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SPACE TRANSPORTATION SOLUTIONS AND INNOVATIONS SYMPOSIUM (D2)
Future Space Transportation Systems (4)

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PROGRESS ON THE SKYLON AND SABRE

Abstract

SKYLON is a reusable single stage to orbit spaceplane that can take off from a runway reach a 300 km altitude low earth orbit with a payload of 15 tonnes and then return to earth for a runway landing. The feature that enables this is the Synergistic Air-Breathing Rocket Engine (SABRE) which has both air breathing and pure rocket modes. This engines allows SKYLON to fly to over Mach 5 and an altitude of 25 km while air-breathing greatly reducing the burden on the subsequent less fuel efficient rocket phase of the ascent trajectory.

The SKYLON development programme has concentrated on the SABRE engines and the component level technology development programme was completed in 2013. Demonstration of those technologies in a system context has now begun.

The bulk of the technology development activity has focused on the pre-coolers required to extract around 400 MWatts of heat from the incoming air to enable it to be compressed to pressures suitable for a high performance rocket engine. The extracted heat then provides the energy required to power the engines compressors and pumps. A test heat exchanger using flight representative modules constructed on a prototype production basis has completed its testing programme, successfully demonstrating continuous operation with air cooled to cryogenic temperatures.

Other engine technology development work has included experimental programmes on advanced nozzles, air intakes and turbines.

The SKYLON airframe work has included a series of technology development programmes mostly centred on the structure and thermal protection system. There has been a revision of the payload interfaces in light of more detailed analysis and feedback on the Version 1 of the SKYLON User's Manual. A major activity on establishing the certification requirements for the vehicle has been started. Also more detailed studies of the ancillary support systems such as payload carriers and upper stages have been started.