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Advanced technology: Historical development and technology advancements in electric aircraft and spacecraft propulsion

As it approaches its seventy-fifth year of existence, the NASA John H Glenn Research Center has pushed the boundary of technologies for aircraft and spacecraft propulsion. Originally known as the Aircraft Engine Research Laboratory (AERL), the facility began through advancement of aircraft engines in support of the war effort as well as icing research. Moving through its history, the center retained a focus on engine performance, noise and emissions while also unlocking the challenges of high performance in-space propulsion systems. Today, NASA Glenn is pushing the boundaries of future air travel, charting a course towards more electric and eventually all-electric aircraft. In parallel, NASA Glenn is leading in the development of high power Solar Electric Propulsion (SEP) systems that will serve to enable human exploration architectures through a robust and efficient logistic train to destinations such as Mars. Rooted in its history and building on the future, NASA Glenn enables electric propulsion.

Biography

James M Free serves as the Director at the National Aeronautics and Space Administration's John H Glenn Research Center in Cleveland, Ohio. In this position, which he assumed on January 4, 2013, he is responsible for planning, organizing and directing the activities required in accomplishing the missions assigned to the center. Prior to accepting the Director's position, he served as Glenn's Deputy Director since November 2010. He has served in a number of other leadership positions including Director of Space Flight Systems at Glenn, where he was responsible for overseeing the management of Glenn's significant activities in the agency's Constellation, Space Shuttle, International Space Station, Space Communications, Human Research and Science Programs. He held that position from September 2009 to November 2010. He was also Chief of Glenn's Orion Projects Office from February to September 2009, responsible for all Orion-related work at the center. From 2008 through 2009, he served as the Orion Test and Verification Manager at NASA's Johnson Space Center, Houston. In this role, he was responsible for planning and executing all verification activities supporting development of NASA's next generation human space vehicle. He also served as the Orion Service Module Manager overseeing the team designing the service module, which propels the Orion Crew Module. He began his NASA career in 1990 at Goddard Space Flight Center in Greenbelt, Md., as a Propulsion Engineer and later as a Systems Engineer on several space-crafts. At Glenn, his first assignment in 1999 was as the International Space Station liaison for the Fluids and Combustion Facility. He also led the development of electric actuation technologies for NASA's Next Generation Launch Technology Project, and was the Launch Vehicle Manager and Autonomous Rendezvous and Docking Manager for the Prometheus spacecraft. He is the recipient of a NASA Outstanding Leadership Medal, NASA Exceptional Service Medal, NASA Significant Achievement Medal and numerous other awards. He earned his Bachelor's degree in Aeronautics from Miami University in Oxford, Ohio and his Master's degree in Space Systems Engineering from Delft University in the Netherlands.

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