B.C. CHANG, J.H. LEE, D.C. CHOI, M.Y. LEE, T.S. LEE. ***Pneumatic excavation for lunar ISRU (In-Situ Resource Utililization)****. Gerontechnology 2012;11(2):365;* doi:10.4017/gt.2012.11.02.488.00 **Purpose** Space agencies including NASA, JAXA, KARI have a vision for lunar surface exploration. For a successful long-term unmanned/manned mission, using on-the-spot resources would be crucial as there is a limit to the cost and volume-sending resource from the Earth to the Moon. In-situ resource utilization (ISRU) is a core component of space exploration which establishes, evaluates and assesses the in-situ resources available on the Moon and Mars and the technologies needed to utilize and exploit these resources[1]. One of the primary goals is to extract propellants from the regolith such as oxygen and hydrogen which could then be used for in-space transportation[2]. Therefore, mining and excavating lunar regolith is important. However, the properties of lunar soil along with the Moon's reduced gravity make the task of excavating very difficult. Lunar soil is very dense and has a high cohesion rate densely compacting the soil becomes. Also 1/6g of the Moon reduces traction force of equipment such as bulldozer type excavator that can be used for traditional terrestrial excavation[3]. Thus, there is a need of new type of excavation and the pneumatic excavation for lunar soil is suggested. **Method** All basic factors of the lunar environment are different from the terrestrial environment, thus adapting pneumatic excavation system in the lunar environment should begin with basic steps. In this study, a prototype of the pneumatic excavation system for lunar ISRU was designed and developed to test the possibility and feasibility of the new concept. A preliminary test will be held on a lunar simulated environment including lunar simulant KOHLS-1, craters, obstacles, and remote control, based on basic scenarios such as driving through the lunar surface, excavating, driving back to the soil bin, and loading. Preliminary test will validate the mobility of the system on the lunar surface and the task process. In addition to the main factor of pneumatic excavation module itself, the transfer efficiency will be examined. Thus, the relation between the cyclone design, the lunar simulant, and velocity of the flow will be tested. **Results & Discussion** Developed prototype and test results will be presented and discussed during the conference.

References

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