MINERAL PROCESSING VIRTUAL FORUM WORKSHOP OUTCOMES

February 9th 2021

During the GMG Mineral Processing Virtual Forum, collaboration focused on topics within mineral processing to help defining the key needs for industry collaboration as well as existing work and resources. GMG is in the processes of defining proposed projects in these areas, and industry input is essential for narrowing down scope and objectives to assist in making sure the outcome of the project will be of value to the mining industry. These outcomes will be forwarded to project groups to provide input and guidance for the projects.

What are the key needs/priorities for industry collaboration initiatives?

Geometallurgy

- Design for the entire life of mine planning
- Maximize proper data generation with minimal cost
- Prediction of mineral properties – control of incoming feed
- OSA systems measure elements – how to measure key minerals?
- Increase understanding of what geometallurgy is and how it can add value
- Use of existing data from across mine and processing/metallurgical operations.
- Develop common definitions and increase integration between disciplines
- AI application to reach autopilot mode of optimized process performance
- Grindability of different minerals
- Sampling regimen
- Heterogeneity and preconcentration studies in greenfield and brownfield
- Online mineral species detection.

Process Control

- Model predictive control
- KPIs standardization
- Define importance between instrumentation and process control
- Expert systems require learning time – how to maximise learning in minimal time?
- Better connectivity to machine learning tools
- AI/ML use cases and best practices repository
- Information regarding application of standards internationally for different sensors, PLC/DCS - particularly related around tailings management.
- Single place to demonstrate what is available from the market
- Metallurgists and process control engineers to have common objectives
- Adoption of model-based control derived from the process behaviours
- Data-sharing protocols and IP

Metal Accounting

- Solid data infrastructure
- Reliable and proportional sampling of feed and products
- Commodity specific needs and accounting accuracy
- Open systems
- Way to transform data into information
- Defining the right operating conditions
- Measurement and reporting of variability
- Understanding of metal accounting at all organisational levels and why it is important
- Comparison benchmarking
- Systems that easily incorporate online data for preliminary shift reporting but can be later replaced with actual data
- Need to filter and do gross detection before using data reconciliation.

Comminution

- Improve comminution efficiency through AI, new equipment, and fundamental understanding of the liberation and selection
- Grinding and flotation integration
- Prediction of comminution properties of incoming feed material to optimise the process – how to get a BWi measurement on a ROM sample
- Mine-to-mill optimization can help energy saving in comminution circuits
- Rheogeology estimation to avoid grind outs and cyclone roping
- Coarse particle flotation for early gangue rejection and reduced grinding power and coarse tailings stream (dry stacking)
- Improve data cleansing and context from the dark data available from control systems
- Comminution efficiency starts with blast fragmentation - improve understanding of the impact this has on downstream processes
- In addition to improving coarse particle recovery, more efficient classification to minimize overgrinding is needed
- System simplicity

GMG

Defining the landscape: What publications, organizations, educational materials, resources, etc. currently exist/are doing work in mineral processing?

Organizations	Academic Institutions	Research Institutions	Resources / Publications
- SAIMM - AMIRA - AusIMM - AustMine - CMIC - CIM and its MRMR committee - Mining Institute (Peru) - SME - Natural Resources Canada - APRIMIN - CEEC - CEMI - JKTech	- San Augustine National University - McGIll University - University of Guanajuato - University of Guadalajara - Surface Science Western (Western University) - Curtin University - Utah University - Universidad de Concepcion - Universidad de Atacama - Universidad Catolica del Peru - Universidad Catolica del Norte - Universidad Catolica de Valparaiso - Universidad Andrews Bello - Universidad de Santiago - University of QLD - University of Toronto - University of Alberta - UNSW	- COREM - CRC ORE - UQAT	- SMC Testing – Steve Morrell - SME Mining Engineering Handbook - Metcelerate online learning platform - Digital Transformation for the Process Industries: A Roadmap published by CRC Press - ScienceDirect - ISA Standards for process control - TECSUP - MEI - Cemvity Factory - Papers presented at SME by Bascur and Soudek