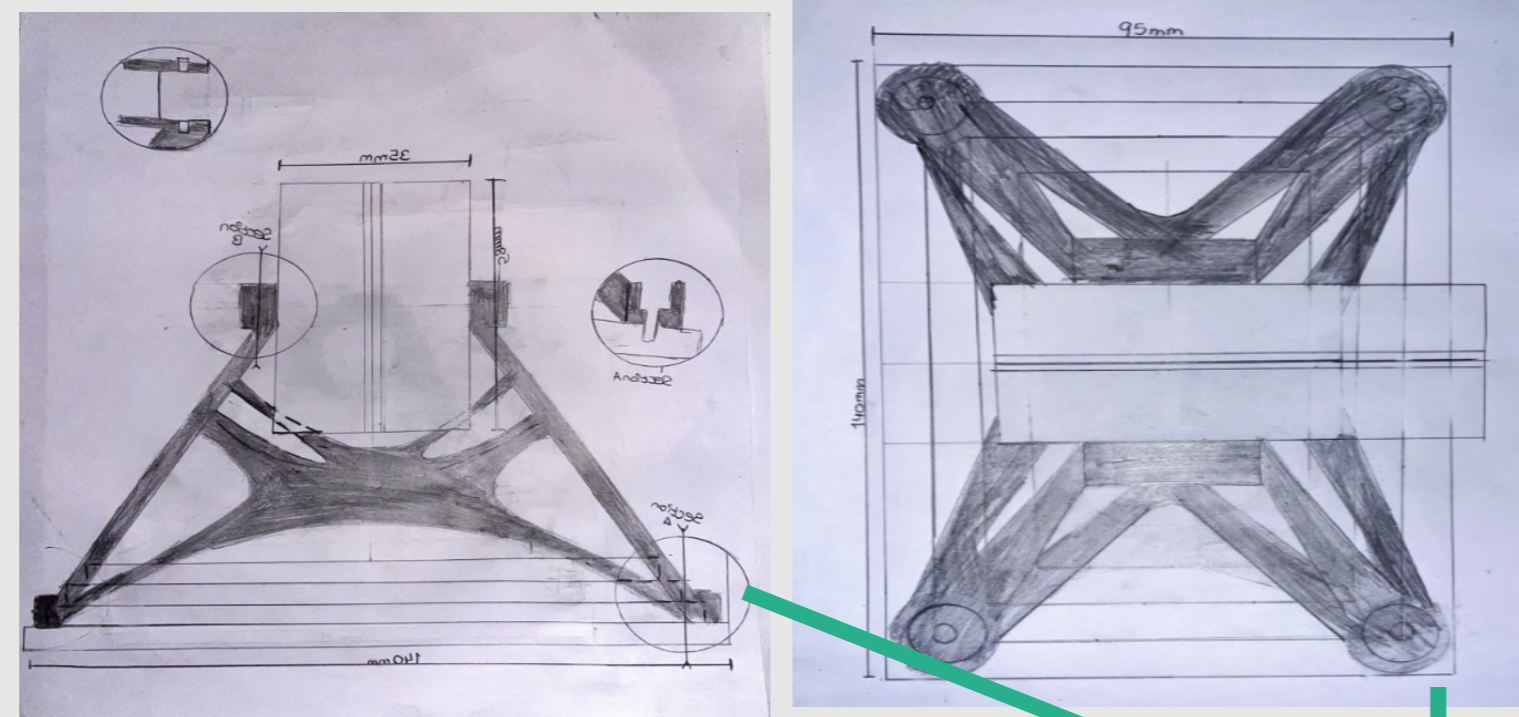
An impeller pump is a type of pump that uses a rotating component called an impeller to increase the pressure and flow of a fluid. As the impeller rotates, it creates centrifugal force, pushing the fluid away from the centre and towards the outlet of the pump. This action helps move the fluid through the pump and into the desired system or application.



There are 3 main types of impellers. Open, Semi-open, and closed. Our team chose the semi-open impeller because of its efficiency and it's not overly complicated to be manufactured.

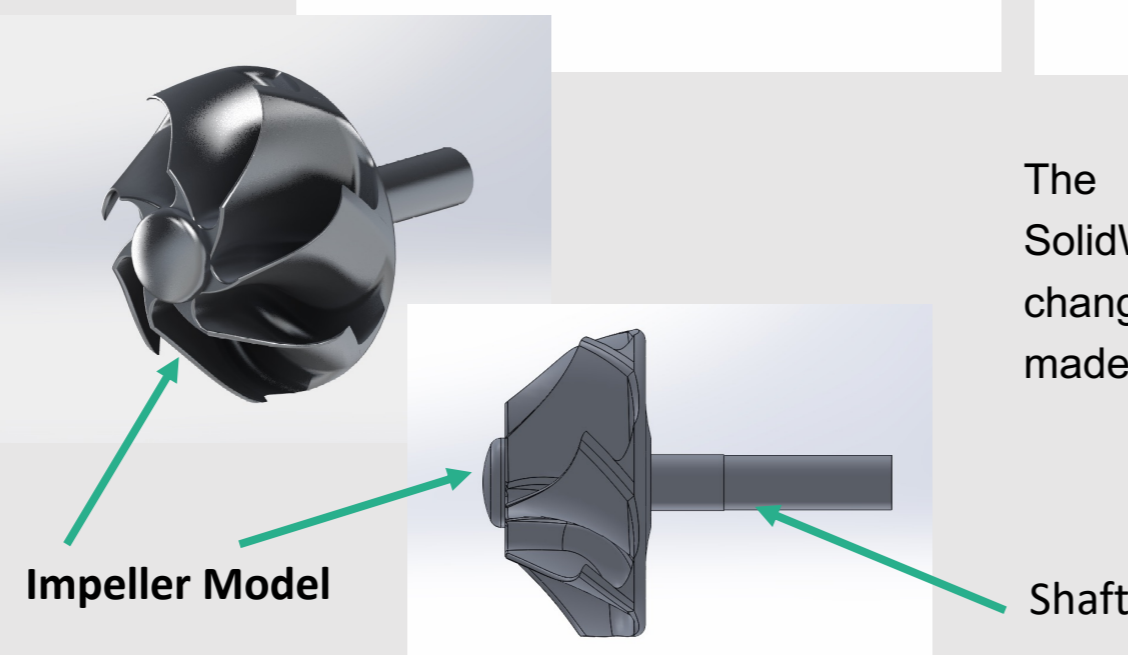
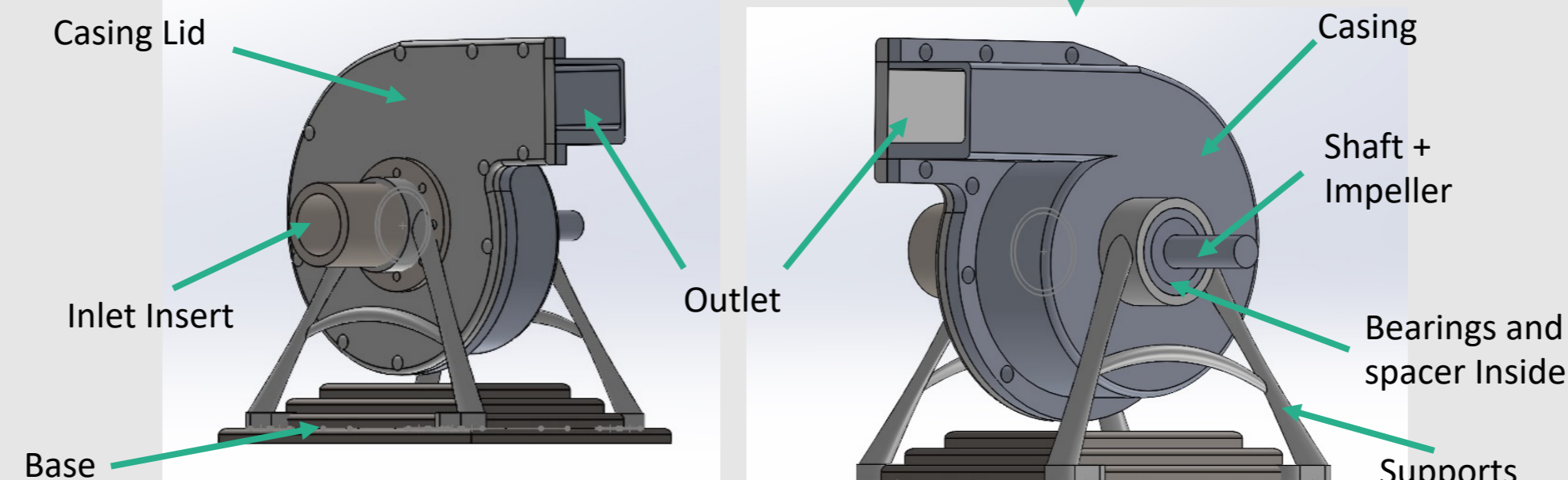
Design

Final Design



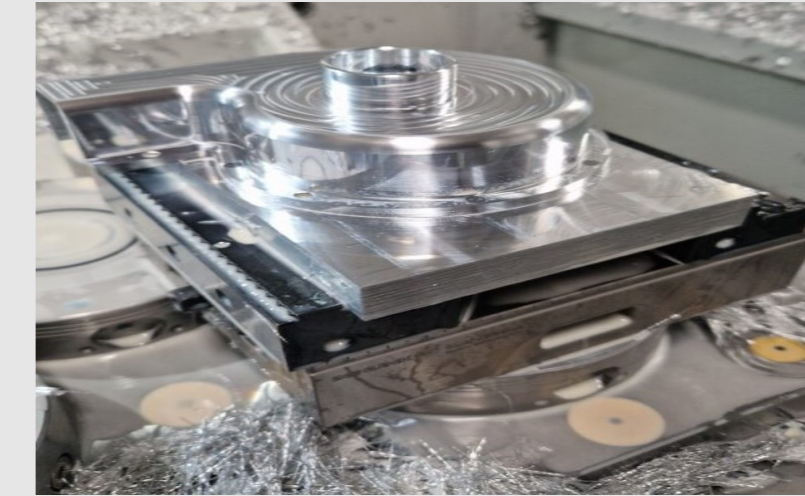
Three concept sketches were created. The design above was the final iteration as it satisfies the design requirement. This design was made into a SolidWorks Model.

SolidWorks Model



The final iteration was used to make the SolidWorks Model but had to make last minute changes to the design. A transparent lid must be made for the casing.

Making of Parts

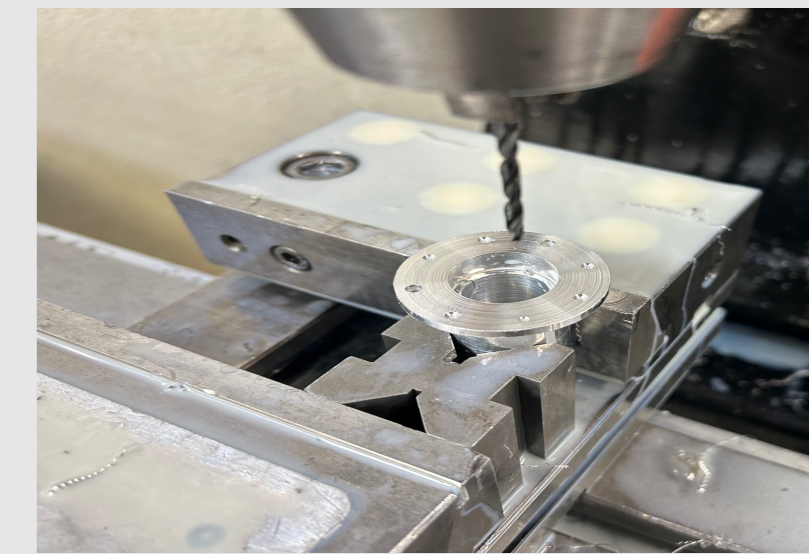


- The base was made on the milling machine.
- The casing lid was laser cut.
- The inlet insert was made on lathe and milling machine.
- The supports were 3D printed.
- A spacer for the bearings were made on the lathe.

Our team chose the casing and the impeller to be CNC.

The casing was machined one side first (internal) and then flipped around and bolted to be machine (external).

The impeller and the shaft is combined. The shaft was cut to size in the workshop before the impeller was CNC.



Conclusion

- ☐ CFD (Computational Fluid Dynamic) analysis should be used during the process of designing the impeller for a more efficient impeller.
- ☐ Accuracy is very important when making the impeller pump. The inlet insert, casing lid, casing, supports and the base must be perfect dimension or else it won't fit together. Greater accuracy could have been met ensure a more successful assembly.
- ☐ Time management is essential for the success of any project. Our time management was ok but not the best, by creating a detailed project plan with clear timelines, milestones, and deadlines, our team can stay on track and deliver results efficiently.

References

1. Fuchs, J., 2012. *Pumps – Centrifugal Pumps*. [Online] Available at: <https://techblog.ctgclean.com/2012/02/pumps-centrifugal-pumps/>
2. Tobee, 2024. *Slurry Pump Impeller Types*. [Online] Available at: <https://www.slurrypumpsupply.com/news/slurry-pump-impeller-type.html>