

## New rocket test rig for safe Ariane 6 launches

02 June 2016

The future European launcher **Ariane 6** will debut in 2020. In order for it to bring all its payloads safely to their orbits, the engines for the new launcher must first be extensively tested. To test the upper stage of the new launcher, a new test rig will be built at the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) site in Lampoldshausen. The Chair of the DLR Executive Board, Pascale Ehrenfreund, and the Director General of the European Space Agency (**ESA**), Johann-Dietrich Wörner, signed the contract for the development and construction of the P5.2 test rig for the Ariane launcher programme on 2 June at the International Aerospace Exhibition (ILA) in Berlin. All upper stages can be tested in this test rig – a capability unique in Europe.

"The Ariane 6 is the future of European space transportation – and DLR is an indispensable partner. Before the first flight of Ariane 6, the upper stage of the new launcher will be put through its paces in Lampoldshausen. With this, DLR assumes responsibility for the central task of making Ariane 6 as safe as its predecessors," said Ehrenfreund in Berlin. The upper stage of the Ariane 6 will be tested extensively on this new P5.2 test rig at the DLR site in Lampoldshausen. These include fuelling and defuelling tests and hot running tests for the upper stage. The commissioning is scheduled to begin in 2018.

### Commitment to Germany as an aerospace location

The DLR Space Administration in Bonn lobbied for the new test bench to be built in Lampoldshausen. The German participation in the Ariane 6 programme will be controlled from this location. "Germany will have a 23 percent contribution in the new launcher, making it the second largest partner after France. We want to participate effectively and contribute our expertise profitably within the European arena. The construction of this test facility in Germany is a clear sign and confirmation of the great success of our commitment," explains Denis Regenbrecht, responsible for the Ariane 6 programme at the DLR Space Administration.

### Extension of the test portfolio at the DLR Lampoldshausen site

The DLR Institute of Space Propulsion is technically responsible for the construction and subsequent operation of the test rig. At the Lampoldshausen site, DLR tests liquid rocket engines of different power classes on behalf of ESA and the European space industry. "The P5.2 is a major expansion of our test portfolio," explains Stefan Schlechtriem, Head of the DLR Institute of Space Propulsion. "In addition to engines and their components, we will be able to use it to test complete upper stages in future. This capability is unique in Europe."

#### Ariane 6 – Europe's future space transportation

The Ariane 6 development programme was approved at the ESA Council at Ministerial Level in December 2014 and signed by 12 member states. With its first launch set for 2020, this European launcher system currently in development is globally competitive and will guarantee European access to space for ESA Member States. The total launch costs will be reduced by almost 50 percent compared to the Ariane 5. The major contractor for developing the Ariane 6 is the Franco-German company Airbus Safran Launchers (ASL). Another significant German player in this development is the Augsburg-based company MT Aerospace.

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#### Artistic illustration of P5.2



What it will look like – the test rig P5.2. The upper stage of the Ariane 6 will be tested extensively on this new test rig at the DLR site in Lampoldshausen. These include fuelling and defuelling tests and hot running tests for the upper stage. The commissioning is scheduled to begin in 2018.

Credit: DLR (CC-BY 3.0).

#### Pascale Ehrenfreund and Johann-Dietrich Wörner sign the contract



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Credit: DLR (CC-BY 3.0).

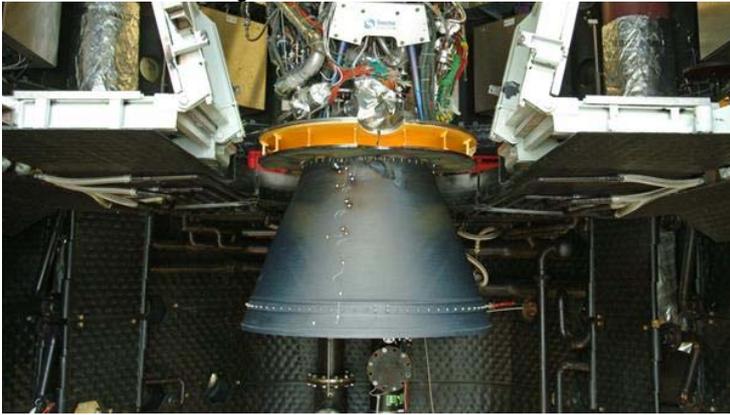
#### Exterior of the P4.1 test rig



The new Vinci upper stage engine is being tested in test rig P4.1 at the DLR site in Lampoldshausen as part of the Ariane 6 programme. This campaign is an important milestone for the development of future European launchers; their flexibility will be greatly enhanced with the re-ignitable engine. DLR conducted hot running tests on Vinci under space conditions using self-developed steam generators. During this test, the engine was ignited three times and can burn for up to 820 seconds during an experiment in a vacuum at less than six millibars. A maximum of five ignitions are possible. The test campaign began on 4 May, 2016 and will last until September 2016. The first launch of an Ariane 6 is planned for 2020.

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Credit: DLR (CC-BY 3.0).

#### Exterior view of the test rig P5



Ariane 5 Research and Technology Accompaniment (ARTA) tests for the Vulcain-2 engines of Ariane 5 were carried out at the P5 test rig of the German Aerospace Center (DLR) in Lampoldshausen. From 1999 until 2004 this was the scene for development tests to improve the Vulcain-2 engine. The new first stage of the future European Ariane 6 launcher will also be equipped with a new engine, the Vulcain-2.1. This will be a further development from the Vulcain-2 engine of the Ariane 5 with, among other things, a newly developed sandwich nozzle. For the development and qualification tests of the Vulcain 2.1, which are planned from 2017, the DLR P5 test rig is currently being adapted to the new requirements.

Credit: DLR (CC-BY 3.0).

#### Vulcain-2 engine at the P5 test rig



The Vulcain-2 engine was extensively tested at DLR's P5 test rig in Lampoldshausen. Ariane 5 Research and Technology Accompaniment (ARTA) were carried out from 1999 until 2005 to continually improve the Vulcain-2 engine. Europe's future Ariane 6 rocket will be equipped with a new engine, the Vulcain-2.1, in which a new sandwich nozzle will come to use. This new engine will also be put through its paces at the P5 test rig. For the development and qualification tests of the Vulcain 2.1, which are planned from 2017, the DLR P5 test rig is currently being adapted to the new requirements.

Credit: DLR (CC-BY 3.0).