ABSTRACTS

REPORT ON THE 18th ANNUAL INTERNATIONAL COAL PREPARATION CONGRESS (ICPC) 2016, Osborne, D, O’Brien, M, Swanson, A

The 18th ICPC was held in Saint-Petersburg, Russia from the 28th June until 1st July 2016. Russia was successful in bidding to hold the 18th ICPC in St Petersburg and the selected venue was the renowned Mining University located in the centre of the old city. St Petersburg is a truly beautiful city, with an 18th century Western Europe heritage and a number of cultural visits and tours were included in the Congress activities.

There were 187 papers published in the ICPC Proceedings, and 120 papers presented in parallel technical sessions; however a disappointingly small number of delegates participated (150-180). Due to the downturn in the coal industry, Australian participation was at the lowest level for many years and only about a dozen Australians attended with only six Australian representatives participating in the conference presentations, i.e., Andrew Swanson – Australian member of the ICPC committee and Dave Osborne of Somerset, Mike O’Brien from CSIRO, Chris Clarkson of Clarkson and Associates and Chris Thornton of Mineral Technologies.

As usual, the conference proceedings were divided into key theme areas, i.e.

- Resources of the Coal Industry
- Coal Preparation Plant Design
- Gravity Concentration
- Flotation,
- Deep Coal Processing,
- Dewatering & Agglomeration,
- Quality Control, Automation, etc.,
- Dry Separation

A brief account of each of these will be included in the report together with an assessment of the value of some of the key presentations to the Australian Industry.
EVALUATION OF LOW CUT-POINT SPIRALS; Thornton, C

Recently Mineral Technologies (MT) has developed the new LC3 spiral with a unique trough design capable of producing cut-points of 1.45 to 1.6 RD. The LC3 opens up new possibilities for coal processors who prefer the operational simplicity and potential cost savings of spirals but desire a lower fines circuit cut-point.
There have been many recent papers over the low cut point spirals which are primarily concerned over proving the low cut point under laboratory conditions and using LIMN to evaluate the benefits of the spirals for a range of coal types.
Since these papers were presented there have been many site trials of LC3 spirals and this paper will present the results from these trials and highlight the additional features that have been discovered concerning the LC3, specifically:
  - Improved Ep at conventional cut points
  - Greater reject of high SG Material
  - Benefits in ultrafine processing
  - 2 stage processing results

HOW FAR DO YOU GOT TO GO – FILTRATION MAKES THE DIFFERENCE; Hahn, J, Reinhard, M

Rotary vacuum filters, filter presses and the modern Hi-Bar Filtration technology for continuous pressure and steam pressure filtration are pace-making technologies which define the state of the art and provide for profitable solutions and new options in filtration of coal ultrafines. Depending on the coal deposit the amount of ultrafines can sum up to some 10% - 40%. However, the high moisture limits the amount to be blended into the final product.

If the moisture content of the coarse and fine coal fraction is well below 10wt-%, then filtration of the ultrafines with modern rotary vacuum disc filters is a profitable way to produce ultrafines with 20 – 30wt-% moisture, what allows to blend all ultrafines into the end product.

If the coarse and fine coal fraction together have already a moisture content close to 10wt-%, then the continuous Hi-Bar steam pressure filtration is capable to produce extremely dry ultrafines below 10 wt-% moisture which now offers new options in coal ultrafines treatment. To turn coal ultrafines from a waste into product the cake moisture must not exceed 9 -10 weight %. HiBar steam pressure filtration produces ultrafines at this target moisture and can be either marketed as own product or admixed to the coarse and fine fraction in any wanted amount. HiBar Filtration technology uses a rotary filter - for coal dewatering a disc filter is used - which is installed inside a pressure vessel filled with compressed air (up to 7 bar, abs). For steam pressure filtration the filter discs are equipped with patented steam cabins and feed pipes for steam supply. The use of steam at continuous steam pressure filtration leads to an accelerated and intensified dewatering by a combined thermal/mechanical phenomenon during cake dewatering followed up by a subsequent convective drying with pressurized gas. This way, a new era in coal ultrafines usage will start to overcome former limits in ultrafines treatment.

In July 2014 the BOKELA HiBar pilot plant was operated at the coal washery Auguste Victoria (RAG), Germany, for steam pressure filtration of coal ultrafines. For the first time filter cakes of dry coal ultrafines below 9wt-% moisture were produced in a semi-industrial scale. In March 2016 the HiBar pilot plant was operated together with ACARP at Tahmoor coal mine in Hunter Valley NSW. The pilot plant was operated with two different flotation concentrates and could demonstrate the feasibility of steam pressure filtration also for Australian coal flotation concentrates.
**SOLID BOWL CENTRIFUGE FINES RECOVERY TRIAL; Harriman, A; Euston, J**

Peabody Energy Australia in conjunction with Somerset International Australia has recently installed and commissioned a solid bowl centrifuge into the fines circuit of one of their Bowen Basin Operations. The project was initiated to address the issue of ultrafine coal losses from the fines circuit due to misplaced fine coal in the screen bowl effluent and screen drain. Proven benefits are the addition of 8 to 12 tph of ultrafine coal onto the product belt previously being lost to tailings at an acceptable moisture content. This presentation will outline the process from installation to operation with details of the benefits to Peabody.

**OPTIFLOX SYSTEMS; Salisbury, B; Harriman, A**

Wilpinjong Coal, a wholly owned subsidiary of Peabody Energy Australia, is trialling a new technology and method to assist CHPP operations in the chemical treatment of fines tailings in conventional thickeners or clarifiers.

CHPP plants continually experience coal fines feeds that do not remain homogeneous. The types and concentrations of the particles in such slurries vary significantly as coal extraction moves from one pit to another within the mine site. This variation in the loading and composition of the material can cause ineffective chemical usage and inadequate control/clarification which cannot be solved by today’s conventional optical sensing devices commonly installed in thickeners.

Highly turbid or ‘blackwater’ events can therefore occur resulting in wash plant’s shutting down and production slowing or ceasing. Substantial losses in productivity and revenue can therefore result. The value of lost revenue due to productivity loses from inadequate wastewater clarification is estimated to range from $1.6M to almost $10M per annum depending on the size of the operation.

Developed by Science Developments Pty Ltd, this OptiFlox® technology addresses this issue by continuously measuring in real time the appropriate particle characteristics of coal tailings. As a result this technology automatically determines and maintains the optimal coagulant dose rate required even when the characteristics of the slurry feed to the thickener continually change. Optimal flocculation conditions are thereby maintained to enable consistent and reliable clarified water to be produced.

The OptiFlox® System enables coal productivity to be maximised through minimising the number of shutdowns caused by excessively turbid water return to the washery. Further benefits in the form of increased yields, reduced magnetite consumption, improved underflow dewatering and chemical cost savings may also be realised through optimal thickener performance.
VIBRATING SCREEN RELIABILITY; Cutbrush, M

Typically vibrating screen failures cause a loss of production due to the equipment’s criticality within a Coal Handling Preparation Plant. Depending on the type of failure and plant design the impact to production targets during the repair period can be significant. Reducing unplanned downtime as a result of vibrating equipment failures can be achieved by utilising preventative and predictive maintenance strategies, which can lead to the development of a proactive maintenance strategy. Preventative maintenance activities can include resonance testing; operational performance testing; structural component NDT inspections; visual inspections. Predictive maintenance activities can include, but not limited to, vibration analysis on exciters/mechanisms, electric motors, and plummer block bearings; operating deflection shape testing; permanently mounted condition monitoring systems. Proactive maintenance activities can include advanced lubrication strategies; eliminating the initiation of corrosion through protective coating maintenance; maintaining erosion prevention coatings; addressing material presentation issues; design reviews when processing parameters or screen media components change. The advancements of electronic technology can allow for robust systems to be installed on vibrating equipment allowing continuous and remote monitoring of critical parameters to aid maintenance planners in the development of proactive maintenance strategies. The industry shift to monitor plants remotely requires reliable and accurate measuring equipment which can quickly transmit information back to site based and remote monitoring centres with full integration into existing systems.

DESIGN OF A DYNAMIC MODEL FOR A DMC CIRCUIT; Scott, N, Holtham, P, Firth, B, O’Brien, M

Dense Medium Cyclone (DMC) performance has been widely explored in the past but prior investigations have been limited by the lack of on-line plant data. Coal preparation plants typically run to a set of conditions based on mine yield/ash predictions and steady-state design parameters without visibility on how dynamic changes affect the DMC circuit and the dense medium composition. The development of a dynamic model of a single-stage coal DMC circuit has now been completed. The model has utilised online plant data and RFID measurement to enhance the model’s performance. This project has yielded some interesting results when measuring residence times through a DMC circuit. The symposium presentation will include an overview of the dynamic model and a discussion of residence time measurement using RFID technology.