The Collaboration Between Industry and Academia

Using applied knowledge from a summer work placement to a final thesis.

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Industry Placement: Oil and Gas Industry.

The company designed, manufactured and tested valves on the same site.

Duties:

- Draughting 3D models, assemblies and 2D drawings — such as shown in Figure 1.
- Extracting information from sales data sheets to provide valve information on 2D drawings for downstream operations and workers.
- Obtaining data from sales data sheets and the ASME Boiler and Pressure Vessel Code regarding properties like material specifications, working pressures and dimensions as a few examples. This was to be entered into MathCad calculations in order for the valve to be checked and validated for safety, before manufacturing and testing.
- Working alongside skilled colleagues while learning about the mechanisms, manufacturing and testing processes used in-house.

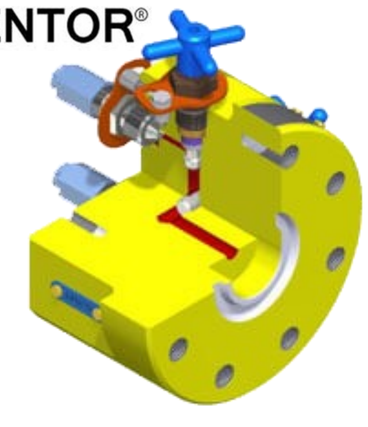

Figure 1 — Example of a needle valve.

The Link: Applying Knowledge from an Industry Placement to a Final Thesis.

- Using knowledge and experience interpreting the ASME BPVC code on industry placement has given confidence in picking a final thesis topic where base knowledge could be built upon.
- Even though the industry placement was valve based, the experience dealing with pressure containing units has been easily transferrable towards the final thesis on a pressure vessel.

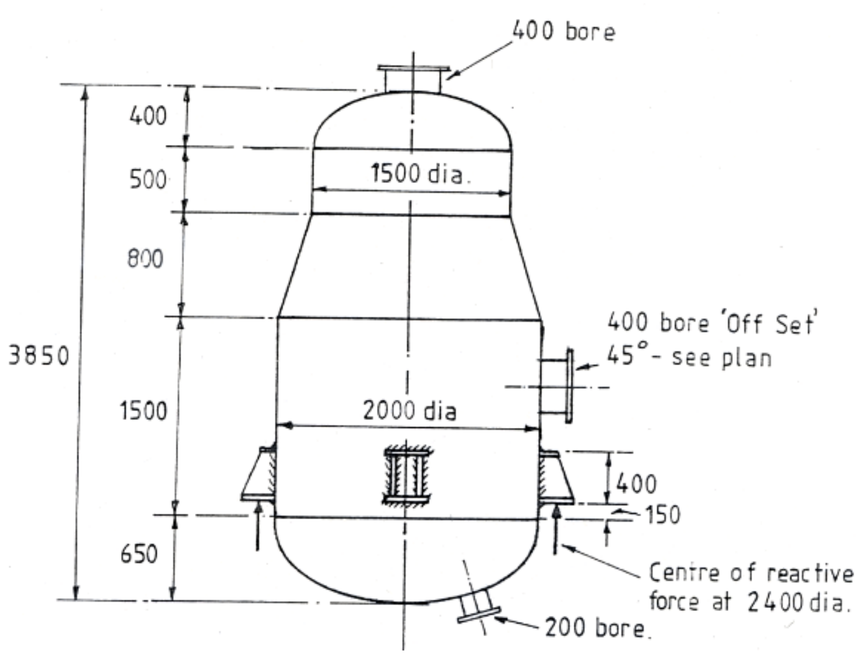

Figure 2 — Final thesis pressure vessel diagram.

University Final Thesis: The Design, Manufacture and Finite Element Analysis of a Thin–Walled Pressure Vessel.

The process:

- Using a design brief (shown in Figure 2 and draughted in Figure 3) of the vessel section, nozzle and lug configuration the correct wall thicknesses and design needs to satisfy applicable aspects of the ASME BPVC.
- Conduct research into the history of design codes and lack of understanding of failure mechanics.
- This involves being able to properly know how to read and interact with the code itself, due to layout and different sections.
- The plan is to compare the ASME BPVC calculation outcomes with the British code PD 5500 results. This involves interpreting a British and an American code.
- Conduct finite element analysis using ANSYS on the vessel to find and minimise any stress concentrations.

Problems Faced: The Difference Between Experience in Industry and Applying Standards and Codes as a Student.

Some problems that have reared include:

- Certain sections of codes having no disciplined values for circumstances and it being left to the 'experience of the engineer'.
- Access to American codes in order to see the differences when compared to a British code.
- Learning how to navigate the code effectively and to sift through masses of information to find applicable equations and sections.

Benefits: What Has Been Gained From an Industry Placement?

- Useful knowledge on how to interpret codes the best that you can without having much engineering experience yet.
- Knowing that asking and conversing with colleagues on certain issues to do with codes allows more understanding due to their wealth of their experience combined.
- Confidence in applying for graduate jobs and having experience to talk about and relate future work prospects to.
- Gave a good base understanding on applying design codes that will be useful in an engineering career.
- Apart from the knowledge being applied to this specific thesis, many other skills were built upon and different bases covered in terms of subjects being taught at university versus the real world application.
- One instance being materials requirements planning, where creating parts with different requirements of materials and testing are needed to be loaded into bill of materials to create demands downstream and allow for updates on parts to automatically be available to any worker.

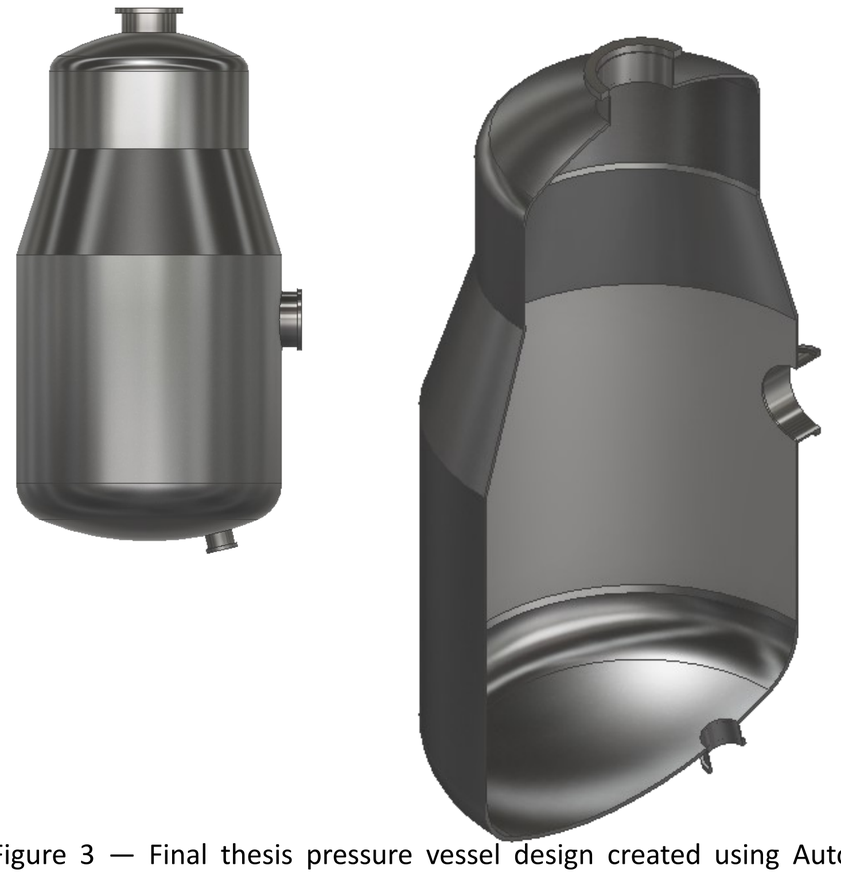

Figure 3 — Final thesis pressure vessel design created using Autodesk Inventor.