GE engineers make engine using additive manufacturing process

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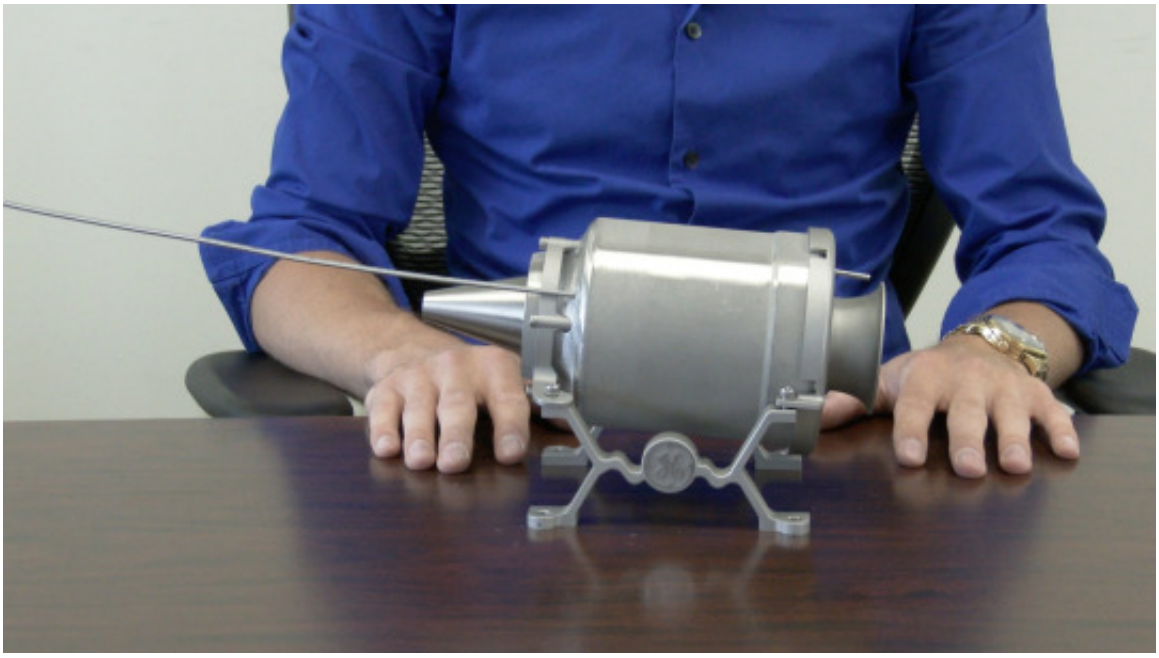

GE engineers have been getting firsthand insights about additive manufacturing as applied to jet engines. News of their success in 3D-printing a mini-jet engine has gathered some attention. The team made a simple 3D-printed engine that roared at 33,000 rotations per minute, said a report. The team who built it are at GE Aviation's Additive Development Center outside Cincinnati. The focus there is on techniques in additive manufacturing for making 3D structures by

melting metal powder layer upon layer.

GE Aviation's site (GE Aviation provides jet and turboprop engines, components and integrated systems) reviewed the additive approach, and where it departs from past methods. "Unlike traditional manufacturing methods that mill parts from a slab of metal, additive manufacturing 'grows' parts directly from a CAD file using layers of fine metal powder and an electron beam or laser. The result is complex, fully dense parts without the waste, manufactured in a fraction of the time it would take using other methods," said a recent post on the site.

The team pooled their skills as technicians, machinists and engineers. "We wanted to see if we could build a little engine that runs almost entirely out of additive manufacturing parts," said one of the engineers. "This was a fun side project."

David Bartosik, engineer with GE Additive Development Center, said they used a process called DMLM, Direct Metal Laser Melting. One of the big advantages is that you can redesign your parts, with new geometries, he said.

General Electric has been exploring additive manufacturing for some time now. In an interview in 2013 with *AdditiveManufacturing.com*, Greg Morris and Todd Rockstroh spoke about GE's work in exploring such technologies.

Rockstroh spoke about the DMLM process, saying it was "the use of a focused laser to fuse, layer-by-layer, a three dimensional object. It is the same as the various industry used terms for additive manufacturing: Selective Laser Melting, Selective Laser Sintering, Direct Metal Laser Sintering. We chose 'melting' as the machines do not technically sinter but overlap a series of fusion welded layers. The mechanical properties can be generally near-forged and significantly better than cast properties

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Morris said, "Additive provides the ability to create geometry that cannot be made any other way. For the aerospace industry, additive is particularly attractive because it can create components in materials that are commonly used in aerospace such as nickel-based alloys, Titanium, etc. and we can make those parts with structures that provide design benefits, such as lattice structures that allow for substantial weight reductions, yet do not compromise the mechanical integrity of the part."

This was no complex commercial aircraft engine. They started out with a design for a radio-controlled aircraft engine, developed for remote control model planes, and customized the plans for their printing machines. The final product measures around a foot long by about eight inches tall, said Michael Keller, writing in *GE Reports*.

In the bigger picture, Morris, GE Aviation's General Manager for Additive Technologies, earlier this month said additive manufacturing "will fundamentally change the way we think about how we design our parts, how we manufacture components and ultimately how our products look and function." He said that "all of us who work with additive technology at GE feel extremely fortunate to be part of an organization that has embraced this technology as fully as GE Aviation has."

Later this year, GE will begin using additive manufacturing to create complex components of its newest fuel nozzles. This will be done at a new 300,000 square-foot facility in Auburn, AL. "Fuel nozzles are an intricate and highly sophisticated engine component that are key to delivering industry-leading fuel efficiency and lower emissions for next-generation jet engines," said the company. The nozzles will be on the LEAP jet engine.

More information: www.gereports.com/post/1183940 … mini-jet-engine-then

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