
News Archive Space 2009

30 Years of Ariane - an unique success story

16 December 2009



The first Ariane launch on 24 December 1979

On 24 December 1979, the first European launcher lifted off – and DLR was there from the very beginning

24 December 1979: The new European launcher lifted off from the South American launch site at Kourou, French Guyana, with thundering engines – a day of enormous importance for the entire European space effort. This was the first time that the member states of the European Space Agency (ESA) launched their own rocket into space – the foundation stone of the extraordinary success story of the Ariane launcher system.

The German Institute of Aviation and Spaceflight Research and Development (Deutsche Forschungs- und Versuchsanstalt für Luft- und Raumfahrt; DFVLR), the forerunner of today's DLR, played an essential role in the story. It was at the Institute's Lampoldshausen, Heilbronn, testing facility that the Viking rocket engines were tested and qualified.

This historic first launch was a milestone in commercial space flight, but the road to success was beset with innumerable hurdles and stumbling blocks. Understandably enough, there was little need for rocket science in post-war Germany. The first seed for a future rocket programme was sown at the end of the fifties in Baden-Württemberg.



Viking engine

Rocket researcher Eugen Sänger established the Forschungsinstitut für Physik der Strahlantriebe (Rocket Engine Research Institute) in Stuttgart, which later set up a test facility in the Harthäuser Forest near Heilbronn. In autumn 1962, the first tests were conducted using the new engine test stands – for what was still a national rocket programme. Test stand P2 was already able to test engines with a thrust of 100 tons.

1962: The difficult beginnings of the Europa rocket project

It was at this time that politicians, researchers and industrialists all came to the conclusion that a worthwhile rocket programme would be beyond the means of any single state, and that it would therefore have to be developed internationally, in the framework of the European Community. This led to the establishment, in June 1962, of the first European space agency, the European Launcher Development Organisation (ELDO). This was followed just a few weeks later by the foundation of the multinational European Space Research Organisation (ESRO).

The member states were soon to agree that they should develop not only satellites, but also a payload launcher. The national programmes in Great Britain and France had already laid the foundations for the development of separate rocket stages and their engines. The British Blue Streak programme thus became the basis for the first stage of a European rocket, and the French Veronique high altitude research programme contributed to the second stage booster. Although it was as yet unclear who would be responsible for the third stage, the members of ELDO had already decided that the launch facility would be in Australia, where the British already had a launch pad at Woomera.

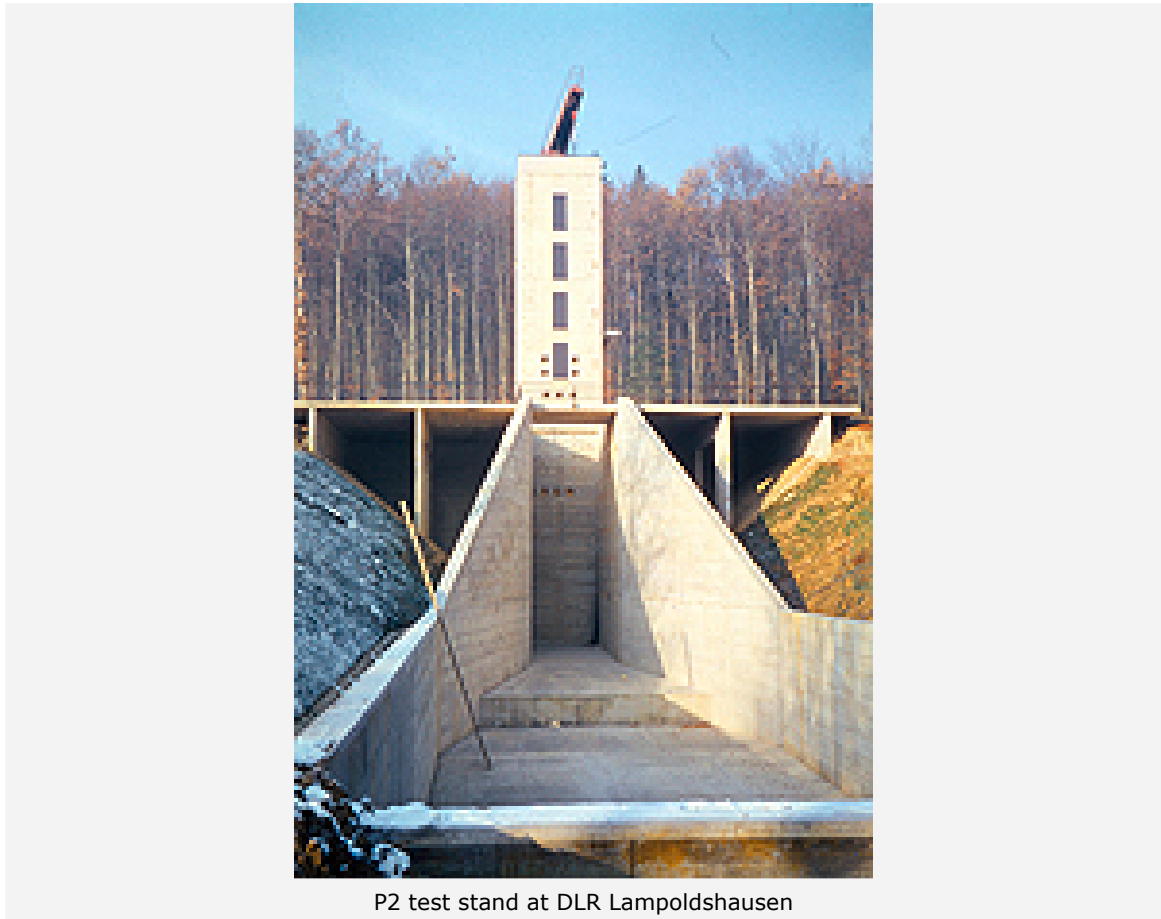


Research on the steam generator

After several primarily political setbacks, the ELDO states agreed to assign the development of the third stage, a demanding industrial and development project, to the still young Federal Republic of Germany. Researchers and engineers specified a mid-power engine with a thrust of 22.5 kilonewtons. The development work required the Lampoldshausen test facility to be significantly expanded; new test stands were built to enable the engines to be tested under space conditions. Special steam-powered ejectors were built to simulate the vacuum of space.

1968: The failure of Europa

After thorough testing, the first Europa rocket was to be launched in late autumn 1968 from Woomera. However, the first launch was a failure and a second launch, in summer 1969, also failed. The first successful launch was to be a year later – although there was no payload and the flight was beset with problems.

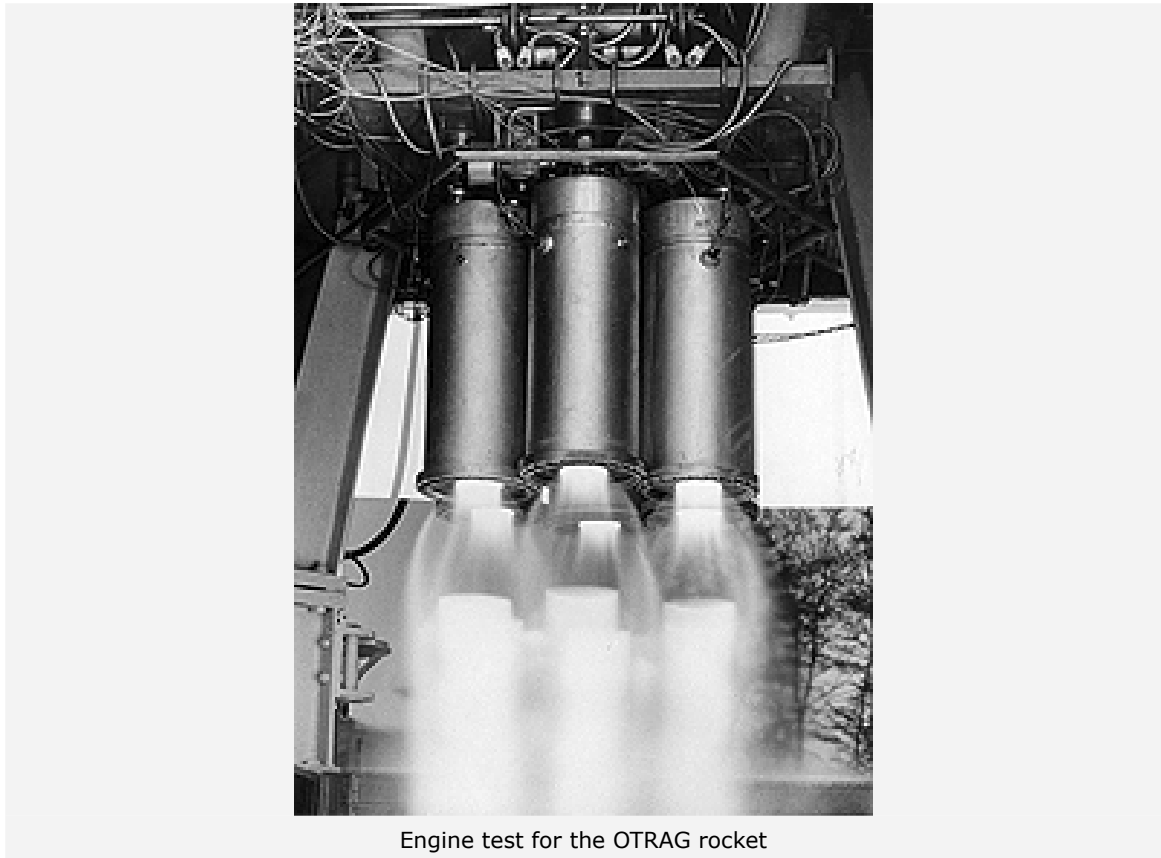


P2 test stand at DLR Lampoldshausen

Analysis of the failures soon brought to light significant failings in technical and scientific cooperation and agreement between the participants. To this were added divergent evaluations of the project from the political point of view, which made the success pointless in the end. There were more launches, and France pushed for the development of a Europa 3 rocket, on which work was started, but ELDO decided to shut down the entire Europa rocket programme in spring 1971.

This seemed to have pushed the development of a European launcher into the far future. On the other hand, work at the rocket test facility in Lampoldshausen did not come to an end. The facility, with its high altitude test stands, was still one of the most modern of its kind in the world. The facility – which was now under the management of the new DFVLR – found a powerful and reliable industrial partner in MBB.

New challenges soon came up. The vernier engines for the first, experimental German-French Symphonie satellite were qualified at Lampoldshausen – and the two Symphonie satellites were to become an important success for European space flight.



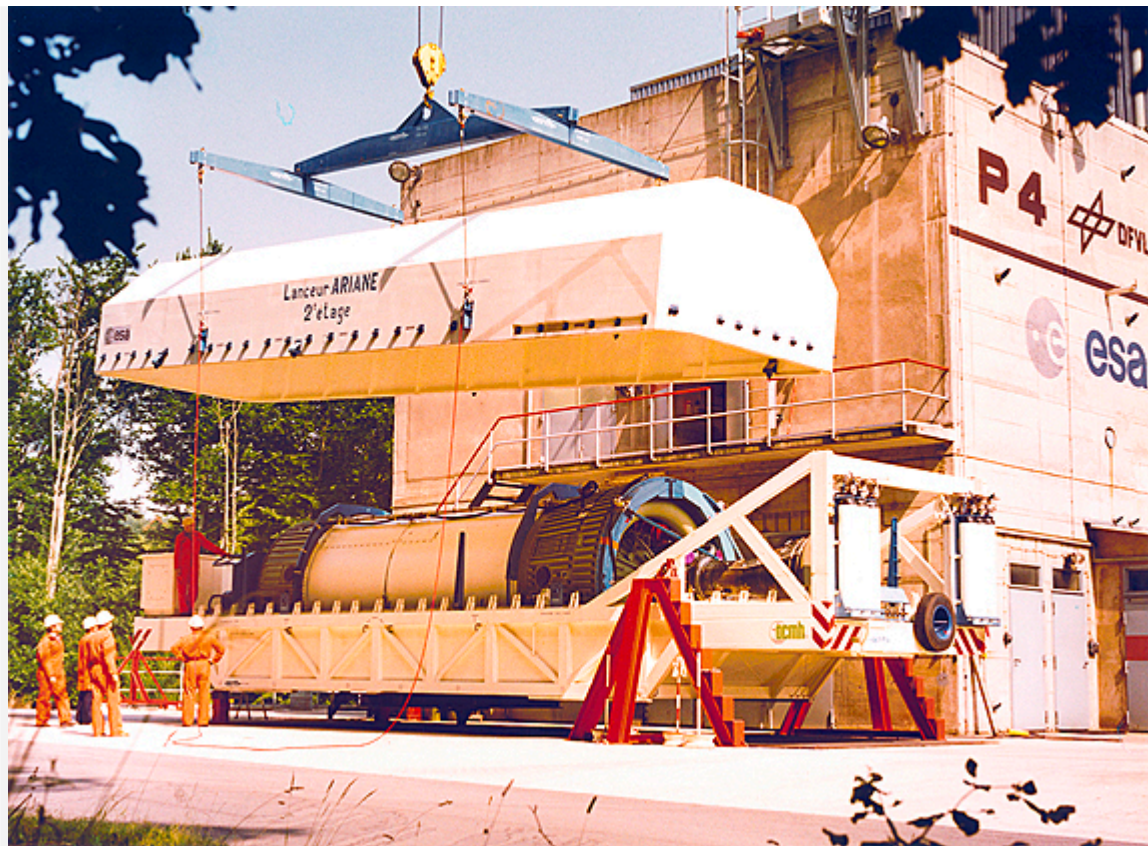
Another important project for the technicians and scientists at Lampoldshausen was the collaboration on the space engineer Lutz Thilo Kayser's private Orbital Transport and Rocket Company (OTRAG). This ambitious self-made rocket builder planned a commercial launcher programme, but had settled on politically very delicate launch sites in Zaire and Libya. OTRAG had no great success, but the tests for Kayser gave the Lampoldshausen specialists a great opportunity to develop their expertise in rocket technology and prove it in practice.

1975: Foundation of ESA – the midwife for Ariane

In the meantime, the need for a European launcher was becoming ever more urgent and even politicians were waking up to its necessity. The result was the foundation of the European Space Agency (ESA) in 1975.

Work on a European launcher started again immediately. The omens were more than good. After the unhappy end of the Europa rocket, excellent technological expertise had been developed in France and Germany. The Vernon and Lampoldshausen test centre staff were highly motivated and qualified and their ability to develop and test high performance rocket engines had been demonstrated in practice.

Now, the institutional and structural bases for the success of a European space project were finally available. Furthermore, France's facility in Kourou was ideally suited as the site for a future European launch base.



Setting up a Viking engine on the test stand

Indeed, it was France who had demonstrated its strategic thinking in never giving up development of a launcher system. In contrast to the Europa project, the new project had an optimised, streamlined structure and management. Technical responsibility for the new programme was taken over by the French space agency, Centre National d'Etudes Spatiales (CNES). This was to be the roof under which all development and preparation would be coordinated and implemented. The ambitious new project finally got a name as well – Ariane, in reference to Ariadne, the Greek mythological goddess – it was also easy to pronounce in any of the ESA's member languages.

France took the lion's share in financing and technological development, so that the development and building of the first and third booster stages was contracted to Aerospatiale. The second stage was to be developed under the management of the German MBB-ERNO organisation, and MBB was also to supply components for the upper stage engines.

1976: DLR's test stands make history

These challenging plans led to a considerable expansion of Lampoldshausen, so that test equipment and stands had to be significantly upgraded and expanded.

Testing started in 1976; the engines were reliable and completely up to expectations. The engines for the planned Ariane 1 developed a thrust of 611 kilonewtons. Four of these engines were to drive the first stage, and a Viking engine was to power the second stage. The third stage was to be equipped with a HM-7-engine employing liquid oxygen and hydrogen.

Over the next three years, the Lampoldshausen facility tested and qualified the Viking engines – even under high altitude conditions – completely successfully.

2009: A unique success



On 29 October 2009 an Ariane 5 ECA carrying the lettering 'Forum Ariane Lampoldshausen' and 'Heilbronner Land' launched from Kourou

The first Ariane launch was scheduled at last for 15 December 1979. But technical problems at the Kourou launch facility set the launch back to the 23rd. Then weather forced a further delay – but the next day, the 24th, saw a perfect launch of Ariane to a 218-kilometre orbit, and an experimental instrument capsule weighing 1.6 tons was placed into orbit. France and Germany had given themselves the perfect Christmas present as leaders in European space flight, and proved at last that not only the USA and USSR could have a successful space programme, but also Europe.

This was just the start of a unique success story; Ariane 1 to 4 had many launches, by far the majority of which were successful. There were small setbacks and failures, of course, but the concept was a winner and resulted in an unrivalled technological and commercial success.

The youngest member of the launcher family, Ariane 5, has been operational since 1998. It stands for the secure future of European space flight – and Lampoldshausen is an essential part of its success.

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