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AD ASTRA ROCKET COMPANY SUCCESSFULLY DEMONSTRATES INNOVATIVE DESIGN OF CRITICAL VASIMR® SYSTEM UNDER NASA RESEARCH CONTRACT

[Webster, Texas – for immediate release] – Ad Astra Rocket Company (Ad Astra) has successfully completed a 30-month contract with the National Aeronautics and Space Administration (NASA), to develop an advanced thermomechanical design of the radiofrequency (RF) coupler for the VASIMR® rocket engine. The innovative design was experimentally demonstrated in late March 2025, during sustained plasma tests of the VX-200SS™ VASIMR® engine prototype at Ad Astra’s Texas laboratory. The innovation produces up to 28% reduction in the steady-state operating temperature of the RF coupler, an improvement that would enable the engine to operate at higher power.

The RF couplers (each engine needs two) are highly integrated, electromechanical assemblies that handle virtually all the power of the engine. They launch RF waves into the engine’s magnetized central core. These waves produce and heat a plasma – a superheated gas – to millions of degrees. The plasma internal energy is converted to rocket thrust by the engine’s magnetic nozzle.

The RF couplers are critical elements of the engine’s architecture. By their power handling function and location close to the plasma, they are naturally subject to substantial heating. During normal operation, they must remove up to 10-15% of the engine power as waste heat. While the present RF couplers work well at power levels up to 80 kW, at higher power, they hover uncomfortably close to their temperature limit. The new design, featuring advanced materials and innovative manufacturing, runs significantly cooler than the present system and opens a higher power range for the engine.

Phase I of the project began on July 25, 2022, and ended on January 25, 2023. Four months later, Phase II initiated on May 22, 2023, and ended on March 31, 2025. Over the 30-month effort, the Ad Astra team developed unique and innovative manufacturing techniques and in-house materials test capabilities for rapid prototyping to explore multiple materials combinations and manufacturing protocols.

“It is exciting to see the incredible amount of innovation of our team in engineering solutions and manufacturing techniques,” said Dr. Franklin Chang Díaz, Ad Astra CEO; “I am proud of their awesome creativity and hard work in bringing technical concepts like this quickly to reality,” he added.

These system improvements are designed to increase the robustness and ultimate power of the VASIMR® engine and set the stage for advancing the engine’s Technology Readiness Level (TRL) from its present TRL 4-5 to TRL-6; namely, a system capable of being field tested in space.

ABOUT THE TECHNOLOGY

Short for Variable Specific Impulse Magnetoplasma Rocket, VASIMR® works with plasma, an electrically charged gas that can be heated to extreme temperatures by radio waves and controlled and guided by strong magnetic fields. The magnetic field also insulates nearby structures so exhaust temperatures well beyond the melting point of materials can be achieved. In rocket propulsion, the higher the temperature of the exhaust gases, the higher their velocity and the higher the fuel efficiency. Plasma rockets feature exhaust velocities far above those achievable by their chemical cousins, so their fuel consumption is extremely low.

ABOUT AD ASTRA

A US Delaware corporation established in 2005, Ad Astra Rocket Company is the developer of the VASIMR® engine, an advanced plasma space propulsion system aimed at the emerging in-space transportation market. Ad Astra also owns and operates supporting research and development subsidiaries in the US and Costa Rica. Through its subsidiaries, the company also develops earthbound high technology applications in renewable energy, green hydrogen, advanced manufacturing and applied physics. Ad Astra has its main laboratory and corporate headquarters at 141 W. Bay Area Boulevard in Webster, Texas, USA, about four miles from the NASA Johnson Space Center.