

## 2015 SIPS Project Summaries

### Participating organisations

- AB Mauri Technology and Development Pty Ltd., North Ryde, NSW (2 Students)
- BOC Ltd., North Ryde NSW
- Dow Chemical, Minneapolis, USA
- Dow Chemical, Sadara, Saudi Arabia
- Dow Chemical Australia Ltd., Geelong, VIC
- Ignite Energy Resources, Somersby, NSW
- Schneider Electric, Macquarie Park, NSW
- Sydney Water, Parramatta, NSW
- VISY, Smithfield, NSW

### Projects

#### **An Empirical Study of HADY Yeast Drying Parameters for Maximum Quality Retention**

**Sponsor: AB Mauri Technology**

AB Mauri produces a range of Highly Active Dry Yeast or HADY with both low sugar and high sugar strains. Different operating conditions at different production facilities lead to differences in yeast quality. This study at the North Ryde Centre has investigated the impact of the drying temperature and drying duration on the yeast activity and yeast shelf life. Yeast activity is a measure of the carbon dioxide produced by a yeast sample whilst the shelf life is the activity following extended storage.

#### **Improvements to Helium recovery at BOC's Darwin plant**

**Sponsor: BOC Limited**

An analysis was performed of the Helium losses incurred when insulated containers are filled with liquid Helium at the BOC Darwin plant. Various design options were produced to reduce losses and the hardware (compressors, pipeline, storage bag etc.) required to implement these alternatives. An economic analysis was produced of the cost-benefit and payback periods for the various options. This will enable the BOC Board to make rational decisions on upgrading the Darwin plant.

#### **Sadara Reverse Osmosis Project**

**Sponsor: Dow-Aramco Sadara**

The project was based at the reverse osmosis (RO) membrane plant within the bounds of the Sadara Chemical Company site, a Dow/Aramco JV in Jubail II, Kingdom of Saudi Arabia (KSA). This project was concerned with the improvement and reliability of testing procedures used to qualify RO membrane produced in Edina, USA for use in Jubail II. The aim of this thesis was to investigate whether differences in stack pressure testing affected the test results and to recommend optimal operating stack pressures for plate and frame in the KSA plant.

## **Pre-commissioning Improvement at the Sadara Polyethylene Envelope**

**Sponsor: Dow-Aramco Sadara**

The punch verification and loop check efficiencies were tracked and measured through in-field studies at the Dow Aramco Polyethylene Envelope in Saudi Arabia. Work process for these activities were improved utilising six sigma methodology. The findings of this study have resulted in reduction of cost and schedule for the pre-commissioning phase at the Polyethylene Envelope and will be leveraged across the entire Sadara site.

## **Production Development - Syncrude & coal products processing for transportation and consignment to end-users**

**Sponsor: Ignite Energy Resources**

The project investigated how Cat-HTR technology transforms low value lignite into upgraded black coal and synthetic crude oil via hydrothermal liquefaction with supercritical water. The upgraded black coal has the potential to be used as a PCI grade coal substitute for coke in steelmaking whilst the synthetic crude oil can be used as a source of platform chemicals and fuels for marine and start-up boiler applications. The project involved sample preparation, fuel property analysis and an economic analysis of upgrade options.

## **Challenges with Wastewater Odour: Regulation, monitoring, modelling and abatement**

**Sponsor: Sydney Water**

Sewer odour has been posing a multidimensional challenge that can lead to odour complaints. Factors include the lack of satisfactory universal sensors, subjective nature of odour perception, requirements of complying with stringent environmental regulations and efficient abatement technologies. During this project, the existing models were modified for significant enhancement in prediction accuracy of odour potential, better compliance with regulations and improved performance was estimated using biofilters for odour abatement with substantial savings.

## **Numerical Modelling, Optimisation and Control of the Ball Mill, Hydrocyclone & Froth Flotation Mineral Processes**

**Sponsor: Schneider-Electric**

The project aimed to expand and enhance mining libraries used within SE's dynamic simulation software (DynSIM). The project involved:

- developing numerical models of copper mineral processing operations
- verifying and validating the models with physical data
- constructing mineral process simulations
- developing process control schemes

The models are currently being implemented into DynSIM with physical data being obtained from Oulu Mining School.

The economic benefit for Schneider is mainly the enhancement and expansion of their simulation software, DynSIM which costs \$140,000 per license.