Exploration Extravehicular Mobility Unit (xEMU) Pressure Garment System (PGS) Cycle Testing Overview and Results

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With the development of NASA's next generation spacesuit, the hardware life expectations for the new spacesuit required evaluation. The xPGS team designed and performed a test series to assess the new hardware against the life requirements.

The EMU on the International Space Station (ISS) today tests the life of the suit and new components by performing isometric individual joint cycle motions with the requirements based on previously performed Extra-Vehicular Activities (EVAs). The xPGS includes new designs for suit components to provide increased mobility for performance of lunar operations, thus the requirements for the life cycle of the suit had to be developed and tested with these new operations in mind. Cycle requirements shifted to cycles of functional tasks in lieu of isometric cycles to better understand the life of the suit.

Manned cycle testing of the xPGS was conducted by performing repetitions of a series of tasks that reflect predicted Lunar EVA operations. The test series utilized a gravity offload system to simulate Lunar gravity environment. Cycle testing concluded after 30 test days in October of 2022 with lessons learned that will be critical for future spacesuit design. Specific lessons learned with regards to suit performance and test methodology will be provided.