



April 3, 2017

## Aerojet Rocketdyne Achieves 3-D Printing Milestone with Successful Testing of Full-Scale RL10 Copper Thrust Chamber Assembly

SACRAMENTO, Calif., April 03, 2017 (GLOBE NEWSWIRE) -- Aerojet Rocketdyne, a subsidiary of Aerojet Rocketdyne Holdings, Inc. (NYSE:AJRD) has successfully hot-fire tested a full-scale, additively manufactured thrust chamber assembly for the RL10 rocket engine that was built from a copper alloy using selective laser melting (SLM) technology, which is often referred to as 3-D printing.

A photo accompanying this announcement is available at <http://www.globenewswire.com/NewsRoom/AttachmentNg/bf6179fe-4f10-468a-ad92-b0eb4224186d>

Aerojet Rocketdyne has actively been working over the last decade to incorporate 3-D printing technology into the RL10 and other propulsion systems to make them more affordable while taking advantage of the inherent design and performance capabilities made possible by 3-D printing. This recent testing was enabled by the Defense Production Act Title III program management office located at Wright-Patterson Air Force Base near Dayton, Ohio.

"Aerojet Rocketdyne has made several major upgrades to the RL10 to enhance the engine's performance and affordability since it first entered service in the early 1960s," said Aerojet Rocketdyne CEO and President Eileen Drake. "Incorporating additive manufacturing into the RL10 is the next logical step as we look to make the engine even more affordable for our customers."

"We believe this is the largest copper-alloy thrust chamber ever built with 3-D printing and successfully tested," said Additive Manufacturing Program Manager Jeff Haynes. "Producing aerospace-quality components with additive manufacturing is challenging. Producing them with a high-thermal-conductivity copper alloy using SLM technology is even more difficult. Infusing this technology into full-scale rocket engines is truly transformative as it opens up new design possibilities for our engineers and paves the way for a new generation of low-cost rocket engines."

The 3-D printed RL10 copper thrust chamber would replace the current RL10C-1 model design that uses a very complex array of drawn, hydroformed stainless steel tubes that are brazed together to form a thrust chamber. The new chamber design is made up of only two primary copper parts and takes just under a month to print using SLM technology; reducing overall lead time by several months. The part count reduction of greater than 90 percent is significant as it reduces complexity and cost when compared with RL10 thrust chambers that are built today using traditional manufacturing techniques.

Another key benefit provided by 3-D printing is the ability to design and build advanced features that allow for improved heat transfer. For many rocket engine applications, this enhanced heat transfer capability enables a more compact and lighter engine, which is highly desirable in space launch applications.

"This full-scale RL10 thrust chamber test series further proves that additive manufacturing technology will enable us to continue to deliver high performance and reliability while substantially reducing component production costs," said RL10 Program Director Christine Cooley. "Now that we have validated our approach with full-scale testing of a 3-D printed injector and copper thrust chamber, we are positioned to qualify a new generation of RL10 engines at a much lower cost; largely attributed to the additive manufacturing capabilities we have developed and demonstrated. With the next generation of RL10 engines, we aim to maintain the reliability and performance that our customers have come to expect, while at the same time making the engine more affordable to meet the demands of today's marketplace."

Aerojet Rocketdyne is applying 3-D printing technology to many of its other products, including the RS-25 engines that will help explore deep space, and the company's new AR1 booster engine that is being developed to replace Russian-built RD-180 engines by the congressionally-mandated deadline of 2019.

 Aerojet Rocketdyne 3-D Printed Copper Thrust Chamber Assembly

Aerojet Rocketdyne recently completed successful hot-fire testing of a full-scale, additively manufactured thrust chamber assembly for the RL10 rocket engine at its West Palm Beach, Florida facility

Since its first operational flight in 1963, more than 475 RL10 engines have flown in space to help place numerous spacecraft into Earth orbit and propel others to explore every planet in our solar system.

Aerojet Rocketdyne is an innovative company delivering solutions that create value for its customers in the aerospace and defense markets. The company is a world-recognized aerospace and defense leader that provides propulsion and energetics to the space, missile defense and strategic systems, tactical systems and armaments areas, in support of domestic and international markets. Additional information about Aerojet Rocketdyne can be obtained by visiting our websites at [www.Rocket.com](http://www.Rocket.com) and [www.AerojetRocketdyne.com](http://www.AerojetRocketdyne.com).

*This material has been cleared for public release by the U.S. Air Force Research Laboratory, Case Number: 88ABW-2017-1178.*

Contact :

Glenn Mahone, Aerojet Rocketdyne, 202-302-9941

[Glenn.Mahone@Rocket.com](mailto:Glenn.Mahone@Rocket.com)

 Primary Logo

Source: Aerojet Rocketdyne, Inc.

News Provided by Acquire Media