

SMART

Technology Standards for the Surface Mining Industry

Sandvik Mining & Construction Surface Mining Blasthole Drills

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May 8 2010, Vancouver

One industry voice

Vision Statement recap

One Industry Voice: Connectivity and Technology Standards "Vision" Statement:

- Major mining equipment should be configured by the OEM/OTM to be a natural extension of the mine operators Local Area Network.
- Hardware technology should be designed to be "plug & play" regardless of its intrinsic proprietary nature.
- Third-party applications can be readily integrated and cohabitate with, OEM software and application architecture.
- In all cases, data generated by an application is the sole property of the owner/operators while respecting the confidential nature thereof.
- Accessibility to the data will be freely provided without the need for additional interface programming.

Excellent vision statement

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Key Criteria for System selection recap

Key criteria for system selection are:

- √ Cost;
- √ Proven & reliable products;
- √ Based on open standards and commercial off-the-shelf systems (COTS) for hardware & software & communication networks;
- √ Capable to provide ready access to raw, unprocessed data, APIs, configuration parameters & sub-routines from all system components as and when required by mine operator;
- √ Readily capable of multi-vendor interoperability as mine operator needs evolve;

See next slides

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Key Criteria for System selection I

Key criteria for system selection are:

- √ Cost;
- √ Proven & reliable products;
- √ Based on open standards and commercial off-the-shelf systems (COTS) for hardware & software & communication networks;

These criterias are well aligned with SMC Control System Strategy and support / drive each other

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Key Criteria for System selection II

- √ Capable to provide ready access to raw, unprocessed data, APIs, configuration parameters & sub-routines from all system components as and when required by mine operator;
- √ Readily capable of multi-vendor interoperability as mine operator needs evolve;

“ However, the mines are aware of the intellectual

property rights of the OEMs/OTMs to the various applications and algorithms that generate the data and information. “

Liability / IP issues have to be taken into consideration when interfacing with OEM products, especially control system.

SMC's strategy to be an “easy OEM to interface with”

- Common and generic solutions for HW/SW within SMC equipment
 - Cost, reliability, COTS aspects
 - Same solution for same need between SMC UG/SF mining applications
 - Apply industry standards when possible, use open solutions



Construction Tunnelling
Drill Jumbo



UGM Loading
remote operation station



SFM Blasthole Drill

SMC solution proposal to align with One industry voice Vision and Key Criterias

- Large customers v. small customers, different customer needs
- OEM looks needs from several product lines' perspective (UGM, SFM etc)
- Control system HW specifications will remain at OEM's responsibility
 - Distributed control system PLC's, PC's with "time / safety critical" control functions
 - Display vs. Monitor ?
- Following open standards and other listed criterias is OEM's best interest
 - Standard communication protocols to / from the rig ; ethernet / IP networks, mobile terminals, antennas, camera systems
- Providing access to data at the OEM equipment is a requirement already to be competitive in the marketplace

SMC solution proposal to align with One industry voice Vision and Key Criterias

- SMC approach is to follow standards that are in place currently
 - To follow **IREDES standard** for production related data when applicable
 - Use **OPC UA** technology for **real-time** access to rig (Drill Information Gateway), CanOpen
 - Standard communication protocols
- Happy to participate if a standardization workgroup around SMART is established
- See next slides for examples
 - These technologies are already used in mining production applications

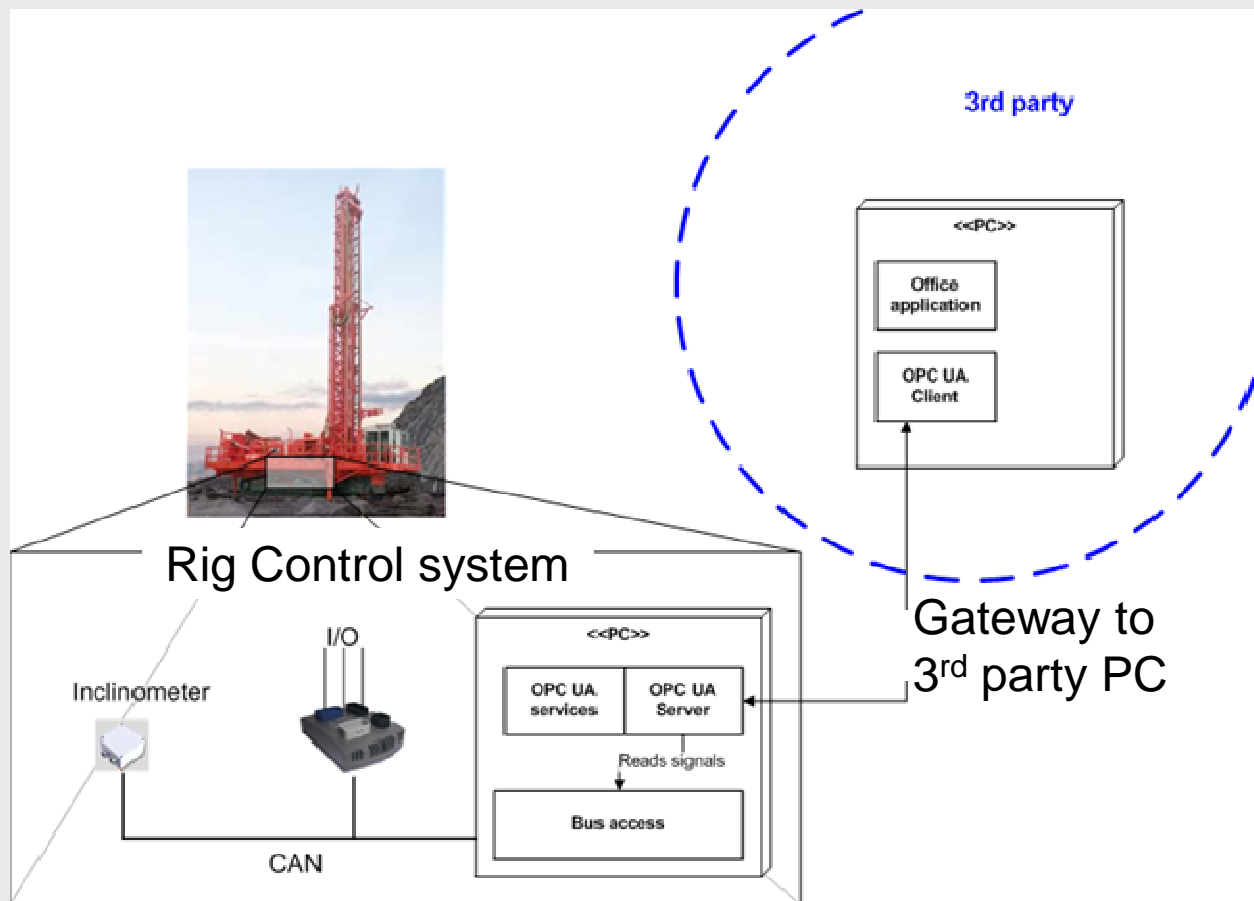
IREDES reports

for production related data (XML files)

- IREDES Drill Plans
 - Data format for drill plans
- IREDES Quality Report
 - Production data report per Hole/Fan/Bench/Pattern
- IREDES Performance Report
 - Production report per hour/shift/day
- IREDES MWD Report
 - Recorded drilling & other rig parameters
- IREDES Maintenance Report
 - System errors, warnings, faults

OPC UA

for real-time data access



Examples of data content for real-time application

- Rig State/mode
- Pressures
- Temps
- Penetration rate
- etc