

Notes from Excavation & Construction Monthly Meeting

August 2020

Notes From Discussion

::Presentation by Athonu Chatterjee (LSIC Focus Group Lead), refer to slides::

- Invitation for LSIC members to give 10-20 minute presentation at upcoming monthly telecons
- Fall LSIC Workshop on 14-15 October, abstracts due 11 September (<http://lsic.jhuapl.edu/Events/102.php?id=102>)
- ISRU Supply and Demand Workshop on 17 September (<http://lsic.jhuapl.edu/Events/103.php?id=103>)
- Confluence is now available for collaboration, get an account by emailing Andrea Harman (ams573@alumni.psu.edu)

::Presentation from Jim Keravala (OffWorld), refer to slides::

- Question from Brad Blair: Are any autonomic systems producing or in a commercial mine? If so, what is productivity compared to humans?
 - Jim responded that they're working at the system level at about a 10x advantage in terms of against conventional processes.
- Brad further asked if that theoretical or practical.
 - Jim answered that it was economic.
- Athonu asked where Jim stands on underground habitation.
 - Jim responded that he thinks it's the way to go, that it should be the baseline.

::Presentation from Jennifer Edmunson (NASA), refer to slides::

- Question from chat: Can vacuum be used as an advantage for construction?
 - Jennifer responded that yes, processes just need to be developed. Glass extrusion is an example, could be stronger when extruded in vacuum.

Notes From Chat

- Greg Baiden pointed out that work had already been done in the mining industry with the Mining Automation Program (MAP) project 25 years ago run out of Inco Limited, that they've already been deployed. Conclusions were equipment suite was proved and validated economic viability of work
- More information available at the Canadian Mining Journal:
<https://www.canadianminingjournal.com/features/inco-s-innovations/>
- Greg Baiden said the group needs a tutorial on where the mining industry is with automated mining.
- Leslie Gertsch stated that partial automation of appropriate parts of mining cycle is generally considered more effective than full automation
 - Jeff Plate added that communication and connection in underground mining environment was a big challenge
 - Greg Baiden added the he holds patents in underground comms using radio and optical communications for terrestrial applications, high bandwidths required. Demonstrated 35 ms comms response
- Brad Blair asked question about whether Jim Kervala has systems producing ore commercially, answered in discussion notes.
- Don Barker shared suggested reading: Don Barker: Suggested reading:
<https://www.sciencedirect.com/science/article/pii/S0273117720302234>
- Brad Blair shared suggested reading: <http://ssi.org/2010/SM14-proceedings/Lunar-Underground-Mining-and-Construction-A-Terrestrial-Vision-Enabling-Space-Exploration-and-Commerce-Baiden-Grenier-Blair.pdf>
- Greg Baiden reiterated that he and others build underground terrestrial facilities to manage extreme conditions, that five meters of rock would provide radiation and thermal protection.
- Jeff Plate stated that the best method may be to sinter via partial melt using dry regolith
 - Leslie Gertsch added dry regolith such as that already processed for volatiles.

Karol Grabczewski asked if vacuum could be used as an advantage in construction (answered in discussion)

- Athonu Chatterjee asked how applicable ceramis matrix composites is on the moon
 - Jeff Plate answered that more study is required
 - Jennifer Edmunson answered that ceramics are definitely in the trade space

- Mamur Hossain asked what types of spare parts would be needed to be manufactured on the Moon
 - Jennifer Edmunson answered that there will be multiple systems needed over the lifetime of a lunar base, difficult to say specifically which ones.