P5.2 Test Bench for testing the Ariane 6 Upper Liquid Propulsion Module

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ABSTRACT

The P5.2 test bench is under construction at the test area of the German Aerospace Centre (DLR) in Lampoldshausen and serves as testing platform for the Ariane 6 Upper Liquid Propulsion Module (ULPM). Development and qualification tests shall be performed at P5.2 in ground and flight representative configurations. Under the leadership of the Institute of Space Propulsion Team the P5.2 engineering, construction and acceptance is performed under ESA contract, in coordination with the ULPM supplier Airbus Safran Launchers (ASL) and CNES, the constructor of the Ariane 6 launch pad ELA4 in Kourou.

The name P5.2 is explained by the fact that resources of the nearby P5 test bench (1) are shared for P5.2 test operation. In general, the design philosophy is to use existing test bench capacities and supply infrastructure at the test site and connect them to P5.2 to optimize effort, cost and planning. Nevertheless, there are systems which are newly built for P5.2 needs, e.g. the GN2 production plant or the P5.2 measurement, command and control (MCC) system to handle parallel test operation with P5. The construction has been started in 2014 (in the frame of A5ME U/S) and is planned to be finished with the acceptance tests in 2018, prior to ULPM tests in 2019.

In this context the current P5.2 construction and acceptance status will be presented in this paper, highlighted in the fields of civil work, mechanical, fluid and MCC systems. In addition engineering topics will be presented focusing the recent changes for the A6 ULPM e.g.:

- Test cell arrangement and layout with regard to ULPM fixation and fluid panel positioning and pipe routing
- Interactions and communication between the ground control system on bench side called P5.2 MCC, the interfacing system to the ULPM CBP5.2 and the launcher management computer (LMC), also treating the safety concept to reach safe state for the P5.2 and ULPM in case of system failures

Furthermore, the foreseen test configurations will be illustrated and explained based on the major requirements for the P5.2. As conclusive chapter the envisaged programmatic milestones and next steps will be given.

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(1) The P5 test bench is in use for development tests of the Vulcain® engine.