

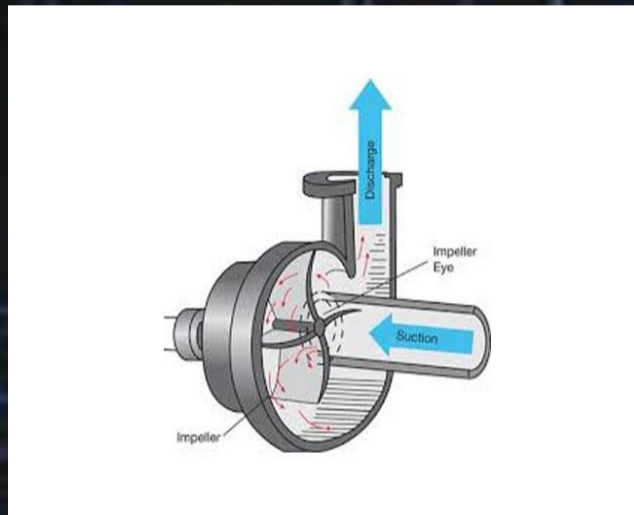
Design & Manufacture a non-submersible impeller pump

Team A1- Brendan Donaghy, Ciara McDonnell, Michael Cross, Cathal Cullinan

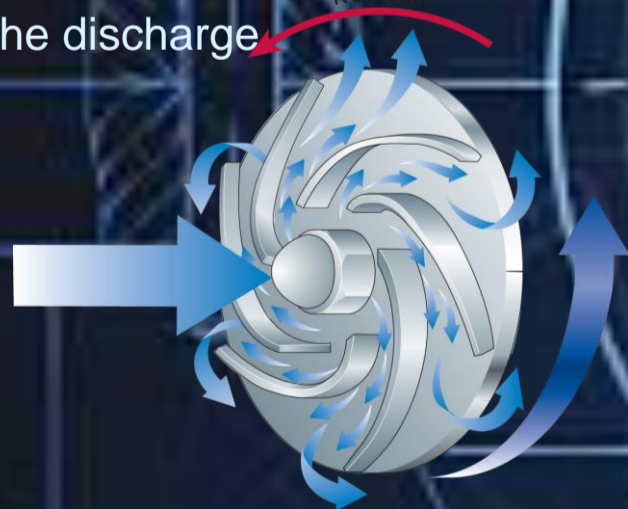
Aim of the Project

The Aim of the project is to design and manufacture a non-submersible impeller pump with the group specific issued impeller diameter, our groups issued diameter size was 52mm

Background



Impeller pumps work off the principle of positive displacement. By turning the impeller creates a region of low pressure at the center of the blade generating suction through the intake and inversely creates a region of high pressure at the periphery of the blade witch in turn produces the discharge.

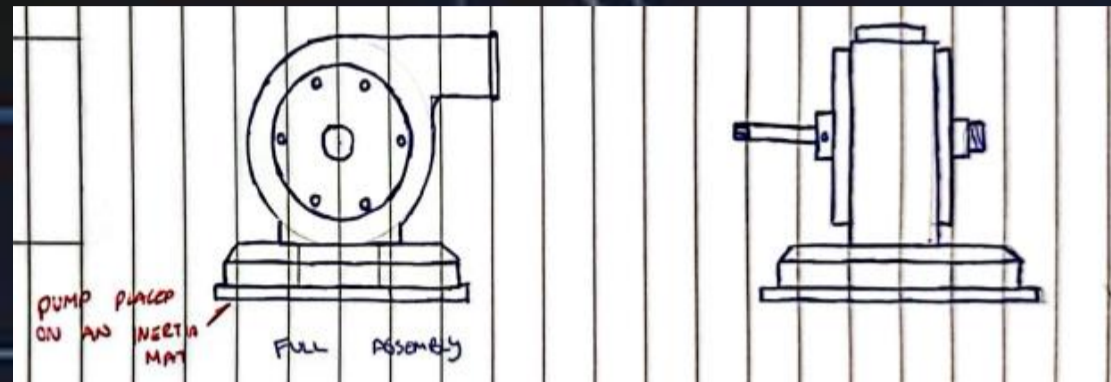


Acknowledgements

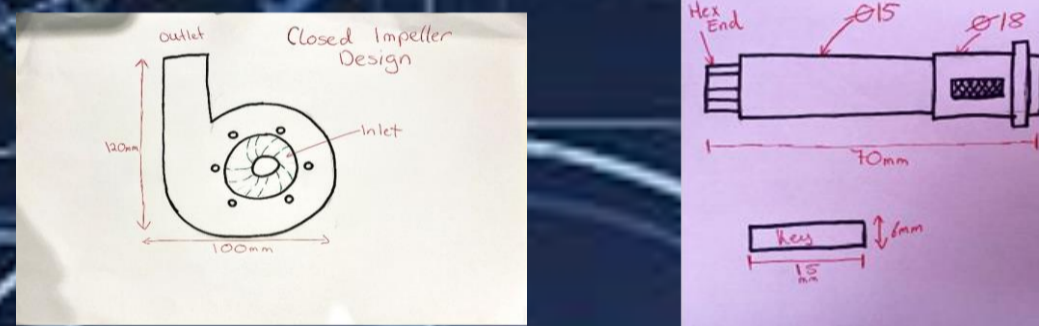
The team would like to thank our lectures who provided assistance throughout the project to the design/manufacture elements & the abundance our questions we sent their way:

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Ger Moynihan Dr. Emma Kelly

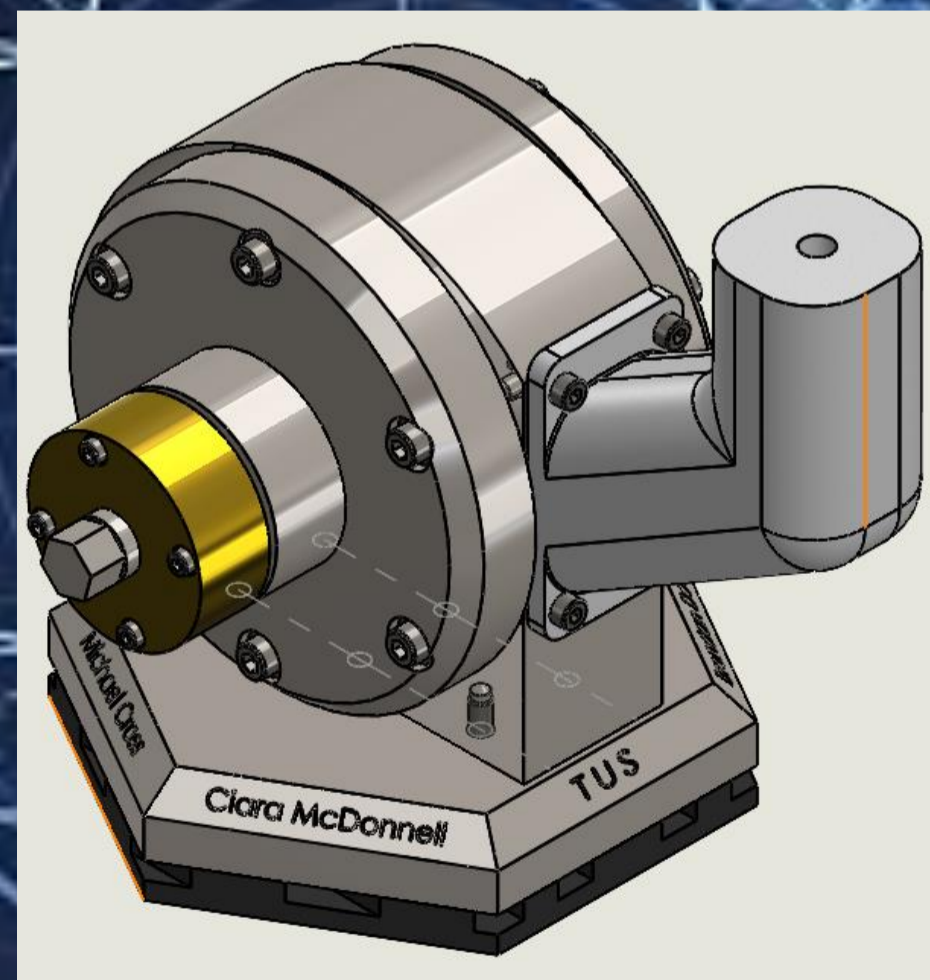
Concept Designs



Three concept were produced during the design process. The first design fulfilled the brief the best with the inclusion of the idea of a vertical outlet from the second design to allow for the pump to be primed more easily

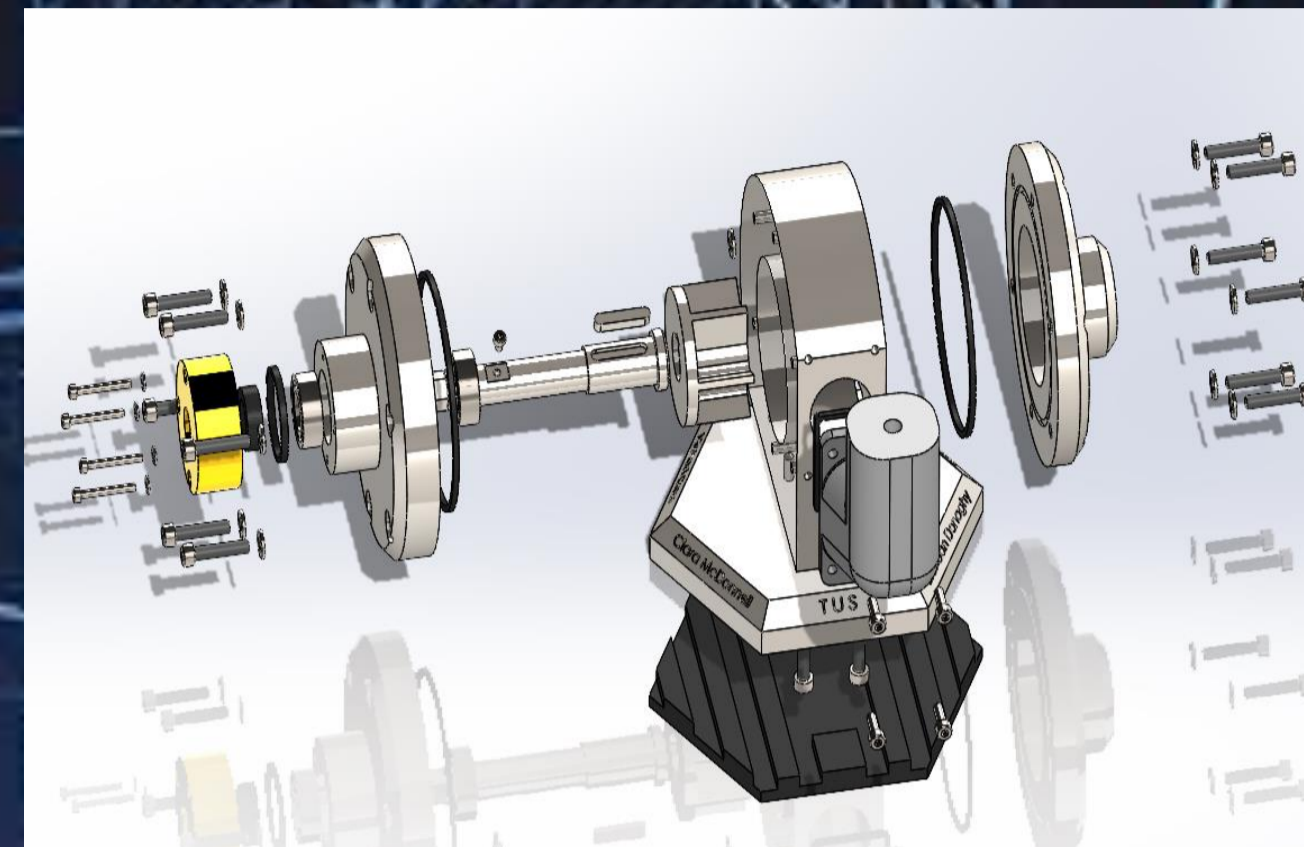


Final Design



The final design was generated with the inclusion of the vertical out being 3-D printed to satisfy all the brief requirements whilst also helping the problem of manufacturing a tricky piece that could've needed to be redesigned for manual manufacturing processes.

Exploded View



Parts manufacturing



The pump casing had to be mounted at a 30 Deg angle to allow for the boring of the out, angle blocks were used to ensure the correct set up

Due to the volute hole being off center to the casing the piece was mounted in the mill and zeroed to volute center. A boring head was then use to take out the correct amount of material.



Materials

- Bearings are stainless steel and sealed to prevent oxidization.
- O-rings are nitrile rubber which has good compression and abrasion resistance and is waterproof.
- An inertia mat is placed underneath the base of the pump to help reduces vibrations and to prevent the pump for slipping from the mounting location.
- The shaft cap is made from brass a non-oxidizing metal.
- The casing & its covers are made from aluminum a lightweight and non-oxidizing metal.
- The 3-D printed outlet is created from a carbon base PVL plastic.

Conclusion

This project came with a lot of challenges. The designing of a non-submersible impeller pump on the surface proceeded quickly at the beginning stages however once the group realized that the design necessitated a manual manufacture first mentality as outlined in the brief a lot of redesigning was required in order for the team to produce the parts in the workshop classes allocated. Another major factor was time, again this required a fair amount of redesigning as a decent quantity of ideas had to be altered to fit into the time constraints imposed.