ESIPS–MIPPS 2018 Project Summaries

Participating organisations:

- AB Mauri Technology and Development
- BHP
- BOC
- Dow Chemical
- Orora Group
- Parkes Shire Council
- Shoalhaven Water
- Visy

Projects:

Feasibility studies: dynamic crossflow filtration for the recovery of valuable materials and the development of premium product

AB Mauri Technology and Development Pty Ltd
Student: Angie Tjandra
Supervisor: Dr John Kavanagh

This project evaluates the technical feasibility of using an alternate to traditional filtration technology for two potential applications; to recover valuable materials from waste and for the development of a premium commercial product. For the valuable materials recovery project, the equipment performance was compared to that of existing technology to justify its potential as a replacement. On the other hand, as no current premium product is commercially produced using the proposed process technology, this project aimed to investigate the technical practicability of its use for this purpose.

The process equipment components involved in this project were operated at benchtop scale for a series of process optimisations trials to identify the maximum filtration capability and operating parameters whilst ensuring the optimal product quality was achieved; also, the evaluation of commercialisation feasibility, the identification of potential industrial operating trade-offs and implications, as well as justifications for the needs of upscaled future pilot plant trials.

Heap leach diagnostic leach development

BHP
Student: Zefu Huang
Supervisor: Associate Professor Marjorie Valix

A diagnostic leach method was developed with BHP as a rapid alternative to evaluate the processing performance of copper and uranium ores in a heap leach operation. Current large-scale test can take up to a year and is costly. The diagnostic leach method that was developed in this project potentially provides a simpler, cost effective and faster method for determining the uranium and copper extraction to determine potential revenue as well as reagent consumptions indicating key operating costs.

Copper solvent extraction laboratory development and process optimisation under hypersaline tenors

BHP
Student: Daniel Hurwood
Supervisor: Dr David Wang

BHP's heap leach team has been operating a heap leach and solvent extraction (SX) pilot plant at Bureau Veritas, gathering essential data and experience for the future operation of heap leaching at Olympic Dam.

This SIPS project was focused on testing and optimising a range of organics for the hypersaline copper SX (CuSX) process through laboratory mass transfer isotherm testing and analysis of reagents and conditions, flowsheet development, assessment of aqueous copper/acid interactions, requirements of scrub water and organic stripping performance. This work involved fundamental aqueous and organic understanding, as well as reagent screening and selection. The finished work will assist development of future predictive hypersaline CuSX process models and pilot plant test work.

Process water optimisation

BOC Limited
Student: William North
Supervisor: Associate Professor Vincent Gomes

BOC is primarily an industrial gas company and have had minimal involvement with process water quality in the past. The 2018 SIPS project was a pioneering venture for BOC to undertake

optimisation of the source of makeup water and the operation of cooling water systems in BOC Air Separation Plants around Australia.

At the Bulwer Island Plant, technical and economic feasibility analyses of alternative makeup sources were undertaken and the use of Reverse Osmosis Technology to purify seawater to serve as makeup was assessed. The project results when implemented will enable BOC cost-savings of $410,000 per year. Further, a stagnant water treatment regime that was analysed will allow cooling water pumps to be switched off during plant shutdowns, saving BOC an additional $45,000 per year. Application of these optimisation strategies Australia wide could generate a saving for BOC of around $1.3 million per year.

Basic process control and emission management system improvement

Dow Chemical Australia Limited, Geelong
Student: Yoong Yun Di
Supervisor: Associate Professor Jun Huang

A safe plant operation requires process control actions to remain within specified limits and process safety actions to prevent reaching dangerous states. SIPS project was aimed to enhance the overall plant safety of DCM Geelong by studying current interlocking system. Meanwhile, the secondary aspect of SIPS project was aimed to eliminate any gaps in data collection for site fugitive emission estimation technique and hence provide consistency across various standards in terms of data capturing, monitoring, recording and reporting.

Waste reduction project

Dow Chemical Australia Limited, Altona
Student: Yee Jin Loo
Supervisor: Professor Timothy Langrish

Dow Chemical Altona manufactures propylene glycol and polyol. Along with the recent increasing operating costs, the plant has been placing more focus on waste reduction. The four main wastes studied in the SIPS project were steam, electricity, nitrogen and process waste. The aim of the project was to understand and analyse the feasibilities of various capital projects. The project has also served as a measure to instil a waste reduction culture in the operations team.

Upset management in a paper mill water system: a case study into process control and water management practices

Orora Group
Studuent: Kia Hau Chan
Supervisor: Dr Li Wei

Water system upsets at Orora Botany Mill (B9) have the potential to detrimentally impact the site operations. To minimise process downtime and improve overall site performance, this project focused on optimising upset management protocols, defining higher level process control opportunities and enhancing discharge capacity. The project delivered a number of positive outcomes including; increased operator understanding of the water balance pinch-points, process set-point changes and the design of a new separation unit into discharge stream.

Formulating a backflow prevention program for the B-Section network

Parkes Shire Council
Student: Patrick Schnelle
Supervisor: Dr Annalisa Contos

Parkes Shire Council supplies drinking water to more than 10,000 consumers in regional NSW. Managing backflow at the customer's property boundary is essential to protect public health. This project involved analysing industry approaches, characterising risk, and developing and recommending implementation pathways for a backflow prevention program across the rural supply scheme.

Developing pilot testing systems to optimise filter operation and predict media performance for water treatment

Shoalhaven Water
Student: Aya Tafech
Supervisor: Dr Alejandro Montoya

Shoalhaven Water's largest water treatment plant has just turned 35 years old. The filter media has not been replaced since commissioning, and the company is unsure if a replacement is necessary now or later. The project encompassed the design and building of a unique and applicable accelerated water treatment testing system. The project developed the first filter testing in Australia at pilot scale, providing Shoalhaven Water with the resources and information to predict how the current filter would continue to perform over the coming years and how alternative filter replacements would tie in with their current operations schedule.

Enterprise wide performance monitoring at Visy Paper 3&6

Visy
Student: Madeleine Neville
Supervisor: Associate Professor Ali Abbas

This project focused on the digital transformation of ICT systems at Visy Paper 3&6 through the development of an IIoT (Industrial Internet of Things) based performance monitoring dashboard. This dashboard allows for real time monitoring of KPIs (Key Performance Indicators) through the integration of heterogeneous data from multiple systems. The increased availability of information enables faster, smarter decision making to ultimately improve operational performance and enhance business competitiveness.