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SPECIAL EDITION

CO₂
ENVIRONMENT

TRAINING

AIR
NAVIGATION

SAFETY

52nd

PARIS AIR SHOW
LE BOURGET

INDUSTRY

AIR TRANSPORT
INTERNATIONAL
COOPERATION

RESEARCH &
DEVELOPMENT

SECURITY



June 2017

Aviation Civile

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INTERVIEW
WITH EMERIC D'ARCIMOLES,
CHAIRMAN OF THE PARIS AIR
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Interview with Patrick Gandil

The aeronautical industry: a pole of excellence laying the groundwork for the future



PATRICK GANDIL Director of the French Civil Aviation Authority (DGAC)

The leading national export sector, the French aeronautical industry is paving the way for the future generations of aircraft. It is one of France's top assets when it comes to international cooperation.

2016 was a record year for the French aeronautical industry. What does it represent in terms of jobs? France is the only country in the world, alongside the United States, to possess a complete aeronautical industry on its own soil. It brings together major manufacturers such as Airbus, ATR, Dassault, the engine manufacturer Safran, and a raft of equipment providers such as Thales, Safran, Zodiac and Daher, along with intermediate-sized companies and SMEs. Together, these companies encompass all the skills required for defining and constructing an aircraft.

This hub of technological and economic excellence enjoyed a record year in 2016, with a turnover of €60.4 billion, including €41.7 billion from exports. The aeronautical industry is the nation's number one export sector. It also creates jobs, with around 10,000 appointments last year, for a net total of 2,000 new jobs created. By the end of 2016, companies that were members of the GIFAS (French Aerospace Industries Association) employed 187,000 men and women. Globally, it is estimated that the entire aeronautical industry employs more than 350,000 people in France, including the subcontractors and suppliers who are not members of the GIFAS.

The second wave of CORAC research projects was launched in 2016. What are the topics treated?

Since its creation in 2008, CORAC has coordinated aeronautical research for improving both the safety and the environmental and operational performance of future generations of aircraft. Working toward this objective, it brings together all the air transport stakeholders, in particular the manufacturers, who finance its work on a parity basis with the French State, whose own contribution is ensured via the budget of the DGAC and the "Programme of Investment for the Future". The CORAC roadmap comprises four components: propulsion, aerostructures, avionics and energy. Two waves of projects have been launched in this way since 2011.

In the first, thanks to six technological demonstration platforms, the work culminated in significant results which should make it possible to reduce by 15-20% the fuel consumption and CO₂ emissions of a commercial aircraft. In 2016, two new platforms were launched. One involves on-board systems and advanced functions, with the objective of preparing the new generation of cockpits, with enhanced pilot assistance, while the other aims at introducing innovative technologies in the production processes of the aeronautical factory of the future.

France is one of the main players in international cooperation. What are its main assets in this area?

International cooperation helps establish the highest levels of safety, security and environmental & economic efficiency for air transport around the world. France has many factors in its favour to help countries with their aviation development. The cradle of aviation, France has built up a comprehensive aeronautical industry with a number of the world's leading companies, and has a training school that is recognised internationally. The missions and competences of the personnel of the DGAC covers all the fields of aviation. Lastly, the expertise of the DGAC has once again been recognised by the ICAO, with which it has concluded a partnership for training, and by the EASA, which has entrusted it with the implementation of cooperative initiatives following on from an invitation to tender.

Interview with Marwan Lahoud

Aerospace in France: a competitive, innovative and united industry

What were the main results and trends in 2016 for the major corporate clients, the equipment manufacturers and the SMEs?

2016 has been a new record year for the French aerospace, defence and security industry, gathered under the banner of GIFAS. Totalling €60.4 billion, 78% in the civil domain, the turnover for the sector continues to increase by 4.1% on a constant scope basis. This technological and economic hub of excellence is a major source of exports, with exports accounting for 86% of the consolidated turnover: a rise of nearly 6%. The industry has, once again, generated the highest French balance of trade surplus, with a positive contribution of €18.6 billion. Order-taking was also very buoyant in 2016, amounting to €73.1 billion. However, even if 2016 has been a very good year, its results have proved contrasting. Indeed, never have so many civil aircraft been produced in France and, in the Defence sector, the commercial success of the Rafale overseas offers long-term oversight of the aeronautical supply chain. Nevertheless, certain players in the industry have experienced difficulties, in particular on the civil helicopters and business aviation markets. The equipment manufacturers and the SMEs posted €21.9 billion turnover, up by 4.7% on a constant scope basis.

What are the sector's development prospects over the medium to long term?

Consistent, solid, united and, more than ever, dynamic, our sector needs to

maintain both the competitiveness of the material and equipment proposed and the know-how and competences of our highly-qualified workforce. GIFAS has set in train a certain number of actions to prepare for the future, and pursue the development of the sector, which today employs 187,000 men and women: 2000 more than in 2015. Every year we invest €1 billion in our production facilities. Last but not least, this year we shall be launching phase 2 of the "Industrial Performance" programme, which has already led to improvements being made to the performance and competitiveness of more than 400 SMEs. Involving the



MARWAN LAHOUD Chairman of GIFAS, the French aerospace industries association

13 new French regions, it will encompass 300 SMEs, including 150 new ones.

In your opinion, what are the most significant developments in the research work coordinated by CORAC*?

CORAC is a successful example of cooperation between all the stakeholders in the aeronautical industry, both private and public, and including of course the DGAC. CORAC has high ambitions, and its research projects constitute collaborative platforms designed to culminate in competitive programmes, for more sustainable air transport. Significant progress has been made in fuel consumption gains, while reducing noise and pollutant emissions. Genuine environmental benefits accrue, such as the 15% reduction in CO₂ emissions. These are all practical advantages, with equipment already benefiting from these R&T efforts as coordinated by CORAC, including the Airbus A350-1000 and A320neo, and the LEAP engine from CFM International. I would nevertheless like to emphasise the fact that support for research is vital, in order to continue along these lines. Our major partners in Europe – Germany and the UK – have planned for civil aeronautical research budgets in excess of €150 million per annum for the coming years. For France, sustained multi-annual planning in the same order of magnitude is a vital precondition for pursuing innovation.

* Council for Civil Aeronautical Research.

Interview with Emeric d'Arcimoles

Paris Air Show 2017: for immediate boarding!

With just a few days to go until the opening of the 52nd Paris Air Show, the site is buzzing at the Le Bourget Exhibition Centre. Everything is in place to ensure that the World's biggest get-together for the sector, from 19 to 25 June, runs like clockwork.

"Since October, we've been fully booked!", exclaims Emeric d'Arcimoles, chairman of the Paris Air Show. "For previous editions, we had to wait until the start of the year to see the bookings accrue. This year, in just a few months, all the exhibition spaces in the 6 halls and practically all the 330 business chalets have been snapped up!" These numbers confirm the strategic choice that was made some 20 years ago: to open up the exhibition to all the stakeholders in the aerospace sector, worldwide, in order to inject momentum into a global approach to the industry, encourage partnerships and consolidate agreements between partners.

Success foretold for the 2017 edition

What this means is that 2,300 international exhibitors will be present, with 30 national pavilions and around 300 official delegations. Some 150,000 professional visitors are expected, not to mention the general public (200,000 strong), who always come in large numbers for the last three days of the Air Show to get a good look at all the aircraft and marvel at their prowess in the flight demos. There will be lots of events over the seven days of the Air Show: conferences, workshops, roundtables chaired by experts from the sector, all enabling professionals to find out more and to discuss the various topics. The "L'Avion des Métiers" careers initiative will provide the opportunity to understand the actual business of those who manufacture these



EMERIC D'ARCIMOLES Chairman of the Paris Air Show Le Bourget

aircraft and who make them safer, more efficient, more environmentally-friendly and more comfortable. And for those who discover their calling, they can turn to the Jobs Training Forum (Forum Emploi Formation) to meet up with hiring companies and educational establishments in order to find out exactly what kind of profiles they are on the look-out for.

Focus on the new technologies

"For each edition, we highlight a particular theme," Emeric d'Arcimoles explains. "In 2017, we shall be focusing on the new technologies, including the digital, and their impact on the aerospace industry." An innovative space packed with surprises, Paris Air Lab will offer

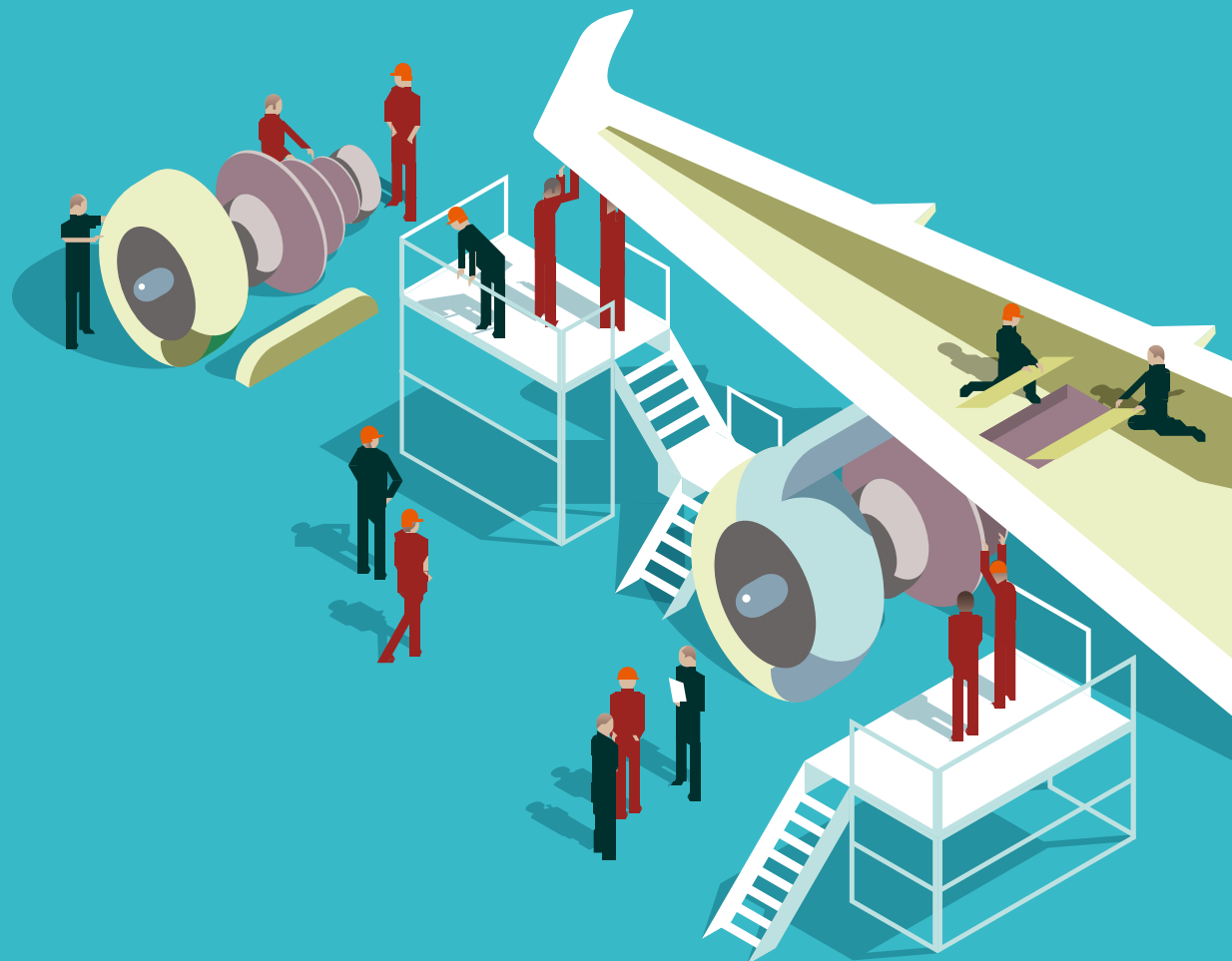
professional visitors and the general public alike the possibility to travel through time in order to discover the Air Shows of the future! The innovations of today and of tomorrow will be showcased there. This totally unique space will be made up of 3 islands: industrial innovation and start-ups; the meeting of ideas; immersive experiences with virtual reality. Once again, the Paris Air Show at Le Bourget will be a place of discovery, encounters, exchanges and partnerships, all designed to reinforce the aerospace sector. "In a sector which calls upon varied and complex skills, it is essential to work towards ever more efficient coordination, to generate ever higher levels of excellence," states Emeric d'Arcimoles in conclusion.

Tools to prepare for your visit

In and around the Air Show, the means of communication and information will be reinforced. Thanks to the mobile apps, it will be possible to prepare for your visit and select the events that you won't want to miss: a useful aid for optimising your precious time!

INDUSTRY

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INDUSTRY

A350-1000, at the top of the range

With its A350-1000, whose maiden flight took place in late November 2016, Airbus intends to compete with the B777 (old and new generations) from Boeing.

THE AIRBUS A350-1000 took its second test flight in January 2017.



© P. Pigevre/master films/Airbus S.A. 2017

With the A350-1000, the A350XWB family now has three members: the A350-800 (eight models sold), the A350-900 (70 aircraft already delivered by late February 2017), and the A350-1000, the most recent addition. At almost 74 meters long, “... the A350-1000 is the largest member of the A350 XWB family. Its longer fuselage means that it can offer 40 seats more than the A350-900. It is a totally optimised aircraft, since its action radius is identical to that of the 900 version, i.e.: 14,800 km,” says François Obé, A350 product marketing director.

To support an MTOW of an extra 40 tonnes, the aircraft is equipped with a main undercarriage that now has twelve wheels instead of eight. The thrust of the Rolls-Royce Trent XWB-97 engines equipping the 1000 version has also been increased by 15%. Nevertheless, the A350-1000 – which has benefited from French State support in the form of reimbursable advances – has 95% of its spare parts in common with the 900 version. It also incorporates 54% composite materials throughout its structure, including the wings. As well as reduced emissions of CO₂ (25% less than the aircraft it replaces) and of NO_x (28% less than the standards in force), the A350-1000 will also be distinguished by its particularly low noise levels. This noise signature should indeed have a cumulative margin of less than 15 EPNdB* with respect to chapter 4 of the ICAO (International Civil Aviation Organisation) noise standards.

A350-1000 versus Boeing 777

With a payload capacity increased to 366 seats in 3-class configuration, the latest addition to the Airbus family takes its place as a formidable competitor to the Boeing 777-300ER and 777-9 (ex-X). Its fuel consumption is, for example, 25% less than the Boeing 777-300ER, and its operational costs are reduced by the same order of magnitude. These are undeniable benefits, on the strength of which Airbus intends to carve out a substantial niche in the market for the 8100 aircraft in this category that could be sold over the course of the next 20 years. By the end of January 2017, the European manufacturer had already found buyers for 821 A350s, including 211 for the new 1000 version. The first 1000s will join the fleet of Qatar Airways, their inaugural airline, in the second half of 2017. They will, in particular, be replacing A340-600s on long-haul flights to the USA and Asia out of the Doha hub. United Airlines is, for its part, intending to replace some of its Boeing 747-400s with A350-1000s (35 which have been ordered).

Olivier Constant

* Effective Perceived Noise Decibel.

Certification expected in the second half of 2017

The flight testing campaign for the A350-1000 destined to lead to joint EASA/FAA* certification began on 24 November 2016. This is the date on which the first of the three aircraft concerned by these flight tests, scheduled to last a total of around 1600 hours, embarked on its first flight out of Toulouse. Its role is to open up the flight envelope, validate manoeuvrability, and execute load and braking tests. The second aircraft, which has been flying since 10 January 2017, is more specifically dedicated to testing the engines, generators and on-board power systems, and to flights in extreme climatic conditions. Lastly, the third aircraft, undergoing test flights since 7 February 2017, is the only one to be equipped with a complete passenger cabin. It will be used for carrying out certification tests linked to commercial operations. The A350-1000 certification is due in the second half of 2017.

* European Aviation Safety Agency / Federal Aviation Administration (USA)

Second wave of CORAC work

2016 saw the launch of the second wave of research projects defined by CORAC (Council for Civil Aeronautical Research), based on a first wave of highly encouraging results.

The results of the first work done by CORAC should enable the fuel consumption, and hence the CO₂ emissions, of commercial aircraft to be reduced by an extra 15 to 20%.

At the same time, noise could be reduced by 5 to 10 EPNdB¹.

"The first wave of research projects has indeed obtained promising results, in terms of both environmental performance and reduced structural mass, through the optimised use of composite materials, more efficient avionics, improved engine performance and optimised management of on-board power, in particular electrical power, enabling less of a drain on the engines," explains Anne-Laure Gaumerais, deputy head of the research support policy office at the DGAC.

Simulating, federating and coordinating

CORAC, set up in July 2008, was created with a view to stimulating, federating and coordinating research and innovation efforts, so that future generations of aircraft might meet the more stringent requirements of competitiveness, safety and environmental protection. Taking inspiration from the ACARE² model, it brings together, with the DGAC and GIFAS³ as its driving force, all the French stakeholders from the air transport sector, i.e.: the aeronautical industry, the airlines, the airports, ONERA, the institutional players and the ministries concerned. CORAC has established a technological roadmap for research, constituting the basis of an ambitious and coordinated strategy. The collaborative work issuing from it is funded on a parity basis between State and industry, with the State contribution until now coming from the budget dedicated to the DGAC or the aeronautical component of the "Programme of Investment for the Future" (PIA).



COCKPIT AVIONICS 2020. New-generation avionics for helicopters.

"The quality and active participation of the delegated representatives of the State and the manufacturers in the CORAC work meetings testify to the importance accorded to it."

FRÉDÉRIC LESCURE / OFFICE OF THE AERO-PME (AERONAUTICAL SMES) GROUP OF GIFAS.

Four broad themes

This roadmap comprises four components: propulsion, aerostructures, avionics and energy. Based on these themes, technological demo platforms have been developed, bringing together major clients and partner companies alongside subcontractors, for a total of 300 participants. The DGAC, which helped to create the roadmap and the platforms, is today, alongside the DGA⁴ and ONERA⁵, keeping tabs on these research projects, in particular by means of periodic follow-up meetings giving rise to progress reports.

There have been two successive waves to date. The first, launched between 2011 and 2013, culminated in six technological demo platforms,



© ETV-T. Berg

BUSINESS JET PROJECT: Falcon LSBJ (Low Sweep Bizjet Concept) from Dassault Aviation, with twin tail assembly, for masking engine noise groundwards.

leading to the acquisition of the aforementioned results. In 2016, two new platforms were launched, with the following themes respectively: on-board systems and advanced functions, the purpose of which is to prepare a new-generation cockpit with enhanced pilot assistance; and the aeronautical factory of the future, whose objective is in particular to introduce innovative technologies into the production processes.

A group dedicated to the environment

Within CORAC, a subgroup bearing the initials RTE (*Réseau thématique environnement - Environment topic network*) is tasked with studying the impact of air transport on the environment, to obtain a better understanding of the physical phenomena involved and an objective assessment of the effects. Its work pursues three study themes: climate (relating to aircraft flight in cruise mode), air quality, and noise (at local level, around airports).

The climate theme is today the most advanced, with research projects now running for four years. These concern the impact of contrails, generated under certain conditions by aircraft in cruise mode, and which are subsequently transformed into induced cirrus clouds. The first results are expected in 2017. Other projects will follow.

After an initial report published in July 2012, the second topic gave rise to a research project on the quality of airport air, taking account of all possible sources of emissions, including in particular vehicles on the ground, possible chemical reactions and the influence of weather conditions. A preliminary project centred on the simulation of these dispersion phenomena was launched in 2016, involving consultation with all stakeholders concerned. Its results are

expected by late 2018. Based on the results, a second project involving in particular a partner airport and its certified air quality monitoring association (AASQA) will be subsequently initiated.

Lastly, the envisaged work on noise will not relate to the causes of the noise pollution itself but will target reductions in the discomfort experienced by the persons on the ground. This involves understanding the factors that influence this discomfort. A report on the current situation was submitted in December 2015.

Régis Noyé

1. Effective Perceived Noise Decibel.
2. Advisory Council for Aeronautics Research in Europe.
3. Groupement des industries françaises aéronautiques et spatiales (French Aerospace Industries Association).
4. Direction générale de l'armement (French Armaments Procurement Agency).
5. Office national d'études et de recherches aérospatiales (French National Aerospace Research Centre).



SCREEN of the Avionics 2020 cockpit project.

© Q.Revlinas/Thales



Meeting at the Paris Air Show

Since CORAC is presided over by the French Minister for Transport, a summit meeting is held once a year in the Minister's presence, generally taking place in June. Every two years, this meeting quite logically takes place at the Paris Air Show. This provides the opportunity to run the rule over the current projects and the work in prospect, with the participation of Patrick Gandil, Director General of the DGAC, and managers from the member bodies of CORAC. The steering committee meeting takes place once a month.

Accompanying the boom in professional drones

The CDC (Civil Drones Council) coordinates the efforts of the industry's stakeholders. Its work helps to keep France at the cutting edge of research and regulatory development.



© R. Metzger/DGAC-STAC

PRESENTATION AND FLIGHT OF DRONES during piloting training at a dedicated site in the Val d'Oise.

“The question of high elongation operations means having to overcoming the many technological barriers limiting drone operations.”

CARINE DONZEL / DEPUTY HEAD OF THE AERONAUTICAL CONSTRUCTION DEPARTMENT AT THE FRENCH AIR TRANSPORT DIRECTORATE (DTA).

Flight of its results in 2016, the dynamism of the professional civil drone industry is plain to see. Last year it generated €160 million in turnover, representing 9000 direct jobs across 3500 operators (compared to 50 in 2012) and 25 manufacturers. Its rapid rise results from the conjunction of balanced and innovative regulations, a particularly dynamic network of SMEs, a long tradition of French aviation, and visionary users. This young branch of industry must today face up to certain challenges, in order to best meet the needs

of its client base, as the stakes become clearer, on both the European and the international stage. To support the development of this new industry, in 2015 France created the CDC (Civil Drones Council), which organised its first forum on 17 November 2016 at the DGAC HQ. “This forum aimed at presenting the CDC officially to the industry’s stakeholders and demonstrating the state of progress of the work that had already been done to date,” says Carine Donzel, deputy head of the aeronautical construction department at the DTA (French Air Transport Directorate).



© R. Metzger/DGAC-STAC

Breaking through the technological barriers

Since then, the CDC has continued its work in three decisive areas for the future of the industry. Firstly, the CDC is working actively on so-called “high elongation” operations. These are drone flights at a height of 150 metres over distances of several hundred kilometres from their point of departure (and back), following line networks on the ground (power lines or railway lines, for example), for surveillance or inspection activities.

“High elongation operations means having to deal with a good number of the technological barriers limiting the operation of UAVs. This concerns in particular the command and control link, which today is lost beyond 15 to 20 km for flights at this height. It also involves working on the capacity of the drone to fly safely in the airspace, in the midst of other users,” Carine Donzel goes on to say. The first line of action for the “high elongation” approach involves taking existing drones as the basis for reaching a stage of “pre-industrial use in 2018”, above sparsely-populated zones. The second takes a more long-term outlook. After a preliminary study that is still ongoing, an R&D project will be launched for constructing a high elongation drone functional demonstrator.

The drone as “business tool”

The second CDC subject aims at adding a regulatory scenario to the four that exist already in French legislation. Basically, this involves considering the drone as a “business tool”, and creating: “...a specific mode of operation whereby a farmer or an industrialist could use a drone for their own business, on a given site, in a field, over buildings, pylons, etc., when they like, while limiting the flight range of the drone to the site in question,” says Carine Donzel. Within this framework, the user - a professional from the sector concerned - would receive limited aeronautical training with no exam to pass. In exchange, such users would only be entitled to work for themselves.

The third point on which the CDC is starting to work concerns the integration of drones in the air space. This indeed presents certain difficulties, on account of the characteristics of these airframes (slow flight, flight paths suited to particular missions, unusual altitudes) and their

The missions of the CDC

The Civil Drones Council (CDC) is dedicated to structuring the UAV industry. To this end, it organises and encourages dialogue between all its members, and coordinates the efforts of the French stakeholders to develop the civil drones market, both nationally and for export. It brings together, on a voluntary basis, all stakeholders in the French industry: manufacturers, operators, training organisations, professional federations and unions, clusters, research

organisations, as well as the GIFAS (the French Aerospace Industries Association) and the Union of French Airports, insurers, legal experts, and so on. Council members also include representatives of various State services, including the DGAC, and major corporations with an interest in the use of drones (SNCF, RTE, Enedis, GRTgaz, Vinci). Orange and Bouygues Telecom are also present, with a view to developments in the field of drone command and control links.

limited capacities for detection and avoidance in flight. This integration is key to the further development of the industry. Violeta Bulc, EU Commissioner for Transport, has asked to be presented with an initial concept of UAV traffic by the end of June 2017. The DGAC and the CDC are among the stakeholders consulted for drafting the project coordinated by the SESARJU.

Europe takes control

A pioneer in this field, France drew up regulations applicable to drones back in 2012, with subsequent improvements made on two occasions: first in 2015 then in October 2016, with the “Drone Act”, drafted on the basis of a report from the Secretariat-General for National Defence and Security (SGDSN) on the risks incurred by the malicious use of drones. Its implementing orders: “...are the subject of interministerial work that is ongoing today. The DGAC is directly concerned by the registration obligations for drones, the records of these registrations, the training of remote pilots and the capacity limits stipulated by law,” says Richard Thummel, deputy director, DSAC, who adds that one of the objectives of the Act, in the framework of the protection of sensitive sites, aims at: “reducing the number of false alarms through identifying ‘cooperative drones.’”

Furthermore, the revision of the basic European regulation, which led to the creation of the European Aviation Safety Agency (EASA) and which determines the safety rules for civil aviation in Europe, provides for the transfer of powers over drones to the EU. “The EASA has already been mandated by the Commission to prepare regulations in this regard,” says Richard Thummel, who points out that, in cooperation with its industry within the CDC, “France is expressing a position that is increasingly finding favour on the European scene.”

François Blanc

* Single European Sky ATM Research Joint Undertaking.

ONERA: a key asset for the aerospace industry

Central protagonist in the French and European leadership of the aerospace sector, ONERA¹ develops its research activity in close association with the stakeholders in the industry and the DGAC. Its Chairman and CEO, Bruno Sainjon, explains to us the framework and orientations of this complex process.



© ONERA

“The commemoration of the 70 years of ONERA highlighted its capacity to span the domains: civil, military and dual.”

**BRUNO SAINJON /
CHAIRMAN OF ONERA**

How is ONERA involved in the work of CORAC?

◆ **BRUNO SAINJON:** ONERA takes part in various committees (steering, roadmap and operational) of the Council for Civil Aeronautical Research (CORAC) and was mandated in 2016 to organise a think-tank on TRL² topics, the most scientific level of the research. This provides us with precious indicators about the long-term needs of industrial partners, thereby guaranteeing that our programmes are correctly aligned upstream of any subsequent developments. The industry’s strategic committee meeting, on 6 January, recognised moreover the need for the sustained support of the aviation industry in terms of R&T (Research & Technology) in the framework of a partnership between the DGAC and ONERA.

The DGAC has asked ONERA to conduct several research programmes in order to improve knowledge of the complex phenomena linked to the aircraft environment. How will the aeronautical industry be able to appropriate the results of this research?

◆ **B. S.:** In 2016, the DGAC asked ONERA to carry out research in five areas: wake turbulence, crashes, lightning, icing and fire. There are representatives from the aeronautical industry on the scientific and steering committees for these studies, and the progress from this work is regularly presented. This work will give rise to scientific publications that will be useful for the industry. The first concrete appropriations of the findings may be envisaged as from mid-2018.

The civil drones sector needs new technological solutions in order to best meet the expectations of the major contracting clients. What work does ONERA do in this area?

◆ **B. S.:** In 2016, ONERA appointed a cross-disciplinary programme director to deal with this question. The work carried out relates to a number of major issues: the flight safety of these machines; the reliability of the avionics; automatic piloting; the capability of these machines to be reconfigured in the event of problems (a field in which ONERA is among the world leaders); and their integration in the air traffic. We are already anticipating the heavier drones we are likely to see in the future. We are also working on the performance of these machines, their sensors, and their travel and decision-making autonomy. What is more, we have been tasked with investigating how developments in terms of cybersecurity can be deployed for all flying objects. Lastly, we are active participants in the CDC (Civil Drones Council) set up by the DGAC, and the SGDSN³ has asked us to conduct research into combating malicious UAVs.

In 2016, ONERA celebrated its 70th anniversary. What directions will its research activities take in the future?

◆ **B. S.:** The commemoration of the 70 years of ONERA highlighted its capacity to span the domains: civil, military and dual. It is a rare case of its type in Europe, and is something to be treasured. Our model has, moreover, been copied around the world. In 2016, we drafted our “Strategic Scientific Plan” (PSS) in close collaboration with the State and industrial stakeholders. We shall be investigating in-depth our traditional research fields, such as test facilities or advanced measurement techniques, as well as reinforcing our activities in other areas, in particular: on-board software, digital tools and new airframe configurations, such as flying wings and aircraft with wing bracing. In the field of noise reduction, our expertise places us among the leaders in Europe. It also led to us being chosen by NASA for undertaking bilateral research, and to the signing of a reinforced cooperation agreement in September 2016. This is also the case with JAXA⁴, in Japan. The objectives and performance contract signed in late 2016 with the French State for the period 2017-2021 consolidates the status of ONERA in its missions and specifies the main expectations of the official services, in line with the strategic scientific plan.

Gilmar Martins

1. French National Aerospace Research Centre.
2. Technology Readiness Level.
3. *Secrétariat général de la défense et de la sécurité nationale* / French Secretariat General for National Defence.
4. Japan Aerospace Exploration Agency.

Competitive clusters: regional research drivers

In addition to CORAC* activities, three aeronautical competitive clusters federate and coordinate research at regional level, giving free range to the spirit of initiative.



MEMBERS OF THE PEGASE CLUSTER in the PACA regional pavilion at the Paris Air Show 2015.

© SAFE Cluster

Around the major groups that make up the French aerospace industry has grown an ecosystem of businesses, large and small, most of which are incorporated within three competitive clusters. These clusters, which may comprise up to 600 and more members, are constituted on a regional scale and around several targeted skills areas. The three French aerospace clusters are as follows: in Ile-de-France, ASTech; in Nouvelle Aquitaine and Occitanie, Aerospace Valley; and in the PACA region, SAFE Cluster, issuing from the recent merger of the Pégase and Risks clusters. Other, more cross-disciplinary, clusters also play an important role, such as EMC2 in Pays de la Loire and Systematic in Ile-de-France. As certified “competitive clusters”, they benefit from the financial support of the State and local authorities. By doing so, they are closely associated with the momentum thereby generated.

These clusters have several stated aims: supporting innovation; supporting the growth of their member companies—notably in the marketing of new products, services or processes deriving from the results of research projects—and helping these companies to develop their market positions, in France and abroad, thereby constituting true drivers of growth and employment.

Access to the Interministerial fund

One of the essential roles of these clusters is to aid with setting up and developing collaborative R&D projects with a view to applying for national or European funding. For its part,

the DGAC is involved mainly in the financing of research projects certified by the competitive clusters by way of the Interministerial fund (*Fonds unique interministériel* - FUI). To be eligible for the FUI, these projects must bring together at least two companies and one laboratory, and be certified by a cluster, as an indispensable prerequisite. These projects are then submitted for FUI funding in RFPs that occur twice a year, in spring and autumn. The ministries involved in this funding then analyse the projects with regard to the public policies that the ministries represent. After this stage, the results of these analyses are passed on to local authorities, which adopt a position on the funding of any given partner for each project. Lastly, the cluster, in association with the relevant ministries, handles the technical follow-up, and can support the project sponsors in exploiting the results. Being invested in State missions, these clusters are in part funded by the State. For the above mentioned clusters, this participation comes via the Directorate General for Enterprise (Ministry of Economy and Finance) and the DGA (French defence procurement agency). The DGAC works in close collaboration on

aeronautical research support (*cf. CORAC article, pages 8-9*) with the DGA. The clusters offer the DGAC a channel to the aeronautical ecosystem and the possibility of establishing contacts with SMEs. At the same time, the FUI enables the DGAC to support small and medium-sized enterprises in the sector. It also constitutes an important element in the French aeronautical research strategy, perfectly complementing the work of CORAC and DGAC.

Régis Noyé

* *Conseil pour la recherche aéronautique civile / Council for Civil Aeronautical Research (see pages 8 and 9 of this issue).*

Key figures

864 SMEs engaged at national level.

8 projects completed in 2016 and 24 ongoing.

241 projects in all certified by the SAFE Cluster, for a total budget of €579 million, including €230 million in public funds.

France conducting active industrial cooperation with other countries

Through its work groups set up with China, Russia and Japan, the DGAC is helping to support the French aeronautical industry with its exports.

Through the actions of the MCI (Mission de la coopération internationale / Department of international cooperation), carried out with the aid of the Aeronautical Construction sub-directorate, the DGAC is helping to support the French aeronautical industry with its exports," says Bertrand de Lacombe, Head of the MCI. These actions are manifested in particular by the organisation of industrial cooperation work groups set up with three countries: Russia, China and Japan. "With each of these work groups we organise bilateral meetings, in the presence of the companies and government bodies of both countries. It should also be noted that our international colleagues are answerable to the Ministries of Industry or the Economy, which underlines the French specificity of entrusting the promotion of its national aeronautical industry to its civil aviation authority," Bertrand de Lacombe points out.

Industrial or equity partnerships

The objectives of these work groups are essentially to create links aimed at encouraging common projects, or indeed facilitating industrial or equity partnerships. Besides the actual purchasing of products by the partner country, requiring either technical or financial support, this cooperation can take several forms. This may involve, for example, the provision of equipment, components or services to meet the needs of French production. It may also concern sites designed to increase market penetration. This is particularly the case in China, with the A320 assembly line, in place since 2007, and the new A330 finishing centre, due to become operational next September, and both sited in Tianjin. The PowerJet joint venture, created in 2004 between Safran Aircraft Engines and NPO Saturn, to produce the SaM146 engine for the Sukhoi SuperJet 100 (SSJ 100), embodies the equity partnership with Russia. Pooled research projects may also be undertaken, such as that of the CNRS for developing, with Japanese partners, a humanoid robot

capable of carrying out certain maintenance tasks. In all these cases, precautions are taken with regard to the exchanges aimed at preserving the confidentiality of know-how. Lastly, cooperation may take place in terms of regulations or taxation, for example, by streamlining procedures or customs rights by drawing on the dialogue struck up between the two partners.

Annual meetings

Conducted purely at DGAC level in the cases of China and Japan, actions are undertaken in the broader framework of the Franco-Russian economic, financial, industrial and commercial committee (CEFIC), presided over by the Ministries of Finance of the two countries. As a general rule, the industrial cooperation groups meet once a year, alternating between France and the other countries. The latest meetings took place in late 2016 with Japan, in Toulouse and Paris, for visiting Airbus, Thales and Air France Industrie;

and with Russia, in Kazan (Tatarstan), including visits in particular to Kazan Helicopters and an additive manufacturing centre. With China, the next meeting is due to take place in spring 2017. Régis Noyé

"France is one of the few countries in the world to benefit from a powerful aeronautical industry that covers the entire chain of activities. Our mission, in compliance with the rules on competition, is to consolidate its position, by standing shoulder to shoulder with our companies."

BERTRAND DE LACOMBE / HEAD OF THE MCI



MOCK-UP OF THE FUTURE FINISHING CENTRE for the A330, operational from September 2017 at Tianjin, in China.

© Airbus S.A.S. 2017

Ramping up production of the LEAP from CFM

Produced in parallel with the CFM56, around 500 units of the brand-new LEAP engine from CFM International should be delivered this year. The first few months of operation comply point-for-point with all customer and engine manufacturer expectations.

CFM International, an equal joint venture between Safran Aircraft Engines and General Electric, seems capable of reproducing, with the LEAP engine, the enormous commercial success it enjoyed with the CFM56. By the end of 2016, it had already sold more than 12,200 units of its latest creation. This is an exceptional commercial result that could well be consolidated in the years to come, with the LEAP being the sole source for the Boeing 737 MAX, the sole Western source for the COMAC C919 and one of the two engine options for the Airbus A320neo. The engine can indeed boast a host of assets, starting with its fuel consumption: down by 15% compared to its predecessor. It also emits 50% less NOx than the standard requirements of CAEP/6. Above all, the objective is to offer, right from service start-up of the LEAP, a reliability rate similar to that of the CFM56.

The Turkish airline company, Pegasus Airlines, can already testify to this operational excellence, having received the first A320neo equipped with LEAP-1A engines in August 2016. "From the second day in operation, the aircraft underwent eight rotations in the same day. The usage peaks today amount to eleven per day, and their availability is thoroughly reliable. Six months after coming into service, the LEAP engine had already been delivered to half a dozen airlines. The engine is off the stock, and it has demonstrated its capability to fit seamlessly into the fleets in service," says a triumphant Sébastien Imbourg, director of three LEAP programmes at Safran Aircraft Engines.

More than 2000 LEAP engines per year in 2020

The ramping up of deliveries constitutes another key factor in the success of the programme. CFM International prepared well for this in advance with the suppliers, the first consultations dating back to the start of the decade. "The company selected a minimum of two sources for the major parts references,"



© A. Dastie/Safran

FINAL ASSEMBLY of the LEAP engine.

says Adrien Kippelen, head of the major programmes office at the Aeronautical Construction sub-directorate of the DTA. Safran also invested in new industrial facilities in France and the USA for producing the new-generation turbofan vanes and housings in 3D woven RTM composites. The engine manufacturer has also

supported its suppliers, who have invested in more than 50 plants or extensions to contribute to this ramp-up. Despite requiring more than thirty years to attain record annual production of almost 1700 CFM56 engines in 2016, it will take only a little more than four years to attain the new record rate of more than 2000 LEAP engines produced come 2020.

After the 77 units delivered last year, 2017 will be another decisive year for the LEAP programme. The 500 deliveries scheduled this year cover, in fact, the three LEAP-1A, -1B and -1C versions, since Boeing is looking to deliver its first Boeing 737 MAX equipped with LEAP-1B engines at the end of the first half of this year. As for the Chinese COMAC, it may be flight-testing its first C919 equipped with LEAP-1C engines in spring 2017. The success of this programme is all the more important inasmuch as the Chinese market could represent some 20% of the market worldwide by 2035.

Olivier Constant

* Comité de la protection de l'environnement en aviation / Committee on Aviation Environmental Protection

The LEAP engine in 3 key figures

More than **12,200** orders (as of 31/03/2017).

More than **2,000** engines to be produced per year by 2020.

15% fuel consumption improvement compared to the CFM56 engine.

AIR TRANSPORT

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AIR TRANSPORT

The airports go green

Reducing gas emissions, preserving biodiversity, anticipating the risks related to climate change: the French airports, present in number at COP22 in Marrakech last November, are strengthening their environmental policies.

One year after the Paris Agreement, the French airports stakeholders restated their commitment to reducing sustainably the environmental impact of their activities at COP22. They reinforced their strong commitment to the Airport Carbon Accreditation (ACA) international programme. The major French airports, following the example of the airports of the ADP Group and of the Vinci Airports Group, have applied for this certification for their active greenhousegas (GHG) management process. The Nice-Côte d'Azur airport was one of the guests of honour at COP22, after becoming in 2016 the first French airport to attain the top level of the ACA programme, synonymous with carbon neutrality.

In the framework of the French energy transition Act*, the major airports must assess their GHG and pollutant emissions for 2020 and 2025, an indispensable step forward in the framework of the drawing up of their programmes to reduce their environmental footprint. To help them to do so, the DGAC has designed and made available to them in late 2016 a tool for transforming traffic forecasts into emission forecasts for taxiing aircrafts concerning GHGs and different pollutants.

Balancing biodiversity and airport activities

At COP22, the DGAC and the HOP! Biodiversité association, its partner, also presented biodiversity management actions on airport platforms, along with the participative protocols put in place with the dozen or so airports associated with this project. "The HOP! Biodiversité project marks an important paradigm change, insofar as we are no longer seeking to eliminate biodiversity, which previously used to be considered solely as a risk, but rather to preserve this biodiversity while maintaining the highest airport safety,"



© C. Leroux/photothèque Air France

AIRCRAFT of the HOP! Airline (Air France).

says Guillaume Van Reysel, deputy head of the environment office at the DTA. The project is based on scientific protocols designed with the National Museum of Natural History and open to all personnel of the platforms wishing to take part. Supervised by specialists, volunteers complete biodiversity inventories of the airport spaces processed by the Museum's research scientists.

Lastly, regarding the measures related to climate change, the Civil Aviation Technical Department (STAC) is currently testing with

several airports a method enabling them to diagnose the risks (air conditioning breakdowns during heat waves, the consequences of rising waters, etc.) related to climate change. Vulclim (see box insert), the so-called risk-mapping tool, should be available at the end of the year.

Henri Cormier

* Act No. 2015-992 of 17 August 2015 concerning energy transition for green growth.

The many green avenues of the STAC

In the framework of its 2013-2017 strategic plan, the STAC has put in place a programme entitled: "Toward an environmentally-responsible aerodrome". It includes the implementation of a research & development project for purifying water polluted by aircraft or runway de-icing fluids using vegetation filters. This technique is today

in advanced test phase at Paris-Orly airport. The Vulclim study is also included in the framework of this programme, driving force behind the implementation of an innovative method for qualifying the risks likely to be incurred through the various manifestations of climate change on the

different building blocks of an airport (runways, roadways, terminals, etc.). Lastly, since 2016 the STAC has been developing strong skills in the field of biodiversity, in order to provide concrete support to airport managers keen to preserve the biodiversity of their platforms while maintaining a high level of aviation safety.

CORSIA: the first ever global CO₂ offsetting and reduction mechanism

International aviation is the first economic sector to adopt a global mechanism for offsetting CO₂ emissions. Designated CORSIA*, this mechanism will be operational in 2020.

The world of aviation has gone down in history as the first economic sector to adopt a universal and binding mechanism for controlling CO₂ emissions, at the 39th assembly of the International Civil Aviation Organisation (ICAO) which took place in autumn 2016. This mechanism marks a further stage in aviation's efforts to combat climate change. France is strongly committed to this mechanism, which ties in with the objectives set by the international community at COP21 in Paris: to limit the rise in temperatures to less than 2°C by the end of the century.

The economic component of a global concept

Civil aviation represents around 2% of global CO₂ emissions. It has for some years been working on its contribution to combating climate change. A strategy has indeed been deployed under the auspices of the ICAO to serve one objective: stabilising CO₂ emissions at their 2020 cap, despite air traffic growth forecasts of 5% per year. This is what is called the "carbon-neutral growth in 2020" objective. To achieve this, the ICAO has developed a concept: the "basket of measures". What this implies is that each measure taken separately cannot alone suffice for achieving the

objective of stabilised emissions. This is why 4 levers have been simultaneously activated: improving the environmental performance of aircraft thanks to technological progress; optimising flight procedures to reduce fuel consumption; developing aviation biofuels and economic measures aimed at imposing costs on any CO₂ emissions exceeding the authorised levels: this is the carbon offset system adopted by the ICAO assembly. "When the air carriers have done everything they can with the first three levers, they will, from 2021, offset the emissions exceeding the set objective by purchasing emission reduction credits. These will be available on the market once projects aimed at the reduction of greenhouse gases in other industrial sectors come to fruition," explains Jonathan Gilad, deputy director for sustainable development at the DTA (French Air Transport Directorate) of the DGAC (French Civil Aviation Authority).

Implementation

International air transport requires global and harmonised rules that are applicable to all. The mechanism nevertheless provides for several implementation phases, in order to take account of the special circumstances and respective capabilities of the world's different nations: an initial phase between 2021 and 2026 on a voluntary basis; then a second

"The EU is looking to maintain its position at the vanguard of combating climate change in the field of aviation."

**JONATHAN GILAD /
DEPUTY DIRECTOR FOR SUSTAINABLE DEVELOPMENT
AT THE FRENCH AIR TRANSPORT DIRECTORATE
(DTA)**

phase from 2027 when the mechanism will be applied universally with the exception of a certain number of States exempted on account of their development level, their insularity or their low contribution to world air traffic. The 67 voluntary States taking part in the first phase of CORSIA already represent almost 88%

of international aviation activity. Countries with high levels of aviation activity such as China, the USA, the United Arab Emirates, South Korea, Singapore, Japan and Canada, in particular, are volunteers, alongside the European Union, in committing to the first phase of this mechanism. Once the second phase is underway, the States included in the mechanism will represent over 93% of aviation activity. This means that almost 80% of the world's CO₂ emissions from aviation will be covered by this scheme.

Its implementation requires access to collect precise data about the emissions of the airlines, and a procedure for tracking and verifying these emissions worldwide. This is called MRV (Monitoring, Reporting, Verification). This monitoring mechanism will be put in place by all the Member States of the ICAO so that it will be possible, every year from 2020, to know the

amount of CO₂ emissions from international aviation, and therefore to calculate its offset obligations.

Criteria must also be established to be able to evaluate "the quality of the CO₂ emission reduction credits purchased by the carriers," states the DTA expert. If the purchased credits are used for a project which turns out not to generate the environmental benefits envisaged at the outset, they will not be considered to be of "good quality".

Europe at the vanguard

Lastly, the registries constitute a decisive element in the offset mechanism. "They will play an important role," the expert goes on to say, "in order to collect all the MRV data, and calculate the offsetting obligations for each airline. We also need to monitor the flows of CO₂ emission

The CO₂ standard for aircraft certification

As the first component of the set of measures recommended by the ICAO for combating global warming, the technological developments applied to aviation construction are tending to bring down aircraft fuel consumption. It has therefore been decided on a worldwide level to define an aircraft certification standard for aircraft CO₂ emissions so as to encourage manufacturers to move progressively toward the most advanced environmental technologies. This standard, adopted in 2016 by the Council of the ICAO and applicable from 2020 both for new aircraft and aircraft already in production, is intended to be part of the requirements of the certification bodies, such as the European Aviation Safety Agency (EASA) or the US Federal Aviation Administration (FAA).

reduction credits. These registries must be established for each State, but there will also have to be a global one, connected to the national registries." Only three years remain for carrying this task through successfully. At European level, since 1 January 2012 there is a market mechanism covering aviation emissions and capable of fulfilling, for example, the registry role. This is the EU-ETS (Emission Trading System). With the adoption of CORSIA: "Europe needs to envisage adapting the ETS so as to take account of the emergence of a global system," Jonathan Gilad points out. This is all the more pertinent, he concludes, insofar as the EU: "... is looking to maintain its position at the vanguard of combating climate change in the field of aviation."

François Blanc

* Carbon Offsetting and Reduction Scheme for International Aviation.

Renewed dynamic for SESAR 2020

Following a fruitful initial phase, phase 2 of the SESAR programme, dubbed 2020, was launched in late 2016. Based on the results acquired, it aims to expand upon the work already begun and develop new projects.

Phase 2 of the SESAR programme, dubbed 2020, began in autumn 2016. Its content was established to follow on from the first phase, based on the latter's highly encouraging results. It therefore pursues," explains Patrick Souchu, Director of the SESAR programme at the DGAC, "two main objectives: firstly, to consolidate the initial results and pursue the development of the solutions proposed, in order to get them to a sufficient stage of maturity; and secondly, to study new subjects, in some cases deriving from the first studies, and bringing them to maturity." The SESAR (Single European Sky ATM Research) programme, launched in 2004, constitutes the

DSNA involvement

Out of the 28 projects proposed in all in the framework of SESAR 2020, 25 were selected, including 21 involving the DSNA (French Air Navigation Services Directorate). Among the latter, the DSNA had the leadership over three of them: the SAFE project, for Airport Safety Nets; the "To Be Free"

project, relating to the Free Routes concept; and the X-Stream project, itself following on from the iStream projects (optimised arrivals management), on the Extended AMAN (Extended Arrivals Manager) and Target Time (Target Arrivals Time) topics.

technological component of the European Single Sky, aimed at modernising and harmonising the European air traffic management system. Phase 1, devoted to research and development (R&D) work, ran from 2009 to 2016, culminating in results leading to the deployment of the first technological solutions that were able to be validated. No fewer than 63 of these solutions were presented at a seminar organised in June 2016 by the SESAR JU¹ (cf. Aviation Civile No. 379, page 22). Three new topics were identified: the virtualisation of air traffic control; the oversight of drone traffic; and cybersecurity, a priority cross-disciplinary issue that can also be found across all the subjects of SESAR 2020.

Virtualisation of air traffic control

The increase in air traffic signifies an increasing quantity of information needed for its management, with ever denser circulation of this information between several stakeholders. Faced with this situation, the subject of air traffic control virtualisation has emerged. Truly innovative, this subject derives from a concept, issuing from SESAR 1, which has already been given form through demonstrations which have proved its feasibility, actions in which the DSNA (French Air Navigation Services Directorate) has played a leading role.

The "Virtual Centre" concept consists in isolating and offsetting geographically the technical room



© Comban/DGAC-DSNA

ERATO ELECTRONIC ENVIRONMENT (EEE), the new air traffic control system deployed at the Bordeaux en route air navigation centre in late 2017.

project, the objective is to run this system in the prototype stage as part of SESAR 2020. This stage will prefigure an operational version that may be the object of a service contract proposal based on the technologies that can ensure perfect operational maturity, such as Voice over IP², which enables calls to be rerouted from one centre to the other.

"This concept," says Guillaume Ramonet, Coflight programme director at the DSNA, "can generate savings in the costs of European air traffic management, through the pooling of the services and data that it enables between different control centres." The Swiss ANSP (Air Navigation Service Provider), Skyguide, has already successfully tested the principle, with the transmission of flight plan information processed remotely by the Coflight system.

Controlling drones

The development of civil drones brings with it the problems of how to integrate them into the manned air traffic and how to manage them in the air space at low or very high altitudes. Cohabitation with the IFR (Instruments Flight Rules) traffic and airport traffic, and the collision-avoidance problem arising from this, are topics that have already been launched in the framework of SESAR 2020. Also arising from the exploratory research undertaken for



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DRONE TRAFFIC MANAGEMENT is among the projects of the SESAR 2020 programme.

The schedule and resources for SESAR 2020

The budget allocated to SESAR 2020 derives from the Horizon 2020 programme defined by the European Commission. At €585 million, it is slightly down on the €700 million allocated to SESAR 1. It is also distributed among a larger number of members (19 instead of 16) since the renewal of the SESAR JU membership, in 2016.

The effective start-up of the 25 chosen projects took place between September 2016 and January 2017. The projects will be developed until the end of 2019, whereupon there will follow a second wave of projects, scheduled to run until the end of 2022. The follow-up will clearly depend on the subsequent funding allocations.

SESAR 2020 was the need to define a traffic management concept specific to drones, and designated "Unmanned Traffic Management" (UTM). In summer 2016, the SESAR JU invited tenders for the definition of this UTM concept and for technological systems that would make it possible to realise some of its aspects, such as the identification and localisation of drones and the protection of certain air spaces against their intrusion. These projects will be starting in 2017 and should provide answers to these emerging questions.

Cybersecurity becomes generalised

As for cybersecurity, which had only been the subject of a feasibility study as part of SESAR 1, the topic becomes more generally applicable with SESAR 2020. This is because any project that relates to new subjects and uses new systems must now include a cybersecurity risks analysis, not only for identifying and quantifying these risks but, above all, for producing and proposing at the same time protection solutions.

Régis Noyé

1. SESAR Joint Undertaking.
2. Internet Protocol.

Suborbital aircraft: preparing the new frontier between aviation and space

In order to prepare for the launch of commercial suborbital flights, French and international working groups are busy assessing the current state of play in this nascent field and assessing a potential future regulatory environment well suited for such operations.

The beginning of commercial suborbital flights, postponed several times, could finally become a reality in the coming months. These suborbital aircraft, manned or unmanned, will cover a wide range of missions. Firstly suborbital flights will open opportunities in the field of Research and Technology, with scientific experiments conducted in microgravity, which will last



© Dassault Aviation/M. Chérif

UNMANNED SUBORBITAL AIRCRAFT: Dassault Aviation "VEHRA" launching a satellite into low orbit.

3 to 4 minutes, compared to only 25 seconds for parabolic flights. Also, they will enable what is commonly referred to as "spaceflight experience or tourism". Suborbital flights may also serve the purpose of training professional astronauts for future orbital missions. Last but not least, suborbital vehicles will allow small satellites (up to 500 kg payloads) to be launched into Low Earth Orbit.

Boosted by the 2004 award of the XPrize (\$10 million) to the SpaceShipOne project of Scaled Composites, many private initiatives have been developed in this new field, with the arrival of new players. These include the development of such emblematic projects as the SpacePlane from Airbus and the VSH and VEHRA families from Dassault Aviation, in Europe, along with SpaceShipTwo from Virgin Galactic and the New Shepard from Blue Origin, in the USA.

Structuring thoughts

This dynamic led the International Civil Aviation Organisation (ICAO) to set up a Learning Group on Suborbital Commercial Space Transport during autumn 2014. Since then, the DSAC (French Civil Aviation Safety Directorate) and the CNES (National Centre for Space Studies) have also received many visits and requests

from French and international stakeholders on the subject of regulating commercial suborbital operations or spaceports.

In parallel, a French Task Force on suborbital aircraft was created mid-2015 by DGAC and COSPACE (the Advisory Committee between State and industry in the space sector). This Task Force brings together, quarterly, twenty or so experts from the DGAC, CNES, industry-Airbus, Dassault Aviation, Airbus Safran Launchers (ASL), EUTELSAT, etc., from ONERA and from several ministries, including those in charge of Space, Defence, Economy and Foreign Affairs.

"This gathering of private and public stakeholders around the same table has made it possible to draw up an inventory and establish a roadmap aimed at addressing the challenges of this nascent sector," explains Patrice Desvallées, deputy Director for European cooperation and Safety Regulation at DSAC. He adds that: *"We presently need to anticipate and design a new, flexible and stable legal and regulatory framework, inspired from both aviation and space law, and well suited for the various types of manned or unmanned Suborbital systems, as well as Air launch systems. This exercise will take time, but it will prove itself very useful for the future growth of this new aerospace industry."*

Olivier Constant

Key figures

80 to 110 km altitude
Apogee of suborbital flights (compared to 10 or 12 km for an airliner or a business jet).

6 G Maximum acceleration
re-entering the Earth's atmosphere.

Mach 3,5:
Maximum speed at the end of the rocket-propelled phase.

3 to 4 min.
microgravity compared to 25 s for parabolic flights with traditional aircraft.

Satellite-based precision approaches at Roissy airport

Roissy-Charles de Gaulle airport has paved the way in Europe to EGNOS satellite-based precision approaches which will progressively equip several dozen French and European aerodromes. EGNOS is funded by the European Union, and deployed and operated by a mainly French industry.

A new type of precision approach procedure has been in service at Roissy-Charles de Gaulle airport since April 2016. It backs up the traditional ILS¹, based on electronic beams enabling lateral and vertical guidance of aircraft up to the runway. Dubbed LPV 200², these new approaches are conducted using signals transmitted free-of-charge by the EGNOS³ satellite system, covering Europe. The LPV 200 designation signifies that, in terms of weather minima, the system enables approaches that are as precise as a Category I ILS. This involves operational minima of at least 200 feet (61 metres) of ceiling above the aerodrome and 550 metres of horizontal visibility, beyond which pilots must interrupt their approach if they cannot see the runway.

Operating principles

To enable aircraft to safely pursue the ad hoc descent trajectory to the runway, the precision of the distance and altitude information supplied to them by the GPS satellites must be improved, i.e.: augmented. This is what EGNOS offers, thanks to forty or so reference GPS receivers spread in and around Europe, the geographical coordinates of which are known. EGNOS enables the raw GPS data captured by the aircraft to be corrected, thereby improving the precision and integrity of the data. This principle of differential GPS correction is also at the heart of the "Ground Based Augmentation System", which is more precise than EGNOS and requires a reference GPS receiver in each aerodrome. It should enable guidance down to very low visibility levels (Category II and III all-weather approaches) by 2025.

In France and elsewhere

EGNOS enables the DGAC to deploy a true Category I network, thanks to an efficient and



© R. Metzger/DGAC-STAC

BOEING B777-228ER (F-GSPE) of Air France, landing at Roissy-Charles de Gaulle airport.

cost-effective mix of ILS and LPV 200 approaches, the concept of which is of interest to certain low-cost airlines, according to the DSNA (French Air Navigation Services Directorate). Four EGNOS-type systems, compliant with the "Satellite Based Augmentation System" standards of the ICAO⁴, are already certified and mutually compatible: as well as EGNOS, WAAS is in service in the USA, MSAS in Japan and GAGAN in India. Four other systems are in the course of deployment, in Russia, China, South Korea (with the DSNA offering its expertise to the Thales Group for deploying there a system equivalent to EGNOS, its clone, according to the IT technicians), and in Africa. The Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA), of which France is a

member, is today the African driver in this regard. EGNOS approaches deployment is a subject of interest for this region, since experience shows that it is very difficult there to maintain ILS networks, which poses in particular safety problems for approaches.

Germain Chambost

1. Instrument Landing System.
2. Localizer Performance with Vertical guidance approach 200 (see Aviation Civile No. 378, page 16)
3. European Geostationary Navigation Overlay Service.
4. ICAO - International Civil Aviation Organisation.

LPV 200 in place of ILS

"In France, the weather minima authorising Category I approaches apply approximately 95% of the time," according to Benoît Roturier, Director of the Global Navigation Satellite Systems and

Performance Based Navigation programme in the technical and innovation department of the DSNA. This underlines the operational utility of LPV 200. The DSNA, in consultation with the airports and users, has

therefore undertaken to replace the Cat. I ILS, which are costly installations equipping more than 30 aerodromes. These low-traffic airports will be equipped with LPV 200 by the end of 2017.

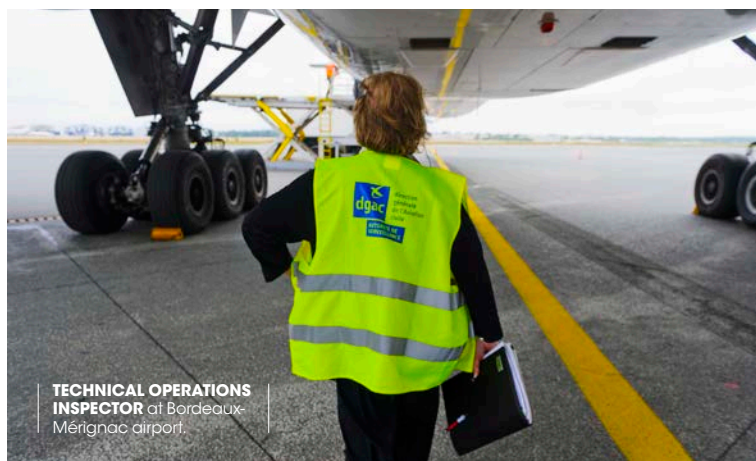
Aviation safety: risks under high surveillance

The DSAC (French Civil Aviation Safety Authority) has been developing the concept of aviation safety oversight based on risks. The objective is to mobilise the resources where the risks and the gains are the greatest in terms of safety for passengers and third parties.

Permanently adapting and evolving remains the best means of maintaining a high level of safety. As early as 2004, the first European regulations¹ included the central topic of a safety management system (SMS) aimed at formalising among operators a genuine culture of safety founded on a structured and proactive approach. The surveillance provided by the authorities is no exception to the rule. The French Civil Aviation Safety Authority (DSAC) is therefore today developing a new surveillance approach based on the risks: RBO (Risk-Based Oversight). Rather than a revolution, this is an evolution which aims to focus the oversight authority efforts first and foremost on the areas where the assessed risks are the greatest. This therefore involves going beyond the simple systematic verification of regulatory compliance, in order to mobilise the oversight resources where they will have the greatest impact on passenger safety.

Targeted oversight

First appearing in the European regulations in 2012², the RBO approach introduces the idea of adapting oversight procedures according to the specific characteristics of different operators (especially airports, airlines, training organisations, and air traffic control providers), the degree of complexity of their activities, the assessed risks, and their safety performance. “Risk-based oversight operates according to a principle of twofold modulation,” declares Richard Thummel, Deputy Director at DSAC: “The first element relates to the oversight cycle, the duration of which may be



TECHNICAL OPERATIONS INSPECTOR at Bordeaux-Mérignac airport.

© A. BOURSSOU-MEEM

so as to facilitate a genuine exchange with them when producing the end-of-year report,” says Baptiste Lefèvre, quality and standardisation manager at DSAC and coordinator of the RBO working group. After defining the methodological framework and the tools for this new risk-based oversight approach, the first tests have begun with a number of operators.

lengthened or shortened depending on the characteristics and performance of the operator; and the second covers the contents of the topics observed during this oversight cycle.” This may involve flight preparations, crew training, flight time limits for airlines, for example, along with aerodrome lighting, runways, wildlife hazards or any worksites in the vicinity of airports. The audits are adapted to the risks identified in each domain.

Critical dialogue with the operators

The RBO approach requires the establishment of risk profiles for each of the operators based on three elements: their risk exposure, the assessment of their safety performance based on SMS assessment criteria and, lastly, their compliance performance, which determines the assessment not only of regulatory compliance but also the capacity to implement corrective actions. These developments also involve initiating critical dialogue between the operators and the oversight authority. “The role of the oversight authority does not consist in purely and simply duplicating the work carried out by the operators, but also in obtaining a qualitative assessment of risks and performance

Deployment could be started as early as 2018. Régis Noyé

1. Regulation (EC) No. 550/2004 of the European Parliament and of the Council of 10 March 2004 on the provision of air navigation services in the single European sky.
2. Commission Regulation (EU) No. 965/2012 of 5 October 2012 laying down technical requirements and administrative procedures related to air operations pursuant to Regulation (EC) No. 216/2008 of the European Parliament and of the Council.

Key figures

Airlines
252 oversight actions

Aerodromes
284 oversight actions

Audits and inspections of French operators conducted in 2016 by the DSAC

A risk analysis capacity to respond more effectively to the terrorist threat

With the terrorist threat still high, air transport continues to be a favourite target. For two years, the Civil Aviation Risk Analysis unit (PARAC) has been analysing the risk so that France is better prepared to counter the threat.

For more than 15 years, the aviation sector has been reinforcing its security measures in response to the risk posed by terrorism. “After the shock of the 9/11 attacks in 2001, new international regulations were put in place,” says Frédérique Gely, Assistant Vice-Director for Security and Defence at the DGAC. “This has created more effective but also costly processes. At DGAC we have been trying to address this by adopting an approach that systematically takes account of the level of risk before implementing security measures. The idea is to construct a comprehensive, consistent and robust system of defence,” Frédérique Gely explains. This risk-based security approach responds to a context in which air transport has been the target of terrorist attacks on four occasions over the past two years: two explosive devices smuggled on board aircraft in Sinai and Somalia and two attacks in the public areas of Brussels and Istanbul airports.

A unit dedicated to risk analysis

PARAC, created in July 2014, is tasked with implementing this new approach. “Our mission is to analyse the risk for each of the different segments of the civil aviation sector,” explains Olivier Boulnois, Head of PARAC. “We work in liaison with the intelligence services to identify the most credible threats, and the weak points in the protection of our airports and aircraft. This enables us to determine the risk level for a specific airport, a specific destination, or even for a specific flight. This directly informs decisions about operations at the airport and regulatory change.”

PARAC’s responsibilities

PARAC has three teams focused on: threat, surface to air risk, inbound flights. The “threat” team, in connection with the



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PARAC’S MISSION: to analyse security risks for passengers, flights and airports.

intelligence services, “pinpoints the terrorist threat for the aviation sector by determining the capacity and intentions of terrorist groups to attack at a given location,” Olivier Boulnois explains.

The “surface to air risk” team deals with risks linked to flying over conflict zones. Using information from the intelligence services on the dissemination of weapons in conflict zones, the team judges if the air carriers can safely fly over the zones, and at what altitude, in order to avoid tragedies such as that of the MH17 flight over Ukraine. This team also coordinates a cooperation programme to raise awareness in other countries of the risks posed by ground-to-air weapons, and helping them to address this risk.

Finally, the “inbound flights” team manages assessments of overseas locations to evaluate the effectiveness of airport security. These assessments are used to suggest appropriate measures in response to the risk. These responsibilities are not set in stone, and evolve according to the risk. PARAC also works on emergent threats such as cyberthreats and

drones. It is also responsible for establishing, in coordination with the French Interior Ministry, an assessment programme for the “landsides” of French airports.

Sylvie Mignard

A cross-ministerial team

Originally composed of four individuals, PARAC is now eleven-strong, with representatives from across police and defence. The team includes officers from the police, the air force, the air transport gendarmerie, and customs. When the team is conducting an inbound flight assessment, up to 40 staff from across the government can be drawn on to take part.

INTERNATIONAL COOPERATION

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INTERNATIONAL COOPERATION

International cooperation: so that no country is left behind

The DGAC has a Department of International cooperation called the MCI (Mission de la coopération internationale), for sharing its experience and know-how with all the countries that ask for it. Focus on the actions of this expert cell.

Drawing on aviation history stretching back more than a century, a first-tier industrial sector, and a civil aviation training school recognised the world over, France is in a legitimate position to help countries with the development of their aviation. Within the MCI, five experts, specialised per geographical zone, carry out projects all around the world for presenting and sharing French aeronautical skills and training the authorities of the countries that so desire, all in a true spirit of partnership. “We also have four French civil aviation attachés in our embassies in Brasilia, Moscow, Beijing and Delhi. They are working in strategic countries in terms of aeronautical development,” explains Bertrand de Lacombe, Head of the MCI. By drawing on all the dynamic energies to be found within the DGAC, the MCI covers all fields of aviation. It proposes long-term cooperation to partner countries, suited to their organisation, their history and their expectations. This invariably concerns a bespoke project, aimed at reinforcing, sustainably, the civil aviation competences of these countries.

Varied and essential missions

Help with internal reorganisation and establishing conformity with international standards; assistance in the implementation of a security system; sharing experience and expertise; training personnel: these are the kinds of missions that are conceived on a case-by-case basis, for and with foreign



BERTRAND DE LACOMBE
Head of the Department of International cooperation (MCI).

Collaborative working

To run this mission successfully, the MCI draws on a broad collaborative network. Domestically, this includes the ENAC National school of civil aviation, a prestigious establishment that trains many foreign civil aviation executives in various fields. Each year, the MCI invites foreign interns to study there, and finances training ranging in duration from several days to a full year. Manufacturers such as Airbus, Thales and Safran - major players in the aeronautical industry - are closely associated with this international cooperation, as are other State services, in France and abroad (Ministry of Foreign Affairs, the Treasury). Lastly, the European Aviation Safety Agency (EASA) and, of course, the International Civil Aviation Organisation (ICAO) are also stakeholders in the approach, which is designed to increase the safety and efficiency of civil aviation all around the world.

organisations, designed to drive forward civil aviation as a whole. “Around fifty cooperation agreements are ongoing worldwide, with variable action density and intervals,” says Bertrand de Lacombe. “We also run twinning projects, funded by the European Union, with certain nearby countries in Europe.” Although international cooperation is not the core business of the DGAC, it is an essential element of its activity. “So many economic and human exchanges take place by means of civil aviation,” insists the Head of the MCI. “With the strong and continuous growth of traffic expected over the years to come, international cooperation will be increasingly necessary, and France intends to continue playing a major role in this dynamic.”
Béatrice Courtois

The DGAC on an international cooperation mission for the EASA

The DGAC, via the MCI¹, has been selected by the EASA² to support it in its international cooperation actions, with a contract that encompasses a wide variety of actions and concerns many countries around the world, and with major industrial issues at stake.



EASA HQ
in Cologne
(Germany).

© L. Bichot/photothèque STAC

Today we have succeeded in becoming a strong and recognised counterweight for the Federal Aviation Administration”, declared Patrick Ky, EASA Director, with satisfaction, a decade after the creation of the European agency. Although promoting European industry may not be an explicit part of the EASA mandates, the agency has nonetheless been able to develop over the years international cooperation agreements, sometimes even quite far from its natural base, with the purpose of disseminating European standards of aviation safety³. Since the industrial issues are linked to the international standardisation choices, this effectively means that the EASA is thereby supporting the export of European technology around the world.

Unprecedented RFP

Not possessing any experience in the practical implementation of this type of cooperation, the EASA turned to certain players “on the ground” in order to develop these activities by way of framework contracts. This was the case of the request for proposals issued by the EASA in January 2016, and for which the DGAC was chosen. This RFP (request for proposals) was unprecedented in its scope. “The EASA had already issued targeted RFPs, such as for an initiative undertaken with China, but this is the first time that the agency had invited tenders for its entire international cooperation actions programme,” explains Bertrand de Lacombe, Head of the MCI at the DTA⁴. In the framework of this RFP concerning technical assistance services in matters of safety and economic regulation, the DGAC will provide the authorities with its expertise on the relevant subjects. On account of

the volume of actions envisaged and the needs in this regard of the countries concerned, the DGAC has chosen to join forces with the British (Civil Aviation Authority) and Spanish (*Agencia Estatal de Seguridad Aérea*) authorities within a parity consortium, the coordination of which has been entrusted to the UK section. These are partners with whom the DGAC is used to conducting international cooperation actions, and which offer the complementary competences and resources required for accomplishing this wide-ranging contract, as the MCI relates.

A wide range of actions

The missions for which the consortium has been chosen concern three broad fields of competence: conducting audits, delivering expertise and producing studies. The range of actions is vast. It will encompass the internal organisation of an authority, the certification processes, the rules applicable in the field of ATM⁵ and the collating of safety incidents. For the operations concerning airworthiness, the DGAC also presented itself alongside its partner, the OSAC (*Organisme pour la Sécurité de l'Aviation Civile* / French civil aviation safety organisation). “The OSAC is certified by ministerial order to exercise control and oversight missions in the field of airworthiness,” explains Jean-Marc de Raffin Dourney, President of the OSAC. “In the case of this RFP, we shall be

called upon in particular to act, as a subcontractor of the DGAC, on questions of inspections with regard to airworthiness.” The action requests began to be issued by the EASA last July, and the members of the consortium must now examine, on each occasion, the resources and organisation to be put in place in order to suggest proposals to the European agency. “We are qualified for our competences, but it is hard to say what precise resources we will be going to have to deploy throughout the period of the contract. It is the EASA that sets the rhythm by progressively delivering action requests of fairly variable nature, to which we need to respond within five days,” Bertrand de Lacombe explains. This cooperation is scheduled to run until 2019, and will concern many regions around the world, according to the Head of the MCI, who points out on a map all the regional programmes already undertaken by the EASA.

Henri Cormier

1. *Mission de la coopération internationale* / Department of international cooperation.
2. European Aviation Safety Agency.
3. In accordance with article 2-2 of Regulation (EC) 216/2008 to “promote Community views regarding civil aviation safety standards and rules throughout the world by establishing appropriate cooperation with third countries and international organisations.”
4. *Direction du transport aérien* (French Air Transport Directorate).
5. Air Traffic Management.



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A rich and geographically extensive programme

“Southern Asia, countries of the Mediterranean region, of the Middle East, or of the Caspian region, and quite recently Madagascar: the first requests formulated by the EASA, since last summer, concern several parts of the world. The MCI will be working in particular, via the OSAC, in several French-speaking countries of the Euromed region, to provide its expertise in relation to airworthiness inspections. Action is also planned in several countries of this same geographical zone, to enable the participants to gain more in-depth knowledge of the EASA standards and the rules applicable to ATM. In southern Asia, several countries will benefit, moreover, from a training programme on various subjects, such as the implementation of State Safety Programmes (SSP), aviation medicine, and safety management systems (SMS). Last but not least is a two-part action (one on the implementation of SSPs, the other concerning the auditing of organisations regarding oversight and safety) in several countries of the Caucasus and Central Asia.

Key figures

€3.4 million

Global value of the contract awarded to the consortium of which the DGAC is part.

7

Number of actions for which the EASA has already formulated service requests.

Over €25 million

Global amount of the financial commitment from the EASA since its creation to international cooperation projects.

The DGAC and the ICAO: a partnership for training

The agreement signed last September with the International Civil Aviation Organisation (ICAO) illustrates the long-term policy conducted by the DGAC in the field of the training of international civil aviation executives. Here we look at this win-win partnership.

A model that should encourage other developed States to offer similar programmes...” This is how Fang Liu, General Secretary of the International Civil Aviation Organisation (ICAO), greeted the cooperation agreement on training signed with the DGAC on 28 September 2016. This is an agreement that ties in directly with the campaign entitled “No country left behind”, launched two years earlier by the ICAO to encourage the most advanced nations to help developing nations in the implementation of its recommended norms and practices. This approach, as the institute underlines, should enable: “... all States to profit from the socio-economic advantages of the safety and reliability of air transport.” The agreement also highlights the long-standing cooperation of the DGAC

and ENAC (*École nationale de l'aviation civile*/ National school of civil aviation) in helping the foreign authorities to train their executives. “France enables executives from the world over to benefit from courses laid on by one of the most prestigious aeronautical schools, although this often passes under the radar,” states Bertrand de Lacombe, Head of the MCI at the DTA (*Direction du transport aérien*/French Air Transport Directorate). “We have therefore joined forces with the ICAO to gain increased visibility for these training programmes, open them up to more countries, and regularly share our analyses of needs worldwide.”

Promoting French know-how

The DGAC will in this way be channelling at least €1 million over three years into the organisation of courses, extending all the way up to specialised one-year Master's degrees. Drawn up in consultation with the ICAO, the training programmes will encompass three broad areas: air navigation, safety and security. The latter aspect is assuming increasing importance, moreover, with, in particular, a security instructor course on offer. If, as Patrick Gandil, DGAC director, points out, this sharing of French expertise makes it possible to: “... contribute to the development of the safest, most efficient and most sustainable aviation possible,” and at the same time it underscores the “soft power” of French aviation. For his part, the ENAC director, Marc Houalla, points out: “When we get external service providers from groups such as Airbus, Thales or ADP involved in our training, we raise the awareness of students to the French aeronautical industry and help to develop an appreciation for things French.” All in all, this is a win-win approach...

Olivier Constant

ENAC: partnering international institutes

“We are the only academy in the world that possesses what I call the ‘Four Jewels Crown’,” Marc Houalla says wryly, referring to the links that the National school of civil aviation, ENAC, has fostered over the years with these four major international institutes or associations: the International Civil Aviation Organisation (ICAO), the European Aviation Safety Agency (EASA), the International Air Transport Association (IATA) and the Airport Council International (ACI). Civil aviation, safety, airlines, airports: today, ENAC works on developing collaborations with all the major international movers and shakers in the aviation world, pursuing a dual objective: optimising the development of training initiatives, and underpinning the reputation and influence of the school worldwide. This has led to ENAC obtaining certification as a regional centre of excellence from the ICAO. It delivers training on safety for the EASA and organises pooled training with the ACI. It has also concluded a global agreement with the IATA concerning not only training but also student internships and research, in particular in the field of big data.

Reinforced cooperation with Colombia

With the support of the DGAC, its Colombian equivalent, Aeronáutica Civil (Aerociuil), is to improve its training and increase its regional appeal.

In September 2015, the DGAC signed a four-year cooperation contract with its Colombian equivalent, Aerociuil. Its training body, the CEA (Centro de Estudios de Ciencias Aeronáuticas), will therefore benefit from the support of the ENAC National school of civil aviation to improve its teaching levels, as Emmanuel Rocque, in charge of cooperation with the Americas at the DGAC, explains: “The objective is to trigger a ramp-up in skills and disseminate best practices to move up from the status of a technical training centre to that of an entity recognised by the Ministry for Higher Education, so that the students are able, at the end of their studies, to obtain the title of engineer.”

These developments will also have repercussions on another scale. For now, the CEA only has Trainer+ certification delivered by the International Civil Aviation Organisation (ICAO). Thanks to the support of the ENAC teams, it is Full Membership Trainer+ certification that is being targeted. These are changes that will resonate well beyond Colombia, as Emmanuel Rocque explains: “The CEA is already training civil servants from surrounding countries, such as Panama, Ecuador and Peru. With Full Membership status, its appeal would be even stronger, and would reinforce the position that Colombia has already established in the field of aviation.”

An agreement targeting the long term

This cooperation agreement is part of the ENAC long-term strategy. Thus, the French civil aviation school signed on the 30 of March 2017 a memorandum of understanding with San Buenaventura University in Bogotá for creating Master's degrees in various civil aviation specialities. This is a field in which ENAC already has considerable experience. It has already created, or helped create, courses of this type in several Asian countries (Philippines, Malaysia, Vietnam, etc.), as well as



in India and, this year, in Brazil. In Colombia, the DGAC and ENAC were invited to prepare and take part in a regional seminar held on 30-31 March of this year. Bringing together experts from France (DGAC, ENAC and manufacturers), Colombia, and other Latin American countries, this provided the opportunity to review the challenges posed by the development of civil aviation and, in particular, the growth in air traffic. These topics

are of particular interest for Colombia, with the country demonstrating the highest degree of air transport development in the region. With stable economic growth, the country has the second largest airline on the continent (Avianca). It is therefore looking to take advantage of its geographical position to reinforce its position as a regional hub.

Gilmar Martins

An agreement between the European Union and Latin America

The European Union (EU) has tasked the European Aviation Safety Agency (EASA) with conducting a programme of cooperation with the main countries of Latin America (Argentina, Brazil, Chile, Colombia and Mexico) along with regional partners, these being the

SRVSOP¹ and the ACSA². Endowed with €7 million in funding, the envisaged actions will take place over a four-year period. The global objective of the programme is to improve the partnership between the EU and Latin America in the field of civil aviation. More specifically, it aims at

promoting EU standards, reinforcing cooperation in the field of regulations and facilitating economic exchanges. This cooperation programme also comprises a facet designed to minimise the impact of the air sector on the environment and climate change.

1. Sistema Regional de Vigilancia de la Seguridad Operacional (Regional system of oversight and operational safety), whose members are Argentina, Bolivia, Brazil, Cuba, Chile, Colombia, Ecuador, Panama, Paraguay, Peru, Uruguay and Venezuela.
2. Agencia Centroamericana de Seguridad Aérea (Central American aviation safety agency), whose members are Belize, Costa Rica, El Salvador, Honduras, Guatemala and Nicaragua.

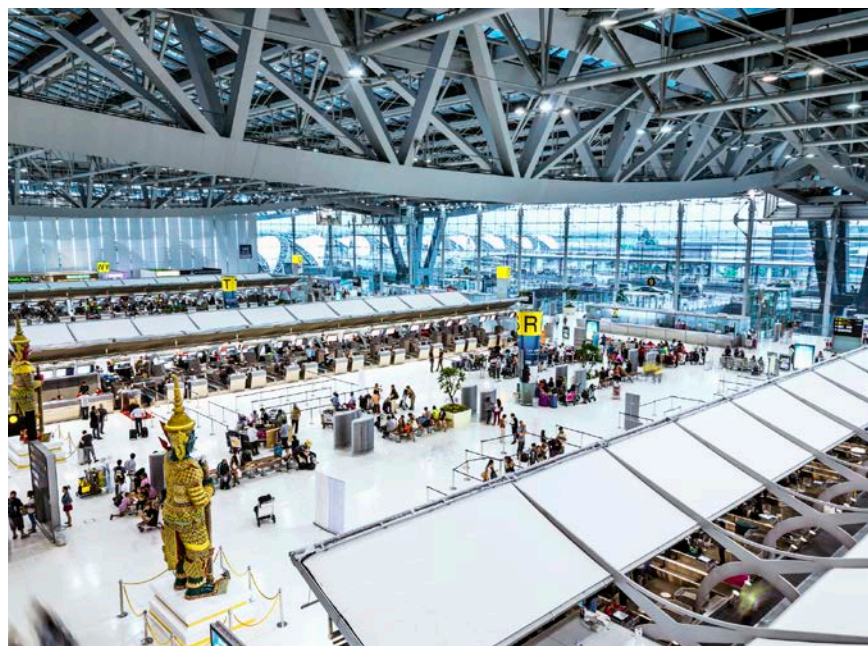
TRAINING
of international
interns at ENAC.



The DGAC supports the ASEAN nations

The ten ASEAN States are addressing the challenge of strong growth in air transport in their air space. Many of them are calling upon the MCI (*Mission de la coopération internationale / Department of international cooperation*) of the DGAC to help them with this.

BANGKOK AIRPORT
(Thailand).



The ten Member States of ASEAN¹, at once participants in and witnesses of the strong growth in air traffic in their region, are committed to the liberalisation of air traffic rights and the implementation of a single air transport market. Several challenges are therefore facing the civil aviation authorities of these countries. These authorities need to support this growth by guaranteeing safe operation of the aircraft fleets. Faced with the increased number of airlines operating in the zone, these authorities need to ensure that the regulations in force comply with the requirements defined by the International Civil Aviation Organisation (ICAO), and that their personnel are sufficiently trained and in sufficient number to fulfil their tasks under satisfactory conditions.

An action plan founded on an inventory

The ASEAN States that are members of the ICAO have their civil aviation authorities subjected to audits conducted by the ICAO in order to check their conformity with international standards. The conclusions of these audits bring to light any deficiencies or failings that the authorities concerned need to overcome or correct. In this context, by way of technical cooperation agreements signed with these authorities, the MCI of the DGAC provides its support to several administrations of the ASEAN States (Laos, Cambodia, Philippines, Indonesia, Thailand and Vietnam). "We work essentially in three areas: air operations, airworthiness and aircraft maintenance, as well as licences for personnel," says Emanuela Gellini,

MCI Head of Mission for the Asia-Pacific region at the time.

Before undertaking any cooperative action, the MCI and the DGAC carry out an on-site inventory. Based on points for improvement, an action plan is then proposed to the beneficiary authority.

Improving regulations

"The problem may be situated at the level of the regulations implemented by the country's authority," the former Mission Head goes on to say. "Either these regulations are not entirely compliant with international requirements, or else they leave gaps that need to be filled. Or else, despite being compliant with the international standards, the authority's personnel have

difficulty implementing them." Whatever the case, the action proposed will consist in bringing the regulations up to the requisite level and, if necessary, supporting the management staff in order to enable them to fully assume their responsibilities. "In any cooperative action, although it is certainly a matter of deploying human and financial resources, it is also a matter of raising the awareness of the personnel," the former Mission Head points out. "It is important to involve them in the work carried out on site by our experts, to ensure that they appropriate the tools and methods proposed, and to get them involved in the process. Each time, we strive to take into account the local context, including the cultural factors."



AIRBUS A330
at Hong Kong airport.

Drawing up a continuous oversight plan

The question of the capacity of the authorities to fulfil their missions may also arise: "Certain civil aviation authorities of ASEAN need to be supported in drawing up a continuous oversight plan for their air operators. Others already have such a tool, but need to reinforce it. Sometimes it's a matter of enlightening the inspectors of the authority concerned, for example, on how oversight audits are conducted," adds the ex-Head of Mission. Through the relations established with the civil aviation authorities, any training needs are detected. The MCI can then help the authority concerned to construct an appropriate training plan.

Beyond the framework of these bilateral agreements tying it to the authorities of ASEAN, the DGAC is also called upon to provide its support in a multilateral framework. This has taken the form of a programme launched by Europe in 2012 (for a four-year duration) and designated AATIP². Its purpose is to support the ten ASEAN States in the creation of a single air transport market, by helping them to reinforce safety whether in terms of air transport operations or air navigation. Assigned by the European Aviation Safety Agency (EASA), the management of this programme (backed by a budget of some €4.5 million) has required the intervention of several partners grouped into a consortium, of which the DGAC is part, in collaboration with

the British civil aviation authority. As initially planned, the programme was run until the end of 2016.

Getting off the European blacklist

The cooperative efforts of the DGAC and the ASEAN States have already begun to bear fruit. These have led, for example, to the Philippines airlines being removed from the European "blacklist". Indonesia has seen seven of its main airlines taken off this same list, while cooperation with the DGAC continues to proceed apace. For Thailand, a programme was launched in September 2016 for a two-year duration. In Laos, aid with the oversight mission of the national authority is underway.

These programmes all benefit from the backing of Airbus, which has a significant presence in the region. The support of this manufacturer has made it possible to make available on site certain resources, through the mobilisation of experts. This daily presence alongside the various stakeholders in the air transport system encourages efficiency and responsiveness, and guarantees the implementation of identified improvement measures.

Through all these actions, it is made patently apparent that the safety chain remains an inseparable whole, in which authorities, manufacturers and operators all play a key role

François Blanc

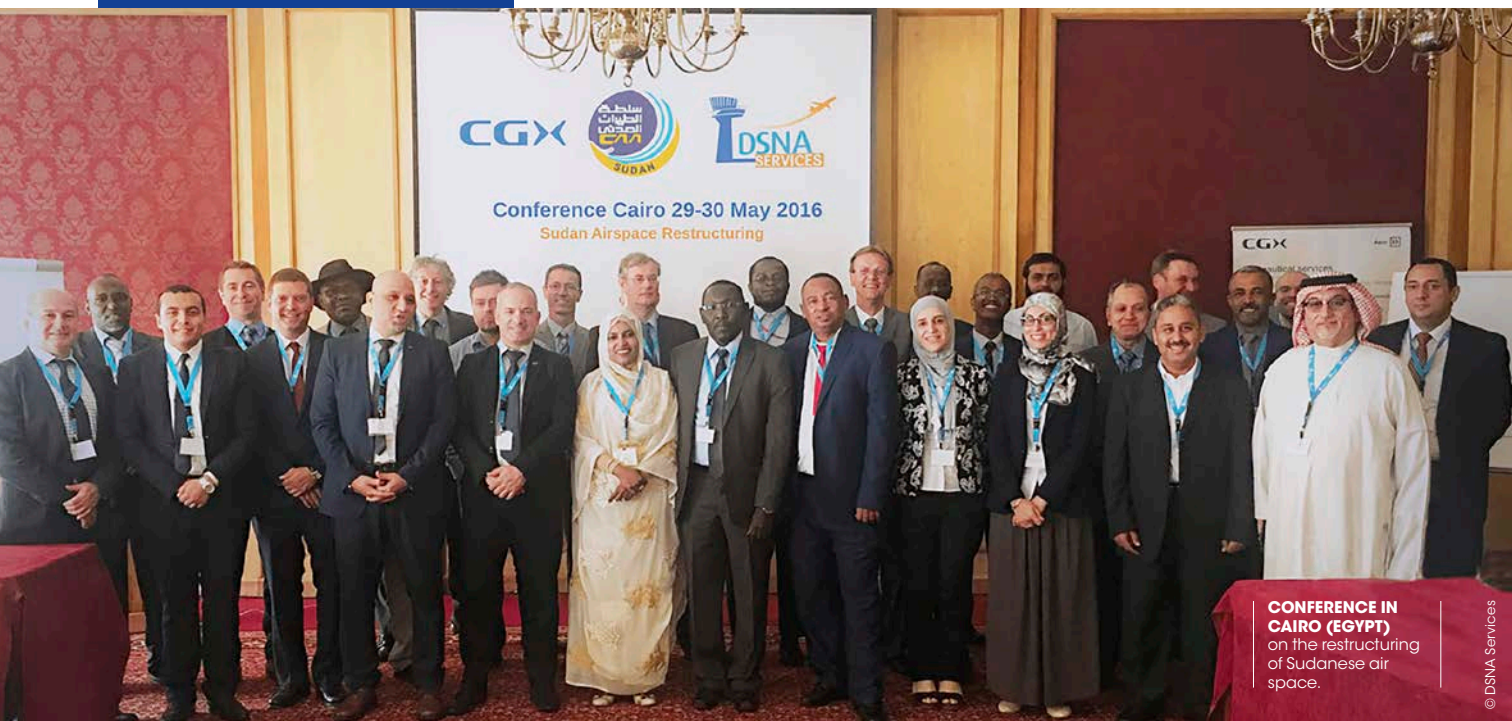
ENAC deployed in Southeast Asia

Engaged in an international development strategy, the ENAC National school of civil aviation is building its network in Southeast Asia. Its actions here cover several countries and areas: academic partnerships with prestigious science and technology universities in Hong Kong, Singapore and Indonesia; professional training via the launch of an Advanced Master's in air safety in the Philippines, then in Vietnam, with the

aim of subsequently setting it up in other countries in the region; ongoing training via support for a pilot and air traffic control school in Indonesia, designed to raise it to European standards; training of Vietnam Airlines pilots and signing a contract with the ATR Training Centre with a view to the training of the pilots of Lao Airlines. In parallel, the School maintains close relations with the DGAC MCI. In the

words of Pierre Lahourcade, International and Development Director at ENAC: "The MCI has a comprehensive vision of the needs of the civil aviation authorities in the countries where it operates. As such, it can identify, among other things, the training needs of personnel in the precise locations where it falls within our remit to work alongside the local stakeholders."

1. Association of South-East Asian Nations. Created in 1967 by five founder States, it today comprises Burma, Brunei, Cambodia, Indonesia, Laos, Malaysia, Philippines, Singapore, Thailand and Vietnam (www.asean.org).
2. ASEAN Air Transport Integration Project.



DSNA Services is strengthening its activities and its partnerships

Three years after its creation, DSNA Services has succeeded in broadening internationally its credibility and established itself as a provider of expertise, consultancy, training and innovation.

“Combining the capacity to act of a large corporation with the flexibility of a start-up enables French know-how to fully express itself.”

STÉPHANE DURAND /
DSNA SERVICES EXECUTIVE DIRECTOR

DSNA Services promotes French civil aviation know-how worldwide. Founded by the DGAC and the ENAC¹, DSNA Services is the expertise and consultancy office of French civil aviation. It supports its customers in reinforcing aviation safety by developing innovative and tailored services as well as solutions on strategic, organisational and operational levels.

Innovative solutions

In developing innovative solutions, DSNA Services combines the excellence of the DGAC personnel with the agility of various French

start-ups. In partnership with the ADP Group and the start-up Aveillant, DSNA Services has developed a one-of-a-kind solution to detect, identify and track drones, including small ones. Its efficiency is proven in spotting targets up to 5 km away. Quite a feat!

In barely three years of existence, this expertise and consultancy office has successfully managed high-level projects on every continent, developing bespoke solutions for its customers, as demonstrated by its partners and customers. In Africa, DSNA Services has redesigned the aviation routes network of Sudan, an airspace three times bigger than the French. In Asia, alongside NAVBLUE², DSNA Services is deploying

Complementary expertise with Bureau Veritas

As a world leader in conformity assessment of materials and certification, Bureau Veritas has offices in 144 countries worldwide. Arnaud Schaeffer, in charge of the Aviation Safety and Security division, underlines the particular contribution of DSNA Services in the implementation of activities to assist foreign civil aviation authorities:

“The experts from DSNA Services provide complementary expertise (focused on airworthiness, air operations, safety management, security) to Bureau Veritas, particularly in the field of ATM. These assistance programs, conducted jointly by Bureau Veritas and DSNA Services teams, will be developed, consolidated and diversified in the near future.”

the operational expertise of French air traffic controllers to boost the performance of the Vietnamese airspace, which is facing a challenging growth of passengers of more than 16% per year. This cooperation project aims to increase the capacity and fluidity of traffic over Hanoi and Ho Chi Minh City, the two largest airports, while reinforcing their safety.

In the Caribbean, DSNA Services has been supporting since 2013 the Haitian civil aviation in modernising its operations, its organisation and its tools. This cooperation was reinforced by the visit of French President François Hollande in May 2015 and by the signing of a four-year contract to strengthen the surveillance activities. *“This is about supporting the Haitians in building their civil aviation market while guaranteeing the highest safety levels,”* says Stéphane Durand, DSNA Services Executive Director. *“This project involves the drafting of the legal basis that governs the Haitian aviation industry as well as its condition of application.”*

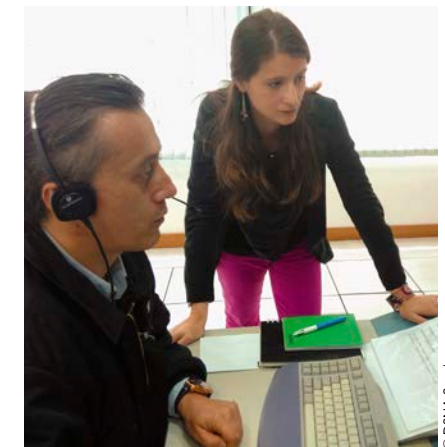
Know-how, the French way

Haiti is the home of a project which demonstrates the methodology and added-value of DSNA Services experts: the supervision of a runway renovation. In this project, DSNA Services serves as an integrator facilitating the collaboration between a major company, ADPI (Aéroports de Paris Ingénierie - ADP Engineering), and a small French company. This partnership combines the recognized experience of a large key player with the flexibility of a start-up. As Stéphane Durand says: *“This is what enables French know-how to fully express itself.”* An identical process has been rolled out in Ethiopia. A special team has been put in place including experts from DSNA Services and experts from partners to design solutions to meet customer’s needs in a country where the number of aircraft in service will quickly double. This efficient combination of talents

can be deployed in many other locations such as Iran or Cuba. Addressing specific needs is a method that has definitely proven its efficiency judging from the growing number of projects in which DSNA Services has been involved since its creation: 14 in 2014, 25 in 2015 and 35 in 2016.

Germain Chambost

1. École nationale de l’aviation civile/National Civil Aviation Academy.
2. NAVBLUE is an Airbus company dedicated to Flight Operations and Air Traffic Management Services.



Reinforced cooperation With Thales

“The Thales Group has around 170 client countries for ATM worldwide, this strong international presence confirms its historic calling for this field,” says Jean-Marc Alias, Thales’ Vice-President for ATM activities. *The Thales Group is a major partner of DSNA Services in the field of air traffic control, a cooperation reinforced over the past two years. “The absence of competition between Thales and DSNA Services, occupying different niches,*

facilitates this rapprochement,” Jean-Marc Alias observes. *The two partners cannot yet publish concrete results as their reinforced cooperation and collaborative prospection has only just begun. Also, Thales established and consolidated its vast network of contacts with international clients over several decades, whereas DSNA Services has been in service for only three years.*

The reinforced cooperation between the partners expresses itself in particular through collaborative approaches and presentations. To illustrate their partnership, they shared a stand at the International Fair in Cuba in November 2016. “This was about establishing a strong common position to negotiate with Cuban authorities. A first step in their direction,” Jean-Marc Alias points out.

*Air Traffic Management.

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