



---

The Space Congress® Proceedings

1997 (34th) Our Space Future - Uniting For  
Success

---

Apr 30th, 1:00 PM

## Paper Session II-A - Operational Evolution in the Ariane Launch Process

Roger Solari

Jean-Michel Desabeau

Follow this and additional works at: <https://commons.erau.edu/space-congress-proceedings>

---

### Scholarly Commons Citation

Solari, Roger and Desabeau, Jean-Michel, "Paper Session II-A - Operational Evolution in the Ariane Launch Process" (1997). *The Space Congress® Proceedings*. 4.

<https://commons.erau.edu/space-congress-proceedings/proceedings-1997-34th/april-30-1997/4>

This Event is brought to you for free and open access by the Conferences at Scholarly Commons. It has been accepted for inclusion in The Space Congress® Proceedings by an authorized administrator of Scholarly Commons. For more information, please contact [commons@erau.edu](mailto:commons@erau.edu).

**EMBRY-RIDDLE**  
Aeronautical University™  
SCHOLARLY COMMONS

**TECHNICAL PAPER TO BE PRESENTED AT THE 34TH SPACE CONGRESS  
BY ROGER SOLARI - DIRECTOR OF OPERATIONS DELEGATE  
HEAD OF ARIANESPACE KOUROU**

=====

**SPACE TRANSPORTATION PAST AND FUTURE : THE ARIANES EXPERIENCE**

Space transportation is entering into a strong development and evolution phase. Commercial business is moving in this area. The access to space is enlarging its capacities to cope with new missions. A lot of new launch systems are foreseen by the turning of the century.

Defense, Science and commercial appliances are presenting new requirements, new performances with a common basis : how to render more flexible and less costly the access to space ?

The Europeans got their own experience during the ARIANE Adventure.

The race to performances and profitable competition was ran with dedicated trumps among which we can underlined :

- the Kourou Range
- the ARIANE launch system with launch vehicles and launch facilities
- the way those assets where managed through adapted organization and methods in order to give a greater competitiveness based upon flexibility, reactivity and optimized human resources.

The presentation will be shared in three main parts :

- The ARIANE operational experience AR1 through AR4 ; campaign duration, staff optimization
- The Range and the Guiana Space Center 2000 Programme (CSG 2000), the European space port of Kourou, one among the best launch places in the world. The main characteristics, the new facilities with the CSG 2000 improvement programme.
- ARIANE 4 and ARIANE 5 launch facilities : production and operations main characteristics
  - . a comparison in between the two concepts
  - . the way the systems are operated
  - . the way the systems are managed.

## **THE ARIANE OPERATIONAL EXPERIENCE**

On the 24<sup>th</sup> December 1979, ARIANE 1 took off from Kourou launch pad number 1. A first attempt on the 15<sup>th</sup> December brought to an aborted launch. A technical caps reached the geostationary transfer

orbit : a delightful Christmas gift for the whole development team.

On the ashes of the defunct Europa Programme, Europe entered into the space age with it's own strategic access system to space.

The ARIANE 1 launch campaign (not included the aborted launch procedure) lasted 55 days.

Slowly by slowly, beside the technical improvements of the systems and the evolution of the launch vehicle (AR1/AR2/AR3/AR4), competitiveness was increased with a production cost reduced to a very good level of efficiency.

Presently, an AR4 launch campaign last 26 days and the production and operations system is able to produce a launch every three weeks. This has been demonstrated those last three years with 11 launches in nine and a half months and 14 launches in 12 months.

Some figures show the performances demonstrated by the European system those last three years :

- . 29 launches in three years (some postponed due to spacecraft slippages)
- . 49 spacecrafts into orbit
- . 31 launch vehicles produced representing a good challenge for the European industry with 229 stages and boosters, 298 engines

and a great effort to reduce both production and exploitation costs.

This is a good omen for the near future.

A standard AR4 operation plan last 26 days, 14 in the preparation area, where the L/V is assembled, 12 on the pad.

The system enables the preparation of 2 L/V in parallel. As soon as, once a launch vehicle has been assembled and tested in the preparation area, it can be moved to the pad, leaving so the area free to enter the next launch vehicle.

About staff, two launch vehicles can be prepared at once with the 140 people dedicated to the 2 L/V on board activities and 100 to the whole ground support facilities on the launch facilities n° 2.

This result has been achieved in particular with a strong planification tool, taking into account the whole activities : L/V activities and maintenance activities, and the whole human resources (operational team and quality teams) in order to optimize their utilization up to 80 % of their availability, the remaining time being dedicated margins to cope with discrepancies fixtures.

The whole establishment operation plan thus defined, integrates also all the safety an security constraints.

The «Actual time response function » in the planification tool give us a permanent view of the proceeding process enabling to face as fast as possible any abnormal situation. This function executes also a replanification of the whole operation plan within a few minutes after a technical problem fixture including the management of the resources.

A lot of improvements where also achieved on the launch vehicle itself thus bringing the performances of ARIANE from 1,85 T (AR1) in GTO to 4,9 T in GTO with AR4.

## **THE RANGE AND THE GUIANA SPACE CENTER 2000 PROGRAMME**

The equatorial location of the Kourou range offers a lot of advantages (geographical, meteorological, operational : azimuth, orbit better accuracy , performances in GTO...).

A great improvement programme was launched 4 years ago.  
It comes to an end right now. A lot of facilities where improved :

- . computation - localization system
- . meteorological systems
- . payload preparation complex and payload support facilities
- . transmission system
- . control center
- . ...

## **ARIANE 4 AND ARIANE 5 LAUNCH FACILITIES AND PRODUCTION OPERATIONS MAIN CHARACTERISTICS**

ARIANE 4 launch facilities where conceived in order to be able to prepare two launch vehicles in parallel.

The existence of only one launch pad forced us to the research of an optimized process.

We talked about the planification tool earlier. An optimized organization has been set up. The launch production within the hands of a single manager, the operational production manager, enables a strong overview of the situation. Beside the operational strong point, the technical activities are based upon the existence of industrial groupements gathering societies working in the same type of business. For instance, the existence of two strong groupements on the launch facilities, the first being dedicated to control command activities, the other to the mechanical and fluid activities is a great incentive to synergy of resources and thus exploitation cost reductions.

The same approach has been achieved on the ARIANE 5 operational and industrial concept. During the transition phase where both AR4 and AR5 are going to be operated at once, those industrials groupements will be in charge of both launch systems under a single ARIANESPACE Management.

About ARIANE 5, if the operation concept is somewhat different , the system enable also the preparation of two launch vehicles in parallel one being operated in the launch vehicle integration building, the other in the final assembly building, until the final chronology and before being rolled out to the pad at H0 - 9 hours.

Both launch systems AR4 and AR5 where conceived in order a client feels like a real customer.

The principle of the launch service offered by ARIANESPACE is based upon the fact that the customer has to treat with only one interface thus, ARIANESPACE and its team.

A single contractual commitment enables on site the directorate of operation to be fully in charge of all the activities on the range dedicated to the customer service.

About ARIANE 5, the same planification tool we talk about before is able to cope with the AR5 activities being fully integrated in the whole operations plan of the ARIANESPACE Kourou Establishment.

Such an integration is a good guaranty for :

- . the lower staff ;
- . the fastest preparation process ;
- . the highest reactivity to face discrepancies ;
- . the best flexibility for staff and hardware.

Once ARIANE 5 will be in our inventory, we expect to prepare and to launch such a launch vehicle within 22 days.

=====

To conclude, we can be sure that there is no miracle in our operational business. Experience and exploitation of experience are the highest trumps to face the present challenge of access to space.

The race to cost reduction to orbit is not only a question of production cost reduction and performances. The management of the launch system with a permanent effort in term of organization and methods is also a true key to success.

There will be, may be, no great place for all the existing launch systems or the ones to come by the very beginning of the next century.

We feel confident on ARIANE side but this confidence give us the certitude that we have to move further and further and that a strong effort is before us to maintain our launch system among the best.