

High pressure work boosts scramjet research

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University of Queensland rocket scientists have upgraded a key ground test facility ahead of three experimental scramjet flights in Woomera in late 2005.

HyShot international program leader Professor Allan Paull said the University's T4 shock tunnel at St Lucia could now simulate true flight conditions of Mach 10 (11,000 km/hour) at an altitude of 30km.

"It can now operate at pressures as well as the world's top facilities, yet it is still a small and comparatively cheap facility," he said.

"We did the maths and upgraded the tunnel by a pressure factor of two and a quarter from 40 MegaPascals to 93 MegaPascals."

"While that mightn't mean much to the average punter, the University now has an asset which can ground test the world's fastest supersonic combustion flight."

Professor Paull said the upgrade was in line with the vision of T4 designer and Australia's first professor of space engineering, Emeritus Professor Ray Stalker AO of UQ's Centre for Hypersonics.

"Ray always thought it could be done — we did what he has been telling us, to push the piston a lot harder than you think you can."

NASA engineer and UQ graduate Dr Michael Smart said the increased pressures achieved by Professor Paull and his team in a week would have taken engineers elsewhere in the world a "whole lifetime" to achieve.

Year 11 work experience student Brooke Van Woerkom of Mansfield High School was one of the first people in Australia to see the full-scale experimental Mach 10 engine and flight model undergo tests in the T4 tunnel this month. Brooke, who has always been interested in space research, was exploring her future career options by experiencing life for a week in the HyShot™ team.

NQEA Australia Pty Ltd of Cairns recently presented the HyShot™ researchers with a key piece of equipment, a nozzle, which was fitted to the T4 tunnel. For the technically minded, T4 is a 45 m long free piston driven facility, capable of simulating flows up to 6 km/s (21000 km/hr). Developed specifically for scramjet testing in 1987, it has proven to be a versatile test bed for a wide range of suborbital aerodynamic projects. It was the large scale prototype on which several major facilities around the world have been based. It was upgraded with a new driver in 2000 and is the test facility in which the world's first scramjet producing more thrust than drag was tested.

Next year three experimental test flights to further air-breathing scramjet technology will be conducted at Mach 8, for British aerospace company QinetiQ and Japanese Aerospace Exploration agency JAXA, and Mach 10 for a joint US Defence Advanced Research Projects Agency/Australian Hypersonics Initiative experiment.

Source: University of Queensland

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