

## **Design, Construction, and Commissioning of a Deployable Liquid Hydrogen Production and Fueling System for Unmanned Aerial Systems**

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***Abstract***— Liquid hydrogen has historically been limited in proximity to baseload liquefiers and research laboratories. This accessibility barrier is a primary limitation to the development of advanced aircraft and is exacerbated by recent trends in unmanned aerial systems to convert to electric propulsion systems. This article describes the design, construction, and commissioning of a self-contained, automated, and deployable liquid hydrogen production and fueling system. Housed within a mil-spec shipping container, the system utilizes a water purifier, proton exchange membrane electrolyzer, cryogenic refrigerator, and custom liquid hydrogen dewar. The system requires only water, electricity, and periodic helium purge gas input for continuous operation. Overall system performance specifications are provided. The system demonstrates the capability of field-deployable hydrogen liquefiers and liquid hydrogen fueling systems.

***Keywords (Index Terms)*** — Liquid Hydrogen, advanced aircraft, liquid hydrogen dewar, hydrogen liquefier, liquid hydrogen fueling system.

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