

A 3D printed rocket engine – made in Melbourne

Monash engineers have designed, printed, and test-fired a rocket engine.

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The new rocket engine is a unique aerospike design which turns the traditional engine shape inside out.

Two years ago, Monash University researchers and their partners were the first in the world to print a jet engine, based on an existing engine design. That work led to Monash spin-out company Amaero winning contracts with major aerospace companies around the world.

Now a team of engineering researchers have jumped into the Space Age. They accepted a challenge from Amaero to design a rocket engine, Amaero printed their design, and the researchers test-fired it, all in just four months. Their joint achievement illustrates the potential of additive manufacturing (or 3D printing) for Australian industry.

The Monash engineers have now created a new venture, NextAero, to take their concepts to the global aerospace industry, starting with the International Astronautical Congress in Adelaide 25-29 September.

“Traditional bell-shaped rockets, as seen on the Space Shuttle, work at peak efficiency at ground level. As they climb the flame spreads out reducing thrust. The aerospike design maintains its efficiency but is very hard to build using traditional technology,” says Marten Jurg, an engineer with Amaero. “Using additive manufacturing we can create complex designs, print them, test them, tweak them, and reprint them in days instead of months”.

Access to Amaero’s additive manufacturing expertise enabled NextAero to play to their strengths. “Designing for additive manufacture opens up a raft of possibilities”, says Graham Bell, the NextAero project lead. “We were able to focus on the features that boost the engine’s performance, including the nozzle geometry and the embedded cooling network. These are normally balanced against the need to consider how on earth someone is going to manufacture such a complex piece of equipment. Not so with additive manufacturing”.

“Going from concept to testing in just four months is an amazing achievement,” says Professor Nick Birbilis, head of the Material Science and Engineering Department at Monash. “It illustrates what’s possible for research and industry. Through our spin-out company, Amaero, Australian companies can design, print, and test metal components for everything from aerospace to surgical instruments, hose fittings to air conditioning parts”, he says.

Minister for Industry and Employment Wade Noonan said the project represents the pinnacle of Victorian manufacturing capabilities.

“Victoria is the nation’s home of manufacturing and this exciting collaboration demonstrates the endless possibilities that additive manufacturing offers. The Victorian Government will continue to back manufacturers so they can innovate and capture high-value opportunities, and bring more projects like this one to life.”

The development of the aerospike rocket was supported by Monash University, Amaero Engineering, and Woodside Energy through the Woodside Innovation Centre at Monash.

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Stills and video of 3D printers at work are available via www.scienceinpublic.com.au.