

IAF SPACE PROPULSION SYMPOSIUM (C4)  
Liquid Propulsion (1) (1)

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## ARIANE 6 UPPER LIQUID PROPULSIVE MODULE QUALIFICATION

**Abstract**

The VINCI engine is a cryogenic expander cycle engine. It benefits the inherent features of this cycle; limited number of components, high specific impulse of the closed cycle, low temperature of gases that drive the turbines. The VINCI has multiple restarts and throttle capabilities that are key elements for the Ariane 6 versatility. The VINCI engine benefits also of the proven technologies used on A5. The accumulated experience from previous European cryogenic HM7 and VULCAIN engines has been systematically introduced into the design and the industrialization of the VINCI. The qualification of the VINCI engine has been achieved with a limited number of development and qualification hardware.

The Vinci engine has been integrated in the Upper Liquid Propulsive Module of Ariane 6. In the frame of the ULPM qualification, an analysis of the liquid propulsive system test needs has been performed; hot firing tests are required. The test campaign will take place at P5.2 in Lampoldshausen. An analysis is performed regarding the past experience of launcher stage testing. The different functions and systems that are operated during the tests at stage level are identified [8]. Each phase of the missions are identified. The possible couplings between systems are described. The benefits from stage testing are evaluated.

The validation by tests of the VINCI engine operating inside a representative stage environment and during the various sequences, is discussed. Attention will be paid on the contribution of stage representative hot firing tests regarding chill down, engine transients, feed lines dynamic and pressurization, during different boosts.