

Exploration EMU Outer Mold Line

Config Control CAD model

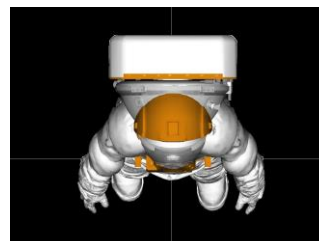
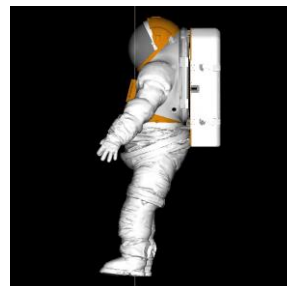
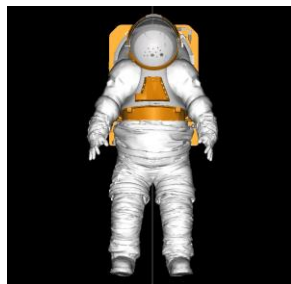
User's Guide

The Exploration EMU (xEMU) CAD model is a configuration controlled and managed copy of the development xEMU system prior to Preliminary Design Review (PDR). Please do not transfer this model to others or modify it. The model download link may be obtained by emailing amy.l.ellison@nasa.gov. Please include your organization /company and designated point of contact (email and phone) along with your request. This will insure that you are working to the most up to date copy as well as tracking of those who have it, so that we may alert you when configuration updates are available.

The flight xEMU Demonstration (Demo) unit is planned for ISS in the 2023 and beyond timeframe. The Demonstration xEMU is a hybrid of the Planetary and Microgravity xEMU; while the hard upper torso and shoulders assembly and life support system are exploration class (ie Deep Space Gateway and Planetary Surface), the Lower Torso assembly, arms, and gloves are that of the EMU in use on ISS today.

The full xEMU with the Planetary Lower Torso Assembly is the configuraton intended for microgravity use on Deep Space Gateway. Mods to this configuration include boots compatible with walking as opposed to use in microgravity restraint via Articulating Portable Foot Restraints. The xEMU with Planetary Lower Torso is compatible with 8psi operations, while the xEMU Demo config is only compatible with 4.3 psi operations. The Exploration LTA and arms are still in development, so the CAD being provided at this point is for the xEMU Demo configuration. Updated files with these Exploration components will be provided in late FY18.

Views of the xEMU Demo config control copy are provided below for reference. The xEMU is a rear entry suit. Separate models of the PLSS and Pressure Garment are provided to allow partners to articulate the suit hatch opened and closed for placement and analysis purposes, if needed.



The work envelope for early CAD analysis purposes can be considered equal to the existing EMU requirement. Design and early testing of the xEMU engineering units indicates that it will be able to exceed the EMU work envelopes shown. However this data is preliminary only, and not sufficient to update the requirements. Please use the envelopes shown as they are within both EMU and xEMU work envelopes. One handed and two handed work envelopes are shown in Figure 1 below.

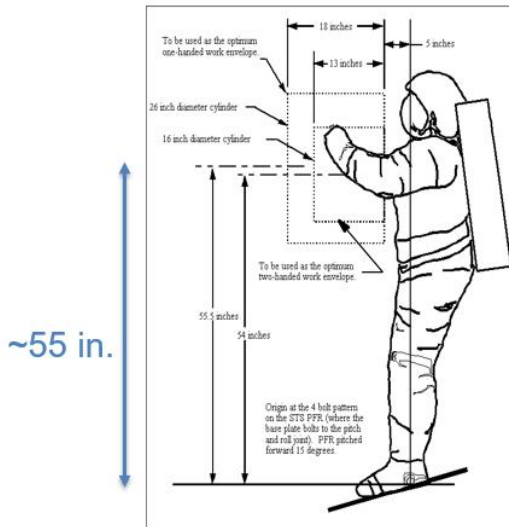


Fig 1: Optimum EVA Work Envelope

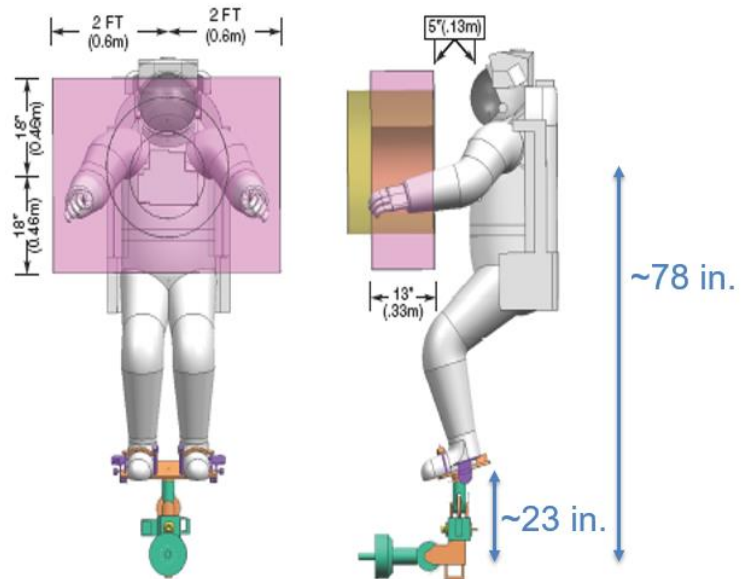


Fig 2: Crew Aids for Stability, Foot restraint Ingress, Egress and Local Force Reaction

Additionally, the approximate distance from the xEMU work envelope to an ISS style Worksite Interface (WIF) used to secure an Articulating Portable Foot Restraint (APFR) is shown in Fig 2 above. An additional requirements box is shown to be able to locate APFR ingress/egress handrails and local restraints to be used while reacting loads during EVA.

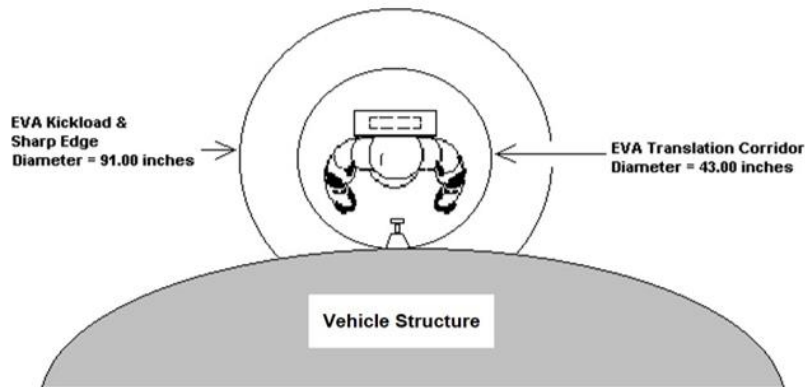


Fig 3 Translation and Work Volume

The volume required for the suit, either for translation purposes or working volume is shown in Fig 3. A 43inch cylinder may be shown around the suit to analyze the amount of room required for 5th-95th % EVA crew.

The xEMU model is intended primarily for visualization and reference use only. It should not be used to program reach and range parameters, as it is for static use only. It is approximately a 50th% in arm span, and 5th% height- a smaller model. It is recommended to use the 43 inch diameter work and translation envelope for reference and show the xEMU within it for clarity. Do not rely on the physical volume of the xEMU CAD model alone. Later CAD config copy updates in FY 19 will include the 99% range size.

The xEMU is a rear entry suit, ingressed thru a suit hatch as shown below. The Don Doff Envelope is dimensioned as shown below in Fig 4. Note: The images below are not representative of the xEMU suit features, and specifically the green plate indicates a suit port, which is not a requirement for the xEMU suit. Regardless, the approximate dimensions are still applicable.

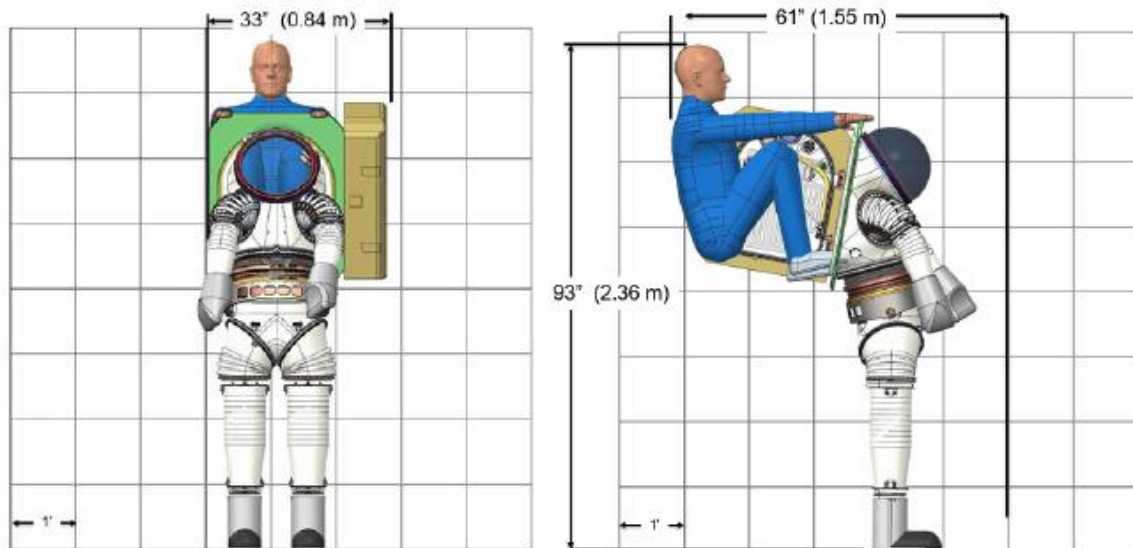


Fig 4 xEMU Don / Doff Volume estimate