Impeller Water Pump Project C1

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Aim of the Project

The Aim of the project is to design, build and test a Impeller Water Pump

Background

We were tasked with designing, manufacturing and testing a Centrifugal impeller water pump.

The final goal of this project is to produce an impeller pump that can pump and empty a 5 litre tank of water. With this knowledge we tried to make the impeller pump as efficient as possible.

Before Christmas, we completed a presentation to our lecturers a bout our design. This presentation was to be preformed as if we were working for an engineering company and we are presenting our ideas to our superiors.

A detailed report of the design and manufacture process was being filled in along the way to document our continuous work.

We used our engineering skills that we had learned from our other modules throughout the year to design and manufacture this project.

These skills included: CNC Work, manual machining, Solidworks modelling, SolidCam programming and 3-D printing for example.

Design

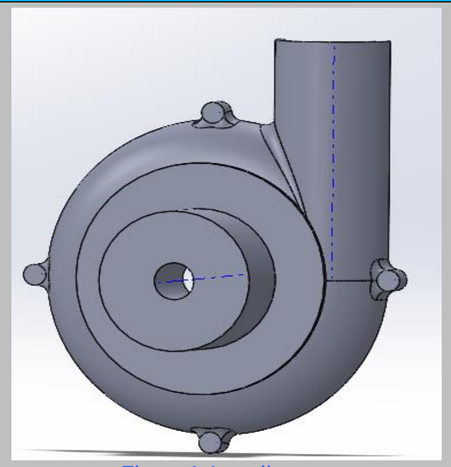

Figure 1: Impeller pump

Our design was inspired by the look of most centrifugal impeller water pumps.

The designed a semi-closed impeller for our pump as we agreed it was the most efficient impeller for this project. The semi closed impeller allows for a moderate amount of liquid to circulate around the casing. This optimizes pump efficiency by decreasing the risk of cavitation.

We also added an inlet and outlet for the water to enter and exit.

We also designed and manufactured a base to secure the pump using the workshop and CNC.

Materials

When deciding to choose a material for our project we went with aluminum. We went with this because it is a very common material used in Industry when dealing with impeller pumps. We also decided that it was an aesthetically pleasing material and that it works very well when using CAM techniques like we were planning on doing.

Photo of: Servers within Racks, aligned in Rows

Photo of: Electrical, Plumbing and HVAC systems using BIM

Manufacture

We used our workshop skills to manufacture 2 parts of the base using the manual mill and bench tools. We programmed and CNC machined the 3rd part of the base. For the impeller housing/casing we used 3-D printing.

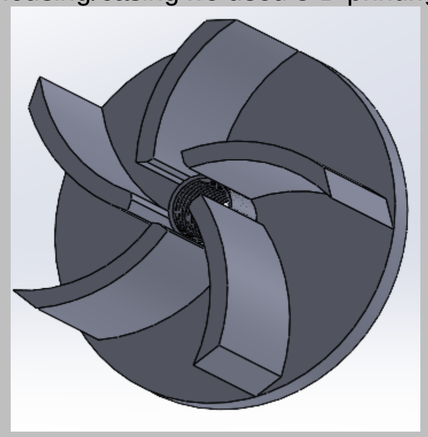

Photo of: Semi-closed Impeller

For the more complicated parts, mainly the impeller, we used Solidcam programming and used CNC machining to machine the impeller as it would not be possible to manual machine due to complicated angles.

Conclusion

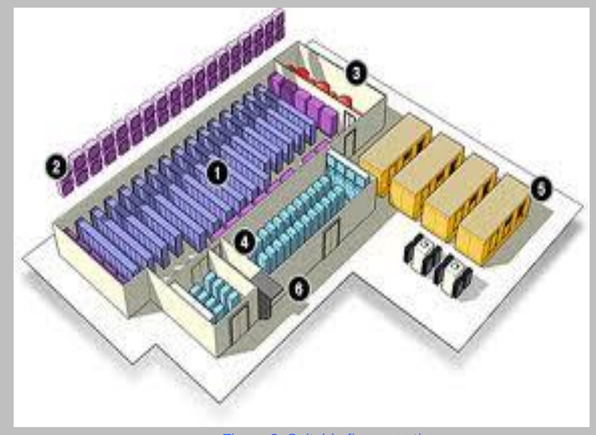

Figure 3: Suitable figure caption

By Using the skills we had learned to date in the course we were able to successfully create, design, manufacture and test our impeller water pump. There were different areas inn this project that we enjoyed and other areas we found difficult, one of these was the casing of the pump, here we had to re-design it 2-3 times so that we could manufacture it in according to the design brief we were given at the start.

We got over this obstacle as a team and were very happy with how we divided our workload and also our team-work and time management.

References

Difference between Open, Semi-Open, and Closed Impellers (mechanicalsealsandpumps.com)