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QUALIFICATION AND INDUSTRIALIZATION OF THE SWAN SANDWICH NOZZLE FOR ARIANE6

Abstract

The paper aims to show the experience learned in the SWAN (SandWich Advanced Nozzle) flight development program for the Vulcain 2.1 engine developed by ArianeGroup for the Ariane 6 application. Challenges in design and manufacturing for the new nozzle extension have been overcome with good results gained up to spring 2022. A new workshop has been built and the process re-qualification and industrialization are well in progress for flight production.

The Paper will report on the following activities:

- Major results, including post-test inspection evaluations (expertise), of development and qualification test campaigns performed 2018-2019
- Key milestones and achievements in design and manufacturing of the first SWAN NE's
- Industrialization including workshop overview.
- Status report on SWAN maturation for flight on the Vulcain 2.1 engine

GKN Aerospace has for almost two decades continuously improved and verified its patented manufacturing method for actively cooled nozzle extensions, i.e. the "Sandwich" laser welded channel wall technology. With the SWAN nozzle, the technology is in good progress towards full industrialisation for serial production.

The GKN Aerospace Sandwich nozzle technology shows clear customer benefit in liquid rocket propulsion applications. Its technological maturity as well as cost saving potential have been demonstrated for gas generator and closed cycle engine applications in collaboration with several customers.

Together with ArianeGroup, the ETID – Expander Technology Integrated Demonstrator – Nozzle Extension demonstrator have also been engine tested in the recent year, with great success. Both the SWAN and the ETID significantly contribute to the verification and maturation of the GKN sandwich wall technology for both regeneratively cooled and dump cooled Nozzle designs.