

MINING AUTOMATION

A Global Perspective – A preliminary report

NIOSH Funded Research

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14/15 September 2022

OUTLINE

- Acceptance
- Automation Paradox
- Distributed Situational Awareness
- HMI
- Skill development
- Productivity/Safety-related trends
- Level of Engagement
- Complacency – Cultural Differences

ACCEPTANCE

- Acceptance by the workforce is critical to success of an automated system.
- Driven by culture
- East vs. West
- Commodity differences
- Age-related differences

AUTOMATION PARADOX – THE IRONIES OF AUTOMATION

- First appearing in the literature in 1983 – Lissane Bainbridge
- Automation will take my job away.
- The truth is, more people are needed to oversee and support the automated systems....suggestion by major OEM.
- The human role is not going away anytime soon. The human role has become so much more critical.
- People have to learn new skills and use higher order thinking to accomplish higher order tasks. Not everyone is willing.

HUMAN-MACHINE INTERFACE

- Designers have done well to incorporate design principles of spacial, pictorial and dynamic realism.
- Some improvements could be enjoyed with improvements with color coding system (provide meaning for the colors used).
- Better deployment of pop up windows is needed – currently instructional pop up windows block important information.
- Can become victim of screen clutter.

DISTRIBUTED SITUATIONAL AWARENESS

- Manual and automated equipment works together in the mine.
- Communication between all players and the controller is critical.
- Everyone needs information and feedback when they need it and the system must be designed to provide it.
- A component of interoperability – without it, there will be accidents.

SKILL DEVELOPMENT

- Controllers
- Maintenance
- Programmers
- Communication systems

PRODUCTIVITY/SAFETY-RELATED TRENDS

- Productivity improvements have not been significant yet.
- Overall 30-35% reduction in injuries has been reported by some companies.
- There have been no injuries attributed to the automation.
- Anecdotal evidence reported - fewer back injuries and musculo-skeletal injuries.

PRODUCTIVITY/SAFETY-RELATED TRENDS

- Productivity is expected to improve as people become more skilled in planning, running and maintaining the operation.
- Currently equipment speed and loading capacity are considerations.
- Expectation for lower maintenance costs.

PROBLEMS – ENGAGEMENT AND COMPLACENCY

- Engagement - Reported at GMG/AUSTMINE Mining Automation meeting in Perth Australia 17 August 2022
 - Australian and Canadian workers are said to be only 19% engaged in their job. US workers are 34% engaged.
 - What does this mean to the use of automation? One may intuitively think that the more engaged, the better the overall transition to automation will be? Still to be understood.
- Complacency – reported by one company to be part of the culture. Must be consequences for improper or under use of the automated system. Currently, there are inconsistencies.

WHERE TO FROM HERE?

- There is more to learn.
- More experience to be gained.
- More practice and training to be undertaken to improve productivity.
- Management must understand their organizations culture.
- There is already a significant drop in risk of injury due wholly to there being fewer people in the mine. There is still a significant risk present though as long as automated and manual operations continue jointly in the mine.