IChemE South Wales Members Group

New Graduate to Chartered Chemical Engineer

Steffan Williams
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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 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)

Axium operates in a number of industries including:

- Brewing
- Food, Dairy, Beverage
- Pharmaceutical and Bio-Pharmaceutical
- Chemical
- Aerospace
- Water Recycling (Textile, Dyehouse, Landfill Leachate)
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.
• 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
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!