

## Aim of the Project

The aim of the project is to design, manufacture and test an Impeller Water Pump. The Impeller Pump should have a design that is well planned, logical and works efficiently when being tested. The design needs to be manufactured coherently with the plans to achieve the best results.

## Background

What is an impeller pump? The main purpose of an impeller water pump is to increase the pressure of the water passing through it. Simply put, the water flowing through the outlet is at a higher pressure than the water entering the system through the inlet. So, what happens inside? Inside of any design for an impeller pump there are parts that will be used for rotating around the centre point. These are called vanes. So, while water is entering the inlet, these vanes will rotate causing a centrifugal force which in turn acts on the water. This force causes the water to be pushed from the centre to the edges of the pump's internals and in turn, out through exit or the 'outlet.' The high-pressure water now exiting the pipe may be used to power or help move many different applications.

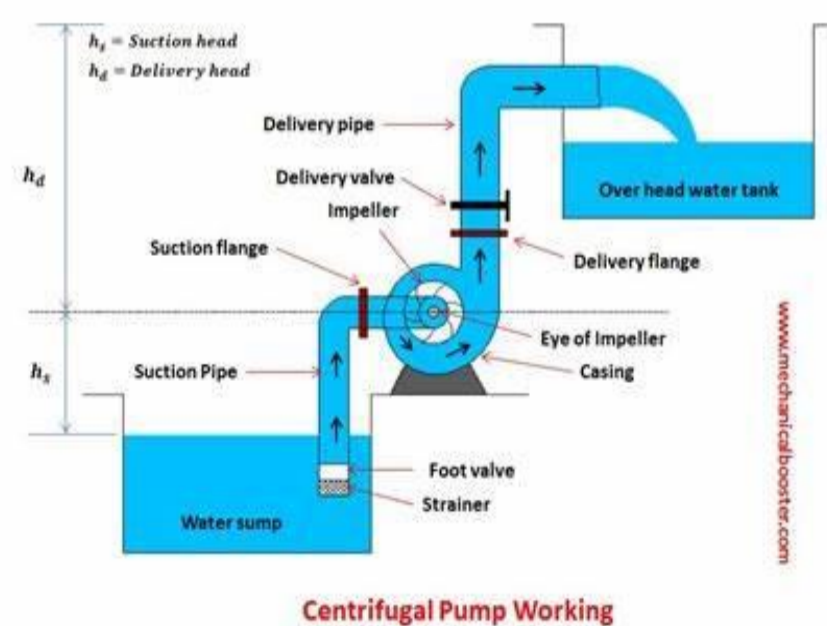
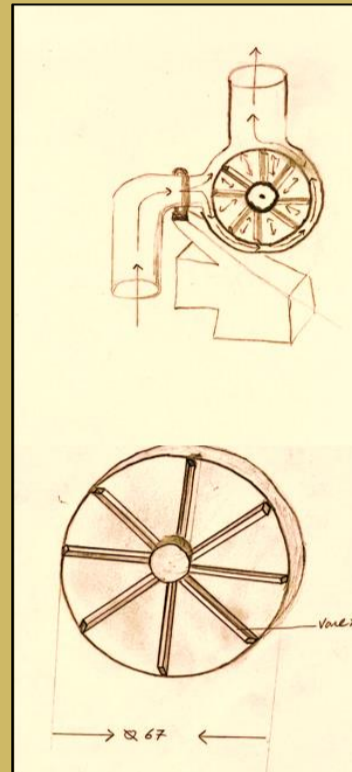


Figure 1: The infographic above shows how the pumps pressure increasing ability is being applied to help elevate the water

There are three different types of Impeller water pump designs. They all have their own pros and cons. Our group chose a semi-open design as we found it to be the best balance of efficiency and effectiveness during our research.

## Design Period

Here are a few sketches created early in the projects design period. As you can see, we wanted our pump to be strong and reliable, but we didn't quite yet know how to make it as such. Further sketching and discussion allowed for us to improve on our designs as time went on



We used many ways to help improve upon our designs such as this table on the right. We came to agree on removing certain designs when we scored them side by side on different, important aspects.

	Design Idea 1	Design Idea 2	Design Idea 3
Criteria 1 (Pressure delivery)	4	5	4
Criteria 2 (Efficiency)	3	2	5
Criteria 3 (Cost to manufacture)	4	3	2
<b>Total</b>	<b>11</b>	<b>10</b>	<b>11</b>

All the discussing about what our final design would be payed off in the end. We now knew exactly how to tackle designing our project on solid works because we all had a clear idea of what we wanted. Of course, we still ran into problems, so a few changes were needed during the modelling process but when it was all done, we were confident going on to manufacture our pump.

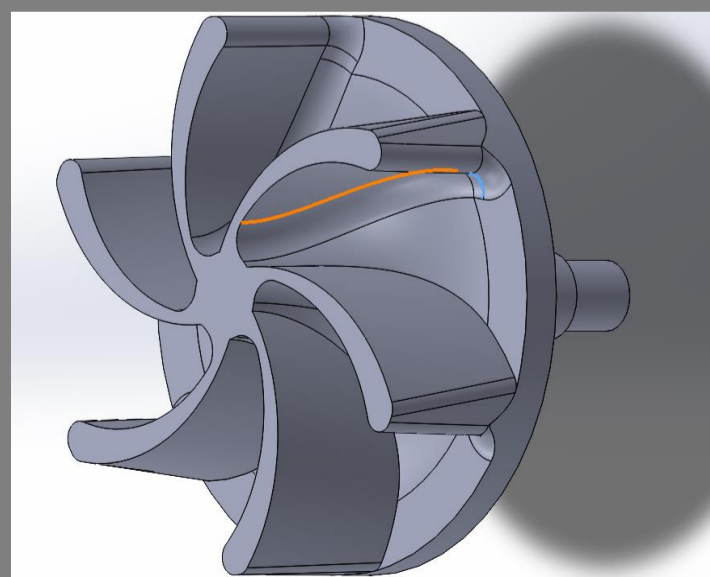


## In the workshop

We ordered the stock pieces  
We split the work into three  
We CNC'd the impeller itself and the base including the engraving while the shaft brackets and casing were machined on the lath and mill



Photo of: Brian milling the base plates



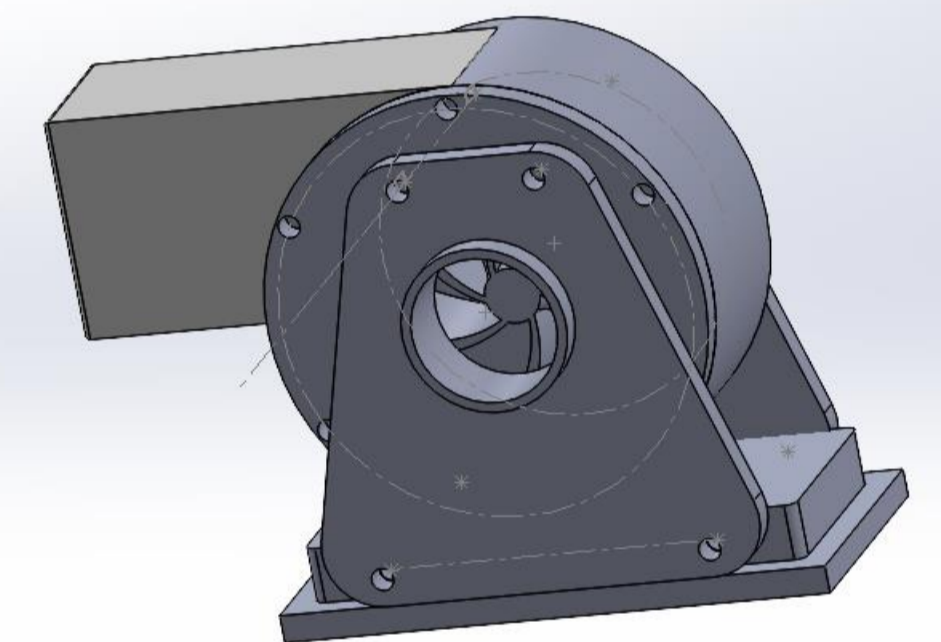
Snip of: impeller blades to be CNC'D



Photo of: Axis piece being machined

## Conclusion

The creation of the impeller allowed for a true insight into the engineering design and production process. From the cad and design side there were challenges such as creating parts which could be machined and from the manufacture and cam side such as having to for the first time decide how to mill and turn pieces without guidance from lecturers as well as programming the cam too be able to be manufactured on the spinner-U620 in the CNC lab.



## References

All photos and writing is the creation and intellectual property of our team  
Any academic sources outside of our own creations are exclusively in the report and are mentioned as needed