2017 ESIPS Project Summaries

Participating organisations

- AB Mauri Technology and Development Pty Ltd, North Ryde, NSW
- Accenture Limited
- Nearmap
- BOC Ltd., North Ryde, NSW
- Dow, Sadara, Saudia Arabia
- Dow Chemical Australia Ltd., Geelong, VIC
- Dow Chemical Australia Ltd., Altona, VIC
- Fire Engineering Professions
- Goldenfields Water County Council, Temora, NSW
- Hazer Group Ltd, Sydney, NSW
- Jet Propulsion Laboratory NASA
- Microspace
- Nanosonics Limited
- Optimized Ortho Pty Ltd
- Orora Limited, Matraville, NSW
- Osaka Gas, Osaka City, Japan
- Papuan Oil Search Limited, Sydney, NSW
- Parkes Shire Council, Parkes, NSW
- Qenos, Botany, NSW
- Sydney Water, Parramatta, NSW
- Visy Pulp and Paper, Smithfield, NSW
- 360 Knee Systems

Projects

Process design: modifications of a yeast plant to produce Y80F

AB Mauri Technology and Development Pty Ltd
Claudia Moretti / Dr John Kavanagh

Following the development of a new product, AB Mauri required the design of a process line that would allow for the production of this product in one of their operational plants. It involved the retrofitting and sizing of unit operations, the development of a model to investigate operating parameters of the equipment, and the evaluation of key trade-offs in the design. Several experiments were also carried out to define key design parameters.

Debottlenecking of High CO2 Feed-Gas LNG Facility

BOC Limited
Alexander Bell / Professor Dianne Wiley

BOC's LNG facility in Dandenong, Victoria, assists with mitigating the demand/supply gap during periods of high natural gas demand in Victoria. The CO2 concentration in the natural gas feedstock has increased in recent years, overloading the amine system, resulting in plant turn down. The 2017 BOC MIPPS project involved seeking a solution to this high CO2 problem, helping to reduce the degree to which the plant would need to turn down when CO2 concentration exceeded plant specifications.

Comparison Study of Dow FILMTECTM Reverse Osmosis Membranes

Dow, King Abdullah University of Science and Technology (KAUST), Saudi Arabia
Grace Henry / Professor Fariba Dehghani

This project involved comparing the performance of two Dow FILMTECTM brackish water reverse osmosis membranes. The pilot plant study was completed at the Dow Middle East Innovation Centre based at King Abdullah University of Science and Technology, Kingdom of Saudi Arabia. The project produced industrially representative data that will be used by Dow sales and marketing teams to demonstrate the membranes operational performance to industrial clients.

Plate and Frame Qualification and Improvements in Industrial Wastewater Treatment

Dow, Al-Jubail, Sadara, Kingdom of Sadara
Isaac Carney / Associate Professor Zongwen Liu

This project covered the commissioning and qualification of membrane testing equipment for the Dow RO (Reverse Osmosis) plant in Jubail, Saudi Arabia. This equipment tests that the membrane flux and salt passage are within product specifications. The site is Dow's first RO element production facility outside of the United States and is strategically placed to meet the Middle East's growing RO desalination market.

The project also optimised reaction conditions and implemented improvements in the plant's wastewater treatment process projected to save Dow over $350,000 per year.

Re-Automation for Process Productivity

Dow Chemical Australia Limited, Geelong
Benjamin Porter / Associate Professor Vincent Gomes

The aim of this project was to optimise the chemical reactor cooling control systems. Initial performance of the control system on the reactor was investigated, allowing the effects of some detrimental factors to be mitigated. Methods were developed by which the automation performance of the control system could be improved in the future. Additionally, a full curriculum of self-paced, interactive technical training items for plant production operators were completed and delivered to the company for implementation.

Optimizing Energy Use in an Industrial Steam System

Dow Chemical Australia Limited, Altona
Michael Hughson / Emeritus Professor Hans Coster

Rising electricity and natural gas prices have created a financial imperative for industry to lower its energy intensity. At the same time, environmental concerns about climate change have also created social pressure to lower carbon emissions.

The MIPPS project was focused on optimising energy use within the Altona site's steam system, so as to reduce natural gas consumption and carbon emissions. The system was analysed to identify areas of high energy use. Solutions were then devised to lower energy input requirements for process equipment and minimize energy losses during steam generation and distribution.

The solutions implemented throughout the first half of 2017 have reduced natural gas use (and associated carbon emissions) by 16%, a significant financial saving for Dow. Nominated for and won an internal Dow company award – 'Q1 Asia Pacific PO/PG One Team Award' (Michael Hughson and some of the operating staff, with industry supervisor Agustin Risso as project leader)

GWCC – Characterizing Chlorine Decay

Goldenfields Water County Council
Dylan Rispoli / Dr Alejandro Montoya

Goldenfields Water County Council supply drinking water to more than 40,000 people across the Riverina in NSW. This study involved investigating historical issues with chlorine residuals, causes of chlorine decay, developing a water quality model and recommending strategies to improve residual retention across the two largest distribution schemes.

Kinetic Optimisation of the Hazer Process

Hazer Group 1, University of Sydney
Mei Quen Yew/Associate Professor Andrew Minett

This project aimed to provide a fundamental insight into the reaction kinetics and thermodynamics of the Hazer Process by investigating the effects of different reaction parameters on the production and growth morphology of graphite. The preliminary information obtained from these studies will be beneficial for the company's present and future commercialisation plans for its eponymous process.

Investigating the fluidisation phenomena of fine particles

Hazer Group 2, University of Sydney
John Murphy / Associate Professor Ali Abbas

The Hazer process utilises thermo-catalytic decomposition of methane to produce hydrogen and a variety of graphitic morphologies. This project focused on the characterisation of particles used in the process and how these characteristics impacted a gas-solid contacting system. Key objectives of the project were to provide initial upper and lower reactor conditions relating to the operation of Hazer's pre-pilot plant.

Hydraulic Modelling and Hydrate Formation of Onshore Multiphase Flow Pipeline Gathering Systems

Oil Search Limited
Yi Xuan Zhang / Dr Alejandro Montoya

The project aimed to expand and enhance the understanding of dynamic multiphase flow conditions in the pipeline gathering systems located in Papua New Guinea. The project involved creating multiple robust and validated pipeline network models in the refining and petrochemical optimisation software Petro-SIM. The temperature and pressure profiles from 2018 to 2022 were modelled, allowing identification of pipeline areas predicted to be at risk due to low operating temperatures and hydrate formation. Management strategies were recommended to mitigate these risks and provide viable options to allow continued safe production.

Stabilisation of the Paper Mill effluent in Preparation for the operation of a Secondary Water Treatment Plant

Orora Group
Bryce Winchester / Dr Rona Chandrawati

Orora is a paper recycling mill in Botany which was in the process of constructing a new secondary water treatment plant to treat the mill effluent. This project involved investigating the conditions of this effluent that could cause damage to the biomass used in the new secondary water treatment plant, to provide an understanding of what needs to change before operation of the new plant.

Recycle Water Scheme

Parkes Shire Council
Matthew Harrison / Dr Annalisa Contos

Parkes Shire Council are developing a recycled water scheme to irrigate community spaces. This project progressed key areas essential to finalise the project design.
Supply and demand modelling, considering soil moisture balance was undertaken to quantify end user requirements, assess peak day demand and quantify top-up water requirements. Potential soil chemistry changes associated recycled water use were modelled to assess the potential for environmental impacts. End user irrigation practices were reviewed for efficiency and sustainability. Output and recommendations from the project will be used for the design and operation of the scheme.

Simplifying Consequence Assessment in a Major Hazard Facility

Qenos
Noah Kaplan / Adjunct Professor David Fletcher

This project involved working as part of the Qenos Process Risk Team to assist in the submission of the 2017 Altona Safety Case. Specifically, this project was to develop detailed case studies demonstrating that Qenos has reduced the risk of major incidents So Far As Reasonably Practicable (SFARP). The submission of the 2017 Altona Safety Case is an essential requirement for Qenos to be a licensed Major Hazard Facility.

The characterisation of hazardous wastewater events detected by real-time online monitoring

Sydney Water
Saanika Rana / Professor Yuan Chen

Sydney Water has been trialling an innovative technology, developed by Griffith University as a part of an ARC project, for the real-time online monitoring of wastewater. This project involved characterising and evaluating the potentially hazardous events detected by the monitoring unit. Pattern-matching techniques were examined to enable real-time risk management of future wastewater events.

Implementation of Kidney Technology and Water Loop Closure in the Paper Industry

Visy
Joshua Fernandes / Associate Professor Jun Huang

The project investigated potential applications to utilise biologically treated water in the mill rather than dispose it. An option to use the treated water from the wastewater treatment plant in the dilution of starch to replace recycled water was further developed and as a result, will be trialled further. The investigation also analysed the potential to increase the mill water quality via kidney technology.

Removal of Scale-Forming Compounds from Recirculating Water Systems

Osaka Gas
Ritika Bhattacharya / Associate Professor Marjorie Valix

Project Title: In addition to supplying natural gas in Japan, Osaka Gas also develops a range of product systems and processes, including in the field of water treatment. Research had been undertaken to examine the selective removal of scale-forming species from water with a specific reagent. This project delivered the operational and economic feasibility of applying this reagent for a continuous flow process by analysing its kinetics and regeneration capability.