IChemE South Wales

Members Group

New Graduate to Chartered Chemical Engineer

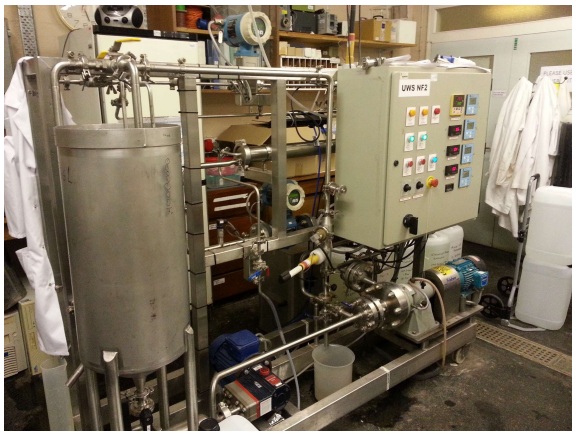
Steffan Williams

April 2021

Background

Steffan Williams

- Studied Chemical Engineering at Swansea University, graduating in 2011
- Studied for a PhD in Chemical Engineering graduating in 2015
- PhD topic was based on the use of membrane filtration technology for the separation, purification and recovery of bioactive compounds
- Joined Axium Process in October 2014 as a Project Engineer
- Promoted to Senior Project Engineer in June 2019
- Member of the IChemE South Wales Members Group recently joining the committee



Axium Process

- Axium Process is a hygienic engineering company that specialises in filtration and membrane separation technology.
- Company employs 75 people at its site in Hendy, Swansea
- Specialise in the design, manufacture and commissioning of process equipment such as:
  - Filtration Systems (Membrane Filtration – MF, UF, NF, RO)
  - Tanks / Vessels (Pressure Vessels, Mixing Vessels)
  - Process Systems (CIP Systems, Pilot plants, Pumping Skids, Heating / Cooling Systems)
- Axium operates in a number of industries including:
  - Brewing
  - Food, Dairy, Beverage
  - Pharmaceutical and Bio-Pharmaceutical
  - Chemical
  - Aerospace
  - Water Recycling (Textile, Dyehouse, Landfill Leachate)

Project Engineering at Axium

- What does an Axium Project Engineer do?
  - Manage a project from inception to design, manufacture, installation, commissioning and completion.

Process Design

- Evaluate Opportunity / Project
- Trial Design / Data Collection / Interpretation
- Membrane Technology
- Heat Transfer
- Fluid mechanics
- Equipment Specification
  - Pumps
  - Valves
  - Instrumentation
  - Line Sizing
  - Material Specification
- Safety / Risk Assessments
- Electrical / Control Specification
- Functional Design Specification (FDS)

Project Management

- Process Feasibility / Risk
- Budget Control
- Gantt Charts / Timeline control
- Contractual Discussions
- Quotation Preparation
- Customer Meetings / Technical Support
- Plant Install / Commissioning
- Customer Training
- Site Support
- Documentation

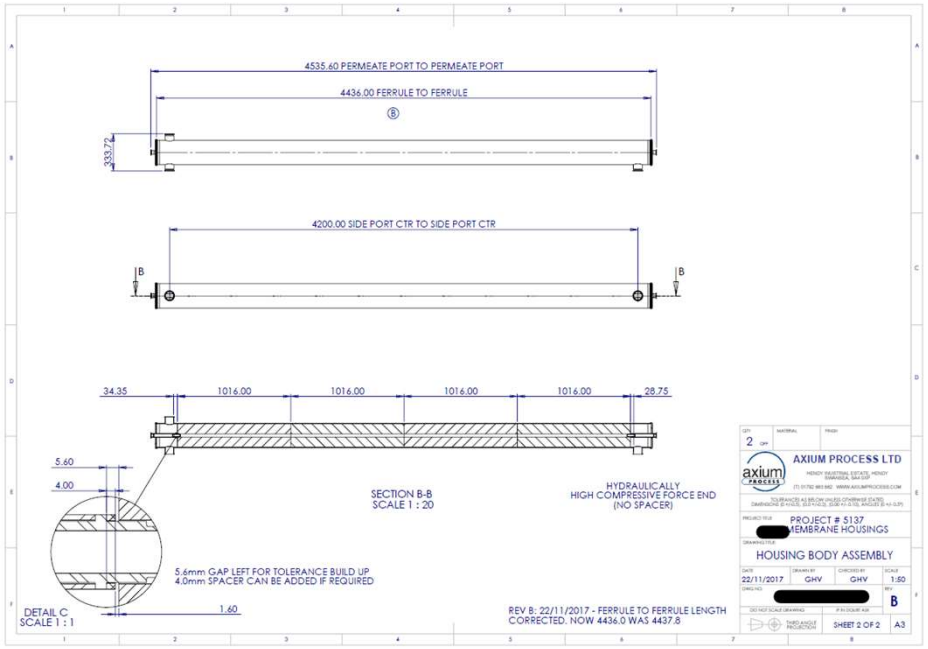
First Project – Time to Really Learn!

- Assisted in the commissioning of a 1.5 million L/day waste water plant for a global ice cream manufacturer.
- Plant designed to recover up to 90% of the water generated for re-use in the factory as wash down / cooling tower water.
- Plant is a fully automated system comprising of:
  - Large storage/buffer tanks
  - Triple liquid solid separators
  - Pre-heating system (heat exchanger network powered by on site CHP plant)
  - pH correction system
  - 4 x Ultrafiltration Skids
  - 2 x RO Skids (Double Pass)
- Plant includes:
  - > 60 Pumps
  - > 250 Valves
  - > 125 Instruments
  - > 200 – 8" Reverse Osmosis Membranes

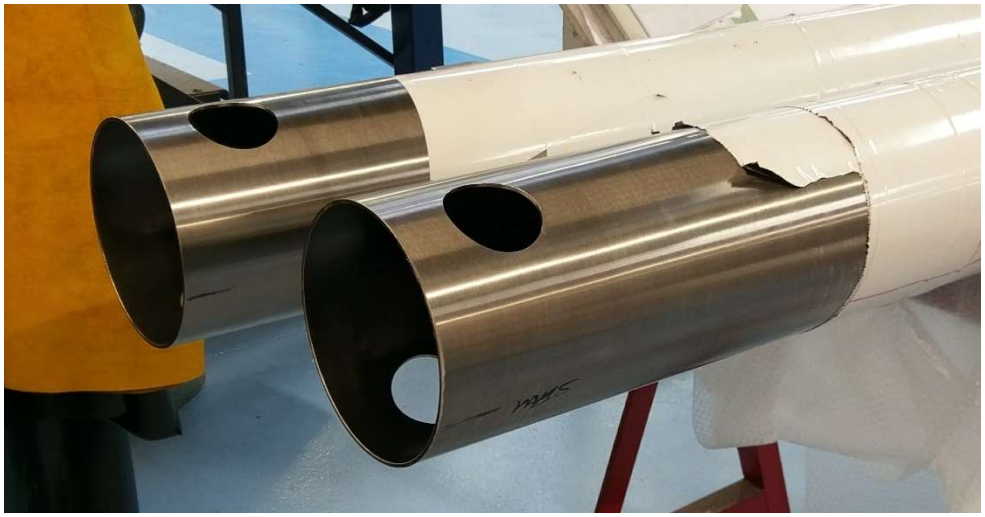
- Preheating system developed scale and reduced heating/cooling capacity, how do you resolve the issue?
- Plant operates 24 / 7 with continuous flow into effluent plant
- Small windows of opportunity to implement carefully planned changes
- The solution was a combination of chemistry (CIP chemicals), heat transfer calculations and process software changes.

Brine Recovery / Product Purification Nanofiltration Plant

- Containerised nanofiltration plant designed and manufactured for a brine recovery process.
- Feed was 50°C, pH 11.0 and >11% NaCl. Plant designed to operate at 20 barg
- 316 stainless steel was not a suitable material of construction. Hastelloy C276 selected as material of construction.
- High Nickel content providing high resistance to corrosion but highly costly.
- £ 7000 per 6 m length of raw material



Brine Recovery / Product Purification
Nanofiltration Plant



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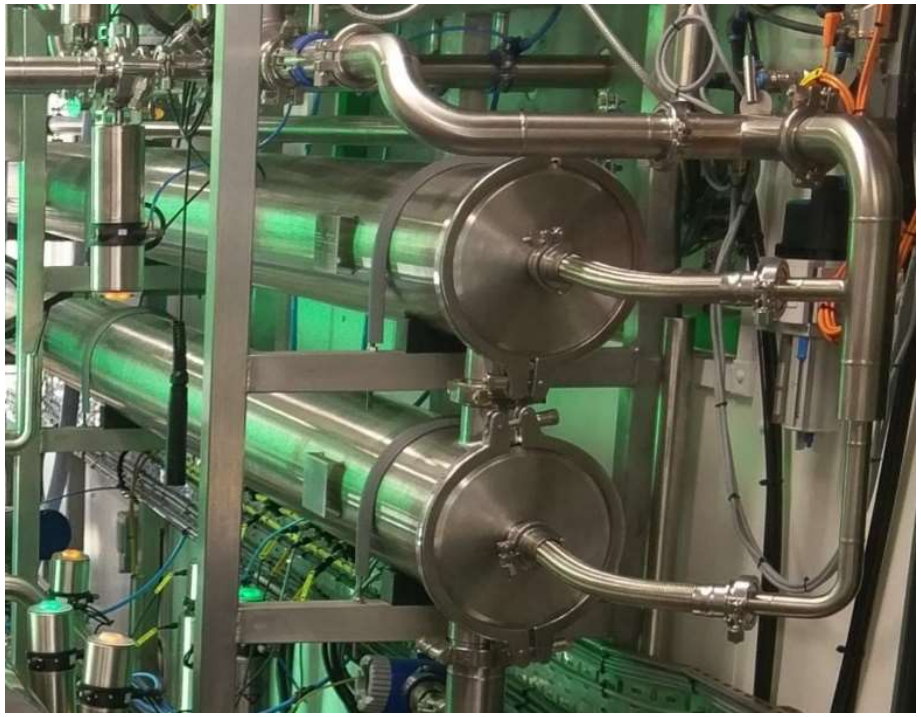

Summary

- Project Engineering is a highly varied and interesting field of Chemical Engineering.
- Working for a small/medium company provides a lot of exposure to a wide variety of industrial sectors, projects and people.
- The work is interesting, challenging and ever changing. You never know what part of Chemical Engineering you'll need next!