

SPACE PROPULSION SYMPOSIUM (C4)  
Propulsion Technology (3)

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HOT TESTING OF LASER WELDED CHANNEL WALL NOZZLES ON VULCAIN 2 ENGINE AND  
SUBSCALE STAGE COMBUSTION DEMO

**Abstract**

Volvo Aero has for over ten years continuously developed and improved its patented manufacturing method for actively cooled nozzle extensions, i.e. the laser welded channel wall technology. Recently two different types of nozzles have been successfully tested in rigs operated by DLR in Lampoldshausen, Germany:

- The full scale Vulcain 2+ Nozzle Extension Demonstrator has now been successfully tested in two full scale hot firing tests on a Vulcain 2 engine in Lampoldshausen, Germany.
- The SCENE subscale nozzle (Staged Combustion Engine Nozzle Extension) has been hot gas tested at the DLR test rig at in Lampoldshausen, during the summer of 2010.

The paper aims to give a good review the test results from the two test campaigns and an outline of the continued work ongoing at Volvo Aero in order to further mature both the sandwich nozzle technology.

The Volvo Aero ambition has been to mature the sandwich cooled wall technology to TRL 6 in order to be ready for the next possible upgrade of the ARIANE 5 as well as other commercial launch vehicles. This goal is now achieved as the sandwich technology has reached TRL 6 by performing flawlessly in the two tests run, also making it eligible for other engine applications.

The Vulcain 2+ NE Demonstrator project was performed under the auspices of SNSB, CNES, DLR and ESA, and performed in cooperation with Volvo Aero's industrial partners EADS Astrium and Snecma.