

Impeller Pump Project

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Introduction

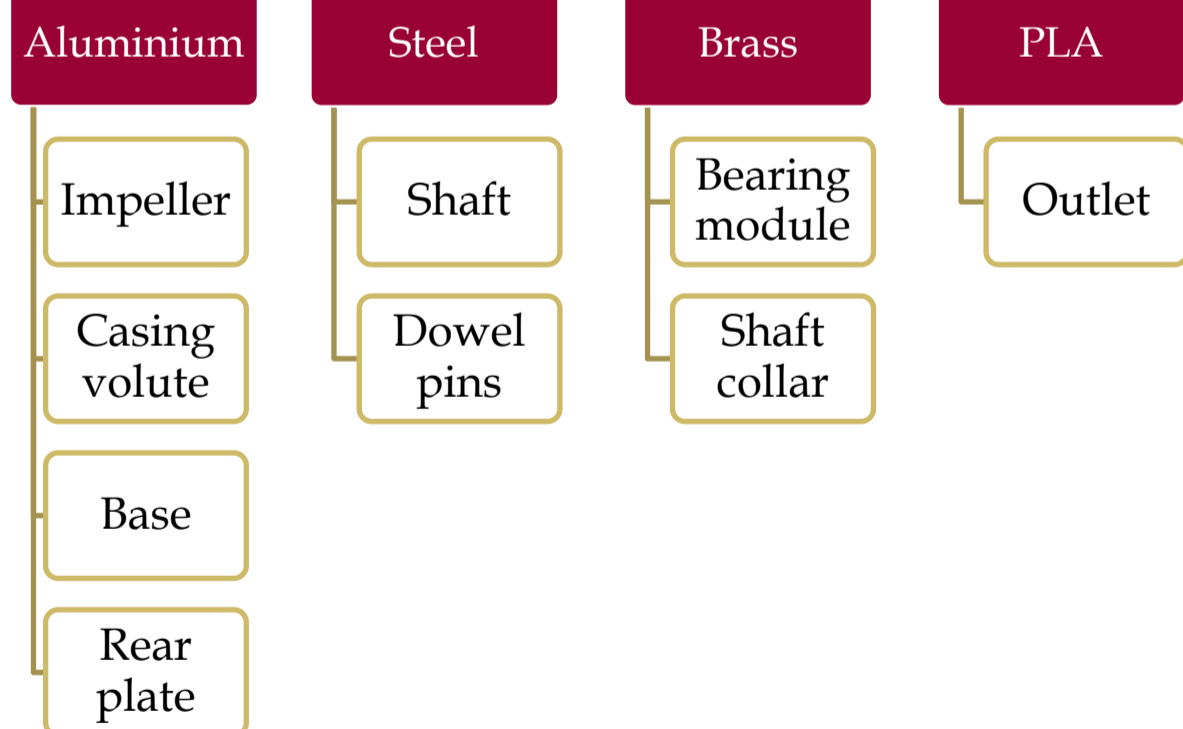
An impeller water pumps is used to move water from one place to another efficiently. An impeller driven pump uses Bernoulli's principle to transfer rotational energy into kinetic energy.

Research

Research was done on various types of impeller water pumps and there applications.

- Open, closed and semi open impellers.
- Sizes
- Components
- Evolution
- Efficiency
- Physics

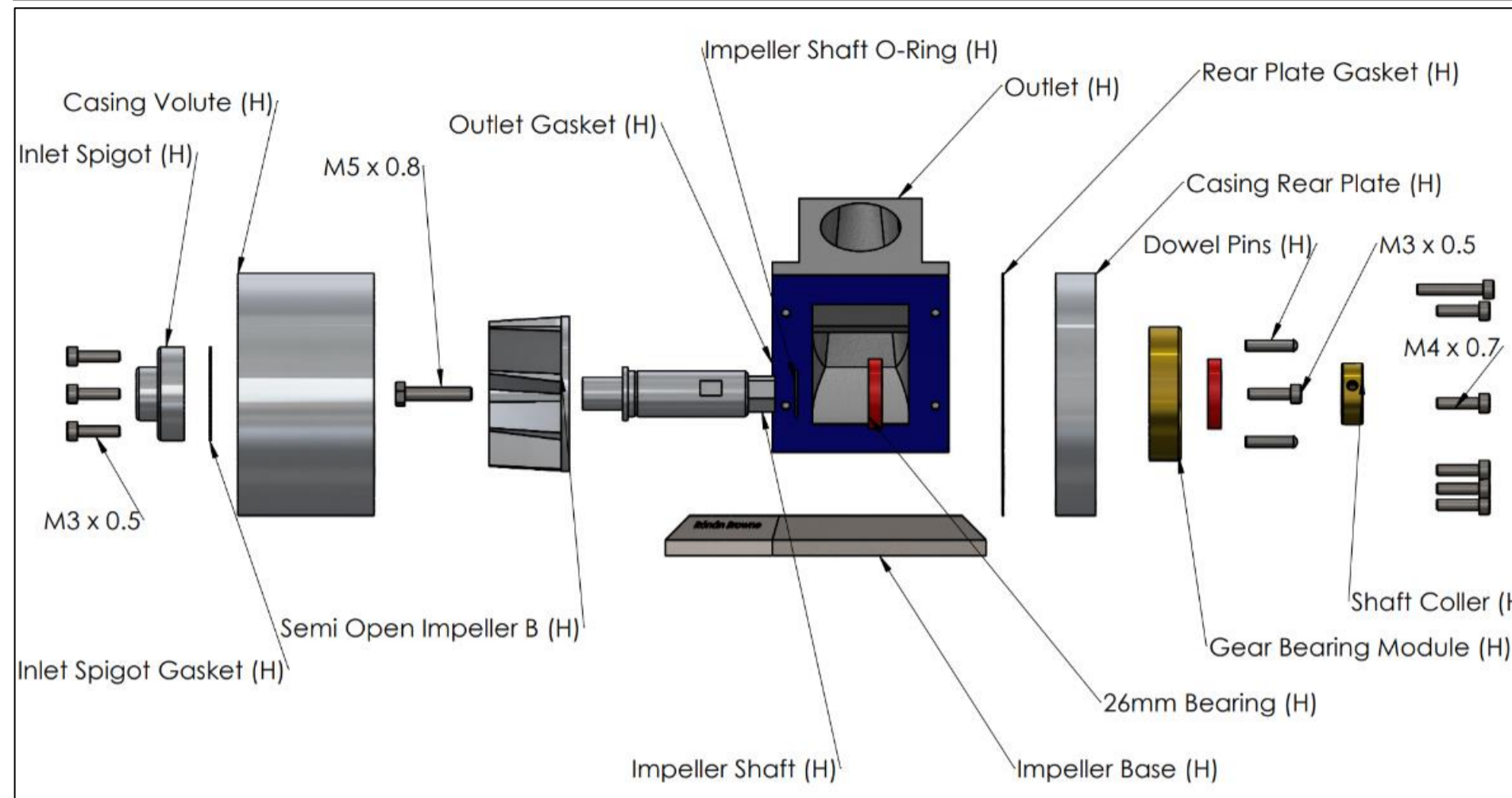
Materials



Requirements

- Pump type (non- submersible)
- Impeller material (Steel or aluminium)
- Maximum Impeller thickness (30mm)
- Impeller type (Open, closed or semi open)
- Maximum base stock size (150mm x 100mm or 150mm diameter)

Exploded view of the Impeller view



Manufacturing

The manufacturing processes of the impeller water pump include.

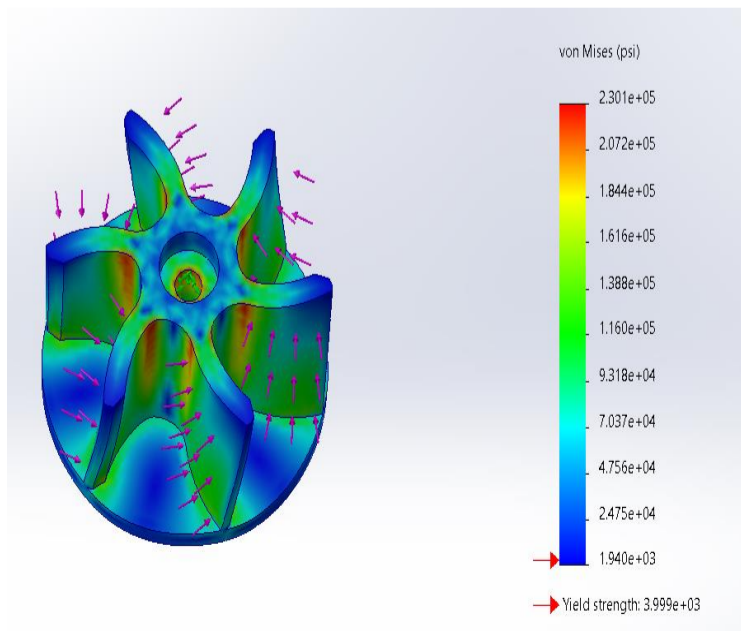
- CNC. Face milling, Profiling and drilling was used for accuracy to machine the impeller and the base.
- Milling Machine. Face milling, boring and profiling were used to machine both parts of the casing and the hexagonal shape on the shaft.
- Lathe. Turning, facing and reaming were used for the shaft, bearing module and inlet.
- Bench work (Tapping, Filing and polishing)
- 3-D printing was used to 3-D print the outlet due to its complex shapes.

Aim of the Project

The aim of this project is to design and manufacture an impeller water pump.

FEA simulations

Finite element analysis was used to test and simulate the impeller.



Conclusion

To conclude this project is that over all the project was a success design and manufacturing of a fully functional impeller water pump from scratch and the resources that were given. Adapting to challenges and obstacles was of major importance such as the designing and manufacturing of the pump. Challenges that were faced during the design and manufacturing stages were that a fully functional pump is built that works safely and efficiently in the time that was allocated. Challenges arose on the design of the volute casing and how it was going to be manufactured in the practical class on the milling machine. The team water pump project uses skills from SolidWorks to excel to practical skills in the work shop to complete the project.



The lathe was used to take the outside diameter down to size and in the correct tolerance.



The dividing head was used on the mill to create the hexagonal shape on the end of the shaft.

References

- <https://www.castlepumps.com/info-hub/pump-impellers-the-types-their-impact/>
- <https://accapumps.com/types-of-impeller-in-pumps-selections-and-considerations/>