

Space Transportation

The highlights of the year were bound up with the decisions taken at the ESA Ministerial Council in Paris on 27 May.

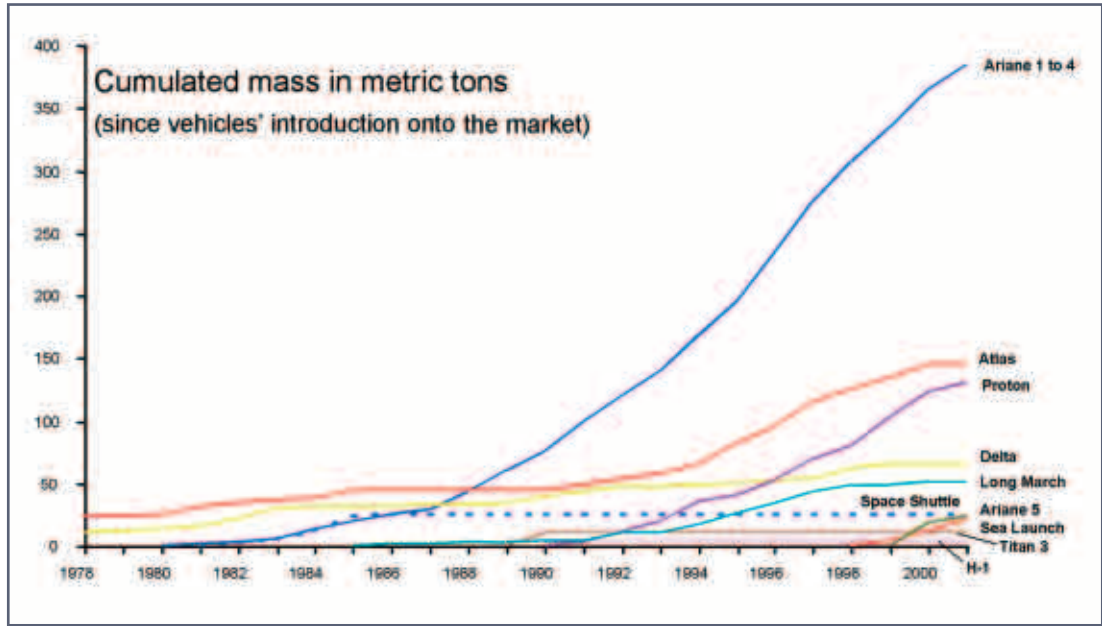
For the short-term, the Ministers endorsed, only five months after the failure of the first Ariane-5 ECA flight in December 2002, a robust Recovery Plan including completion of the Vulcain-2 engine, consolidation of the ESC-A stage, and the starting of a new inflight demonstration programme.

The competitiveness of the Ariane launcher sector over the medium-term was also addressed. Ministers recognised that Ariane's success on the global commercial market has significantly lightened the financial burden on Governments and Industry for guaranteeing Europe's access to space, given that the European institutional market, contrary to other space-faring nations, is far from capable of sustaining such a guarantee. Based on the market situation, they concluded that Governments and Industry would have to take exceptional measures designed to sustain guaranteed access to space with the Ariane-5 launcher, and to improve its competitiveness. The Ministers endorsed a new industrial organisation based on a launch operator (Arianespace) and a launcher-system prime contractor responsible for Ariane-5 vehicle design, development and manufacture. Against Industry's commitment to make significant production cost reduction efforts, they also decided to undertake the European Guaranteed Access to Space (EGAS) programme, aimed at putting European Industry on a level playing field compared to its competitors, and at fostering the creation of a European institutional market.



The final mission for Ariane-4 after 15 years of faithful service. On 15 February, Intelsat 907 was successfully put into orbit by an Ariane-44L (flight 159)

Total masses launched per vehicle for commercial GEO applications between 1978 and 2001
(Source: Euroconsult Ecospace database)



Ministers also decided to undertake a new 'Soyuz at CSG' programme, to develop the ground installations needed at the Guiana Space Centre for exploitation of the Russian Soyuz launcher from 2007 onwards, thereby complementing the launch service provided by Ariane-5 in terms of the lower-mass part of the geostationary satellite market and of non-geostationary launches.

In view of the long-term needs, the Ministers decided to start the Future Launcher Preparatory Programme (FLPP) in 2004 for preparing for the evolution of operational

launchers beyond 2010, as well as development of the Next Generation Launcher. The importance of initiating international cooperation as a source of added value for technology development was reaffirmed and Russia was welcomed as ESA's first partner in long-term cooperation on access to space.

The second half of the year was dedicated to the drafting, negotiation, finalisation, and adoption by the Member States concerned, of all legal texts needed for the entry into force of the EGAS Ariane, FLPP and Soyuz at CSG programmes on 4 February 2004.

Flight	Date	Orbit	Performance (kg)	Launch vehicle	Satellites
V159	15 Feb.	GTO	4723	AR44L	Intelsat-907
V160	9 April	GTO	5443	A514 (5G)	Insat-3A Galaxy-XII
V161	11 June	GTO	6882	A515 (5G)	Optus-C1 BSat-2C
V162	27 Sept.	GTO	6137	A516 (5G+)	Insat-3E e-Bird SMART-1

All in all, therefore, in 2003 Europe clearly showed itself capable of overcoming the consequences of the market downturn, aggravated by the launch failure at the end of 2002, of putting the European launcher sector back on track, and of developing a coherent long-term strategy integrating: affordable guaranteed long-term access to space, a response to growing European institutional launch-service needs, a strengthening of the launcher R&D base, and enhancement of the competitiveness of the European launcher sector.

Ariane Operational Launches

Four launches were conducted from Europe's Spaceport in Kourou, French Guiana, in 2003 with a 100% success rate. The low number with respect to previous years reflected both the crisis in the commercial satellite sector and the unavailability of the new 10 tonnes Ariane-5 ECA version. According to the projections, however, we should now have passed the market low point.

Flight 159 was the last of 116 Ariane-4 launches and the 74th consecutive successful flight, giving an overall success rate of 97.4%. This is a very prestigious record for this legendary launcher which, as the accompanying chart shows, dominated the commercial launcher market for more than a decade, its first flight having taken place in June 1988.

Flight 162 was the 14th commercial launch of Ariane-5, whose overall success rate now stands at 85.7%.

Ariane-5 Development Programmes

Following the conclusions and recommendations of the independent Inquiry Board regarding the failure of the Ariane-5 ECA maiden flight on 11 December 2002, activities concentrated on the launcher's return to flight. A Recovery Plan was put in place with the objective of ensuring the qualification of this version of Ariane, which will be the European space transportation workhorse until 2010 at least, whilst at the same time assuring the resumption of Arianespace commercial flights with the flight-qualified generic Ariane-5 version.



Ariane-5 ready to complete its intricate mission to deploy Insat-3E for the Indian Space Research Organisation, e-Bird for Eutelsat and SMART-1 for ESA. The flawless launch took place on 27 September (flight 162)



An Ariane-5 cryogenic Vulcain-2 main engine at the DLR test facility in Lampoldshausen

The Ariane-5 Recovery Plan was presented to the ESA Ministerial Council in May for approval in conjunction with the proposed restructuring of the Ariane launcher sector. As part of the Plan, Ministers sanctioned development work to correct the Vulcain flight anomaly

and consolidate the ESC-A cryogenic upper stage by drawing upon available funding in the Ariane-5 Evolution programme and reorienting the Ariane-5 Plus programme, including putting development of the Ariane-5 ECB version on hold. It was decided to perform the development work needed to maintain qualification of the Ariane-5 generic version within the framework of the ARTA-5 programme.

The first flight of the consolidated Ariane-5 ECA is currently planned for mid-2004, to be followed by the first launch of Ariane-5 ES. The commercialisation of the ECA version is foreseen for 2005.

Ariane Research and Technology Accompaniment (ARTA) Programme

The primary objective of the complementary ARTA-5 programme is to maintain Ariane-5's qualification status during the launcher production phase, including engine sampling tests. In 2003, ARTA Vulcain-1 engine tests were performed to assist the Recovery Plan. The ARTA sampling tests on the storable propellant (EPS) stage of the Aestus engine allowed qualification of the existing, and an alternative, MMH propellant supplier. The Aestus engine was also used to start a test campaign to qualify engine re-ignition for the ATV mission.

Following the recovery of the (EAP) boosters after the failed Ariane-5 ECA flight at the end of 2002, an extensive examination of the different segments and engine performance data was performed, showing good behaviour of these elements during flight.

For the Ariane fairings, a new separation system concept is being developed which will reduce shock levels at fairing separation. A new manufacturing process (called Autoclave Free Curing) is being developed within ARTA to reduce the fairing's production costs.

Ariane-5 Infrastructure Programme

The Infrastructure Programme for the period 2002-2004 covers those activities related to maintaining the ESA-owned Ariane launcher processing facilities (ELA) at Europe's Spaceport in good operational condition.

The Vega Programme

A major event early in the year was the signature of the two major industrial contracts for the new launch vehicle, namely the Vega contract between ESA and ELV (I), the Vega Prime Contractor, and the P80 contract signed by CNES on behalf of ESA and Avio (I) (formerly Fiat Avio) for the development of the first-stage solid-rocket motor. Both contracts, formalised at a ceremony in Colleferro near Rome on 25 February, are firm-fixed-price arrangements and commit the major part of the Vega programme funds for a launch now planned for the end of 2006.

Another major achievement, in June, was the successful completion of the Level-1 Safety Review. This analysed the risks associated with the launch vehicle and its ground system, as well as its operations and its interactions with the existing launch facilities in Kourou. It also defined a number of measures to ensure compliance with CSG safety requirements.

A contract was also signed in June between ESA and CNES DLA/SDS for the ground-segment technical management, engineering and test activities. This document formalises the partnership between the two Agencies in the management of this part of the Vega launch system.

Completion of the Vega Avionics Preliminary Design Review (PDR) in July was an important step forward in the detailed definition of the launcher system, and was followed in the second half of the year by the PDRs for many other subsystems/units.

The subcontracts for the P80 first stage were all signed by October.

The necessary modifications to the Ariane EAP/P80 test stand in Kourou (BEAP) were started in the last quarter of the year.

In December, the ESA Council concluded the approval process for the Vega and P80



Delivery of the new winding mandrel for the Zefiro 23 motor of the second stage of the Vega small launcher (Courtesy of Avio)

Implementing Rules, which break new ground in terms of cooperation between European agencies.

Guiana Space Centre (CSG) – Europe's Spaceport

2003 saw the end of exploitation of the Ariane-4 launcher after fifteen years of successful operation. The reduction in workload due to the shift from two operational launching systems (Ariane-4 and 5) to one (Ariane-5) had been fully anticipated, resulting in a smooth transition.

To contribute to the Ariane-5 ECA recovery effort, savings have been made in the ESA funding for CSG in years 2003, 2004 and 2005, representing fixed-cost reductions of 9.7, 8.7 and 14.7 MEuro, respectively.

Following the mandate given by the Ministerial Council in May, the process of reorganising CSG was kicked-off under ESA's guidance. It aims at further improving the launch base's efficiency and effectiveness by adapting its organisation to the new institutional framework in the launcher sector.

Preparations for the Soyuz at CSG project were in full swing during the first half of the year, and in May the Ministerial Council approved its implementation as an ESA optional programme. The Programme Definition Review took place in July at ESA Headquarters in Paris with active European and Russian participation.