

# AERONAUTICS

2009

**Airbus, Mirage 2000, Rafale, Falcon—jewels in the crown of the French aviation industry. France's global leadership in aviation is confirmed by the fact that exports represent three-quarters of sales in the sector.**

**The production of aircraft, helicopters, and tactical weapons relies on the skills and capacities of multiple actors: large airframe systems companies for design and production (EADS, Dassault Aviation, Eurocopter), engine makers (Snecma), and manufacturers of equipment and components, from seats to electrical and hydraulic machinery. Once aircraft are put into service, other professions take over: maintenance, airport operations, pilots, and so on.**

**France (and Europe) have an equally high profile in satellites, where Ariespace is the world leader.**

**Field:** Engineering.

Also see the following profiles: Engineering, Transport and logistics, Environment.

**Sectors of activity:** aeronautical construction, air transport industry, air navigation control. Operations agent, airline pilot, air traffic controller, flight attendant, aeronautical engineer, engine mechanic, civil aviation technical specialists (research and operations).

## ORGANIZATION OF STUDIES IN FRANCE

The aeronautics and space industry comprises a wide range of activities, from the research engineers who design the aircraft to the skilled workers who fabricate its components, and from the mechanics on the ground to the crew in the air.

### Short programs

Technicians are trained in specialized aeronautics programs, but also in more general programs in mechanics, industrial automation, and electronics. Common degrees are the brevet de technicien supérieur (for example, the BTS in maintenance and operation of aeronautical equipment) and the diplôme universitaire de technologie (for example, the DUT in mechanical engineering and automation). After earning a BTS or DUT, many students pursue a licence professionnelle at a university or enroll in a school of engineering.

The air transport industry employs many thousands of ground personnel with secondary-school and 2-year postsecondary credentials in business or technical fields.

### University programs

France's universities offer a number of specialized programs in aeronautics. Prominent examples include the 2-year diplôme d'études universitaires scientifiques et techniques (DEUST) in aircraft maintenance at the Université d'Evry, 3-year licences professionnelles at many institutions, and professional master's programs at Université Aix-Marseille (all three divisions of the university), Bordeaux 1, Toulouse 3, and Evry, as well as various research masters. These programs can lead to management, engineering, and research positions with aeronautics and space firms, which require highly skilled employees. In fact, about a third of their personnel are engineers and managers. Many work in design, research, and development, conceiving the equipment, components, and production methods of the future.

### Engineering programs

The prestigious diplôme d'ingénieur, a French national diploma, requires 5 years of postsecondary study. Many engineering schools produce talented engineering generalists capable of grappling with complex challenges, such as those posed in aeronautics.

It is possible to enroll in engineering programs directly out of secondary school, after a 2-year postsecondary preparatory program, or after earning a 2-, 3-, or 4-year postsecondary degree. Regardless of the path taken, engineering programs are highly selective.

Five of France's engineering schools specialize in aeronautics and aerospace: ENAC (École nationale de l'aviation civile), which trains airline pilots and other civil aviation specialists; ENSAE/SUPAERO (École nationale supérieure de l'aéronautique et de l'espace), ENSICA (École nationale supérieure d'ingénieurs de constructions aéronautiques), ENSMA (École nationale supérieure de mécanique et d'aérotechnique), and ESTACA (École supérieure des techniques aéronautiques et de construction automobile).

Some schools of general engineering offer an aeronautics option. Examples include the École centrale de Lyon and the École centrale de Paris.

## RESEARCH THEMES

Tough problems confront the aeronautical sector—chief among them the unstable price of fuel (around a long-term upward trend), shortages of key materials, and the need to reduce pollution.

The sector must do more than cope with the cost of fuel, however. It must also keep up with and strive to get ahead of popular demand to reduce the harmful effects of fuel use (on the climate, for example). Today, efficiency and the abatement of emissions have replaced speed as the principal concern of aeronautical researchers.

## INTERNATIONAL STANDING

Europe's largest airport operator is Aéroports de Paris, which manages the principal Paris airports and employs 11,000 people.

Roissy-Charles-de-Gaulle Airport is France's largest airport and the second-largest in Europe, after London's Heathrow, in number of passengers (56.4 million each year). More than 8,000 people work at the airport.

The Air France-KLM group (104,000 employees) is the world's largest international passenger carrier.

The Airbus A380 was entered into service in 2007, the same year as the Falcon 7X. Seven countries (Belgium, France, Germany, Luxembourg, Spain, Turkey, and the United Kingdom) have come together to finance the development of the A400M. The A350 XWB, notable for its extensive use of composite materials, is scheduled to begin service in 2012.

## Websites

- Centre National de la Recherche Scientifique (CNRS, national center for scientific research), <http://www.cnrs.fr>
- Centre Français de Recherche Aérospatiale (French center for aerospace research), <http://www.onera.fr/>
- Centre National d'Études Spatiales (CNES, national space studies center), <http://www.cnes.fr/web/CNES-fr/6919-cnes-tout-sur-l-espace.php>
- Ministry of Defense, <http://www.defense.gouv.fr/>
- Ministry of Ecology, Energy, Sustainable Development, and Regional Planning, <http://www.developpement-durable.gouv.fr/>
- Ministry of Transportation, <http://www.transports.equipement.gouv.fr/>
- Le Groupement des Industries Françaises Aéronautiques et Spatiales (GIFAS, federation of French aeronautics and space industries), <http://www.gifas.asso.fr/fr/>
- Fédération Française Aéronautique (French aeronautics federation), <http://www.ff-aero.fr/accueil.php>
- Civil aviation office, <http://www.aviation-civile.gouv.fr/>
- Fédération Nationale de l'Aviation Marchande (FNAM, national federation for commercial aviation), <http://www.fnam.fr>
- Air France, <http://www.airfrance.fr/>
- Arianespace, <http://www.arianespace.com/index/index.asp>
- Aérocontact, a Web site for the French-speaking aeronautics and space industry (providing "news and employment opportunities for the aerospace industry, air transportation, and defense"), <http://www.aerocontact.com/>
- Jobs and training in the aeronautics and space industry, <http://www.aeroemploifformation.com>
- Nonprofit center for employment and training information, <http://www.aireemploi.asso.fr>
- French government aeronautics information office, <http://www.sia.aviation-civile.gouv.fr/>
- Espace Aéronautique, a Web site for exchanges among individuals and firms active in the aeronautics industry, <http://www.espace-aeronautique.com/francais/index.html>
- Aerospace Valley (the global competitiveness cluster of the Midi-Pyrénées and Aquitaine regions), <http://www.aerospace-valley.com/>

## Key words

aerospace – air – aircraft – airport – airscrews – armaments – artificial intelligence – astrophysics – automation – aviation – composites – computer science – consulting – electromagnetics – electronics – embedded systems – energy – engine – environment – fluid dynamics – fluid mechanics – fuel – helicopter – maintenance – management – materials – mechanical engineering – mechanics – modeling – nanosystems – navigation – operations – optimization – physics – pilot – planetology – propulsion – robotics – space – telecommunications – testing – traffic – traffic control – transport – turbine