



FROM EARTH TO SPACE

INNOVATIVE ENGINEERING
& MANUFACTURING



Innovative Engineering and Manufacturing for Aerospace
From Earth to Space

LAUNCH VEHICLES

- Studies, Modeling and Simulation
- Manufacturing of Mechanical Components

AIRCRAFTS & AIRSHIPS

- Services: Human Factors, Modeling, IT Engineering, Cybersecurity
- Airships & Site Monitoring

GROUND EQUIPMENT

- Assembly, Integration and Testing -
- Handling Systems -

SATELLITES

- Space Mission Analysis and Design
- On-board Equipment

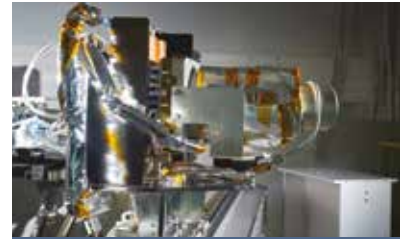


- **Design & manufacturing of space ground support equipment (GSE)**

- Mechanical ground support equipment (MGSE)
- Optical ground support equipment (OGSE)
- Electrical ground support equipment (EGSE)

- **Space flight model sub-systems**

- Optical payload
- Opto-mechanical sub-assembly
- Opto-electronic instrumentation



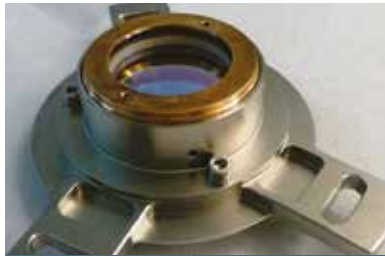
ENMAP
by OHB AG

Opto-mechanical test bed for qualifying and calibrating a key feature of the observation satellite: the instrument for analyzing the light spectrum reflected back from the surface of the Earth



CSO satellite telescope
by CNES for ASTRIUM

Set of several MGSE dedicated to Earth observation telescope and scientific missions



EARTH-CARE spacecraft
by ESA

Atmospheric Lidar (ATLID) instrument for an observation mission of vertical profiles of clouds and aerosols



TARANIS
by CNES

Photometer sensor for the study of storm phenomena located in upper atmosphere

BUILD TO SPECIFICATION

- Preliminary and critical design
- CAE, CAD and CFD
- Assembly, integration and testing workshop (AIT)

STRATOBUS™ by THALES Alenia Space

Stratobus™ is an autonomous, multi-mission stratospheric airship, midway between a drone and a satellite. CNIM is a major player in the project, designing and producing the structure and associated equipment, the ring and the nacelle.



- Innovative industrial solutions to combine cost reduction and product quality
- Design and cutting-edge manufacturing of large size components
- High precision and quality



INNOVATIVE INDUSTRIAL SOLUTIONS

Design and Process department



VEGA 1st Stage Boosters

Nozzle structures for P80 carter



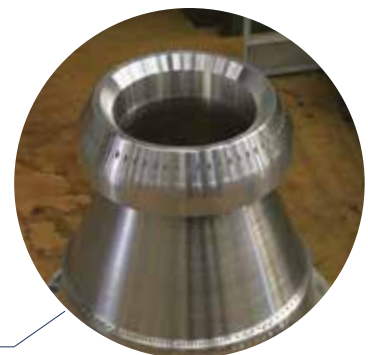
ARIANE 5 Helium Sphere Tank

Electron beam welded joint



ARIANE 5 Boosters

Nozzle structures





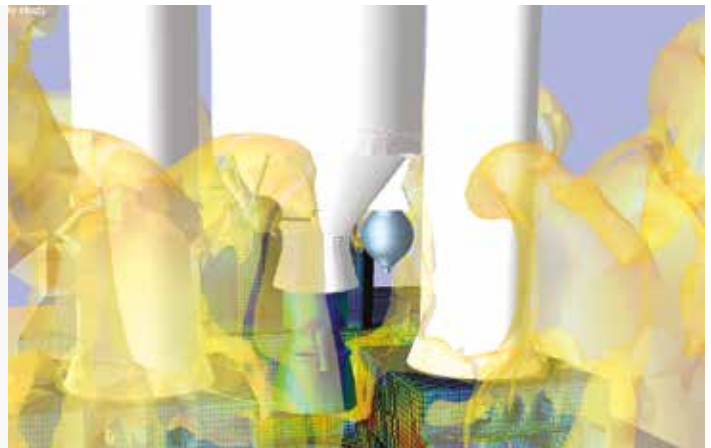
ALTAIR Launch System
System and mission requirements, space launch vehicle design and exploitation studies*

SMART INNOVATION, SYSTEMS AND TECHNOLOGIES

- From market & business assessment to technology innovation management
- Feasibility studies and preliminary design
- System engineering and design-to-cost

DESIGN, SIMULATION AND OPTIMIZATION

- System performance and detailed component analysis
- Modeling, simulation and optimization (MSO)
- High-performance computing (HPC) and multidisciplinary design optimization (MDO)



ARIANE 5/6 launch

Assessment of thermal environment at lift-off, taking into account first stage solid booster and Vulcain liquid engine

ERGONOMICS, HUMAN FACTORS AND RISK MANAGEMENT

- Design and human factors qualification
- Industrial risk management and operational safety



ARIANE V Mission control

Design, ergonomics and human factors of the control room



AIRBUS Cockpits

Human factors management in cockpit design: program and R&T

* Altair project has received funding from the European Union's Horizon 2020 research and innovation program under grant agreement No 685963

STATE-OF-THE-ART FACILITIES



Bertin Technologies

580 people dedicated to consulting, design and supply

AIX-EN-PROVENCE, SOUTH-EAST FRANCE R&D and high-end manufacturing of instruments and equipment

- 3 clean rooms available for AITV of instruments (GSE and FM)
- Low particulate pollution
44 m² + 140 m² ISO 5, 45 m² ISO 8
- Low molecular pollution (COV absorption system)
x10 reduction wrt. std environment
- Standard cleaning and monitoring equipments
- Metrology facilities 140 m², ISO 5
- Low vibrations installation
- Fine thermal regulation $\pm 0.5^{\circ}$ C
- Regulated, ± 0.5 % hygrometry
- Dedicated optical & mechanical instrumentation:
3D CMM, interferometer, theodolite, wave front analyzer, hexapod ...

TARNOS, SOUTH-WEST FRANCE

- Test facilities
- Technological demonstrators

PARIS REGION

- LabUX
- HPC facilities



CNIM Industrial Systems

500 people dedicated to design & manufacturing

LA SEYNE-SUR-MER, SOUTH-EAST FRANCE Cutting-edge manufacturing for large-scale parts

- 60,000 m² workshops with direct access to Mediterranean Sea
- 235 m² ISO 6 clean room
- Stainless, Aluminum and Noble Metal boilers
- Welding :
 - Facilities up to 230 m³
 - 30 years experience in electron beam welding
 - Mastery of all manual welding techniques (TIG, MIG) and automatic welding techniques (TIG, TIG Narrow Gap, MIG, Orbital)

DEDICATED TEAMS



INNOVATIVE ENGINEERING & MANUFACTURING FOR THE AEROSPACE INDUSTRY

CNIM specializes in the design and manufacturing of demanding systems in terms of performance and reliability, for use in extreme environments such as Space.

For example, we manufacture systems within Defense, electro-nuclear sector and reactors for scientific research. Thanks to CNIM high tech manufacturing capabilities, our highly experienced engineers can design and fabricate **very large scale components** for launch modules or ground installations.

Our subsidiary Bertin Technologies enables CNIM to consolidate its multi-discipline skills in scientific engineering and innovative equipment.

Satellites are excellent tools for observation and acquiring knowledge of the Earth and solar system. In order to complete their mission successfully, they have highly complex on-board systems which must not suffer any technological failure. **Ground testing, inspection and calibration** are key factors in which Bertin configures these critical elements in actual operating conditions. Taking these into consideration Bertin's customers are offered a wide range of services to support them in the design and provision of **ground or on-board equipment**, in a reactive and agile manner.

Bertin also provides unique skills in **consulting, innovative engineering, optimization and modeling, ergonomics, human factors, risk management and cybersecurity.**

Together, CNIM and Bertin combine their talents for innovation throughout **the entire aerospace system life cycle.**

THEY TRUST US

AIRBUS	ASL
AVIO	CNES
ESA	OHB
ONERA	SAFRAN
THALES	

FROM INNOVATIVE IDEAS TO THE MANUFACTURING OF TURN KEY EQUIPMENT



CNIM, a global organization providing tailor made solutions



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