NASA University Engineering Design Challenge
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Prepared by Project Iris

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Abstract

Iris is an aerial firefighting system composed of one remotely piloted Lead Plane and eight manned Water Tankers (WT). The system addresses the need for an innovative and adaptable solution to combat the increasing number of wildfires around the world. Iris can deliver 3,000 $gal.$ of water in a single pass and 108,000 gal. over a 24-hour mission. The aircraft are capable of Very Short Takeoff and Landing (VSTOL) which allows them to be launched and recovered from small airports or improvised landing areas, as well as access terrain enclosed water sources. VSTOL performance is enabled by blown lift technology and double slotted flaps. A distributed turboelectric propulsion system and noise insulation technology limit aircraft noise to a maximum of 58 dBA at the airport boundary. The propulsion system leverages the high energy density of fuel while also allowing for future electrification as battery technology advances past the EIS date in 2030.

Additionally, the size and performance of the Iris Water Tanker complement its adaptability to the emerging UAM/RAM market. The Iris Water Tanker has a variant, the Air Taxi (AT), which is produced from the same production line with 91%-part commonality, addressing the needs of urban and regional mobility as well as reducing manufacturing and acquisition costs via economies of scale. The Air Taxi is also capable of VSTOL with a takeoff distance and landing distance of 275 ft and 288 ft respectively. Additionally, the Air Taxi can become a cargo transport aircraft by replacing the passenger seats with cargo. Producing additional Air Taxi variants saves $3.9 million in total firefighting fleet acquisition costs compared to current aircraft.