IEEE IAS MINING INDUSTRY COMMITTEE MEETING AGENDA

Sheraton Vancouver Wall Centre Hotel (Pavilion Ballroom D) October 7th, 2014 (5:50 – 6:30 PM)

1. Call to order and attendance (E. Wiechmann) (5:50 PM)

2. Approval of October 8, 2013 IEEE IAS MIC Meeting Minutes (E. Wiechmann) (Motion: D. Mazur; Second: John Kay)

3. Summary of Technical Sessions
   a. 1: MINING INDUSTRY I (M. Reyes)
      Seven papers scheduled from 8:00 AM - 12:00 PM, Tuesday, October 7, 2014
   b. 1: MINING INDUSTRY II (J. Sottile)
      Six papers scheduled from 2:00 PM - 5:30 PM, Tuesday, October 7, 2014
   c. 1: MINING INDUSTRY III (D. Durocher)
      Six papers scheduled from 8:00 AM - 12:00 PM, Wednesday, October 8, 2014

4. Paper Review Report (J. Sottile) – Attachment I

5. Discussion – Update on Joint Working Group with I&CPS on high-resistance grounding (D. Mazur)

6. Mining Industry Committee History (D. Durocher, J. Sottile) – Attachment II

7. Nominations for Mining Industry Committee Officers (E. Wiechmann)
   Nominations
   Chair: Miguel Reyes
   Vice Chair: Dave Mazur
   Secretary: Joe Sottile
   Continue Call for Nominations until 31-October-2014
   Vote in first week of November, allow two weeks for balloting

8. Call for Papers for 2015 IEEE IAS MIC technical sessions – October 18-22, 2015, Addison (Dallas area), TX, USA (Details on pages 45-46 of the 2014 IEEE IAS Annual Meeting program (M. Reyes)

9. Old business (None)

10. New business (None)

11. Adjourn (Motion: D. Mazur; Second: A. Bagley)

INDUSTRY APPLICATIONS SOCIETY

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October 7, 2014

TO: Mining Industry Committee
SUBJECT: IEEE IAS MIC Paper Review Chair Report

Status of 2013 IAS Conference Papers
A total of 13 papers were submitted and have been reviewed for publication in Transactions or the IAS Magazine with the following decisions:

- five papers have been approved for publication in ***Transactions on Industry Applications***,
- three papers have been approved for publication in the ***IAS Magazine***,
- four papers were rejected or withdrawn, and
- one paper required mandatory revisions and is in process.

2014 IAS Conference Papers
There are 19 papers submitted to the Mining Industry Committee technical sessions for the 2014 IEEE IAS Annual Meeting. The review process for these papers has begun and tentative decisions have been made on several of them. Those decisions will be sent to the authors after the papers have been presented at the 2014 IEEE IAS Annual Meeting.

Respectfully submitted,

Joseph Sottile

Attachment II – IEEE IAS Mining Industry Committee History

IEEE IAS Mining Industry Committee History

Prepared by Joseph Sottile, Thomas Novak, and Galina Mirzaeva

The purpose of the Mining Industry Committee (MIC) of the Industry Applications Society (IAS) is to enhance mine safety and productivity through the application of the principles of electrical engineering. To achieve this goal, the MIC provides a means of communication for the electrical engineer with his/her peers in the mining industry to provide an atmosphere for all members to increase their technical skills and to keep abreast of advancements in this, and associated, fields. The presentation of papers gives members opportunities to demonstrate their knowledge and help others through the exchange of this knowledge. This relatively small committee currently sponsors two or three technical sessions at the IAS Annual Meeting.

The precursor of the present-day IAS Mining Industry Committee began in 1914 as the AIEE (American Institute of Electrical Engineers) Mines Committee. In 1948, the Mining and Metal Industry Committee was formed and became part of the AIEE Industry Group. In 1958, the Mining and Metal Industry Committee was separated into two distinct technical committees: the Metal Industry Committee and the Mining Industry Committee. The Mining Industry Committee became a technical committee in the IEEE Industry and General Applications Society when it was created in 1965. In 1971, the IEEE Industry and General Applications Society changed its name to the IEEE Industry Applications Society, where the MIC currently resides.

Electrical installations in mining have numerous special features and demands, e.g., power system portability, dynamic loading, and remote location of loads. In addition, by the nature of the mining process, the electrical power system, particularly, the utilization portion is moved frequently rather than being static as in most industrial installations. These differences from other industries cause unique electrical system problems, prompting special requirements. Consequently, much of the early work in the MIC produced documentation on terminology, recommended practices, and safety rules, some of which were published as standards. These were used for several years without modification; however, substantial and rapid changes in technology and new federal regulations soon made this early work obsolete.

Committee interest in standards activities was renewed after the formation of federal mine safety and health laws in the late 1960's. In 1976, a cooperative understanding was initiated between the IEEE and the federal mining regulatory agency, now the Department of Labor's Mine Safety and Health Administration (MSHA). In response to this concern, the IAS formed the Mining Safety Standards Committee within the Standards Department. Its membership was appointed to form a consensus to guide and expedite all mining standards activity in IEEE. They were also given permission by the IEEE Standards Board to review federal mine electrical regulations.

The passage of the Coal Mine Health and Safety Act of 1969 combined with the energy crisis of the mid 1970's created many challenges and opportunities for electrical engineers working in the mining industry. At West Virginia University (WVU), researchers recognized that there was a need for a forum for electrical engineers working in the mining industry to interact and present their research. Consequently, in 1972, the First WVU Conference on Mine Electrotechnology was organized. This conference was conducted every two years until 1994. The Mining Industry Committee of the IAS was similarly active in the area of technical information dissemination and sponsored its own Mining Industry Technical Conferences in alternate years with the WVU Conference. These conferences, along with the IAS Annual Meeting, presented venues for publishing research results that addressed the pressing electrical safety issues at that time, such as mine power system analysis and protection, system grounding, ground-wire monitoring, system modeling and reliability, in-mine communications, environmental monitoring, mine illumination, and methods for locating trapped miners.

By the late 1980s, the power requirements for longwall equipment used in underground coal mining had reached a point where the practice of using a 995 V utilization voltage, which was the maximum voltage allowed by federal regulations, was no longer adequate. Significant research and development activities were directed toward the use of 2.40 kV, and 4.16 kV shortly thereafter, for operating longwall equipment at the mining face. Problems with ground-fault-relay sensitivity and selectivity, associated with using high resistance grounding at these higher voltages, were also studied. At that time, automation of longwall equipment and surface-mine haulage trucks became topics of increased interest and continue to present date.

More recently, Congress enacted the Mine Improvement and New Emergency Response Act of 2006, commonly known as the MINER Act (Act). The Act was created in response to a cluster of mine disasters that occurred in early 2006 and identified the need for wireless post-accident communications and electronic tracking systems. As a result, the U.S. government and private sector established comprehensive research programs to develop new, and enhance existing, communications technologies for post-accident applications in underground coal mines. The resulting communications

systems fall into two general categories – *primary* and *secondary* communications. Primary communications include leaky-feeder and node-based mesh systems, while medium-frequency and through-the-earth communications are considered to be secondary (backup) systems. Other recent research includes the application of LED lighting, quantifying arc-flash hazards,

The Mining Industry Committee also continues to showcase international applications focused on improvement of various aspects of mining operations in Australia, Chile, Brazil, and other countries.

One important direction in Australian mining research is improving reliability of production-critical mining machines by predictive condition monitoring. Electric motors used in digging machines operate under high and dynamically changing loads, and the change in their condition can be related to their duty. The concept of Electric Motor Duty Meter, developed by the University of Newcastle, Australia, has been presented at a number of IAS conference sessions, including plenary. Duty Meter models are being tested on full size industrial motors on a dynamic dynamometer (Figure 1) under simulated digging conditions.

Another important research topic is improvement of power quality and power efficiency, particularly in remote mines with weak supplies. A 19-level 415 V prototype statcom (Figure 2) has been constructed at the Newcastle University for experiment verification of various power conditioning strategies. Most recent projects highlighted at IAS-Mining sessions include distributed power generation for remote mines and highly efficient DC microgrids for open cut mining.

Figure 2. Hoist motors on a dynamometer test bed.

Figure 1. Prototype statcom for power quality improvement in mining.

In Chile, applications have been presented on improvements in copper-winning inter-cell bars, as well as large-scale machines and drives used in the copper industry. Results related to the use of fault-resilient drives on long-distance conveyors have been reported from researcher in Brazil.

Bibliography

1. United States Public Law 91-173 (1969). Federal Coal Mine Health and Safety Act of 1969.
2. M. Dayne Aldridge, Lloyd A. Morley, Allen Newcome, E. Keith Stanek, David Victor, "The Mining Industry Committee", IEEE Transactions on Industry Applications, Vol. IA-19, Sep/Oct 1983, pp. 667-670.
3. United States Public Law, PL 109-236, "Mine Improvement and New Emergency Response Act or 2006 (MINER Act)," Jun. 15, 2006.