

Development of a Universal Waste Management System

A concept for a Universal Waste Management System (UWMS) has been developed based on the knowledge gained from over 50 years of space travel. It is being designed for Commercial Orbital Transportation Services (COTS) and Multi-Purpose Crew Vehicle (MPCV) and is based upon the Extended Duration Orbiter (EDO) commode. The UWMS was modified to enhance crew interface and reduce volume and cost. The UWMS will stow waste in fecal canisters, similar to the EDO, and urine will be stowed in bags for in orbit change out. This allows the pretreated urine to be subsequently processed and recovered as drinking water.

The new design combines two fans and a rotary phase separator on a common shaft to allow operation by a single motor. This change enhances packaging by reducing the volume associated with an extra motor, associated controller, harness, and supporting structure. The separator pumps urine to either a dual bag design for COTS vehicles or directly into a water reclamation system. The commode is supported by a concentric frame, enhancing its structural integrity while further reducing the volume from the previous design.

The UWMS flight concept development effort is underway and an early output of the development will be a ground based UWMS prototype for manned testing. Referred to as the Gen 3 unit, this prototype will emulate the crew interface included in the UWMS and will offer a great deal of knowledge regarding the usability of the new design, allowing the design team the opportunity to modify the UWMS flight concept based on the manned testing.