ACTIVITY REPORT

CIVIL AVIATION TECHNICAL CENTRE

2019

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Ministry for an Ecological and Solidary Transition

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STAC

Activity report 2019

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EDITORIAL

2019 saw our strategic project « STAC 2035, Let's prepare tomottow's sky » move into a new phase, launched in October during a working day bringing together all STAC employees. We have collectively committed ourselves to translate this strategic project into a concrete action plan, to further develop the STAC's key strengths: innovation, to remain at the top of expertise in a changing world; horizontal cooperation within STAC, to better work together and propose coherent solutions based on the diversity of our expertise; our international reach and our partnerships with the various players in the field.

All these elements already exist, thanks to the combined action of all STAC employees, whether in technical expertise or support functions. They were brought foreward during the 2019 edition of the STAC Technical Day, which brought together nearly 200 people and covered all of our technical areas: safety, security, sustainable development and biodiversity, capacity, and aviation pavements.

STAC's spirit of innovation is present in all these areas. As you read this activity report, you will discover articles on research on the structure of aeronautical pavements, on the consideration of new terrorist threats thanks to the national explosives laboratory, or new risks such as the runaway of lithium batteries or global warming (Vulclim tool). STAC has also organised itself to develop a voluntarily transversal UAV expertise for the benefit of civil aviation community.

The horizontal cooperation of our teams must be developed. It is already illustrated, in particular, by our contribution to the State's action for the redevelopment of Nantes Atlantique airport. It also allowed for the 2019 renewal of STAC certification according to the v2015 version of the ISO standard. Moreover, all our laboratories have renewed their COFRAC accreditations. The in-house development of IT tools such as GEMASSUR (monitoring of safety equipment certifications) is also part of this approach.

The expertise of STAC staff is internationally recognized through our participation in more than 50 working groups of the International Civil Aviation Organization, the European Aviation Safety Agency and the European Civil Aviation Conference. In particular, we contributed to the preparation of the implementation of the Global Reporting Format (GRF), the future universal method for assessing and reporting runway surface conditions and to the development of air navigation safety oversight according to new European regulations.

Partnerships with numerous players in aviation and other scientific fields enable us to ensure both the originality and relevance of our expertise. You will thus see partners as diverse as the National Museum of Natural History, the Gustave Eiffel University, the National School of Civil Aviation, the Flight Control Organization, CEREMA, Airbus, Eurocontrol, the Ministry of the Armed Forces, to name but a few.

I invite you to discover the diversity of the achievements of all STAC staff, of which I have only been able to give you a first glimpse here, by browsing freely in this report to gather information just like the bees that we have been welcoming to our Bonneuil site since 2019 gather pollen and nectar.

Enjoy reading!

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Senior management team

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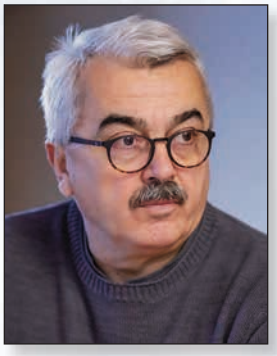

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SAFETY

Study and research

JOINT STUDY WITH THE DIRECTORATE-GENERAL FOR AERONAUTICAL TECHNICAL ARMAMENTS ON LITHIUM BATTERIES

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Since the end of 2017, a study on fire propagation factors in the event of thermal runaway of a lithium battery contained in portable electronic equipment (PED) has been conducted jointly by STAC and the Direction Générale de l'Armement Techniques Aéronautiques (DGA TA). The first part of this study was completed in 2019. It has enabled to understand the physico-chemical mechanisms involved in the thermal runaway of a lithium battery, to identify the aggravating factors, the PEDs most sensitive to runaway and the propagation kinetics inside a baggage item.

An additional study will be launched in 2020, again in cooperation with the DGA TA to evaluate the intervention procedures of cabin crew on these PED's, as well as to test the effectiveness of fire extinguishing means on this type of fire. At the same time, STAC took part in the International Aircraft Materials Fire Test Forum Meeting organised at EASA headquarters in May 2019 and was thus able to exchange with various world players in the field of aviation safety on the issue of lithium.

STAC CONTRIBUTES TO THE COMPATIBILITY BETWEEN VISUAL AIDS AND AUGMENTED VISION SYSTEMS

STAC's Visual Aids Subdivision supports the development of enhanced vision systems such as Enhanced Vision Systems (EVS) that not only improve safety and flight regularity but also airport capacity in degraded weather conditions at airports that do not permit a Category 2 or 3 precision approach. EVS are on-board avionics equipment incorporating infrared sensors, while LED technology, which does not emit in the infrared range, is widely deployed in the field of airport lighting, particularly for approach lighting.

The Visual Aids Subdivision brought this technology compatibility issue to the last meeting of the ICAO Visual Aids Working Group (VAWG) to initiate the development of infrared specifications for airport approach lighting in Annex 14.

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THE CONCEPT OF TYPICAL TRAFFIC

In the context of activities related to airport capacity assessment, the definition of "typical" traffic is particularly important as it establishes the level of demand that an airport system must be able to meet. It is in relation to the current typical traffic that the level of performance of an airport is assessed and in relation to forecast typical traffic that the future dimensioning of the infrastructure must be established.

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As part of its capacity assessment work carried out in support of the Air Transport Directorate, the Airport Safety and Capacity Division undertook work in 2019 to review the methods for determining typical traffic. Many of the current methods based on the analysis of actual traffic handled data have the major disadvantage of giving relevant results only on certain types of airports or for certain types of traffic. These methods thus create a proven risk of under- or overestimation of the typical traffic when the conditions of application and validity of these methods are unknown.

A new methodology based on the analysis of the recurrence of hourly peaks was therefore developed by STAC during the year and implemented at airports such as Nantes and Basel-Mulhouse, where feedback from those involved in the operation of these platforms made it possible to verify the relevance of the typical traffic thus determined. This work is being pursued in partnership with the International Air Transport Association (IATA) with a view to the possible integration of the new methodology into the international standards recommended by this association for the sizing and development of airports.

Study and research

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ANALYSIS OF THE CONFORMITY OF THE NEW DSNA SAFETY ASSESSMENT PROCEDURE WITH REGULATION 2017/373

The new "IR ATM/ANS" Regulation becomes applicable on 2 January 2020 and with it the new provisions for the safety assessment of ATM/ANS systems. These are much more detailed than those of the old regulation, and even more demanding.

Air Navigation Service Providers have therefore had to adapt their procedures and methodologies associated with this new regulatory framework, but also submit them to the supervisory authority for approval, as required by the Regulation.

In 2019, STAC's Air Navigation Division has been strongly requested by CASD/ANA to analyse the procedure in this respect. This expertise has mobilised many resources in terms of document reviews and meetings. If the regulation contains only 4 articles relating to safety assessment, it is more than 80 acceptable means of compliance or guides that had to be analysed in order to compare them with the demonstration of conformity proposed by the DSNA.

TOWARDS NEW TOOLS TO ASSESS RUNWAY WEATHER CONTAMINATION

As part of the continuous assessment of runway surface conditions, and in particular to ease the implementation of the new regulatory system known as “Global Reporting Format” (see dedicated article), the development of robust tools for assessing meteorological contamination on airfield pavements is a major operational challenge for aerodrome operators.

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As part of its mission to support and evaluate innovation, STAC has initiated various actions on this topic. Inparticular, STAC leads the Eurocae WG-109 on the standardization of runway weather information systems. In 2019, it contributed to the group’s work by assessing the performance of manual "tripods" measuring water heights.

STAC is also developing, in partnership with Cerema, a physical model that calculates real-time runway water heights based on available precipitation intensity data. In 2019, an evaluation campaign of this model began at Strasbourg Entzheim airport which follows a first campaign carried out in Lyon Saint-Exupéry.

Finally, in 2019, STAC hosted an ENAC graduate student to analyze existing models that could produce relevant information for other meteorological contaminants (snow, ice, etc.). This work constitutes a valuable documentary scoping for a research project carried out in partnership by Groupe ADP Group, Gustave Eiffel University and STAC.

Standardisation and Regulation

NORMATIVE WORK ON THE LIGHTING AND THE MARKING OF WIND TURBINES

STAC's Visual Aids Subdivision participates in the standardisation work of "PT61400-29", a sub-working group of IEC TC88, in charge of defining specifications for marking and lighting of wind turbines. This work aims at harmonizing the various existing national regulations, compensating for the rather non-prescriptive ICAO normative framework.

The PT61400-29 draft standard includes in particular the definition of infrared specifications for LED lights for wind turbines to enable their compatibility with Night Vision Goggles (NVGs), as well as the definition of means of reducing light pollution. Such means may, for example, consist of aircraft detection systems or systems for regulating the light intensity of lights according to meteorological visibility.

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STANDARDISATION OF AIRPORT LIGHTING

Ludovic LEGRAND of STAC's equipment division has been appointed Chairman of the AFNOR/UF 97 Standardization Commission for a three-year term to replace Mr. Sébastien MIROUZE. He now sits on the IEC (International Electrotechnical Commission) TC97 technical committee in charge of the standardisation of electrical installations for airfield lighting and beaconing.

A working seminar on behalf of this technical committee was organised at the invitation of AENA in Barcelona in October 2019. During these five days of meetings, some thirty experts from 10 different countries were able to discuss many points on the work in progress and future work.

The first part (Generalities) of the new IEC 61820 standard validated during the 2018 seminar in STAC's Toulouse premises was published at the beginning of 2019.

The drafting of the second part on the specifications of serial circuits is in progress. A new version should be proposed to the member countries in 2020 and a publication could be envisaged at the beginning of 2021.

The revision of the other standards concerning electrical installations for airfield lighting and beaconing has been decided. Indeed, their content will now have to provide a framework for the new technologies that have been deployed in recent years in aerodromes without restricting manufacturers in their innovation projects. On this occasion, all these texts will be brought together in a single publication (IEC 61820). This work will facilitate the evolution of the standard as well as its consultation by users.

With this in mind, four new working groups are being set up under the aegis of TC 97 (constant current regulators, series transformers, characteristics of aerodrome lights and secondary safety circuits).

STAC'S PARTICIPATION IN THE FRENCH REGULATORY REVIEW ON AIRCRAFT RESCUE AND FIREFIGHTING AT FRENCH AERODROMES

In 2019, STAC participated in the normative work initiated by the Direction de la Sécurité de l'Aviation Civile to revise French regulations on aircraft rescue and firefighting at French aerodromes. In particular, STAC led the group in charge of proposing changes concerning equipment and the rules for intervention by services, involving representatives of aerodrome operators and administrations. This work, which will continue in 2020, is aimed at renewing national regulations, dating from 2001, particularly for aerodromes not subject to European certification provisions (less than 10,000 passengers/year).

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STAC CERTIFIES ISO 9001 V2015

STAC was certified according to the 2015 version of the ISO 9001 standard at the beginning of March 2019.

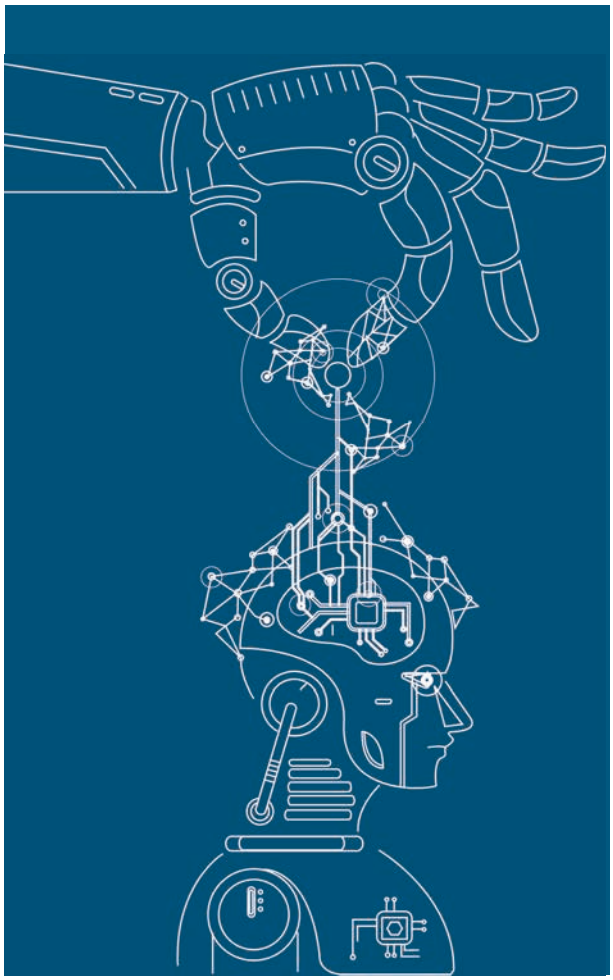
This step was marked by the evolution of the quality management system with a complete overhaul of the documentary structure of the quality system. Thus, the STAC quality manual was structured identically to the ISO 9001 standard and seven existing procedures were merged into this quality manual. This eliminated all redundancy and considerably simplified STAC's QMS documentation, since its pagination has been reduced by about half in total.

At the same time, STAC's testing laboratories have had their accreditations renewed by COFRAC according to the new version (v2017) of the ISO 17025 standard (scopes available on www.cofrac.fr). This mark of COFRAC's confidence in the ability of our laboratories to carry out valuable tests is the result of significant work that has involved the laboratories and has enabled them to homogenise their practices in terms of monitoring the training and qualifications of their agents.

The Laboratoire Essais et Expertise (L2E) of the Chaussées Aéronautiques department, which organizes intercomparison tests according to standard 17043, has also had its accreditation renewed by COFRAC.

Standardisation and Regulation

ARTIFICIAL INTELLIGENCE AND SAFETY



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Artificial Intelligence (AI) is one of the leading technologies of this decade. Algorithms have been known for more than 40 years, but it is only thanks to the significant increase in computing power and the availability of huge amounts of data that they are finding concrete applications.

AI covers different classes of applications. The ones that are the focus of much attention today are based on Machine Learning or neural networks. The innovation is based on the fact that an AI "learns" (almost) by itself to perform complex tasks that cannot be described in detail: recognizing an orange, sounds, etc.

Learning is based on the analysis of millions of pieces of data that allow the AI to imagine what is expected of it, but we then come up against the same shortcomings as human learning: is it sufficient, efficient, unbiased, ethical? These shortcomings lead to significant uncertainty about AI behaviour.

In the field of safety, intolerant to this kind of uncertainty, the use of AI requires us to review our practices and develop appropriate standards. This is the role of the EUROCAE working group WG-114 in cooperation with the RTCA working group G34, in which participate, among others, Airbus, Thales, Frequentis, DFS, ADP as well as STAC.

Work began in the summer of 2019 for a period of 3 years with a view to the certification of UAVs, more autonomous air traffic control systems, etc.

STAC WORK ON ICAO OBSTACLE LIMITATION SURFACES

In 2019, agents of the Aerodrome Safety and Capacity Division remained committed in the working groups overseen by the ICAO Aerodrome Design and Operations Panel (ADOP). For several years, engineers from the division have been involved as members and chairpersons of the Aerodrome Reference Code Task Force (ARCTF) and the Obstacle Limitation Surfaces Task Force (OLSTF), respectively. These two groups have the specific task of revising Chapters 3 and 4 of Annex 14 describing the physical characteristics of aerodromes and the obstacle limitation surfaces (consisting of Obstacle Limitation Surfaces and Obstacle Free Zone, OLS and OFZ).

In 2019, the ARCTF concentrated their efforts on one of the last two remaining tasks: the review of runway strip widths. A small group of ARCTF members, of which STAC is a part, has been working to build a database of over 5,000 lateral runway excursion cases collected worldwide by various authorities. The ARCTF's objective is now to perform a statistical analysis of this database, in order to derive strip widths suitable for the protection of veer-offs. The OLSTF, on the other hand, wishes to bring consistency between the obstacle limitation surfaces of Chapter 4 of Annex 14 and the protection surfaces defined in ICAO document 8168. Indeed, since the clearance surfaces define the volume of air which must remain free of obstacles around runways in order to guarantee the safety of operations and the accessibility of aerodromes, these clearance surfaces must be consistent with the protection surfaces. Overall, the goal is that Annex 14 protects the airspace required for civil aviation operations.

In 2019, at the instigation of the STAC, the OLSTF has almost finalised the description of two of the three families of surfaces that are to replace the current OLS and OFZ, as well as the drafting of its proposal for a new Chapter 4 in Annex 14. The revision of strip widths and obstacle limitation surfaces is under way since the strip perimeter is now used as the starting point for aeronautical clearance surfaces and, through its active participation in both groups, STAC has helped to ensure that the work is done in close coordination between the ARCTF and the OLSTF.

THE STAC HOSTS THE UAF/FA AIRFIELD LIGHTING WG IN TOULOUSE

On 5 and 6 February 2019, the UAF/FA airfield lighting WG chaired by Arnaud GUILLARD met at STAC in Toulouse. For several years, the Equipment Division has been an active member of this WG and close cooperation has been established between airport operators and ourselves. During these exchanges, it appeared necessary, for example, to carry out electrical tests on LED lights. This offer is now available.

In another area, the use of unmanned aircraft system (UAS) for the measurement of PAPI settingis in high demand among airport operators and new experiments are currently underway by the DTI CEVdepartment and Brest airport. These fruitful exchanges also make it possible to draw up or refine regulatory proposals within the various groups and/or commissions of international or national organisations (ICAO, AFNOR, etc.). Also, to date, several working groups including airport operators and STAC staff are drafting and/or fine-tuning guides. The most advanced one should be issued at the end of 2020 by both UAF and STAC and provides the good practices in terms of installation of airport lights. The airport power supply maintenance guide commissioned by DSAC and drafted by STAC will also be fed by exchanges with airport operators. To us, this cooperation and/or partnership is a source of knowledge acquisition and exchange, and it seems that the same applies to UAF members.

Implementation

HELIPORT AUDITS

In 2019, STAC participated in two audits of surveillance of the helipads of the CHU de Meaux and Lariboisière.

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During a heliport audit, focus is set on assessing the compliance of the heliport and its operation with regulatory requirements using factual elements. This process is a condition for obtaining or maintaining the airport safety certificate. Participation in these audits is also necessary to maintain the qualification of heliport auditor and to be granted a heliport surveillance licence.

Participation in these surveillance actions allows STAC to maintain its expertise in the field of heliports.

A NEW TOOL FOR THE PRODUCTION OF NOISE MAPS

IMPACT REPLACES INM

Regulatory noise curves and acoustic impact studies around aerodromes require the use of internationally recognised software or computer tools within the framework of CAEP's work.

Since 2002, noise maps such as PEB (Noise Exposure Plan), PGS (Noise Disturbance Plan) and CSB (Strategic Noise Map) have been produced using the American software INM (Integrated Noise Model) developed by the FAA. In order to replace this software, STAC conducted a comparative study of the two potential replacement candidates: IMPACT (An Integrated Aircraft Noise and Emission Modeling Platform), a European tool developed by Eurocontrol and AEDT (Aviation Environmental Design Tool), an American tool developed by the FAA to replace INM. The results of the study and cooperation between STAC, the DTA and Eurocontrol's IMPACT technical team made it possible to adapt the IMPACT software to the specific needs of the DGAC.

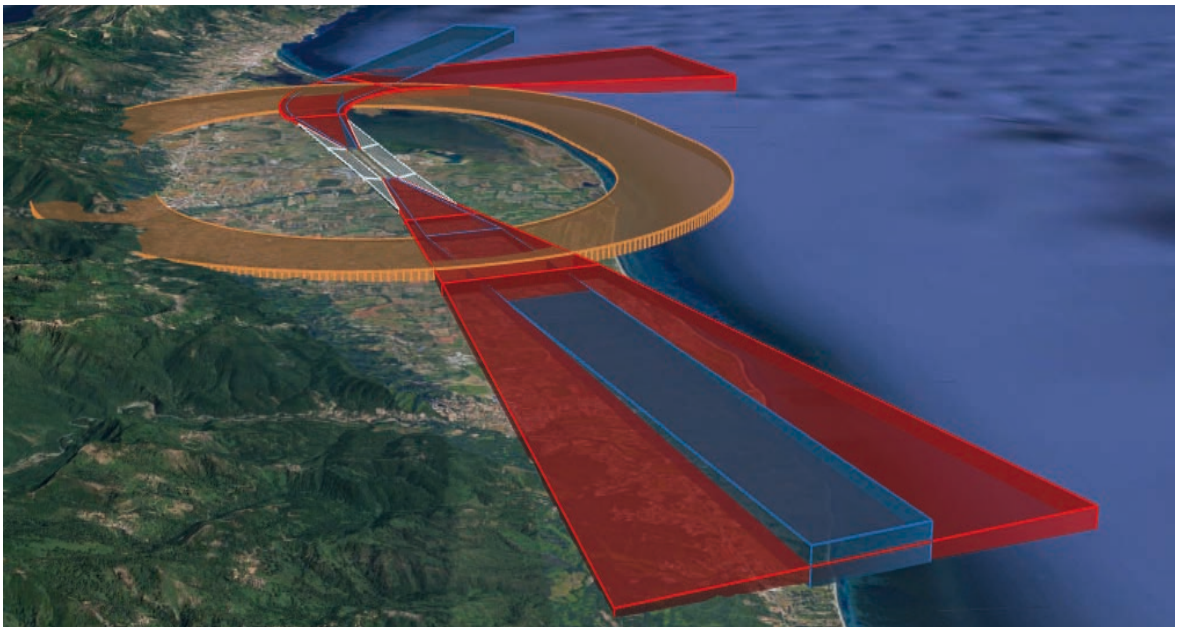
The DTA therefore positioned itself in mid 2019 in favour of the European tool. The latter meets 100% of the international and European recommendations on noise modelling (ECAC Doc 29). The network of DGAC noise modellers (DSAC, DSNA, STAC, SNIA and ADP) was trained on the new tool at ENAC in November and December 2019. IMPACT is also a tool used in the CAEP work carried out by the Modeling Data Base Working Group.

In addition, STAC has developed the OASIS tool (Tool for Input Assistance under Impact Stapes) allowing modellers to prepare IMPACT input data. The new decade starts with a new modelling tool for noise curves, impact studies and balanced approach studies.

NICE-CÔTE-D'AZUR AND NÎMES GARONS PSA

STAC's Airport Safety and Capacity Division is involved in the production of aeronautical easement plans (in French : Plan de Servitudes Aéronautiques or PSA). For this activity, the division works in close collaboration with the Air Transport Directorate and the services representing the the French civil aviation authority at a regional level,in order to establish the key components of the aeronautical easements plans.

After a twelve-year process for the Nice-Côte-d'Azur PSA and a seven-year process for the Nîmes Garons PSA, these two dossiers were respectively approved by French regulatory decrees on June 18th and September 17th 2019.



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NEW VISUALIZATION TOOL TO ASSIST IN THE DRAFTING OF AERONAUTICAL EASEMENT PLANS (PSA)

STAC's Airport Safety and Capacity Division has developed a tool that allows a quick, three-dimensional visualization of the predictable surfaces of a PSA around any aerodrome.

The tool also offers other functionalities such as obstacle clearance calculations and conversions of Lambert 93 and WGS 84 projection systems.

After a development and test phase in 2019, the tool is now used by STAC to help check the content and quality of the technical information gathered for the production of aeronautical easement plans, in the upstream phase of the development. Driven by an open innovation spirit, this tool has also been presented and shared within the network of of French civil aviation authority PSA correspondents.

Implementation

GLOBAL REPORTING FORMAT

ANTICIPATING IMPLEMENTATION TO PREPARE IT BETTER

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Through the Global Reporting Format, ICAO has established a new global system to assess and communicate runway surface conditions to pilots in all weather conditions. This regulation, which will enter into force on November 5th, 2020, significantly modifies the practices of many air transport actors (airports, air traffic control, aeronautical information, airlines and pilots, etc.).

In order to achieve the best possible implementation of this reform, the DGAC has decided to implement it in advance on two voluntary airports – Strasbourg and Colmar – in order to obtain and disseminate a beneficial feedback to all.

STAC actively contributed to this early implementation for winter 2019/2020, assisting the various stake-holders (in particular the aerodromes, the DSAC and the DSNA) at each stage. The Aeronautical Pavements symposium originally scheduled for April 21th, 2020, and postponed, will be an opportunity to share feedbacks learned from this implementation.

PARTICIPATION IN EUROPEAN INTERLABORATORY COMPARISONS FOR FRICTION MEASURING DEVICES

© Mohamed BOUKHELIFI DGAC/STAC

The Laboratory of the Pavement & Friction Department participated in the second European interlaboratory tests campaign dedicated to pavement friction measuring devices, in May 2019.

This event, which was organized by IFSTTAR (now part of the Gustave Eiffel University), represents an important meeting for the international community of friction experts.

The STAC took part in the testing program with two devices, but also presented the progress of on-going works on runway weather information systems (RWIS).

FIRST DEPLOYMENT OF VISUAL MANAGEMENT

In 2019, the laboratory of the Pavement & Friction Department started implementing visual management in its activity fields – a first for the STAC. This collaborative approach consists in building new tools to improve both the intern communication of operational teams and the monitoring of the various activities, in a global objective of continuous improvement of the quality of our services.

In practice, implementing visual management led to the installation of management charts built by all the agents, who now fill them and use them daily.

In the light of the collective commitment to this new approach, an expansion to the Department has been initiated and will continue in 2020.

Implementation

EXPERTISES

POWER PLANT RENOVATION

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With the ageing of power plants, many airports are in the process of renovating or redesigning them.

This is an opportunity for aerodrome operators to replace obsolete equipment and to review the architecture of the electrical distribution system in order to improve the reliability of the power supply for lighting and air navigation equipment.

The Airfield Lighting Energy Subdivision plays a key role in providing expertise to CASD/IR in the study and validation of these complex changes.

In 2019, STAC was thus in the front line for the validation of the new power plants in Marseille-Provence and Lyon-Saint Exupéry.

In 2020, renovations will continue with those in Toulouse-Blagnac, Bordeaux-Mérignac, Cayenne Félix Éboue and Pau Pyrénées.

Monitoring

COOPERATION OF THE FRANCO-SWISS AUTHORITIES IN THE SUPERVISION OF SKYGUIDE

The supervisory authorities of the six FABEC countries (Belgium, France, Germany, Luxembourg, the Netherlands and Switzerland) regularly exchange information on their practices with a view to harmonising and sharing best practices, in particular within the FABEC Change Task Force in which STAC participates as vice-chairman.

In 2019, the Swiss authority took this approach a step further by inviting STAC to participate in the analysis of the new safety study methodology proposed by the main Swiss provider, SkyGuide. These very rich exchanges have already shown their usefulness in the context of the supervision of French providers.

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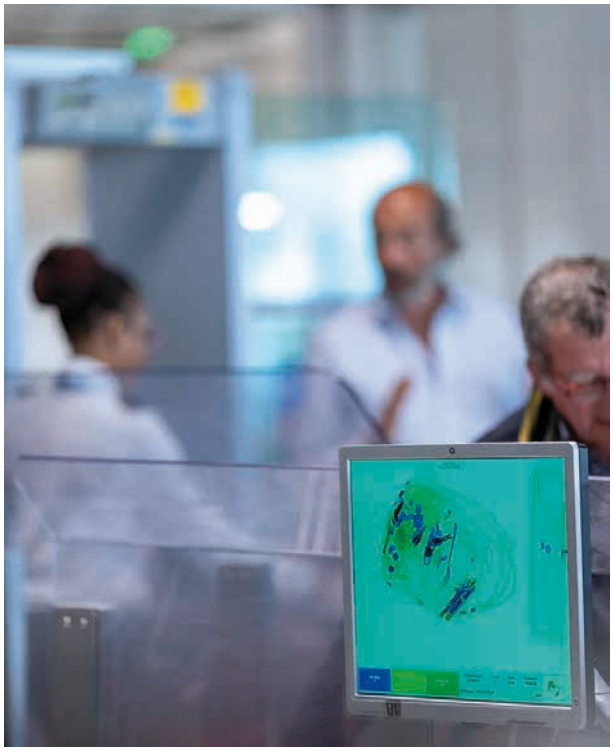
SAFETY

Study and research

IMAGE QUALITY CRITERIA FOR 3D EDS

Standard 3 Automatic Explosive Detection Systems (AES) equipment is becoming widespread as the first level of screening for hold baggage. The absence of image quality criteria for standard 3 and 3.1 EDS led the STAC security division to conduct studies to define qualitative and quantitative criteria to assess the quality of the three-dimensional X-ray images produced by this equipment.

The image quality criteria defined by STAC are directly linked to the EDS alarm resolution protocols in order to optimize and make more robust the analysis of the radioscopic images by the security officers, who are at the heart of this device. These image quality criteria were the subject of a presentation on 20 April 2019 to the test centres participating in the ECAC Common Evaluation Process (CEP), to industrialists and to the European Commission. This first version aroused a lot of interest from the participants and confirmed STAC's willingness to continue this work. Collaborative work has been initiated with the English authorities to continue this work with the aim of arriving at a European standard for the evaluation of the quality of three-dimensional images of explosives detection equipment.



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FIRST MEETING OF THE WORKING GROUP STAC/CYNOS

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Regular exchanges between the cynotechnical companies, the SESA and the STAC have highlighted various problems that can be encountered in the field. The absence of a guide for the use of the dog, outside the "air freight" working environment, as well as the lack of information on certain regulatory subjects, can sometimes lead to disparities in practices between different sites.

This is why, a first meeting of a working group between STAC, SESA and cynotechnical companies was held on May 14, 2019 at the STAC headquarters in Bonneuil-sur-Marne. This meeting made it possible to collect a relevant feedback on how to evaluate cynotechnical teams in the field. The objectives of this working group for the year 2020 are to identify good practices in terms of operating procedures and limits of use, evaluations on operational site, to assess the needs for modification of educational programs, and to identify possible adaptations of evaluation protocols at the STAC test center in Biscarrosse.

SAFE VISION

PROGRAMME 2019 AND UAF MEETING IN BIARRITZ

Since its official launch in April 2018, the second phase of the Security Vision programme has been able to test new and innovative techniques for the screening of passengers and cabin baggage (IFPBC).

© Richard METZGER DGAC/STAC

Roissy-Charles de Gaulle airport has thus hosted a multi-phase trial of C3-standard explosives detection equipment, known as "EDS", used for the screening of cabin baggage. While allowing automatic detection of explosives, C3-standard cabin EDS equipment offers passengers the comfort of keeping their laptops and liquids inside their cabin baggage.

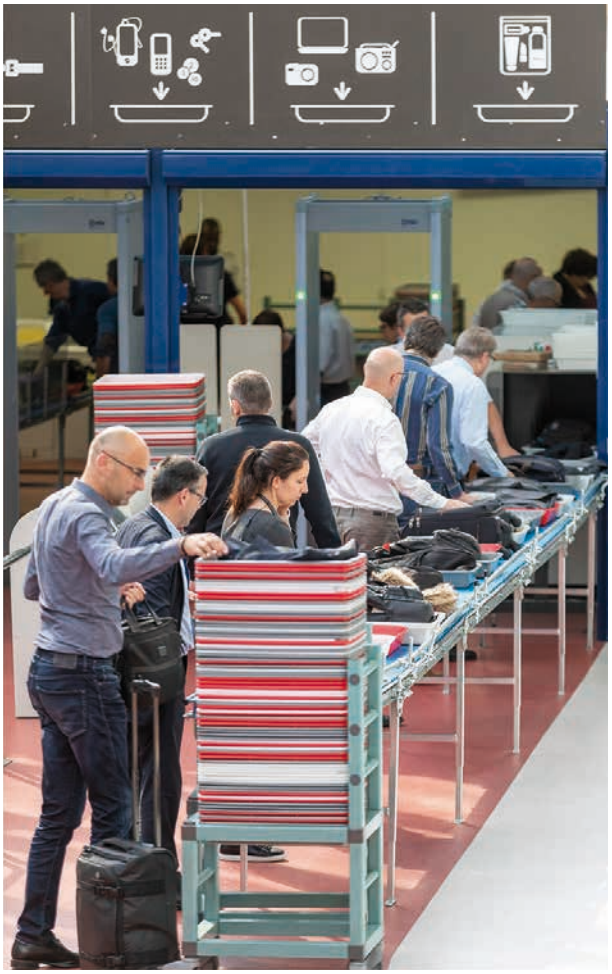
The DGAC intends to test cabin EDS on a panel of airports of various sizes in order to define its national doctrine on the deployment of this equipment. A project to test a C2 cabin EDS is being prepared in Brest and other platforms have announced their intention to test cabin EDS in 2020.

At Orly airport, explosives detection dog experiments on people are continuing in this new phase of the Vision Sûreté programme, aimed at deepening the technical feasibility of this inspection method. In order to prepare the deployment of this method of explosives detection in an operational environment, STAC has led the organisation of simulation exercises in its laboratories with the participation of the competent State services and a security partner company.

While in 2019, Vision Sûreté focused on the screening of passengers and carry-on baggage, 2020 will extend the scope of the experiments to innovative subjects such as facial recognition, perimeter protection or the screening of hold baggage and air cargo.

Study and research

WORK ON THE CYBER THREAT AND ACCESS CONTROLS



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The Security Division's work on the cyber threat focused mainly in 2019 on preparing the performance justification of access control systems for access to the Security Restricted Access Zone (ZSAR) at airport platforms.

This performance justification is based on the recommendations of the French National Agency for the Security of Information Systems (ANSSI) in the area of access controls, but also on the specificities of the access control systems inherent to the new Computerised Traffic and Entitlement Processing System (STITCH).

FRANCO-SPANISH COLLABORATION

In the framework of the European Civil Aviation Conference (ECAC) Common Evaluation Process for Security Equipment (CEP *), STAC is evaluating, at its Biscarrosse site, the technical performance of automatic explosive detection equipment (EDS) for hold and cabin baggage. These evaluations are carried out in a standardised manner and in compliance with the requirements of the ISO 17025 standard.

Tests carried out according to Common Evaluation Protocols (CTMs) established by ECAC Member States provide reliable information on the performance of the equipment with respect to regulatory requirements.

The Biscarrosse Safety Laboratory hosted its Spanish counterparts from the National Institute of Aerospace Technology (INTA) from 14 to 16 October 2019; three days during which STAC staff provided training, both theoretical and practical, in test methodologies for EDS, with a special focus on the conduct of simulator tests.

Indeed, if an EDS has already been evaluated in a laboratory, in one of the 4 European test centres (Germany/ICT-FPTC; Netherlands/TNO; France/STAC; UK/DSTL) and if the manufacturer has not made any critical modifications on the software part, then the equipment can be evaluated according to a new software configuration on simulator using the raw data acquired during the full test.

** CEP : Common Evaluation Process; the ECAC Common Evaluation Process for Security Equipment is the programme of laboratory testing of security equipment against European performance standards established by ECAC Member States to provide a common reference for national administrations to certify/approve security equipment deployed at airports under their responsibility.*

Standardisation and Regulation

NEW CEAC WORKING GROUP

At the beginning of 2019, a new working group entitled "Quality WG" was established by ECAC.

The main objectives of this group are to promote and continuously improve all quality aspects of the tests performed by the test centres participating in the ECAC Joint Assessment Process (JAP) for safety equipment. Taking into account the know-how of STAC's laboratories, accredited according to ISO/IEC 17025 for the testing of explosive trace detectors (ETD) and automatic explosive detectors (EDS) in hold baggage (scopes available on www.cofrac.fr), STAC has been entrusted with the steering of this new group.

To date, two meetings have already been held at the STAC in Bonneuil-sur-Marne, with the active participation of the various European test centres.

VISIT BY A DELEGATION FROM THE CSAC

STAC received on 10 July a delegation, mainly composed of officials from Eastern European countries undergoing training at ECAC, on the technical aspects of safety.

After a full presentation of the activities of STAC's safety division, a detailed visit of the laboratories illustrated the safety equipment tests carried out by STAC, in particular those conducted in the framework of the ECAC common safety equipment assessment process.

VISIT OF THE DOMAIN COMMITTEE

SUSTAINABLE TRANSPORT, SAFETY, INTER-MODALITY AND MOBILITY

Following a working meeting held in Bordeaux the day before, the members of the "Sustainable transport, security, inter-modality and mobility" domain committee went to the STAC on 15 October 2019 at the Biscarrosse site to discover the evaluation activities for security equipment and explosives detection.

On the programme was a visit to the installations and the new explosives detection laboratory where tests can be carried out with home-made explosives, and demonstrations of tests and developments by cynotechnical teams.

Implementation

ROISSY

SGITA STOP ON JANUARY 22ND AT 6PM

As part of the transition from the Computerized Access Document Management System (SGITA) to the Computerized Processing System for Circulation and Entitlement Documents (STITCH), on Tuesday 22 January, all the data from the last site to be deployed (Roissy-Charles de Gaulle) were transferred to the DGAC's IT services department. After having been filtered and put into pivot format, these data could be inserted into STITCH.

Tuesday 22 January 2019 thus marked the official end of the SGITA software which had been deployed in 1999, a few weeks before the Y2K problem, fatal to its predecessor. The SGITA system was then put in a cocoon, the equipment was dismantled and the mass media that had stored this information was securely destroyed.

This also marked the end of the synchronisation of authorisations between SGITA and STITCH, an essential technical device to enable tiling between the two systems by guaranteeing that authorisations created in SGITA can be used to establish Airport Circulation Titles (ACTs) in STITCH and vice versa.

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DEPLOYMENT OF STITCH

After deploying the STITCH software at all provincial and overseas airport sites during 2018, the beginning of 2019 marked the start of the deployment of the Paris sites. Prior to this operation, data retrieval was simulated on test environments. For the real data, everything began on 16 January 2019 with the shutdown of the Le Bourget site, and the extraction of the data in order to be injected by the Information Systems Department (DSI) of the DGAC into the STITCH software. The opening of the STITCH service at Le Bourget was carried out on 21 January 2019. At the same time, the SGITA software for Orly airport was stopped on January 18, 2019 for a STITCH start up on January 23. Finally, this same operation took place at Roissy from January 22 to 28, 2019.

Given the size of these sites, throughout their deployment, a daily progress review was carried out between the ADP services, the STITCH contracting authority, the services of the Information Systems Department, and the STAC. This made it possible to take stock of the actions carried out during the day and to confirm the list of operations planned for the following day while rescheduling, if necessary, the overall timetable for the operation. This work allowed the STITCH start-up on the Parisian sites without any hitch, nor any backtracking, marking the end of the deployment stage of the STITCH project, a project initiated in 2014.

INFO-STITCH

PREPARATION IN PROGRESS OF A "FORUM" TYPE TOOL FOR AIRPORT MANAGERS

To ensure smooth communication with future users of the STITCH software (CASD/DSNA, airport operators, police services, prefectures), the STAC has set up the "Info-Stitch" Internet site, which brings together the main information, documentation and technical elements that may be necessary for sites hosting STITCH.

This will soon be supplemented by a discussion forum aimed at offering site access control managers a space for exchange with STAC to share technical and organisational information on the implementation of performance justification, or on the technical principles to be put in place for the renovation of an access control system.

Monitoring

CONTROL OF THE PERFORMANCE MAINTENANCE OF SECURITY EQUIPMENT INSTALLED IN FRANCE

The Security equipment used for the screening of passengers, staff, baggage and materials contributes to the protection of Security Restricted Areas (SRAs) and their critical parts.

In order to ensure a good level of Security, before being installed in an airport, each piece of equipment is subject to a type assessment by the STAC. This evaluation allows to measure its compliance with the regulations. Threat detection performance and the false alarm rate are mainly evaluated in the laboratory and in operation. Equipment models that meet the level of requirements required by European and French regulations are certified and can then be offered to airports. The list of certified equipment is available on the STAC website at **www.stac.aviation-civile.gouv.fr/fr/surete/certification-equipements.**

In addition to type certification, STAC continues its action by monitoring each piece of equipment installed on all French platforms during its lifetime. Indeed, each machine deployed has an individual certificate and all the equipment on each platform is checked by STAC according to a schedule defined by the central supervisory authority. In the event of failure found during these inspections, the operator may be required to take compensatory operating measures to remedy the situation. Suspension or even revocation of the machine's certificate may also be initiated. These checks ensure that the performance of the main safety barrier constituted by the equipment is maintained.

In 2019, the STAC carried out safety equipment checks on 16 platforms. This represents more than 600 machines inspected and almost 200 days of control on airport sites for the personnel of STAC's Security laboratories.

A NEW GEMASSUR MANAGEMENT TOOL

2019 was the year in which GEMASSUR was commissioned. A new IT tool for the management of the Materiel Management and Safety Systems.

This tool, developed by the Computer Project Assistance Subdivision (API), and the service provider MAMASSAM, for the STAC Security Laboratories, allows to ensure in a computerized way :

- ▶ the processing of requests for type certification of security equipment as well as individual certificates for deployed equipments;
- ▶ the management of the invoicing of services;
- ▶ the management and follow-up of non-conformities of security equipment found during performance maintenance controls at airports;

The GEMASSUR software brings even more reactivity and traceability to the response given to manufacturers by the STAC security division, and to the monitoring of the security equipment deployed in French airports.

BIODIVERSITY AND SUSTAINABLE DEVELOPMENT

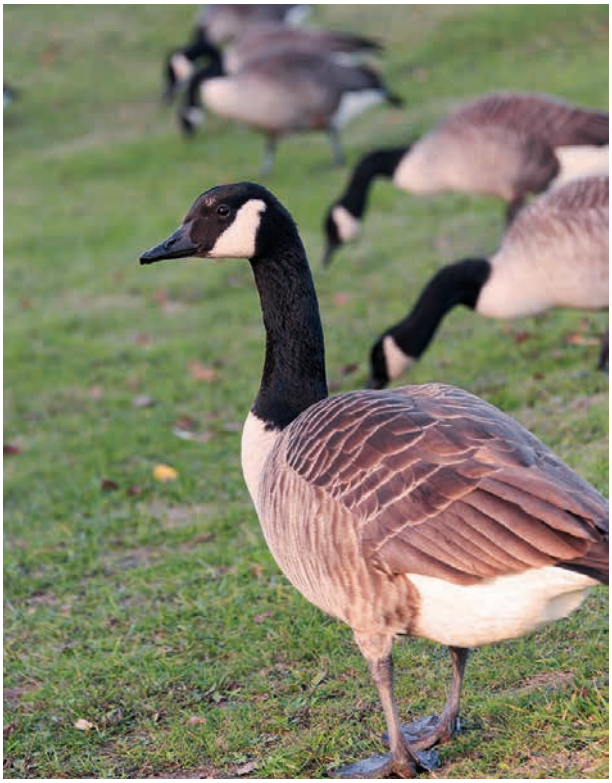
Study and research

IMPROVING KNOWLEDGE FOR BIODIVERSITY AND AVIATION SAFETY

In partnership with DSAC-North, ADP, the National Museum of Natural History (MNHN), and the Interdepartmental Hunters Federation of Île de France (FICIF), STAC launched in 2019 a new study on the tracking by GPS loggers and identification collars of a group of Canada Geese in the vicinity of Paris-Le Bourget and Roissy-Charles de Gaulle airports.

The launch of this study follows the latest animal surveys carried out by STAC at the Paris airports on the emergence of a risk of collisions with animal species such as Canada Geese, whose numbers are increasing significantly in the Ile-de-France region.

This study, carried out over 2 years, will provide useful knowledge on the biology and behaviour of birds. The data collected will also make it possible to characterize the movement of these birds around airports and to more accurately assess the risk of collisions with arriving and departing aircraft.



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A STUDY OFF THE ISLAND OF REUNION (TROMELIN)

TO BETTER UNDERSTAND AND PROMOTE BIODIVERSITY AT AIRPORTS, WHILE PREVENTING AND REDUCING ANIMAL RISK

Following avian collisions that resulted in damage to several aircraft, both civil and military, and the decision to close its runway for an indefinite period of time, DSAC-Indian Ocean and the TAAFs requested STAC's expertise on Tromelin island off the coast of La Réunion.

Tromelin Island, described as an "ocean sanctuary of primitive nature", has a remarkable land and marine biological heritage. The heritage interest of Tromelin's terrestrial ecosystem lies mainly in the fact that the island is home to several large colonies of birds such as the Masked and Red-footed Boobies, as well as a population of Brown Noddy and White Tern.

As these birds have never been subjected to any kind of frightening stimulus, trials were conducted to measure the effectiveness of different means of frightening that could be used on this exceptional site.

The on-site observations and the experiments carried outcontribute to the reflection on the actions that could be implemented in the more or less long term in order to be able to envisage the reopening of the runway while preserving the quality of the island's natural heritage and in particular its bird colonies.

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Study and research

DEVELOPMENT OF A NEW VERSION OF ALIZÉ-AIRFIELD SOFTWARE

STAC and IFSTTAR (now included in the Gustave Eiffel University) have started working on a major update of Alizé-Airfield software used for mechanical design of airfield pavements.

The new version will offer a more ergonomic use of the existing module for designing new flexible pavements, as well as new features to implement the new rational procedure for flexible pavement overlay design (to be published soon). Finally, a free module will allow computing the "PCR" which is the new indicator for airfield pavements' bearing capacity, as required by new ICAO regulations.

This version should be available by 2021.

PARTICIPATION IN THE WORK OF THE UMS-PATRINAT ON THE AERIAL GRID PROJECT

Within the framework of a collaborative work led by the UMS-Patrinat*, STAC contributed to the drafting of an issues and problems note on the green and blue grid and the flying species, by providing its expertise in particular on the parts dealing with issues and measures for managing collisions between aerial wildlife and aircraft.

The objectives of this note are to highlight the specific issues at stake for airborne biodiversity and to warn on the importance of thinking about the implementation of a possible aerial network, which would be complementary to the current green and blue networks.

** Joint Service Unit 2006 Natural Heritage. Scientific body under the supervision of the French Office for Biodiversity (OFB), the National Museum of Natural History (MNHN), and the National Centre for Scientific Research (CNRS).*

AIRFIELD PAVEMENT DIAGNOSIS

A POST-DOCTORAL RESEARCHER SUPPORT FOR THE STUDY OF INTERFACE BONDING BEHAVIOR

In the frame of its current works about airfield pavement structural diagnosis, STAC launched a research program to better understand the bonding behavior of interfaces between bituminous materials, which is of major importance to identify the actual pavement mechanical functioning and impacts all residual life, PCR and overlay design calculations.

This research program involves a sizable experimental work to develop innovative prototypes which enable measuring a core hole deformation due to various mechanical solicitations (rolling wheels, HWD loading) , and the development of sophisticate numerical tools (3D FE method) for data analysis.

This research program was an opportunity to hire a post-doctoral researcher, who supports the airfield pavement and friction department thanks to her expertise developed during her PhD about the pavement interface modelling. First experimental and numerical results are promising and have already been promoted through two scientific papers.

HWD/RAPTOR CROSSED TESTS FOR PAVEMENT BEARING CAPACITY ASSESSMENT

As part of its innovation support assignment, the STAC accepted a partnership with Dynatest and Infralab companies to compare pavement bearing capacity obtained from "Raptor" rolling weight deflectometer deflection measurements with those from the HWD reference device.

An experimental plan was elaborated by the STAC and Infralab, and crossed tests were performed for several road and highway sections in Switzerland. Raw deflections obtained from Raptor and HWD were analyzed and compared, which highlighted the complementary between both devices, that is a high-efficiency device dedicated to network-level assessments and the HWD, required for an accurate analysis for pertinently selected test points.

The results of this valuable experimentation will be promoted in a scientific paper. Furthermore, this international partnership was an opportunity for a STAC-ENAC coop engineer student to enrich his knowledge about pavement testing.

FUEL DUMPING AND ENVIRONMENT

Fuel dumping is an exceptional event that is only carried out in circumstances where flight safety requires an emergency landing when the aircraft weight is above the maximum certificated landing weight.

In order to update the fuel dumping information leaflet, STAC has been working on fuel dumping circumstances and aircraft performance data, including input from ENAC and the OCV.

The new leaflet will be published in 2020 and available free of charge on the STAC website.

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Study and research

CONTRIBUTION TO THE EXPERIMENTATION OF DIFFERENTIATED FLIGHTS AT TOUSSUS-LE-NOBLE

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At Toussus-le-Noble aerodrome, and on an experimental basis for light aircraft (1), from 1 April to 30 September 2019, the silence period applied on Sundays and public holidays and the runway circuit restrictions applied on weekends and public holidays (2) for aircraft other than those based and equipped with silencers shall be replaced by a system of differentiated flight privileges according to the CALIPSO classification (3).

In 2019, STAC installed an additional acoustic measurement point at the existing points, thus contributing to the evaluation of the CALIPSO system tested at Toussus-le-Noble.

On the basis of acoustic and traffic indicators, the results of the experiment will be presented at the beginning of 2020 at a meeting of the Consultative Commission for the Environment of the Toussus-le-Noble aerodrome. The indicators presented have been calculated from measurements taken on site throughout the duration of the experiment.

(1) Aeroplane equipped with one or more piston engines, with a maximum take-off mass less than or equal to 8 618 kg.

(2) Amendments introduced by the Order of 20 March 2019 to Article 1 of the Order of 23 November 1973 laying down the conditions of use of the Toussus-le-Noble aerodrome.

(3) CALIPSO Classification: Classification created by the decree of 11 June 2013 classifying light aircraft according to their noise performance index.

PREVENTING NOISE POLLUTION

ASSESSMENT OF THE CALIPSO 2019 CAMPAIGNS

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As part of its annual activities, the team of the STAC acoustic measurement laboratory located in Toulouse and accredited COFRAC 17025 (for the acquisition of raw acoustic data as the aircraft passes by - scope available on www.cofrac.fr) carries out aircraft noise measurement campaigns, in particular according to the CALIPSO protocol "Classification of Light Aircraft according to their Sound Performance Index".

CALIPSO enables the acoustic classification of light aircraft according to the noise level they produce during runway laps, thus enabling appropriate measures to be taken to reduce the nuisance generated by the repetition of these laps, the main cause of local residents' dissatisfaction.

In 2019, seven measurement campaigns were carried out at the Castelsarrasin-Moissac (82) and Montargis-Vimory (45) aerodromes. It should be noted that this type of measurement must be reproducible, which means that the atmospheric conditions must be stable (no precipitation, no temperature inversion, average wind over 30 seconds less than 10 knots...) and therefore respect very strict conditions in order not to influence the final result.

In 2019, 19 aircraft were measured in this way according to the CALIPSO protocol, but also 3 others, in the framework of the acoustic certification of aircraft under ICAO Annex 16.

The emphasis this year was on measurements at Montargis, an aerodrome close to that of Toussus-le-Noble frequented by light aircraft and where STAC also provided its expertise to the DTA.

Implementation

GREEN AIRPORT

THE ISSUE OF GLYCOL RECYCLING

STAC is investing in a new field of study, that of recycling glycol products used during the winter period to decontaminate and protect aircraft against ice accretion.

In 2019, and in partnership with CEREMA, a bibliographical study detailing, on the one hand, the airports already invested in this approach and, on the other hand, the methods used as well as the possible recovery of the recycled product, was conducted.

This first stage sets the context for glycol recycling, which is implemented on different scales, mainly at foreign airport platforms. The subject deserves to be studied in greater depth in order to study with the French airports how, and in what forms, this could be implemented on the territory.

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PREVENTING NOISE POLLUTION AROUND AIRPORTS

THE PARIS CDG GLOBAL WEIGHTED MEASURED NOISE INDICATOR (IGMP) CONTINUES TO DECLINE

The IGMP, representative of the noise energy emitted by aircraft taking off and landing at Paris-Charles de Gaulle airport, reaches the value of 66.3 in 2018. It continues to fall, with a slight decrease compared to the previous year (-0.7 points), despite a slight increase in the number of movements (+1.1% compared to 2017).

The use of more modern and quieter aircraft is the main factor behind this decline. The specific indicator for the "night" period also continued to decline, reaching its lowest value since 2008 (70.5).

VULCLIM

A TOOL FOR AERODROME OPERATORS TO ANTICIPATE AND BETTER PREPARE FOR CLIMATE CHANGE

© Richard METZGER DGAC/STAC

The STAC, associated with the actors of the scientific and technical network, responded to the order driven by the National Plan for Adaptation to Climate Change (PNACC) through the VULCLIM study.

The STAC, at the request of the DTA, has developed a methodology for assessing the vulnerability of aerodromes, based on risk measurement, by combining both climatic hazards and their potential impacts by 2100. The project and the method have been presented in numerous forums (TRA 2016, ICAO's 2017 green airports seminar, etc.).

In order to make the methodology easily accessible, STAC has developed a "VULCLIM tool" with the help of a representative panel of aerodrome operators. An easy-to-use evaluation tool such as an online questionnaire was thus developed. The tool is available to managers of metropolitan aerodromes via the STAC website.

The vulnerability grid generated by the tool makes it possible to point out the elements of infrastructures, buildings or operations requiring monitoring in the face of the impacts of climate change.

To date, around ten operators have requested access to the questionnaire. In addition, ENAC has integrated the pedagogical use of the tool into the continuous training of TSEEACs.

Implementation

A ROADMAP FOR AIRPORT INFRASTRUCTURES' ASSET MANAGEMENT

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Since the end of 2018, the Airfield Pavements & Friction Department has been leading a working group dedicated to the development of new methods and practices for airport infrastructures' asset management, with the cooperation of the French Airport Engineering National Service (Service national d'ingénierie aéroportuaire – SNIA) and the French Ministry of Armed Forces.

In collaboration with other stakeholders (mainly aerodrome operators and engineering companies), this working group aims at producing reference documents in order to assist platform managers with the optimization of their strategies, as far as their infrastructures' assessment, maintenance and rehabilitation are concerned. Asset management's purpose is simple: to guarantee a level of service adapted to operational needs and safety requirements, while optimizing infrastructures' management cost.

To meet this ambition, a roadmap was created in 2019 to formalize the challenges, objectives and action plans related to: (1) the condition and performance's assessment of existing infrastructures, (2) data collection, saving and visualization (using digital devices in particular) and (3) data analysis and exploitation (via the use of methodologies and "technical" tools that are either already available or still to be developed).

The implementation of the outlined actions continues in 2020, with in particular the consolidation of the methodological corpus already available and the preparation of experiments to develop existing knowledge. The Airfield Pavements symposium, initially scheduled April 22nd, 2020, will also be an opportunity to exchange views with the stakeholders on this important topic for the proper management of airports.

CONSULTANCY IN AIRPORT PLANNING AND DESIGN

A REMARKABLE YEAR

© Isabelle ROSSI DGAC/STAC

STAC has pursued its efforts toward the development of airport planning & design consultancy for government organizations.

As for the notorious project of redeveloping Nantes Atlantique airport, STAC has been actively engaged in the preparation, the realization and the assessment of the public consultation procedure that was led by DGAC under the supervision of two officials from the national commission for public debate (Commission Nationale du Débat Public – CNDP). The team participated to more than thirty public events across the Nantes territory during summer 2019.

STAC also contributed to other significant projects, such as the renewal of public grant for Tahiti Faa'a airport management, the upgrade of Basel-Mulhouse terminal facilities and the evaluation of land-use needs for Melun Villaroche aerodrome.

In order to support the ramping up of consultancy activities, STAC created a dedicated project-management leadership and recruited its manager in 2018, as well as his deputy in 2019.

Dissemination of knowledge

SAFETY INSTRUCTOR TRAINING

The CASD Security Directorate organized a symposium for security instructors on June 13, 2019.

In this context, STAC was asked to present, in partnership with the DTA and CASD, one of the latest innovations in security equipment: explosives detection systems for cabin baggage (EDS CB).

After a presentation of the differences between EDS CB and conventional X-ray imaging devices, particularly in terms of concepts of use, the participants were able to get a video overview of the imaging interface of an EDS CB and understand its specific features, such as the use of 3D or the display of alarms (explosive or masking), as well as the various image processing functionalities.

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PSA OF THE AIRPORT OF BAFOUSSAM-BAMOUGOUM (CAMEROON)

© DGAC/STAC

On February 4th 2019 in Yaounde, France Aviation Civile Services and STAC presented to the Cameroon Civil Aviation Authority (CCAA) the conclusions of a project aiming to develop an aeronautical easement plan (PSA) for the Bafoussam-Bamougoum airport.

At the end of the presentation, Mrs. Paule ASSOUMOU KOKI, Director General of the CCAA, underlined the quality of the project and the good cooperation with STAC, then noted with satisfaction the level of appropriation of its teams on the subject of PSA. The end of the project resulted in the transmission of the complete file of the airport's PSA.

THE 6TH TECHNICAL DAY OF THE STAC

The sixth STAC Technical Day was held on 4 June 2019 at the DGAC headquarters and brought together more than 190 participants.

This day was organized around 4 thematic sessions :

- The session "Security - Capacity" led by Marc HOUALLA, Deputy Managing Director of the ADP Group, Director of Paris-Charles de Gaulle Airport.
- The "Infrastructure and Airfield Lighting" session led by Guy MARGUET, Chairman of the UAF Technical Commission & coordinator of Geneva Airport projects and methods.
- The session " Biodiversity and Sustainable Development " led by Bérengère CAPPA, head of the sustainable development department of Marseille-Provence Airport & president of the UAF & FA sustainable development commission.
- The "Security" session led by Véronique DEPLACE, Deputy Director of Security and Defence (DGAC/DTA).

Presentations covered a wide range of topics such as: cybersecurity, biodiversity, airfield lighting, implementation of the Global Reporting Format (GRF), aeronautical pavements, impacts of climate change, aircraft firefighting, simulations to assess airport capacity.

At the end of each session, a discussion with the audience allowed to answer questions from the audience.

The presentations are available on the STAC website : **www.stac.aviation-civile.gouv.fr**.

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Dissemination of knowledge

STBA EXHIBITION AT THE STAC A FARMAN

After an initial presentation from 20 December 2018 to 8 March 2019 in Bonneuil-sur-Marne, the photographic exhibition "Back in pictures on the Bonneuil-sur-Marne site: from STBA to STAC", retracing the evolution of the civil aviation technical service in the Val-de-Marne, was installed in the hall of the DGAC headquarters in October 2019.

This event made it possible to showcase photographs from 1933 to the present day, including aerial shots, but also visual testimonials of the evolution of the workshops' work.

These 27 photos, spread over five triptychs and completed by a descriptive panel, allowed some to discover the site and its technical specificities (such as the instrumental test board), and others to remember the good times spent on board the dock.

© Alexandre RABETLLAT DGAC/STAC

AIRFIELD PAVEMENTS

PAPERS, CONFERENCES, AND A RGRA SPECIAL ISSUE

The Airfield Pavements and Friction department team devoted special effort to promote his technical and scientific recent works in 2019.

Three technical sessions in international conference were built and (co)chaired: two for the quadrennial World Road Congress, and one for the European Asphalt Technology Association biennial conference. Works were also presented in other international conferences (Airfield and Highway Pavement Conference and Transportation Research Board), and to the annual French pavements technical congress.

Finally a scientific paper was released in a high-rated journal and 7 papers were published in a special issue of the Revue générale des routes et de l'aménagement (RGRA).

GLOBAL REPORTING FORMAT

NUMEROUS AWARENESS-RAISING ACTIVITIES IN FRANCE AND ABROAD

In the context of the implementation of the global regulation known as "Global Reporting Format" before the November 5th 2020 (see article on this subject), STAC has strongly contributed to aware air transportation stakeholders to the practical and technical issues of implementing this new system.

In 2019, the Airfield Pavements & Friction department was involved in four symposiums organized by ICAO in Montreal, Paris, Dakar and Frankfurt, and presented the topic during UAF&FA Infrastructure Working Group meetings, DSAC airports seminar and within the Aviation Transport Commission of the Superior Meteorological Council.

STAC also supported UAF&FA in raising awareness among training and advisory actors, and was involved during the training day of the network of airport security officers.

TROMELIN PHOTO REPORT

© Marc LEMENAGER TAAF

The Audiovisual unit followed an wildlife expertise of STAC, on the island of Tromelin.

Tromelin is a French island, located about 500 km north-west of Reunion Island. Its surface area is 1 square km. This island is currently only accessible at the price of a 24-hour boat trip, as the airstrip is unusable due to the large number of birds.

The Terres Australes et Antarctiques Françaises (French Southern and Antarctic Lands) requested STAC's expertise to test different scaring methods to be able to resume the operation of the airstrip and allow a rotation of personnel on site and more frequent refuelling.

Approximately 100 kg of specific equipment was transported to the site. Cameras, cameras as well as two UAVs and their accessories. General images of the island, the different species of birds and the implementation of the tested solutions were taken. In addition, drones were tested to scare the birds, following defined protocols.

The realization of the mission has long been uncertain. The STAC staff was able to adapt to numerous constraints of time, organization, weather conditions, logistics... Almost the whole program could finally be carried out.

Dissemination of knowledge

PREVENTION OF ANIMAL/BIODIVERSITY RISK

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THREE PUBLICATIONS

▶ Technical guide: Prevention of animal risk, the lethal control of animal species (technical guide STAC, CEREMA, DGALN).

▶ Statistical bulletins: Wildlife strikes 2017

▶ Flyer: Airports and biodiversity, results of the survey "Biodiversity at Airports".

TWO CONTRIBUTIONS TO SCIENTIFIC PUBLICATIONS

▶ Green and Blue Grid and Flying Species (Issues and Problems Note, Nature Data and Expertise Centre. Collectives: STAC, DREAL, UMS, LPO, MTES...).

▶ Interest of individual monitoring for animal risk management: the case of the Little Bustard on the Marseille-Provence airport platform (scientific article for the magazine Faune sauvage, ONCFS, DREAL, STAC, DDTM).

DE-ICING / DE-ICING

The environmental impact of emulsifiers is studied with the support of CEREMA and the University of Lorraine. A scientific article reporting the first results "Chemometrics-Assisted Monitoring in Raman Spectroscopy for the Biodegradation Process of an Aqueous Polyfluoroalkyl Ether from a Fire-Fighting foam in an Environmental Matrix" was published on the mdpi website **https://www.mdpi.com** at the end of 2019.

The first results show that the biodegradation of the fluorine contained in the emulsifiers (tridol S3B in the article) is partial. The classical approach to evaluate this parameter is to be qualified in view of the results brought by the spectroscopic analysis demonstrating the persistence of Carbon-Fluorine bonds.

THE DRONE, A NEW TOOL FOR THE PHOTO LIBRARY

© Richard METZGER DGAC/STAC

STAC regularly updates the DGAC's iconographic collection. To this end, it produces photo and video reports on airports.

Wildlife expertise from the STAC environment division at Calvi-Sainte Catherine airport mobilised the service's photographer-video maker, also a telepilot, in November 2019.

On this occasion, the use of a STAC UAV in the airport right-of-way enabled the capture of exceptional and rare images of the airport.

The active collaboration with the local ANS and the assistance of the local aircraft rescue and firefighting service made it possible to take these shots without inconvenience to the users of the facilities and in complete safety.

Contribution to training

AIRFIELD PAVEMENTS TRAINING ACTIONS

The Airfield Pavements and Friction department has pursued and enhanced its training efforts about airfield pavements design, evaluation and asset management. Several training sessions were renewed in 2019 for the benefit of the Ministry of the Armed Forces, as well as for several engineering schools: ENTPE, ENAC, ESITC or IITBTP.

Two new continuous training sessions have also been elaborated in 2019, to be proposed by the ENAC respectively as of 2020 and 2021.

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TRAINING OF AIR FRANCE SAFETY AUDITORS

At the request of the national airline Air France, the STAC security division provided training on security equipment to Air France security auditors on 2 April 2019.

The aim of this training day was to review the security equipment certified by STAC and the associated concepts of use, the technologies implemented for threat detection, the sharing of best practices on their use and the methods for checking the proper functioning of equipment in an operational environment. The training carried out was a great success and was welcomed by both parties.

A COMPUTERIZED TRAINING ROOM IN BONNEUIL-SUR-MARNE

A room dedicated to computer-based training was installed at the Bonneuil-sur-Marne site in 2019. This permanently available room is characterized by the simplicity of the computer implementation of training courses. It increases the comfort of the agents undergoing training via a space, input peripherals and adapted screens.

The equipment used for the trainer has also been chosen to optimise the training courses. A large screen allowing touch inputs and annotations has been installed. The workstations in this room have been virtualized to allow easy deployment of software in line with the training and their complete reset at the end of the training.

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A NEW VIDEOCONFERENCING SYSTEM AT THE STAC

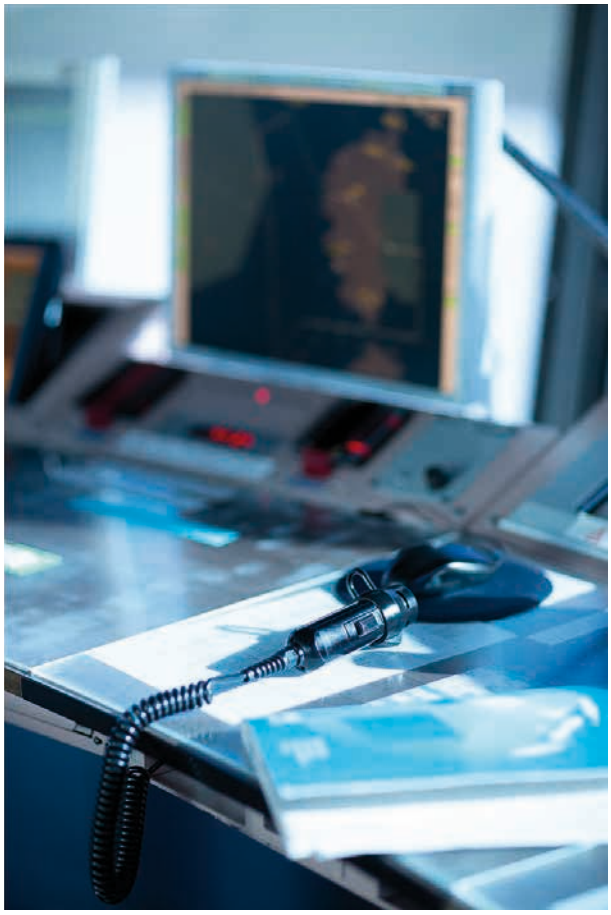
A new videoconferencing system was implemented in 2019 at all three STAC sites, now facilitating communication, exchange and sharing of documents among all staff. The three sites can exchange documents simultaneously via this system in an easy and secure manner. The Bonneuil-sur-Marne and Toulouse sites now have two equipped rooms instead of just one, allowing parallel meetings and limiting booking conflicts.

The new system interfaces with the DGAC's central videoconferencing system, and with the virtual rooms, and diversifies the possibilities of linking up with heterogeneous external systems, in particular office automation clients.

This allows STAC to exchange more easily with its external partners and facilitate participation in working groups.

Contribution to training

ENVIRONMENTAL TRAINING



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In 2019, on behalf of ENAC, the Environment Division provided several training courses.

IN THE FIELD OF AIR QUALITY

▶ 2 air quality training sessions delivered to DGAC agents as part of continuous training.

▶ 1 "Aircraft Emissions" training session delivered as part of the specialized master's degree in "Air Navigation System Engineering and Operations".

IN THE FIELD OF NOISE

▶ 2 training sessions were given to IEEAC engineering students on the INM software.

▶ 3 trainings on noise modelling given to French-speaking African engineering students and to agents taking up positions in DGAC (Airport Technical Position Taking Course).

▶ 2 trainings delivered to noise modellers from DGAC and ADP on the new IMPACT tool.

IN THE FIELD OF BIODIVERSITY AND ANIMAL RISK PREVENTION

▶ 13 training courses were given to air traffic controllers, surveillance inspectors, DGAC officers, and aerodrome operators.

Our facilities

INSTALLATION OF BEEHIVES ON THE BONNEUIL-SUR-MARNE SITE

STAC's management, sensitive to sustainable development, wished to be part of an approach to safeguard biodiversity.

Therefore, after the planting of more than a hundred trees and shrubs on its Bonneuil site, it seemed natural to encourage pollination and therefore to install beehives.

© Alexandre RABETLLAT DGAC/STAC

The STAC joined forces with a beekeeper "les Ruchers Parisiens" and signed a convention. Thus, STAC committed to provide the site and the beekeeper installed 6 hives on April 19, 2019.

At each harvest, the beekeeper returns 15% of the production made on the site to STAC.

Although the first harvest was modest, future harvests will be much better with the arrival of additional hives.

It is certain that the STAC staff will appreciate the honey produced on our site.


dgac
STAC

HUMAN AND FINANCIAL RESOURCES

Staffing and training

WORKFORCE AS AT DECEMBER 31, 2019	
Technical staff	
IPEF	3
IEEAC	23
ITPE	25
IESSA	5
TSEEAC	29
TSDD	17
Contract agents and NINs	10
Defence Technician	1
TOTAL TECHNICAL STAFF	**113**
Administrative staff	
Ancillary	2
Assistants and NINs	2
Assistants	12
Assistants	25
TOTAL ADMINISTRATIVE STAFF	**41**
Worker personnel	
Workers AC	24
Defence Workers	2
TOTAL WORKERS	**26**
GENERAL TOTAL	**180**

TRAINING RECEIVED	Number of days
Management	151
Human resources	12
Preparation for competitions	65
Professional environment	353
Health and safety	108
Public procurement	19
Economics, finance and management	32
Legal techniques	1
IT and office automation	49
Languages	11
FSpecific training for DGAC missions	111
TOTAL NUMBER OF TRAINING DAYS FOLLOWED	**912**
Number of staff trained	
CAT. A	
IPEF	3
IEEAC	20
ITPE	22
IESSA	3
Ancillary	1
Contract Agent	5
CAT. B	
TSEEAC	29
Technicians DD	17
Assistants	10
CAT. C	
Administrative assistants	14
Workers	24
GENERAL TOTAL	**148**

Budget execution

DTA - BOP 614-1	k€
Environmental and security studies	193
Heritage - Aviation pavements	171
Airport access control management system and various security measures	202
Security Vision 2017	40
Laboratory for the detection of liquid and home-made explosives	641
Training	147
Bilingual study	3
IT - Telecommunications	353
Documentation - Dissemination of knowledge	184
Logistics	1160
Staff travel expenses	739
Staff related expenses	40
TOTAL	**3873**

DSAC - BOP 614-2	
Security and environmental studies	48
Aviation pavements	177
Airfield lighting test centres and SSLIA	72
Operation of safety test centres	358
Production of test objects and various safety items	72
Quality - Metrology	63
TOTAL	**790**

SDP - BOP 613	
Occupational accident annuities	43
TOTAL	**43**

DCSID - MILITARY BUDGET BOP 212	
Maintenance of BAN/Auscultation/ PEB shutdown strands	303
Logistics	140
Staff travel expenses	12
TOTAL	**499**

DTA - Civil budget P203 - Nantes Atlantique	884

INCOME	
Income - Certification and surveillance fee	676
ADP (product allocation)	36
TOTAL	**712**

SCIENTIFIC AND INTERNATIONAL ADVISOR	G. ROGER
PROGRAMMES AND PARTNERSHIPS MANAGER	N.
QUALITY AND COMMUNICATION MANAGER	N.
HEALTH AND SAFETY ADVISOR	S. LEMRABET
COMPETENT PERSONS IN RADIATION PROTECTION	C. FUCHÉ

DEPARTMENT

ADMINISTRATIVE

J. MALET
Assistant: S. CHAYLA

Service Life Division
S. CHAYLA

Administrative Transversal Affairs Division
L. BANTCHIK

Personnel Division
M.D. MARCILLAUD

Career Support Unit

Job Management Unit and Competency Development

Competency Centre
A. DUBOURG-MARIE

Procurement Division
L. GAY-NÈGRE

Finance Division
G. SCHIANO di LOMBO

Accounting Subdivision
E. KOBOZO

OLES Revenue Authority
M. THÉVENEL

PLANNING CAPACITY ENVIRONMENT

F. BRANGIER

UAV Project Director
D. JAUVIN

Airport Safety and Capacity Division
J. SENG Adjoint: A. LOPEZ

Environment Division
C. BONARI Adjointe: B. QUENIN

Water, Soil, De-Icing and De-icing Subdivision
G. CASTERAN

Acoustic Studies, Analysis and Modelling Subdivision
D. WEBER

Acoustic Measurements Subdivision
T. CABANNES

Animal Risk Prevention Subdivision
B. MARS

Air Quality Subdivision
S. KERBRAT

ADHESION STRUCTURES

G. BLANCHARD

Project Director
G. GAZON

Structural Safety and Eco-design Group
M. BROUTIN

Program Managers
M. GHARBI
L. TRAVAILLEUR

Runway Adhesion Safety Group
N.

Programme Managers
G. LEHUREAU
H. BILOT
A. DEJEAN DE LA BÂTIE

Testing and Expertise Laboratory
N. Assistant: M. DEWILDE

Operational Units
- Inter-comparaisons
- Functional Adhesion
- Load-bearing capacity/IS

WWW.STAC.AVIATION-CIVILE.GOUV.FR

STAC BONNEUIL | STAC TOULOUSE | STAC BISCARROSSE

ORGANIZATION

Director: F. MÉDIONI — **Deputy Director: S. LEFEBVRE**

TOULOUSE SITE DELEGATION

F. BRANGIER

EQUIPMENT SAFETY

T. MADIKA

Safety Division

B. LAÏMOUCHE — Adjoint: N.

Safety Laboratories

S. MAMMAR

Bonneuil-sur-Marne site laboratories

N. ABAB

Biscarrosse site laboratories

A. SALES — C. FUCHÉ

Studies, Research and Innovation Group

Characterization programs of the Pyrotechnic Threat and Safety

Threat Detection Technology Program

D. DE CARPENTRY

Human Factors Program

M. AÏDONIDIS

Access Control Group

L. FELGINES

Access Control Program

Systems Interoperability, Safety and Security Program

Equipment Division

R. BUFFRY — P. VERGER

Visual Aids Subdivision

V. FOK BOR

Beacon energy subdivision

D. ALLAIN

Aircraft Firefighting Subdivision

L. OSTY

AIR NAVIGATION AND INFORMATION SYSTEMS

S. LY

Information Systems Division

T. FAULCON

Systems Support and Administration Subdivision

N.

IT Project Support Subdivision

N.

Documentation and Knowledge Dissemination Group

C. GROUAS-GUITTET

Air Navigation Division

A. BARKAT

Programme Managers

C. BAZIN DE CAIX

T. JEANSON

P. MOREAU

L. PLATEAUX

L. MORIN

NAVAL AIRFRAME

G. BERCARU

Stop strands workshop

D. GILLET

SUPPORT POLE

G. BERCARU

Resource management subdivision

N.

Administrative unit

Receiving/Storage unit

Maintenance and transport subdivision

D. THOREAU

Maintenance unit

Fleet unit

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Glossary

A

AC
Civil Aviation

ADOP
Aerodrome Design and Operations Panel

ADP
Aéroports de Paris

AEDT
Aviation Environmental Design Tool

AENA
Aeropuertos Españoles y Navegación Aérea

AFNOR
French Standards Agency

AHPC
International Airfield and Highway Pavements Conference

AI
Artificial Intelligence

API
Assistance to IT Projects

ANSD
Air Navigation Services Directorate

ANSSI
National Agency for the Security of Information Systems

ARCTF
Aerodrome Reference Code Task Force

ARFF
Aircraft Rescue and Firefighting Service

ATM/ANS
Air traffic management and air navigation services

B

BOP
Program Operating Budget

C

CASD/ANA
Directorate of Civil Aviation Safety, Technical Directorate of Airports and Air Navigation

CASD
Civil Aviation Safety Directorate

CSB
Noise Strategy Map

CCAA
Cameroon Civil Aviation Authority

CAEP
Committee on Aviation Environmental Protection

CEP
Common Evaluation Process

CEREMA
Centre for Studies and Expertise on Risks, the Environment, Mobility and Development

CHU
University Hospital Centres

COFRAC
French Accreditation Committee

D

DCSID
Directorate General of Armaments

DDTM
Departmental Directorate of Territories and the Sea

DGAC
Directorate General of Civil Aviation

DGALN
Directorate General of Planning, Housing and Nature

DGATA
Direction Générale de l'Armement Techniques Aéronautiques

DREAL
Regional Directorate for the Environment, Planning and Housing

DTA
Air Transport Directorate

DTI
Directorate of Technology and Innovation

E

EASA
European Union Aviation Safety Agency

EATA
European Association for Bitumen Technologies

ECAC
European Civil Aviation Conference

EDS
Explosives Detection System

EDS CB
Explosives Detection System Carry-on Baggage

ENAC
National School of Civil Aviation

ENTPE
National School of State Public Works

ESITC
Higher School of Construction Engineering

ETD
Explosives Trace Detector

EU
European Union

EVS
Enhanced Vision Systems

F

FAA
Federal Aviation administration

FABEC
Functional Airspace Block Europe Central

FICIF
Interdepartmental Federation of Ile de France Hunters

FTR
Information Technical Data Sheets

G

GEMASSUR
Management of Materials and Safety Systems

GEP
Noise Exposure Plan

GPS
Global Positionning system

GRF
Global reporting format

H

HWD
Heavy Weight Deflectometer

I

IATA
International air transport association

ICAO
International Civil aviation Organisation

IEC
International Electrotechnical Commission
IEEAC
Civil Aviation Design and Operations Engineer
IEESA
Electronic Engineer of Aviation Safety Systems
IFSTTAR
French Institute for Transport, Planning and Network Science and Technology
IGMP
Weighted Measured Global Index
IITBTP
Institute of Building and Public Works Engineers
IMPACT
An Integrated Aircraft Noise and Emission Modeling Platform
INTA
National Institute of Aerospace Technology
IPEF
Forest and Water Bridge Engineer
ITPE
State Public Works Engineer

J

JVN
Night Vision Binoculars

L

L2E
Tests and Expertise Laboratory (L2E) of STAC's Aeronautical Roads Department
LED
Light-emitting diode (light-emitting diode)
LPO
League for the Protection of Birds

M

MNHM
National Museum of Natural History
MTES
Ministry of Ecological and Solidarity Transition

N

NACS
National Airport Engineering Service
NCCAP
National Climate Change Adaptation Plan

O

OASIS
Input Tool for Impact Stapes
OCV
Flight Control Organisation
OE
State Worker
OFZ
Obstacle Free Zone
OLS
Obstacle Limitation Surfaces
OLSTF
Obstacle Limitation Task Force
ONCFS
National Hunting and Wildlife Board

P

PCR
Pavement Classification Rating
PED
Portable Electronic Equipment
PSA
Plan of aeronautical easements

R

RCR
Runway Condition Report
RGRA
General Review of Roads and Development
RIN
National Rules of Procedure
RTCA
Radio Technical Commission for Aeronautics
RSA
Regulated Access Security Zone

S

SESA
Airport Security Companies Union (Union of Airport Security Companies)
SDP
Personnel Branch
SGITA
Computerized access ticket management system
SID
Defence Infrastructure Service
SINA
STAC's Information Systems, Air Navigation Department
STAC
Civil Aviation Technical Service
STITCH
Computerised System for the Processing of Circulation and Entitlement Titles

T

TAAF
French Southern and Antarctic Territories
TC
Technical committee
TF
Task Force
TRA
Transport Research Arena Conference
TRB
Transportation Research Board
TSDD
Senior Sustainable Development Technician
TSEEAC
Senior Civil Aviation Engineering and Operations Technician

U

UAF & FA
Union of French and associated French airports
UMS
Joint Service Unit

V

VAWG
Visual Aids Working Group

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