IMII Backgrounder – Mining Materials Research Cluster

Introduction

Saskatchewan potash producer experience has shown that the selection and performance of materials used in potash mines and mills in processing, environmental and transportation applications has a major effect on the need for equipment maintenance, safety performance and plant availability. The high chloride conditions that exist in the industry can cause corrosion and wear to production and related equipment and infrastructure, and lead to hazards to personnel and reduced asset life.

Production equipment that may be exposed to corrosion and wear include rail cars, tanks, heat exchangers, scrubbers, boilers, crystallizers, flotation cells, dry screens, compactors, rod and cage mills, dryers, cooling towers, pipelines, pumps, compressors, fans, valves and conveyors, as well as steel and concrete structures supporting these units.

Given a common interest in avoiding premature deterioration and potential failures of equipment and support structures resulting from corrosion, the industry has determined it was important that corrosion control technologies and strategies be developed to avoid corrosion problems in current and future mines and mills.

The Mining Materials Research Cluster

In response to this identified industry need, researchers from the Universities of Saskatchewan and Regina, and the Canadian Light Source, have formed a cluster of researchers to examine the corrosion of materials used in the selection and fabrication of mineral processing and mining equipment, and its supporting infrastructure. It is the expectation that this group of researchers will become the provincial and national authority for mining related materials research, providing solutions for existing corrosion problems, preventing future corrosion problems, and training highly-qualified professionals for the province's mining industry.

To initiate the Mining Materials Research Cluster (Research Cluster), four projects have been chosen by the IMII.

Slurry Erosion Corrosion

Principal investigators:	Dr. Richard Evitts, Department of Chemical and Biological Engineering, and Dr. Akindele Odeshi and Dr. Ikechukwuka Ogoucha, Department of Mechanical Engineering, College of Engineering, University of Saskatchewan
Length of project:	4 years
Key deliverables:	A material selections guide and standards for the fabrication of mining and mineral processing equipment that could significantly reduce equipment damage and increase equipment life

International Minerals Innovation Institute

Final report for industry that identifies the standards for material selection for use when erosion-corrosion and corrosion wear problems could potentially be an issue

Stress Corrosion Cracking

Principal investigators: Dr. Ikechukwuka (Ike) Oguocha and Dr. Akindele Odeshi, Department of Mechanical Engineering, and Dr. Richard Evitts, Department of Chemical and Biological Engineering, College of Engineering, University of Saskatchewan

Length of project: 4 years

Key deliverables: Material selection guides and standard operating procedures for combating stress corrosion cracking and reducing or eliminating downtime, safety hazards and product wastage

A model for predicting time to failure based on stress corrosion cracking

Concrete Corrosion

Principal investigators: Dr. Ian Burgess and Dr. Andrew Grosvenor, Department of Chemistry, College of Arts and Science, University of Saskatchewan

Length of project: 4 years

Key deliverables: Final report on the state-of-the-art in minimizing/mitigating concrete corrosion

Identification of the best application method for coating reinforcing steel bar (rebar) with an impermeable membrane that prevents chloride ingress and corrosion

Corrosion Inhibitors

Principal investigator: Dr. Amornvadee (Amy) Veawab, Department of Environmental Systems Engineering, Faculty of Engineering and Applied Science, University of Regina

Length of project: 4 years

Key deliverables: Final report on effective corrosion inhibitors that have capability for protecting process equipment and piping specific to the corrosive environments of the Saskatchewan potash industry

Guidelines and best practices for the effective application and monitoring of the selected corrosion inhibitors

For more information on these and other IMII projects please contact:

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