

# Design of Water Impeller Pump (Mech 2B)

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### Aim of the Project

The Aim of the project is to produce a fully functioning water impeller pump that is capable of emptying a 5 litre tank of water as quickly as possible. The team must work well and efficiently to be able to design and produce the water impeller pump before the deadline.

### Background

Compressing, moving, or transferring water from one level to another is done with a water pump. A water pump's main tasks are to move water between two different places and to remove excess water. It is frequently used in residential buildings, tunnels, riverbeds, and construction sites.

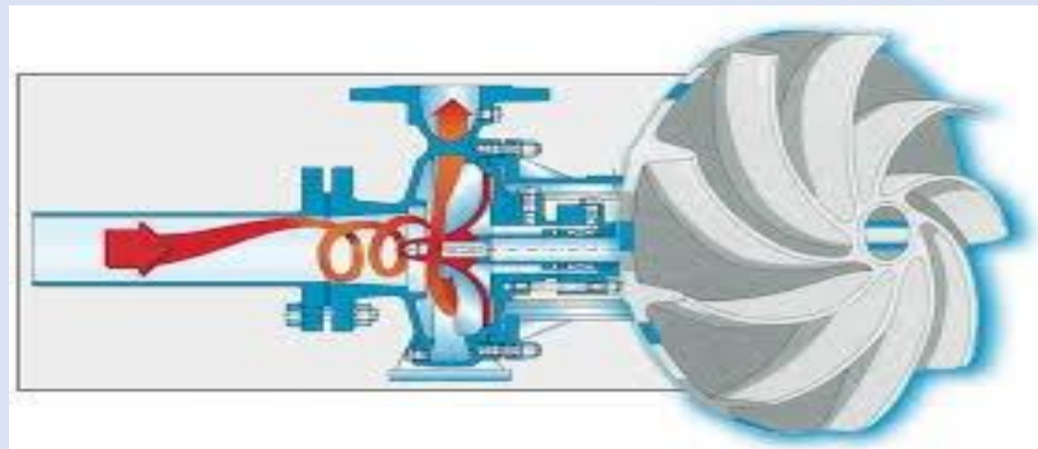


Figure 1: Simplification of how impeller pump operates

The main water pump components for almost every basic water pump include, the hub/pulley the body house, bearings, and the impeller. An impeller pump's efficiency is determined by a number of factors, including the pump's specific speed, shape, and vanes' spacing inside the impeller.



Figure 2: Water Impeller Pump

### Design

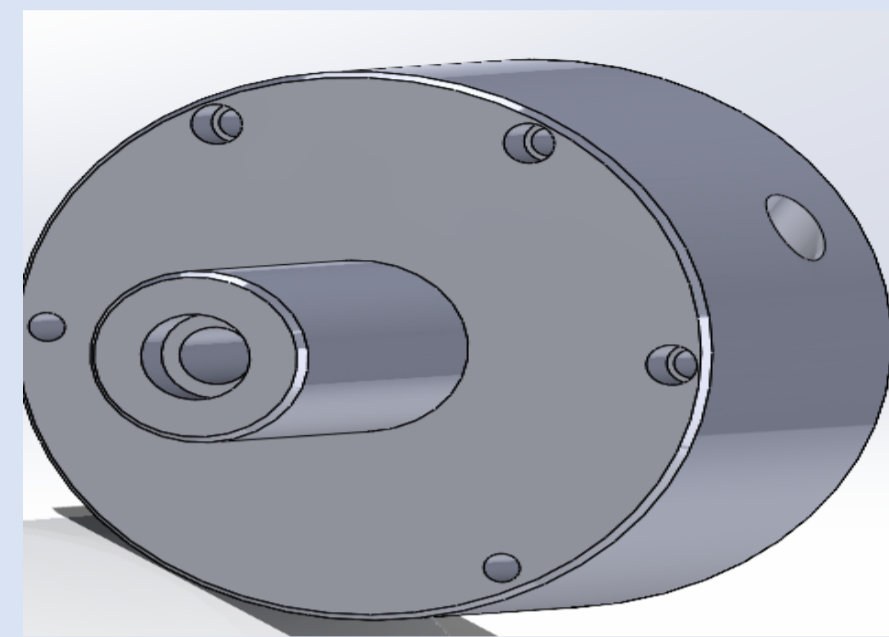


Figure 3: Design of Main Casing Body

When designing the different parts for the water impeller pump, there was a lot of changing different aspects of each individual part so that they would all assemble together properly and be able to carry out their function efficiently. The 2 parts that the team found most challenging for the design was the main body casing and the impeller. The Casing was difficult as it was hard being able to make sure the outlet position for impeller was correct and that the casing would fit well in stand and assemble right with other parts. The impeller was also a challenging enough part as the team wanted to make sure that it would fit nicely in the casing and bearings and do its function of emptying water as quickly as possible to a high standard. The team created a nice semi open impeller with 5 curved vanes and a dome shape at centre to help impeller with its performance as the water hits off against it.

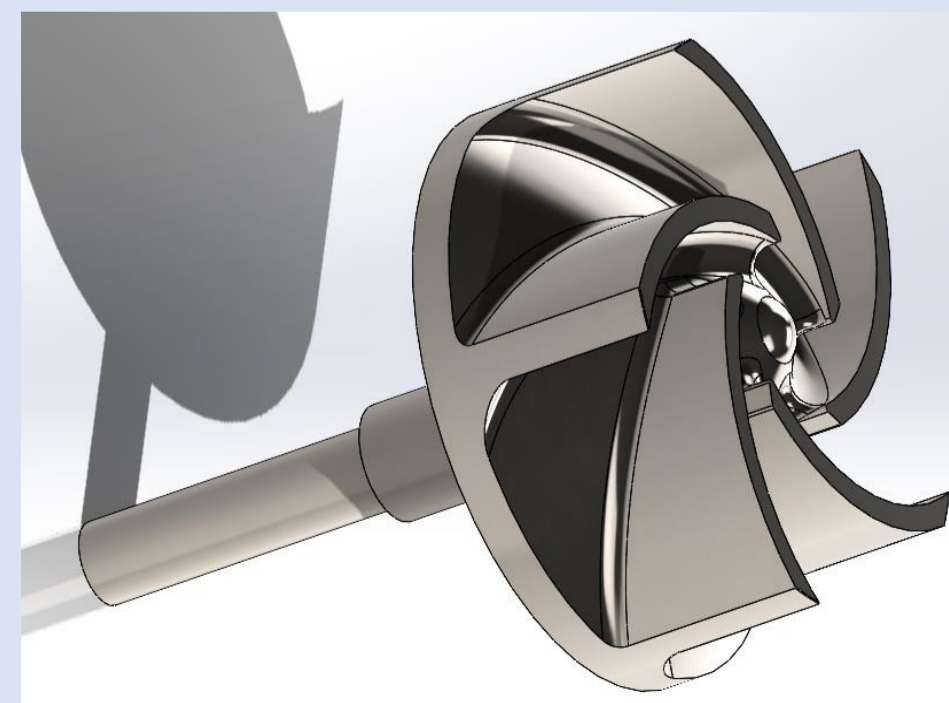


Figure 4: Design of Impeller and shaft

### Manufacture & Assembly

For manufacturing the different parts for the water impeller pump the team did 2 the parts (face of impeller and stand) in the CNC room using Solid Cam as software for being able machine to high precision using a Spinner U – 620 to physically produce the parts. The front of impeller took 47 minutes to be machined while the stand took considerably longer at roughly just over 2 hours due to the large amount of operations required to complete it.



Figure 5: Making of Impeller

The team then produced 3 parts (shaft of impeller, Casing cover plate and main casing body) in the workshop using various machines like the lathe and milling machine to be able to produce the parts. The team also decided to 3D print the outlet part for the project as at least one of the parts produced was required to be done by a 3D printer. The team then also ordered 2 types of bearings, a gasket, a seal, nuts and bolts for the assembly of the project through the website [ie.rs-online.com](http://ie.rs-online.com)



Figure 6: Cutting of outside diameter of Main Casing

### Conclusion

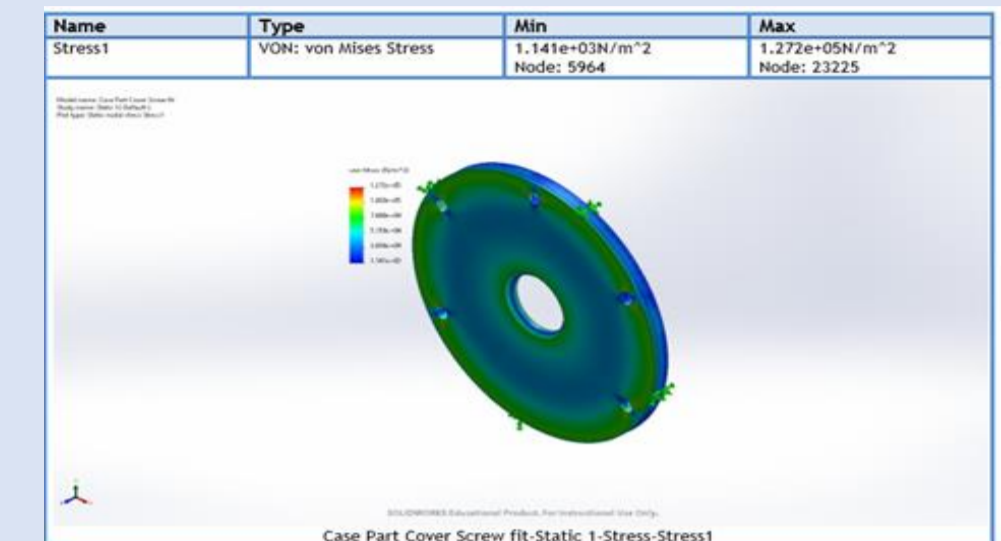


Figure 7: Simulation of Casing Cover Part

Overall, the team was happy with how the water impeller pump turned out for a finish. The team thinks that the design is appealing and that it performs out its function to a high standard. If the group was to do project again we would have made the case cover part out of clear Perspex plastic so that people would be able the impeller operating and pushing water out of the casing but overall we are happy about how we all performed, especially when we were down a group member.

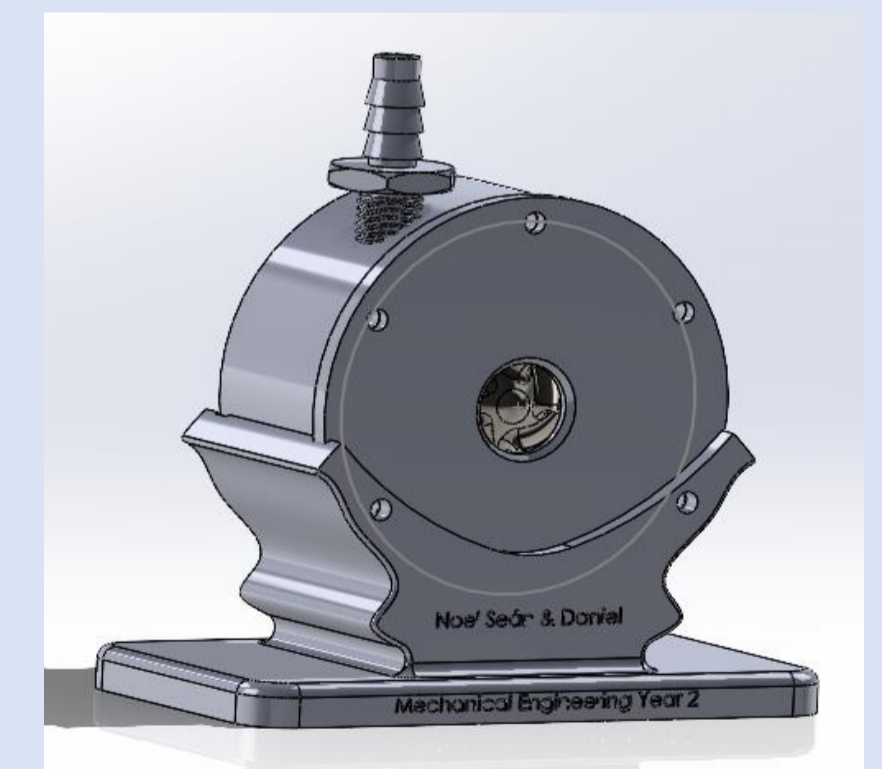


Figure 8: Finished Assembly design on Solidworks

### References

- (n.d.). *Centrifugal Pumps*. file:///C:/Users/roche/Downloads/master-36-module-5-Centrifugal-pump-types.pdf.
- <https://www.crompton.co.in/blogs/pumps/water-pump-working-and-types/>. (n.d.). *What are water pumps and how do they work?* Crompton.