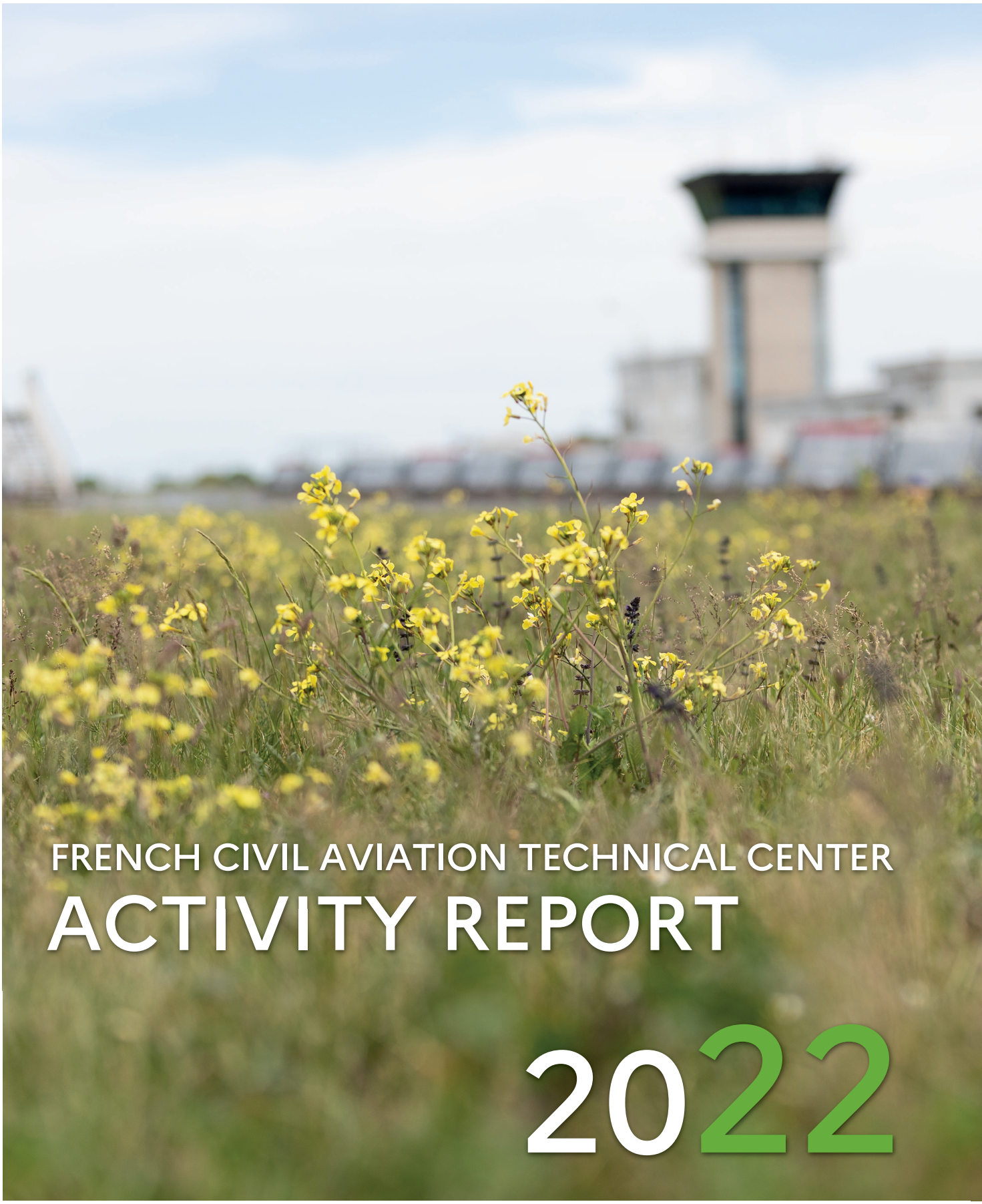
MINISTÈRE
CHARGÉ
DES TRANSPORTS

Liberté
Égalité
Fraternité

dgac direction générale de l'Aviation civile



FRENCH CIVIL AVIATION TECHNICAL CENTER

ACTIVITY REPORT

2022

CONTENTS

2022

OR TIME REGAINED

Sandrine
LEFEBVRE
Acting Director

After just over two years marked by the Covid-19 pandemic, 2022 saw a gradual return to business as usual. We were pleased to be able to meet up again for a number of events.

On 4 October, the Airfield Pavement department organised a symposium on asset management for aeronautical pavements and the ACR-PCR method. Nearly 150 participants, including contracting authorities, service providers and public works companies, came together to raise awareness of the challenges of sustainable asset management.

Recognised for its expertise at both national and international level, the STAC, thanks to its 50 experts, has seen its influence grow, particularly in ICAO bodies. For example, OLSTF was successful with its proposal to amend Annex 14 on aerodromes, the most ambitious proposal since the creation of this reference document. In addition, the chairman of the ADOP panel, Andrew Badham, honoured us with a visit in June. He was able to discover STAC's new experimental test bed dedicated to the study of the integration of recycled materials in aeronautical pavements, in base and wearing courses. STAC's commitment to the ICAO is also illustrated in the environmental field by the work of the new CAEP cycle 13 and the development of the dual Noise/CO2 standard, a key subject if ever there was one.

Working on behalf of all the DGAC directorates, the STAC teams supported the DSNA in the commissioning of the 4-Flight programme. The teams were heavily involved in auditing the safety studies.

The STAC has also developed the APPSA3D tool. This software, created to represent aircraft-helicopter and vertiport clearance surfaces, has enjoyed constant growth. It has won rave reviews from DSAC users and has been requested by our ICAO colleagues. The tool will soon be developed into a web application.

We also took part in acoustic measurements on the manned Volocopter C2X, an electric vertical take-off and landing aircraft (e-VTOL), an innovative and fast-growing subject. This work was carried out jointly with the acoustics laboratories of BruitParif, ONERA and RATP.

In the field of airport equipment, STAC revised and published the technical information note on photovoltaic panels in November. This long-awaited publication takes into account the constraints faced by project developers and proposes solutions to support the development of renewable energies.

With regard to the department's security activities, a number of studies and experiments have been carried out with explosive detection dogs and on equipment, such as the study of an EDSCB's capacity to detect precursors of chemical threats. The security division is working hard to prepare for the 2024 Olympic Games.

Finally, I can't conclude this editorial without mentioning the visit of Clément Beaune, the French Minister for Transport, to our Bonneuil-sur-Marne site at the beginning of January 2023, to mark the end of the first phase of support for the AIT's Propulse programme. This visit marks a first in the history of STAC.

As you will have seen, STAC's expertise is in great demand. I would like to pay tribute to the commitment and professionalism of our teams. Without them, STAC would be nothing.

Enjoy your reading!

Frédéric **MÉDIONI**

Director

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Deputy Director

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Executive Assistant

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Head of Naval Aviation

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Guillaume **ROGER**
Scientific and international advisor

Bérioska **MARCHANT**
Head of Security - Equipment

Julien **SCHMIT**
Head of innovation

Émilie **VIDAL**
Program Manager
and partnerships - Communication

MEMBERS OF THE MANAGEMENT COMMITTEE

* ESSOP: Environment, Systems and Operations Safety, Planning

KEY FACTS

FEBRUARY

February 21th

Launch session of the Propulse support programme & AIT demonstrations by the winners of the Propulse programme, at the Informal Council of European Transport Ministers as part of the FPEU - Le Bourget

MARCH

First acoustic measurement campaigns for the e-VTOL in Pontoise

APRIL

Signing of the "Alizé" research agreement with the Gustave Eiffel University: improvement and development of the Alizé software; reinforcement of flexible airfield pavements and rigid PCR

April 15th

"Accelerating together: Propulse & its ecosystem" - Meetings with AIT partners at the Université Gustave Eiffel - Champs-sur-Marne

April 28th and 29th

Eurocae General Assembly and election of STAC's scientific and international adviser as vice-president of the body

MAY

Cameroon aviation authority trained in animal risk prevention

JUNE

June 15th

ISO 9001 certification for STAC by new certification provider AB CERTIFICATION

June 15th

Visit from Sophie WOLFERMANN, Prefect in charge of safety and security at Paris airports - Bonneuil-sur-Marne site

JULY

Delivery of the new test bed made of recycled materials - Bonneuil-sur-Marne site

SEPTEMBER

Launch of AAP « Call for projects » Propulse II

OCTOBER

October 4th

Symposium on asset management and the ACR/PCR method - Farman, DGAC headquarters

NOVEMBER

Publication of Major Sensitivity Area maps for large birds of prey, with the creation of a new section in the aeronautical information section

November 10th

Publication of revision no. 5 of the Technical Information Note on photovoltaic panels

November 23th

Workshop on the adaptation and resilience of airports to climate change, co-organised by Proavia with the support of STAC and airport platforms - Farman, DGAC headquarters

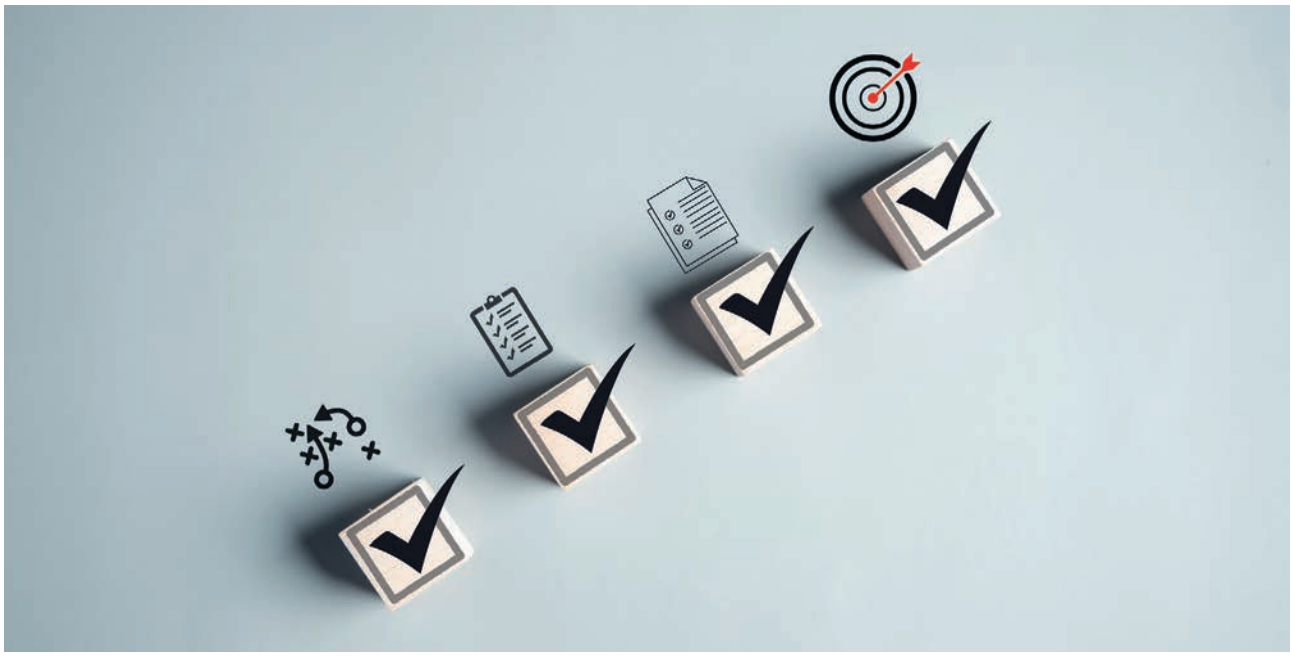
PROGRAMS & PARTNERSHIPS

ENAC AND STAC SEAL THEIR JOINT COMMITMENT TO WORKING TOGETHER WITH A FRAMEWORK AGREEMENT

January 16, 2023 the National School of Civil Aviation (ENAC) and the French Civil Aviation Technical Center (STAC) signed a Framework Agreement at the STAC's premises in Toulouse, formalising a working relationship that began several years ago.

ENAC, under the supervision of the DGAC (MTE) Ministry for Ecological Transition, provides training (bachelor's, master's and doctorate degrees) and conducts research in aeronautical engineering, air navigation and aircraft piloting. The STAC, a national service attached to the DGAC's Air Transport Division, is responsible for airport and aeronautical technical issues throughout France, in metropolitan and overseas territories. For several years now, the higher education establishment and the complex expertise service have been working together on various missions of public interest. This partnership has culminated in the signing of this Research and Innovation Framework Agreement.

The framework agreement provides a governance framework for this new partnership, as well as legal tools to facilitate the setting up of joint bilateral innovation projects and eventually theses or post-docs. The regular meetings that will take place between the two entities will enable them to get to know each other better and thus increase the potential subjects for collaboration.



AWARD

Since 2020, STAC has been involved in the European AWARD (All Weather Autonomous Real logistics operations and Demonstrations) project, which aims to anticipate technical and regulatory developments to facilitate the integration of autonomous vehicles, particularly in airport environments.

As part of this project, STAC is working with France Aviation Civile Services on a forward-looking analysis of the issues associated with the deployment of this new technology on airport platforms.

INNOVATION AGENCY FOR TRANSPORT

AIT BLOWS OUT ITS FIRST CANDLE

STAC welcomes Clément Beaune, Minister for Transport, to close the first edition of the Propulse programme

Inaugurated on November 22, 2021 AIT blew out its first candle at the end of a year rich in achievements and successes.

The start of 2022 was marked by the integration of the Directorate-General for Maritime Affairs, Fisheries and Aquaculture (DGAMPA) into the AIT's activities. A partnership agreement between the AIT and the DGAMPA was signed at the AIT's first Steering Committee meeting on March 21, 2022 by the three Directors General, Damien Cazé (DGAC), Thierry Coquil (DGITM) and Eric Banel (DGAMPA). This agreement brings together the three Directorates General in charge of land, sea and air transport, covering all the modes of transport promoted by the AIT.

AIT has set up the Propulse programme to identify and support the most promising innovative projects, and to encourage and facilitate innovative ideas that will shape the mobility of the future.

Launched in the summer of 2021, the first edition of this programme ended with a visit by the Minister for Transport, Clément Beaune, to the STAC in Bonneuil-sur-Marne on January 13, 2023. The Minister highlighted the work carried out by the teams working with the 20 winning projects.

After the first year of support, the following figures underline the impact of the Propulse acceleration programme:

- 76% of project sponsors were satisfied with the support they received;
- The winners have secured almost €23 million in total fundraising, covering 70% of the financing needs identified by project sponsors for 2022 (estimated at a total of €33m).

This support has taken the form of regulatory assistance, particularly for the winners of the Sustainable Transport call for projects. One example is the EP Tender project, whose technical feasibility and approval have been made possible within a national framework (subject to obtaining funding for industrial production of mass-produced vehicles). Similarly, XSun was able to clarify its regulatory framework for the development of an autonomous solar-powered drone, enabling it to develop a flight-test programme.

The Data Communities PAA saw the signature of a number of data-sharing agreements. These include an agreement between Groupe ADP and SNCF Gares & Connexion to carry out a Light Detection And Ranging (LIDAR) experiment in the terminal 2 station at Paris-Charles de Gaulle airport to improve knowledge of passenger flows on rail-air connections.

Building on this success, a second edition of the Propulse programme has been launched for 2022, with a similar timetable to the first edition. As in the previous year, this second edition comprises four separate calls for projects:

- The "Sustainable Transport" call for projects aims to contribute to the implementation of sustainable and clean mobility solutions.
- The "Data Sharing" call for projects is designed to support the deployment of data sharing solutions within the mobility ecosystem.
- The call for projects "Developing spaces for multiple use: multimodality and intermodality" aims to accelerate efficient intermodality or multimodality solutions for users and regions.
- The aim of the "Intrapreneurship" call for projects is to support government employees and their home departments in improving public services in the transport and mobility sector.

More than 70 applications were received for the four calls for projects. 38 finalists had the opportunity to present their projects to juries made up of qualified and recognised experts from the transport sector, chaired respectively by Barbara Pompili, former Minister for Ecological Transition and MP for the Somme; Florian Maître, Vice-Chairman of the GART in charge of Digital Mobility; Karima Delli, MEP and Chairwoman of the European Parliament's Transport and Tourism Committee, and Carole Desnost, Director of Innovation at the SNCF Group and Chairwoman of CORIFER. 18 of the 38 finalists were selected and announced at the 1st AIT Forum.

The 1st AIT Forum was held on 7 and 8 February 2023 at the Cité des Sciences Convention Centre in Paris. The event brought together more than 2,000 players in transport innovation to take part in the 20 themed round tables and discover the solutions offered by the 80 exhibitors.

All AIT's partners were present for these 2 days, including the Gustave Eiffel University and ENAC, USAIRE, VNF, Autonomy, the OECD and Quebec, which came as part of the Year of Franco-Quebec Innovation. The Forum was also an opportunity for AIT to renew its partnerships with CEREMA and ATEC-ITS France.

As part of the event, the funders' club met for the first time. This club has been set up to direct funding towards innovations in the transport and mobility sector.

Finally, the STAC has continued its work to disseminate a common innovation culture within the DGAC and DGITM departments, notably via several regional seminars (in Bordeaux and Toulouse), aimed at prefiguring a local organisation of players involved in innovation in transport.

QUALITY

EXPERIENCE THE LIFE IN QMS

An interesting party!

The basic definitions for ISO quality management system (QMS) identify an interested party or a stakeholder as a person or organization that can affect, be affected by, or perceive itself to be affected by a decision or activity.

The founding stage in the implementation of a quality management system in the NF EN ISO 9001 standard is the determination of the needs and expectations of interested parties or stakeholders. The 2015 version of the standard uses the term "interested parties", which, according to AFNOR (the French standardisation association), focuses on the customer relationship, whereas in 2022 the term "stakeholder", which can be seen as more inclusive of the ecosystem of the domain looked at, seems to be more widely used. Thus, for standardisation, manufacturers are interested parties and standardisation players such as AFNOR are stakeholders. It should be noted that this distinction between interested parties and stakeholders, which would seem to clarify the nature of expectations, is still being debated within ISO.

Within STAC, stakeholders include our funders such as DTA, DSAC, DCSID, or industrial companies. Among our participants are also STAC staff members. We see that the needs of our agents when they carry out the planned processes of our activities have an influence on the products and services provided by the STAC.

From 2020 to 2022, a continuous effort has been made to develop a quality culture within the STAC, such as systematic customer surveys at key meetings with our interested parties. As for each change, this means striking the right balance between the need for control and the slowdown in operational activity. In that matter, as quality players, our agents have largely contributed to obtaining and maintaining STAC's various certification and accreditations. As a result, during quality management reviews, we talk much more about STAC's activities than about the formalisms of the QMS, these notions being increasingly integrated. This is undoubtedly a sign that our quality management system is maturing. From now on, it should deliver more benefits. These benefits are expected by our certification standards. Among them, is an increased customer satisfaction.

A NEW ISO 9001 CHAPTER WITH AB CERTIFICATION

In 2022, AB Certification became STAC's new ISO 9001 certification provider for three years. The initial audit took place in May 2022 and enabled the auditor to visit STAC's three sites to assess the performance of the quality management processes for the operational players involved in their various activities. The audit concluded that STAC's quality management system allowed our organisation to meet the applicable statutory and regulatory requirements and to comply with all contractual obligations, as well as the objectives set for it on an ongoing basis. This was an opportunity to implement improvement actions that will benefit both the DGAC and STAC's agents.

ISOOTOPIA OR HOW TO FIT 17025 INTO 9001

The STAC operates laboratories to enhance its main areas of expertise in Airport operations: Security, visual aids, noise measurements and Airfield pavements. These laboratories are all accredited by the French Accreditation Committee (COFRAC) in accordance with standard NF EN ISO/IEC 17025 on the requirements for the competence of testing and calibration laboratories.

The purpose of the 17025 accreditation is to increase customer confidence in the ability of laboratories to produce valid results. The COFRAC has added additional requirements to its accreditation framework to ensure a high level of laboratory practice in France. STAC laboratories meet these requirements throughout rigorous practices.

Standard 17025 requires laboratories to put in place a management system to ensure and demonstrate that the requirements of this standard are met and to ensure the quality of laboratory results. In this regard, the STAC has used the quality management system it deploys for ISO 9001.

The management system is therefore identical for all STAC activities and applies to all staff whether or not they are attached to a laboratory.

STAC's quality department, with the support of a dual-education-scheme senior engineer, has set up a network of laboratory quality correspondents to bring out good practices and share them between the laboratories. This approach applies to specific laboratory activities (ISO 17025) such as metrology, but also to non-specific activities (ISO 9001) such as purchasing. In 2022, the service provider evaluation method developed by the laboratories to ensure impartial evaluation of providers was extended to all STAC buyers.

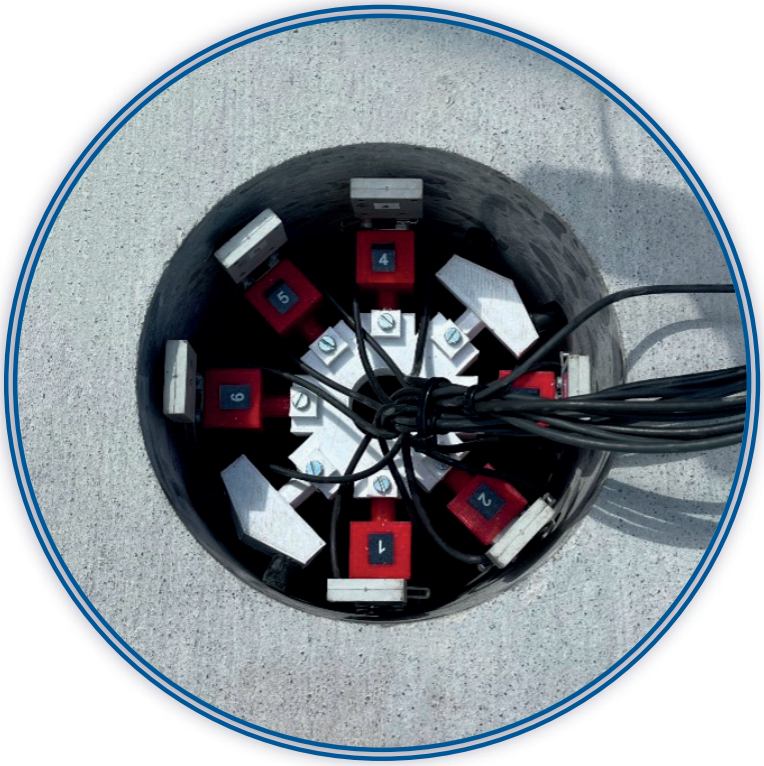
The rigour of the ISO 17025 implementation by the laboratories can thus benefit many ISO 9001 activities to the full STAC.

BACK TO THE FUTURE FOR STANDARDISATION

The STAC is responsible for coordinating standardisation within the DGAC. To this end, it reports the standardisation needs of the DSNA, DTA, DSAC and DGAC Secretariat-General to the network of standardisation coordinators at the Ministry of Ecological Transition. Moreover, it can relay the expectations of the Ministry to these major civil aviation directorates. Since 2022, the French authorities have intended to draw the European Commission's attention to several areas that they consider to be strategic in terms of standardisation. The priority areas identified by the French Aviation authorities, which are already relevant to our service's future activities, are decarbonisation of the industry, autonomous vehicles, Artificial Intelligence and cybersecurity.

BIODIVERSITY & SUSTAINABLE DEVELOPMENT

STUDIES AND RESEARCH



IMPROVEMENT OF THE OVALISATION MEASUREMENT PROTOTYPE

For airfield pavement interface monitoring

Little is yet known about the behaviour of interfaces between pavement layers. Although the layers are supposed to be perfectly bonded when they are designed, numerous studies show that this is a critical element and that an interface defect would lead to premature failure of the structure. It is therefore important to be able to characterise their mechanical behaviour in detail. With this in mind, the STAC has undertaken work on the ovalisation test, originally developed in the 1970s by the LRPC in Saint-Brieuc. It consists of measuring the variation of diameter of a core hole when a load is applied.

Since 2018, STAC has been working on the design and continuous improvement of an ovalisation measurement prototype. In 2022, a new version of the prototype was developed. It can now simultaneously measure the ovalisation of the core hole at two depths, 2 cm apart. In this way, measurements below and above an interface can be taken concurrently, considerably reducing the duration of the test and further improving the quality of the results. This new device has been validated on the STAC's experimental test facility and then used for expert appraisal purposes on the Charles-de-Gaulle platform. Further developments, involving new sensor technology and improved ergonomics, are also under way to make ovalisation measurements even easier.

LOW-COST CAMERA DISTRESS DETECTION

With almost 160 airports (civil and military) in mainland France and the French overseas territories, France's airport infrastructure is one of the largest and most heavily used in Europe. It represents more than 100 million square meters of airport pavement to be maintained.

To manage this type of asset, it is necessary to monitor the pavement condition. To do this, regular investigations must be carried out. The historical method used is the French pavement condition index, recommended by the STAC. In the field, operators manually record the various distresses and calculate on this base a pavement condition score. Based on the data obtained, an estimate of the maintenance work required or to be planned is proposed. This method is very restrictive for managers. For safety reasons, they have to close their runways during the surveys, which can last several days. In addition, the subjectivity of the operators has an impact on the results, which may differ from one operator to another.

Advances in technology, in terms of sensors, acquisition systems, computing and storage, have led to the emergence of new types of equipment for acquiring and processing high-throughput data in real time. Mounted on vehicles, Lidar-type sensors can scan the runway in wide swaths (between 2 and 4 m), with sufficient resolution, at speeds of up to 100 km/h. Although promising, these devices are still expensive. Besides, the data collected in this way cannot be made public. As a result, it is difficult to verify or quantify the accuracy of the results obtained.

With this in mind, STAC, in partnership with Gustave Eiffel University and ADP Group, has developed its own method for detecting and characterizing distresses , based on low-cost industrial optical cameras. Several tests were carried out in order to find the right acquisition tool (industrial camera, webcam, smartphone, etc.), as well as the height that would provide the best compromise between resolution and imaged surface area. Once the method had been defined, several conventional image processing models using filtering were compared with advanced artificial intelligence models. The developed tool was tested under real conditions on the runways of the ADP Group's airports at CDG and Lognes. This data was used both to train the artificial intelligence model and to test it satisfactorily.

In order to continue improving the detection algorithms, the team plans to continue testing airport pavements in the near future, with the aim of improving their accuracy and diversifying the distresses that can be detected, particularly on rigid pavements.

GLOBAL REASONED DIAGNOSIS

Launch of tests at air base 105

In 2021, the Airfield Pavement department launched its Global Reasoned Diagnosis (GRD), with the aim of acquiring feedback on practices in terms of evaluating aeronautical pavements. Numerous tests exist to qualify the condition of pavements, each with its advantages and disadvantages. The only way to obtain a sufficiently reliable diagnosis is to sequence the tests correctly and to carry them out under optimum conditions. The stakes are high, because the diagnostic approach provides the input data that is essential for design, reinforcement or PCN/PCR calculation.

In this context, two air bases have been selected, in conjunction with the French Ministry of the Armed Forces. In 2022, the zero point was carried out at Évreux air base 105, with HWD testing, core sampling and ovalisation testing. Lastly, a cross-test campaign was carried out to characterise the subgrade bearing capacity, combining a dynaplate, a light dynamic plate, a CBR and a dynamic penetrometer. This initial test campaign is paving the way for the creation of a database that will eventually enable the STAC to formulate a series of recommendations in its future technical guides.

INNOVATIVE ACOUSTIC MEASUREMENTS

VTOL and electric aircraft

In March 2022, acoustic measurements of the manned Volocopter C2X, an electric vertical take-off and landing aircraft (e-VTOL), were carried out at Pontoise - Cormeilles-en-Vexin airport (LFPT), near Paris, as part of Choose Paris Région - Re. Invent Air Mobility - an initiative led by Groupe ADP and RATP.

This measurement campaign, a joint effort by the acoustics laboratories of BruitParif, ONERA, RATP and STAC, aims to characterise the sound radiated to the ground by this new type of aircraft under various flight conditions: overflight, hovering, take-off and approach.

Acoustic sensors were installed at ground level on a 300 metre long straight line perpendicular to the direction of flight, on a 10 metre vertical arm and at other critical points.

This acoustic system was supplemented by accelerometers, Meduse dual video-noise sensors (developed by BruitParif), Ambisonic sensors and a weather station.

The e-VTOL was also equipped with a D-GPS system to ensure precise 3D positioning in relation to the microphone arrays.

An analysis of these measurements, giving an overview of the noise radiated by the e-VTOL, will be presented at a later date.

GREEN TRACK MACHINES

In 2019, STAC carried out a survey of runway equipment manufacturers. The main goal was to find out what electric equipment was being offered.

A number of responses were received indicating a wide range of electric and hybrid machines that could replace purely internal combustion engines. This data was used to initiate a study to estimate the reduction in greenhouse gas emissions that could be achieved by converting all existing airport ground support equipment to electric.

This study is underway, and initial results show a potentially significant reduction in CO2 emissions.

QUATSHI

Quantifying winter surface treatments

The aim of the QUATSHI project is to produce near-real-time data on the concentration of de-icing products present on runways. It has been developed with a number of partners, including the University of Lorraine through the LMOPS laboratory (Optical Materials, Photonics and Systems Laboratory), CentraleSupélec and CEREMA.

Following conclusive tests carried out in mid-May 2022 at Paris Charles-de-Gaulle airport with ADP Group teams, development is continuing with the help of SATT SAYENS (Société d'accélération du transfert de technologies), an organisation responsible for promoting public research. SAYENS is providing funding to improve the existing system, followed by a patent application.

The QUATSCHI project has also been selected as part of the 1st "Propulse" support programme run by the French Transport Innovation Agency (AIT). The AIT's financial contribution, combined with that of SAYENS, will enable the system and its ergonomics to be perfected. In addition, the networking offered by the AIT, in particular through participation in forums and conferences, should make it easier to make contact with manufacturers interested in marketing the device.

By optimising the use of de-icing solutions, airport operators can expect to benefit in two ways. Better use of these chemicals will reduce their environmental impact while saving on operating costs. The operational version of the project is scheduled for 2024.

STANDARDISATION AND REGULATION

APU

Experimentation using thermal imaging cameras

The Auxiliary Power Unit (APU) is a small on-board turbine engine, generally located at the rear of the aircraft fuselage. It enables the aircraft to be autonomous on the ground during a stopover. It can supply electricity and air conditioning to the cabin, as well as compressed air to start the main engines. This APU runs on kerosene and, like the aircraft's engines, emits pollutants. These pollutant emissions depend on how long the APU is used. This duration is regulated and controlled at some airports.

Checks are currently carried out by air transport police officers and are costly in terms of human resources. To optimise and automate these checks, the STAC has looked into the use of thermal systems that can detect APU nozzle temperatures. This solution is proving promising. With this in mind, STAC carried out studies in 2022 to select the system best suited to its needs, and equipped itself with thermal imaging cameras. In collaboration with Toulouse-Blagnac airport, STAC is planning a trial in 2023.

CONTRIBUTION TO INTERNATIONAL WORK

ENV staff take part in a number of CAEP and ECAC working groups, particularly in the areas of emissions, noise and climate change.

The year 2022 marks the start of a new three-year cycle 13 for CAEP. The new work programmes of the various CAEP groups, WG3 (Emissions Technical Issues), WG2 (Airports and Operations) and MDG (Modeling Data Base) have been validated and work has begun. These include updating ICAO Doc 9911 on noise modelling, developing a dual noise/CO2 standard, and analysing the vulnerability of air transport to climate change over the last 5 years. The ECAC AIRMOD group is focusing its work, among other things, on developing a methodology for modelling helicopter noise.

The STAC's participation in the WG3 working group is contributing to the development of existing standards for nitrogen oxides (NOx) and non-volatile particulates (nvPM). Questions are being raised about the representativeness of current certification data, based on the Landing/Take-Off (LTO) cycle, which describes aircraft operations around an airport, in the other phases of flight, such as climb, cruise and descent. STAC is also contributing to the development of standards on pollutant and CO2 emissions that will apply to the Overture supersonic business jet developed by Boom.

Through its participation in the WHMEG working group, STAC is contributing to the updating of ICAO documentation on animal risk management. Following the republication of Doc 9137 - Part 3, in 2020, the group is currently working on updating Doc 9332: the manual for IBIS (ICAO Bird strike Information System), ICAO's bird strike database. This guide, which will present best practices for collecting and reporting bird strike data, as well as recommendations for analysing these data, should be finalised by the end of 2023.

INSTALLATION OF PHOTOVOLTAIC PANELS NEAR AIRFIELDS

Revision of the technical information note

Revision No. 4 of the Technical Information Note (TIN) dating from July 2011 and concerning the provisions relating to DGAC opinions on photovoltaic panel (PPV) installation projects near aerodromes required updating in order to take account of the constraints expressed by project developers. This update is also in line with the political will to develop renewable energies and to improve knowledge of glare phenomena for pilots and air traffic controllers.

Revision No. 5 of this TIN, published on 10 November 2022, takes account of these points and simplifies the administrative procedure for handling requests for advice.

It includes 3 "compliance" objectives and 3 "safety" objectives, one of which concerns glare control.

In particular, it abolished the thresholds for acceptable luminance for PPV, and introduced the concepts of discomfort glare (a psychological phenomenon) and incapacity glare (a physiological impairment of visual performance). Discomfort glare is tolerated, whereas incapacitation glare is not acceptable.

This revision makes project developers more accountable in a declaratory mode and offers flexibility in the possibilities for arguing the absence of incapacitating glare (expert testimony, practical assessment, theoretical modelling and/or use of accessories and complementary equipment). This new approach makes it possible to improve the economic viability of projects while increasing the energy yield of PPVs, and should therefore contribute to the development of solar energy around airfields.

A webinar attended by almost 350 participants was organised by the STAC and DSAC/ANA/AER on 2 February 2023 to present the application of this revision to project developers and design offices. This was an opportunity to discuss the general philosophy, the main changes introduced by this new revision and the possibilities for argumentation.

STAC is supporting a number of project developers in implementing these new provisions.

In order to expand Visual Aids team's knowledge of the glare caused by PPVs, a contract for a study will shortly be published. Delivery of the results of this study is targeted for summer 2024.

IMPLEMENTATION

3rd

INTERNATIONAL F/HWD ROUND ROBIN TESTSCAMPAIGN

Between October 17th and 19th 2022, STAC organised its third F/HWD round robin tests campaign at its Bonneuil-sur-Marne site. This campaign had been cancelled in 2020 due to the Covid pandemic. This event was open to users of FWD (Falling Weight Deflectometer) and HWD (Heavy Weight Deflectometer), deflection measurement devices commonly used on road pavements and airport platforms. For users, this initiative represented an opportunity to test and validate the quality of their measurements, as well as to verify the results obtained. For the scientific community, these tests provide an opportunity to collect statistical data on the reproducibility and repeatability of the measurements made using these devices.

Six devices, including two belonging to the STAC, were registered to take part in this round robin tests campaign carried out on the flexible and rigid sections of the instrumented test facility.

The forces delivered by the F/HWDs were first checked using the STAC's precision dynamic weighing system in order to apply the correction coefficients needed to improve the comparison between the devices.

On both pavement types (flexible and rigid), the linearity with respect to stress, the repeatability and the reproducibility of the tests were then verified for different load levels. Finally, the comparative study looked at the interchangeability of the devices, by analysing the dispersions between the devices and those of the test points for the flexible section, and by assessing the condition of the corners and edges of the concrete slab, as well as the quality of the load transfers for the rigid section.

BACK TO THE SYMPOSIUM

Asset management and ACR/PCR method

On October 4th 2022, STAC organised a symposium on Asset Management and the transition to the ACR/PCR method. Nearly 120 participants from the entire aeronautical community (administrations, contracting authorities, prime contractors and major construction and public works companies) gathered at the DGAC headquarters. With the transition from the ACN/PCN method to the ACR/PCR method just two years away, this seminar was eagerly awaited by the entire community. In force since 1983, the ACN/PCN method is the international system developed by the ICAO. It aims at providing information on aeronautical pavements bearing capacity, enabling the admissibility of each aircraft to be assessed on the basis of its load and the strength of the pavement.

Marc BOREL, Director of Air Transport, who came to open the discussions, stressed the importance of good asset management, a subject that is part and parcel of the challenges of sustainable development, and an integral part of the DGAC's major objectives.

Asset management and the ACR/PCR method are two closely related subjects. Good asset management provides reliable input data for applying the ACR/PCR method, which is one of the tools used in asset management.

Various airport operators took the floor to give recommendations on how they manage their assets: operating strategies, shared experience on infrastructure maintenance and upkeep, etc. This feedback is invaluable for adapting to operational needs and meeting safety requirements, while keeping the financial costs of these operations under control.

At the end of the day, the richness of the presentations and the diversity of the exchanges with the community were underlined by Patrick CIPRIANI, Director of Civil Aviation Safety. He stressed the importance of preparing for the transition to the new ACR/PCR method as effectively as possible and without delay, in particular by anticipating the need to carry out reliable and relevant pavement evaluation.

GRASS MANAGEMENT AT AIRPORTS

Wildlife risk management and biodiversity enhancement

As part of the actions undertaken by the DGAC to promote biodiversity at French airports, the STAC has carried out a study of grass management practices on airfields. Through a series of interviews and a literature review, the aim of the study was to draw up a technical guide for airports.

This technical guide, which has been available online since early 2023, looks at the subject from the angle of both wildlife risk management and biodiversity enhancement. Its aim is to encourage the airport community to adopt more environmentally-friendly management practices.

It provides general information on airport grasslands and maintenance procedures, as well as best practices and ideas that have to be adapted locally, as each airport has its own specific characteristics in terms of local flora and fauna. Finally, it provides a general methodology for designing a green space management plan.

MAJOR SENSITIVITY AREAS

New in the Aeronautical Information Publication (AIP)

In 2021, with the dual aim of protecting biodiversity and ensuring safety, the Wildlife Risk Prevention sub-division launched a project in partnership with the Regional Departments for the Environment, Planning and Housing (DREAL) and the Aeronautical Information Service (SIA) to enable pilots to take better account, when preparing their flights, of the Major Sensitivity Areas (MSA) in which certain large raptors, such as the Bearded Vulture, breed.

At the end of 2022, this work led to the creation of a dedicated paragraph in section ENR 5.6 of the AIP, which presents the different sectors of the concerned mountains, and a specific page on the STAC website with detailed maps for each sector. These indicate the active MSAs for a given period and are updated according to a calendar based on the reproduction cycle of the species concerned. A communication campaign has been carried out with aviation federations.

This work will continue in 2023, taking into account feedback from pilots to improve the maps distributed and continuing communication campaigns aimed at airspace users.

CLASSIFICATION OF LIGHT AIRCRAFT BY NOISE PERFORMANCE INDEX (CALIPSO)

6th measurement site operational

Created in 2013, the Acoustic Classification of Light Aircraft by Noise Performance Index (CALIPSO) assigns an A, B, C or D acoustic class to each aircraft according to its noise performance. Class A, the best class, accounts for 30% of the aircraft classified.

The south-east of France, which has been missing for a number of years, now has a new CALIPSO measurement site: Aubenas, in the Ardèche. This site, chosen by the STAC, is not entirely located in the extreme south-east of France, but has a maximum number of positive points compared with the other sites studied. The first campaign is scheduled for early March 2023. Other acoustic measurement campaigns are scheduled for Montargis, Moissac, Montceau-les-Mines, Mauléon and Vesoul.

The ranking of these aircraft is freely available on the CALIPSO web application:
https://calipso.dta.aviation-civile.gouv.fr/application-externe/.

VULCLIM: VULNERABILITY OF AERODROMES TO CLIMATE CHANGE

Updating and promoting the tool

In 2013, as part of the National Plan for Adaptation to Climate Change (PNACC), the STAC developed a methodology for assessing the potential impacts of climate hazards on aerodromes in mainland France by 2100.

In 2019, this methodology led to the creation of the VULCLIM tool. Based on an online questionnaire, this tool establishes a matrix pointing out the vulnerabilities of each part of the airfield to each climate change hazard identified.

In 2022, some of the decision aids in the VULCLIM tool were updated to take account of the new climate projections proposed on the DRIAS website. The Technical Information Note on this subject has also been updated to include a new paragraph dedicated to the tool.

The meetings of French and French-speaking airports organised by the UAF&FA and the "Airport Resilience" seminar organised by PROAVIA were opportunities to gather a large number of actors (aerodromes, Météo France, Eurocontrol, DGAC, etc.), and to communicate widely on the tool and its development.

The VULCLIM tool will continue to be improved, promoted and distributed in 2023.

MONITORING

Noise monitoring systems

As part of its assessment of the noise monitoring and trajectory systems of the major airports under the authority of the ACNUSA, the STAC noise measurement laboratory carried out 3 noise measurement campaigns in 2022 at the Basel-Mulhouse, Beauvais-Tillet and Bordeaux-Mérignac airports.

The aim of these measurements is to compare the levels recorded by the airport's monitoring stations with those of the laboratory, located in the immediate vicinity and for a period of several hours. A technical controller from the laboratory takes the acoustic and meteorological measurements and correlates them with the aircraft flying overhead. A qualitative study of the airport's systems, processes and methodology is also being carried out."

The methodology for these measurements was validated by the ACNUSA as part of the accreditation granted to the STAC to carry out expert assessments of the monitoring systems.

This comparison of measurements also makes it possible to check the noise/aircraft trajectory correlation rate achieved by the airport system.

MEASURE IN THE ENVIRONMENT

A campaign on the island of Réunion

The Direction de la Sécurité de l'Aviation Civile Océan Indien (DSAC-OI) asked the STAC to assess the contribution of air traffic to the noise environment on Réunion Island.

The STAC acoustic measurement laboratory team, comprising 3 technical inspectors and 2 acoustic and meteorological measurement stations, visited the site from 8 to 21 May 2022 to respond to this request.

The measurement campaign took place in three sectors of the island to the west, in Cilaos and in the south, at 7 measurement points. A great number of aircraft present on the island were measured, in particular helicopters.

PIAF

A new avian presence information platform

At the beginning of 2023, the STAC launched a new information tool on the presence of birds in France, dedicated to the main migratory species (https://piaf.stac.aviation-civile.gouv.fr). This work was carried out using data collected and transmitted to the STAC by League for the Protection of Birds, covering the whole of mainland France. The PIAF application allows users to consult information on the presence and migratory movements of the main avian species that are potentially dangerous to aviation safety.

Designed for use by aerodrome managers and their teams in charge of wildlife risk management, PIAF provides access to information based either on a specific species or on the location of an aerodrome. The tool provides a description of the different species, detailed information on the migration corridors used (in time and space), and an assessment of the dangerousness of their passage near French aerodromes.

STAC'S WILDLIFE EXPERTISE

Complementing oversight actions

Each year, the STAC carries out a certain number of wildlife expertises on civil and military airfields. The annual programme is defined on the basis of an analysis of the data available in the PICA database, in conjunction with the Direction de la Sécurité de l'Aviation Civile (DSAC – French Civil Aviation Safety Department) for civil airfields and with the Commandement des Forces Aériennes (Air Force Command) for Air Force and Space Force bases.

STAC's expertises are carried out in two stages:

- An initial preliminary phase in which the data in the PICA database and the documentation provided by the operator are analysed, and the environmental situation of the aerodrome and its surrounding area is studied;
- A second phase in the field during which the airport site and its surrounding area are visited and numerous discussions take place with the agents in charge of wildlife risk prevention.

These assessments result in the production of a report. This provides airport managers with a range of recommendations, and enables the DSAC to assess whether the risk has been taken into account by the operator and to evaluate the relevance of the preventive measures put in place.

SAFETY

STUDIES AND RESEARCH

MEASUREMENT OF LIGHT SOURCES

In the NIR infrared range

Unlike halogen lamps, the LED lights that are widely used have a narrow light spectrum with no infrared (IR) component. Manufacturers are therefore increasingly incorporating an infrared component (IR LEDs) into their aeronautical lights in response to the development of on-board aircraft systems (EVS: enhanced vision system, NVS: night vision system), used for flights in low visibility or darkness.

In preparation of lighting tests in the NIR (near infrared, from 780 nm to around 1,100 nm) range, the Visual Aids laboratory has equipped itself with a spectroradiometer and a radiometer operating in this band.

These devices can be used to measure fixed lights qualitatively (spectral distribution) and quantitatively (released energy) by interfacing with the following existing elements:

- Goniometric table ;
- Software for setting parameters, controlling and acquiring measurements.

The evaluation of IR flashing lights is currently being studied.

These measurements will enable the Visual Aids laboratory to acquire sufficient experience in this area and contribute to the on-going standardization work.

STUDY ON LANGUAGE PROFICIENCY

On the manoeuvring area

Requirement ADR.OPS.B.029 of Regulation (EU) No. 139/2014 stipulates that all personnel holding a licence to drive on the manoeuvring area of European certified aerodromes must demonstrate a satisfactory level of English at least equal to the ICAO operational level. In order to inform its decision regarding compliance with this requirement, the DSAC commissioned the STAC to study assess the safety benefit associated with the English proficiency of drivers on the manoeuvring area.

As part of this study, the STAC first gathered the expertise of aerodrome operators, air navigation service providers and AFIS regarding communications and traffic on the manoeuvring area. It then compared this with an analysis of over a thousand safety occurrences involving vehicles on the manoeuvring area to assess the role of English proficiency as a factor in accidents. This work should enable conclusions on the influence of English language skills on the manoeuvring area on the safety of airport operations. The study will run until the end of 2023.

MODELLING OF OPERATOR TASKS

Acquisition of HAMSTERS software

Planning Division approached the Toulouse Institute for Computer Research (IRIT) to evaluate their software for the modelling and simulation of operator's tasks, called HAMSTERS.

By their very nature, air traffic control systems are socio-technical systems that rely on human performance. The later is particularly affected by the quality of the coupling between the operator and the man-machine interface of these systems, in application of the standard relating to user-centred design. One of the foundations of this standard is the analysis of an operator's tasks which relies on the identification the user's objectives and tasks when using the system. Task models allow analysts to organise the information gathered during the task analysis in an abstract way, and to go into greater detail if necessary. As these models can be voluminous, it is important to provide analysts with IT tools for editing and simulating them.

The acquisition of this software will enable STAC to consolidate its skills in the analysis of human factors, particularly for the evaluation of changes in the air traffic management related systems.

LIGHTING SYSTEMS

New power supply technologies

To ensure optimum safety for take-off and landing procedures in poor visibility conditions (night, fog), all airport lighting systems must be able to deliver uniform and reliable light intensity.

Given the very long cable runs required, in the vast majority of cases the lights are supplied via "series 6.6A" circuits, which are particularly well suited to lights fitted with halogen incandescent lamps.

Thanks to this principle, the electrical intensity of the current flowing through the lighting loop is identical along its entire length and the uniformity of the lighting devices is therefore ensured, whatever the length and load of the circuit.

Since the early 2000s, halogen lights have gradually been replaced by devices equipped with LEDs (Light Emitting Diodes) which, unlike halogen lamps, need to be powered by a direct current.

In order to install this equipment on existing circuits, it is therefore necessary to incorporate electronic devices in each lamp to adapt the historical power supply (6.6 A AC) to the needs of the LED (DC voltage).

These electronic devices represent additional sources of power consumption and limit the life of the lights.

In theory, replacing halogen lights with LED lights should have a considerable impact on the power consumption of a lighting installation.

For equivalent photometric performance, a LED light can consume up to fifteen times less electrical power than an incandescent lamp.

However, when using historical electrical circuits, a very large amount of power is still consumed by:

- Constant current regulators;
- Isolation transformers;
- Long cable lengths (line losses);
- Earth leakage;
- Electronic adaptation devices installed in each traffic light.

Studies are currently being carried out by the STAC's "power and lighting" subdivision to quantify these power losses precisely.

Initial results tend to show that switching to LED technology will, for the time being, deliver power savings around 50%.

At the same time, STAC is working with manufacturers on a technical analysis of new power supply principles better suited to the performance of LED lights, which should eventually lead to a drastic reduction in the power consumption of airport lighting systems.

STANDARDISATION AND REGULATION

VERTIPORTS

The beginnings of regulation

VTOL (Vertical Take-Off and Landing) aircraft is an emerging mode of transport that is contributing to the development of urban air mobility. It could be used for commercial passenger and freight transport or for medical transport at vertiports, the infrastructure dedicated to accommodating these new aircraft.

Under the aegis of EASA, STAC has contributed to the drafting of a set of technical recommendations for vertiport designers, brought together in a document entitled PTS.VPT.DSN, aiming at enabling the large-scale operation of vertiports in an urban environment. The EASA document sets out innovative concepts for the development and operation of vertiports, such as new aeronautical clearance surfaces designed to take full advantage of the performance of these aircraft and facilitate their integration into city centres. The vertiport concept defined by EASA will also be put to the test during the 2024 Olympic and Paralympic Games, with the construction of experimental facilities in Paris and its region.

STUDIES TO REGULATE OPERATIONS

European Regulation (EEC) 95/93 on the allocation of slots provides for two mechanisms to regulate operations in order to offset the risk of saturation of facilities at airports with high traffic demand at various times of the year. At aerodromes where there is insufficient capacity for actual or planned movements, the coordination of schedules forces air carriers to be allocated slots for landing and take-off.

For aerodromes where the risk of congestion is lower, schedule facilitation encourages voluntary cooperation by air carriers around recommended operating schedules. Slots and recommended schedules are allocated on the basis of coordination or facilitation parameters reflecting the aerodrome capacity limits assessed in a prior study. These parameters are set by the State after consultation with aerodrome operators, the air navigation service provider and air carriers using the aerodrome, meeting in executive committees (COMEX).

In support of the Airport Capacity Office of the Airports Sub-Directorate, the STAC studied the capacity constraints at Figari and Cannes airports in 2022 as part of the regulation of their operations. These airports are characterised by highly seasonal traffic and complex and unusual capacity constraints.

Figari airport is subject to extremely concentrated traffic demand during weekends in July and August, which has to be reconciled with its limited facilities, particularly in the terminal and on the commercial aircraft parking area.

Cannes airport is unique in that it handles only general aviation traffic, some of which is flown under instrument flight rules and some under visual flight rules, with these two traffic components having very different performance and air traffic constraints. Using fast-time simulations and statistical analyses of traffic data, the STAC has provided decision-support elements that have informed discussions on demand regulation parameters at these airports' COMEXs.

STANDARDS ON OBSTACLE LIMITATION SURFACES AND GROUND HANDLING

In February 2022, the Aerodrome Design and Operations Panel approved the revision and creation of provisions relating to obstacle limitation surfaces and ground handling, to which STAC actively contributed.

In March 2023, the Air Navigation Commission also approved the proposed changes.

At the end of April, the ICAO secretariat sent a State Letter to the main civil aviation authorities and organisations, asking their opinions and giving them six months to formulate them.

PROTECTION OF WORKERS WORKING ON LIGHTING SYSTEMS

Given the technical particularities of lighting circuits, linked to the priority of operation of the systems, it seemed appropriate to introduce specific regulations to ensure the worker's protection. Over the last few years, the Ministry of Labour, the UAF (French Airports Union) and the audit firms have been working together to draw up a substantial dossier.

To date, the guide on the maintenance of power supply and airfield lighting facilities at aerodromes published by STAC (version 2022) includes a new chapter on worker's protection, defining the safety rules to be applied when working on lighting circuits. A new electrical qualification has also been created for specific work requiring appropriate training.

At the same time, work with the Ministry of Labour has led to the finalisation of legal texts that will subsequently comply with the Labour Code. These texts concern:

- A draft decree
- A draft design order

These texts, which have passed through the various departments concerned several times, are now in the process of being signed and should then be presented to the various committees and submitted to the Council of State.

IMPLEMENTATION

CHOICE OF FOAM

In 2022, the STAC listed the emulsifiers used by the ARFF services of French airports.

The range of products on offer has evolved significantly in recent years, with the characteristics and performance of new formulas or product ranges differing from those of previous emulsifiers.

The STAC has therefore initiated the drafting of a Guide to the selection of emulsifiers for airport operators, due for publication in the second half of 2023, to help them choose an emulsifier that meets the expected fire-fighting and environmental protection performances.

MONITORING

ACTIVITY MONITORING

Airport infrastructure

The STAC continues to support the DSAC in its surveillance of power and lighting infrastructures at airports.

To this end, the "power and lighting" subdivision carries out assessments that form part of the auditing processes carried out by the supervisory authority's inspectors.

In 2022, the staff of the "power and lighting" subdivision intervened at the request of DSAC's regional offices at the Clermont Ferrand, Le Bourget, Metz Nancy Lorraine, Roissy CDG, Rodez, Montpellier and Marseille airports.

Eight other expert assessments are planned for 2023, and an increase in capacity is envisaged for subsequent years.

ACQUISITION OF A NEW IMAG

Measuring skid resistance on aeronautical pavements using self-wetting continuous friction measurement equipment is one of the main specialities of STAC's Laboratoire Essais et Expertises (L2E), based at Bonneuil sur Marne.

These tests are carried out either as part of the organisation of inter-laboratory comparisons with a view to the approval of equipment, or in the service of the research and development projects of the STAC, the infrastructure managers of the Ministry of Defense and other services of the DGAC including the national authority for the surveillance and certification of aerodromes (DSAC). The equipment used is mainly of the IMAG (Instrument Automatique de Mesure de l'Adhérence) type, designed by a partnership between the Service Technique des Bases Aériennes (STBA, formerly the STAC) and the ADP Group.

This equipment offers robust and reliable skid resistance measurement methods and uncertainty levels, and is periodically assessed for EN ISO/CEI 17025 and EN ISO/CEI 17043 standards by the French Accreditation Committee (COFRAC). These assessments guarantee the quality of the test results supplied to clients and other customers.

In 2022, the laboratory took advantage of the renewal of ageing equipment to provide IMAG with new functionalities offered by new technologies. These changes were eagerly awaited by the expert staff in charge of testing.

The two main features of the new device, which was delivered at the end of 2022, are real-time geolocation, so that the value of the measurement and the coordinates of the point measured can be provided on the same file line, and a system for managing the triggering and flow ofwater ejected by the nozzles onto the road during functional skid resistance measurements.

STAC INVOLVED IN THE FIRST COMMISSIONINGS

From 4–Flight to Reims and Aix

Launched in 2009, the 4-Flight programme, which aims to replace all the DSNA's En Route systems, saw its first operational commissioning in 2022, at the Reims and Aix sites. This is a change on a scale not seen for decades, representing both a technological and operational breakthrough, with the introduction of 4D flight modelling, new alert systems and the disappearance of strips of control positions. The safety challenges for its initial commissioning were commensurate with the scale of the change: major!

DSAC examined the safety activities carried out by DSNA on this subject, and called in the EDS auditors from STAC's Safety-Performance-Planning division. They began to validate the overall safety approach. As DSNA had broken down the safety activity into autonomous tasks carried out by different entities, it was necessary to ensure the consistency of the overall process and its effective implementation, in particular by checking the processing of inputs and outputs at each level of the safety activity. The auditors then looked at the results of this approach: the risks generated by the introduction of 4-Flight were broken down into several categories, according to their nature. For each category, extensive verification activities were carried out, focusing on the aspects of greatest importance to safety.

In terms of the risk of internal malfunctions in the new system, aspects relating to network infrastructure, software assurance and the behaviour of critical functions were particularly targeted. Similarly, a special analysis was devoted to the problems of integrating the new 4-Flight component into a much older, static Cautra system. Finally, a great deal of attention was paid to the operational use of 4-Flight, and to the acceptability of the trade-offs between needs and solutions put in place by the DSNA.

In all, the STAC's EDS auditors will have devoted almost half of their time over 6 months to providing the DSAC with the necessary support. This work will have enabled the supervisory authority to approve the safety arguments developed by the DSNA. The 4-Flight revolution is now underway!

ACQUISITION OF A NEW IMAG

Certification of lighting systems

As part of its certification of aeronautical lighting equipment, the Visual Aids laboratory assessed 50 lighting functions, broken down as follows:

- 32 functions from airport lighting systems,
- 15 functions from obstacle lights,
- 3 functions from helistation lighting.

These assessments resulted in 30 test reports and 45 certificates of conformity/approvals. The lists of certified/approved lights and signs are available on the STAC website under the heading "Aerodrome safety", section "Visual aids/Certification".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SECURITY

STUDIES AND RESEARCH

SYNTHESIS OF A LIQUID EXPLOSIVE SIMULANT

For EDS certification

The CTM (Common Testing Methology) for EDSHB (Explosives Detection Systems for Hold Baggage) standard 3.2 and EDSCB standard C3 require the detection of explosives in a liquid state, including home-made explosives (HME).

Among them, two threats, T11.1 and T12.1, have very high shock sensitivities, one of which (T12.1) is so sensitive that it presents an almost immediate risk of detonation if dropped slightly.

In these conditions, the synthesis or manipulation of these threats could not be envisaged without risk, so a study was carried out by the Laboratoire National d'Explosif (LNE) in Biscarrosse to find viable alternatives.

The aim of this study is to develop an explosive simulant in the liquid state whose characteristics are close to or even identical to those of the T12.1 liquid threat.

By iterating the addition of products, the compositions are analysed by a tomograph-type LEDS (Liquids Explosives Detection System) which provides the intrinsic radioscopic characteristics of the material, equivalent to an EDS, i.e. density and Zeff (effective atomic number).

After a number of tests and measurements, we were able to produce a safe product with characteristics equivalent to the threat under consideration.

The simulant proposed by STAC Biscarrosse has the advantage of being easily formulated and can be stored at room temperature. Besides, it is stable for up to 7 days (vacuum stability study) and can be safely destroyed.

However, the formulation settles rapidly, leading to solidification of the lower phase. To overcome this problem, LCEP will develop a means of reducing the size of the droplets suspended in the majority phase, via improved shearing, in order to obtain a simulant with fluoroscopic characteristics as close as possible to those of the T12.1 threat.

CONTINUING WORK ON THE CHEMICAL THREAT

The year 2021 marked a turning point for the STAC Security Division, with the relaunch of work on the chemical threat, and in particular on the dispersion of gases in aircraft cabins. In 2022, the International Methods and Actions (MAI) subdivision continued to work on this type of threat.

Efforts have focused in particular on the detection of chemical threat precursors by security equipment. This ambition, set out in the previous 2021 activity report, was the subject of studies in 2022. Security equipment, which everyone is confronted with when using an airport, is one of the essential links in the security system. Knowing about them, improving them and helping the manufacturers who market them to develop them is therefore a major challenge for STAC.

For the first time in France, the ability of an EDSCB (Explosive Detection System for Cabin Baggage) to detect precursors of chemical threats has been evaluated. It is now possible to use this equipment to detect much more than just explosives, including precursors of chemical threats. To do this, X-rays, which provide access to certain properties of matter, and specialised algorithms work together to provide information automatically. In short, these are new-generation X-ray scanners, whose capabilities and limitations STAC is keen to understand.

To achieve this, the STAC security division launched a Call for Expressions of Interest (AMI) from manufacturers offering this type of solution. An initial EDSCB was selected for testing at Biscarrosse, in close cooperation with the Laboratoire Certification et Évaluation Pyrotechniques (LCEP). The STAC now has more extensive knowledge of this new use of EDSCBs, and is now continuing this work in order to provide as exhaustive a picture as possible of the capabilities and possible developments of the various types of equipment on the market.

EVALUATION OF THREAT DETECTION EQUIPMENT ON SHOES "SHOESCANNER"

Carrying out a pilot test for the recognition of a common ECAC protocol

A type of equipment evaluated and certified by the STAC since 2016 for French territory as an additional means of screening, shoescanner threat detectors have not yet been evaluated at ECAC level within the framework of the CEPMG (Common Evaluation Process Management Group).

In order to establish recognition of the detection and false alarm performance of this type of equipment in relation to European standards, a common evaluation protocol needs to be validated by the Member States. To this end, carrying out a pilot test is a major step in the validation process, consisting of running the entire test protocol in the laboratory to validate its feasibility and reproducibility in other test centres.

In this respect, the STAC has positioned itself in 2022 as a pilot test centre for the detection of metallic threats using a shoescanner. The results shared by the ad hoc working group have enabled the joint European evaluation project to be set up, pending the pilot test on explosive threats in 2023.

ACQUISITION OF OTS

Airport security depends in part on the vigilance of airport security officers (ASOs), who check and screen passengers and their baggage before boarding. In order to maintain the vigilance of the ASOs with regard to the threats they have to detect, the State services carry out impromptu tests by slipping STOs (Security Test Object) into cabin baggage.

These STO simulate real threats and appear as such when passing through the various security devices. They must be renewed periodically so that they are not systematically recognised by the AOSs.

In 2022, STAC was therefore asked to draw up specifications for around fifteen new objects and to issue a call for tenders.

In cooperation with the DSAC, the validation of the types of objects, their descriptions and technical characteristics have been defined by the experts of the security division in order to provide several hundred copies of STOs to the State services during the year 2023.

STANDARDISATION AND REGULATION

EDSCB DEPLOYMENT POLICY IN FRANCE

Participation in a benchmark of EDSCB cabin baggage screening facilities in Europe

With the aim of defining and supporting an appropriate policy for the deployment of EDSCBs in French airports, the DGAC wanted to carry out an international survey in 2022 of platforms equipped with a cabin baggage screening line using this type of equipment. These new-generation tools promise great technological advances for security, but may also have certain drawbacks that need to be understood and measured before encouraging a change adapted to all types of airports in France, from the smallest to the largest.

To this end, the STAC has gathered invaluable information from operations at London-Heathrow, Geneva-Cointrin and Amsterdam-Schiphol airports, supplementing the DGAC's view of other airports. Over and above security, this data highlights robust systems that can still be improved, greatly enhancing passenger comfort, but whose design and implementation are sometimes a technical or financial feat given the highly constrained environments of airports.

PARTICIPATION IN WORKING GROUPS

ECAC "European Civil Aviation Conference"

The STAC is one of the six ECAC Test Centres. Within this framework, it participates in certain security equipment evaluations that are part of the ECAC's common process, the CEP MG (Common Evaluation Process Management Group). This programme, set up in 2009, provides a common reference for national authorities, in line with ECAC/EU standards, for the evaluation of a number of pieces of equipment such as ETDs (Explosive Trace Detectors), EDSs (Explosive Detection Systems), WTMDs (Walk Through Metal Detectors), SED-SMDs (Shoe Explosive/Metal Detection Systems), and so on. ECAC member states can then recognise these assessments as part of their national certification or refer to them. The CEP MG meets quarterly, with representatives from the STAC and the DTA/SRD2, to plan equipment assessments, rotate between ECAC test centres, and discuss political and technical issues in airport security.

Directly attached to the CEP MG, the Quality Control Study Group (QC SG) was created in 2019 to support the quality part of the joint process. STAC has steered the group for 3 years. Starting from a common working base, the group recently proposed a guide to help draft a quality plan for CEAC test centres (existing or new).

The TTF (Technical Task Force) also works in close cooperation with the CEP MG, on all the technical subjects that the various working groups (WG) placed under the responsibility of the TTF can deal with (generally one WG per equipment).

The STAC's Security Division also participates in these various groups, and a number of subjects were of particular interest to its staff in 2022: the use of new equipment to deal with the chemical threat, the proposal of standards at European level (list of threats and expected detection rate) for APIDS, automatic detection software for prohibited articles, and the SED-SMD pilot test.

The STAC therefore organises pilot or exploratory tests, to build up its expertise or test new methodologies that France can then promote to European groups.

Finally, the STAC is represented on the EDD SG (Explosive Detection Dogs Study Group), a working group bringing together some fifteen Member States.

MONITORING

CERTIFICATION ACTIVITY

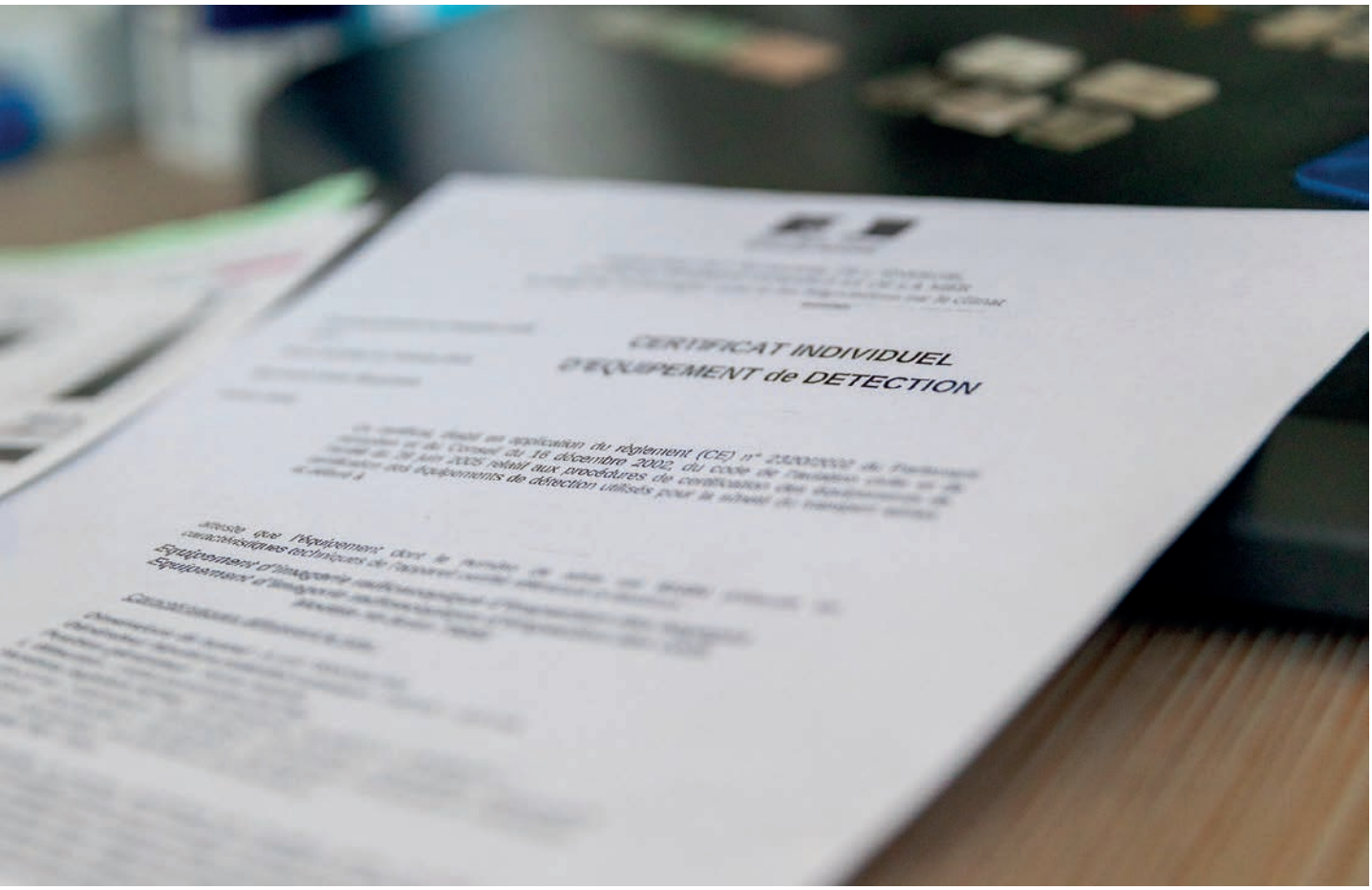
Type certification activity report - LRES lab

As part of its initial surveillance activities (type certification of security equipment), the Bonneuil-sur-Marne security laboratory carried out type certifications in 2022 for equipment to be deployed at airports and freight companies.

Each type of certified equipment is issued with an individual certificate and deployed throughout France. All this equipment is checked by the STAC according to a schedule defined by the central supervisory authority (DSAC).

Certification itself can either be based on an analysis of a file submitted by the manufacturer, or via a series of tests carried out by the STAC security teams, depending on the equipment in question and the complexity of the change.

The number of equipment type-certified in 2022 and subject to fees under the Order of 25 February 2013 was 26, a slight increase on the previous year. This marks a return to a standard level of activity in this area, following the COVID crisis.



CERTIFICATION ACTIVITY

Explosive detection dogs

In 2022, the Laboratoire Certification et Evaluation Pyrotechniques (LCEP) in Biscarrosse continued to certify Explosive Detection Dogs (EDD) used by private airport security companies.

A total of 483 EDD certification tests were carried out at the STAC site in Biscarrosse, in various areas of air transport.

In particular:

- 193 freight tests,
- 101 for airport vehicles and supplies,
- 94 in hold baggage,
- 47 in the field of odorology,
- 46 for premises and aircraft.

The overall success rate this year was 83%.

In addition to their certification activities, STAC staff play an active role in ECAC's Explosive Detection Dogs working group, the EDD SG. The group meets several times a year, by videoconference as well as face-to-face. In October 2022, the Danish members invited their colleagues to Copenhagen for in-depth discussions. The group was able to finalise two ECAC guides, proposing methodologies for the use of explosive detection dogs for passenger screening and for vehicle inspection at airport entrances. It was also asked by the ICAO's Working Group on Guidance Material (WGGM) to review and correct the EDD section of document 8973. This document proposes recommendations and best practices in application of the norms and standards in Annex 17. Finally, a second "EDD Workshop" was organised at ECAC's premises in Neuilly-Sur-Seine, to which all Member States were invited. A wide range of subjects was presented over two days. The STAC, represented by its experts from the Security Division, gave three presentations: the recognition of explosive odours by EDDs, the REST method (Odorology) and the inspection of premises.

CONTROL AND SURVEILLANCE ACTIVITIES

In the field of airport security

To assist the DSAC, the STAC, through its Networks, Equipment and Systems Laboratory (LRES), carries out performance evaluations of security equipment systems and baggage conveyor systems.

Prior to their installation, the STAC assesses whether hold baggage screening systems (IFBS) comply with the requirements of French regulations in order to help airports purchase and install these systems. The STAC also examines whether the systems envisaged are correctly sized for the needs of airports. In 2022, STAC issued around ten regulatory opinions.

Following these regulatory notices, STAC will assess on site whether these hold baggage systems have been correctly installed in accordance with the recommendations and requirements of the regulatory notice issued. This justification of performance (JUS) of IFBS systems consists of on-site tests to check that these systems comply with the recommendations and requirements of STAC (baggage sent to the right destination, security status correctly assigned, etc.). In 2022, 11 JUS were carried out throughout France.

While issuing regulatory notices and performing JUS for IFBS systems are part of STAC's historical activities, since 2022 these activities have been extended to biometric access control systems (in Nice in particular) and automated cabin baggage screening systems (Orly, Nice and Lyon). The widespread use of these systems has prompted STAC to create new procedures and to communicate with airports in order to be able to carry out these actions to check that the systems are working properly in accordance with French regulations.

Finally, STAC continues to assess the performance of all security equipment installed at airports (cabin, hold, cargo, personnel) on a four-yearly cycle. In 2022, STAC carried out 15 Performance Maintenance Checks (PMC) on security equipment installed at airports.

DISSEMINATION OF KNOWLEDGE

FRACS CALLS ON STAC

To support Cameroon's civil aviation authority

With the aim of improving its capacity to respond to the problem of animal risks at Douala and Yaoundé airports, Cameroon's civil aviation authority has called on FRACS (France Aviation Civile Services), an economic interest group responsible for exporting the know-how of the DGAC and ENAC abroad.

FRACS naturally turned to the STAC experts, firstly to run a training session on animal risk management, and secondly to support a group of biologists set up by the Cameroon authorities. The task of these biologists is to carry out animal observations in and around the two airports concerned, over a period of one calendar year, with the aim of producing a risk map for these two areas.

The STAC teams provided methodological advice on how to carry out, record and use the observations. Every month, they meet with the Cameroonian team to discuss and adapt the methodology to the realities on the ground.

COOPERATION WITH THE MOZAMBIQUE AUTHORITY

Under the aegis of the DTA, the STAC has initiated cooperation with the Mozambique Civil Aviation Authority to assist their experts in their surveillance mission linked to the modernisation of the country's airspace, with in particular the forthcoming deployment of ADS-B. This assistance should last until the end of 2023.

TRAINING CONTRIBUTION

POWER AND LIGHTING TRAINING

STAC is consolidating its range of training courses on the technical features of airport electrical power and lighting installations.

Two ENAC modules are available for supervisory inspectors (DSAC).

Three days' attendance at the Level 2 AER Part B training course and a 5-day course on energy and lighting audit techniques.

In addition to the traditional ENAC-ENERBALEX session, maintenance personnel from airport operators can now follow a new training course entitled "Maintenance of electrical power supplies and airfield lighting", with a more technical focus.

The first session will be held in June 2023 at Paul Sabatier University in Toulouse.

Finally, the STAC is involved in training courses for military staff, such as "airport engineering" and "basic knowledge of Ministry of Defence airfields".

STAC AND ENAC JOIN FORCES

Promoting airport biodiversity

The development of training courses for professionals and future professionals in the aviation sector is an integral part of the objectives set by the action plan resulting from the DGAC's biodiversity roadmap.

STAC has been developing expertise in this area for several years. ENAC relies on this expertise to deliver training courses to students and professionals as part of its continuing education programme. In particular, the school has set up a course dedicated to environmental issues, with a strong emphasis on biodiversity.

This high-stakes subject must be taken into account at all decision-making levels, from planning to operations. Thanks to this collaboration between STAC and ENAC, the future players in civil aviation will be better aware of how to meet the environmental challenges of tomorrow.

REVIEW OF THE TRAINING PROVIDED BY ITS

In 2022, the Airfield Pavement Department continued its collaboration with the French Ministry of Defense in the field of continuing education. This collaboration took the form of several training cycles designed and run by the department's experts (engineers and technicians) in the field of airfield pavement design, for the benefit of military personnel. In particular, this training programme has enabled trainees to develop the knowledge they need to use the Alizé-Aéronautique software.

Training dedicated to the diagnosis and management of aeronautical infrastructure assets, with the presentation of different inspection methods and tools (service index, ground tests, ACN/PCN method, CFL) was also provided during 2022. Tailor-made by the department's experts, these training modules, alternating theoretical presentations and practical exercises, have provided know-how and solid knowledge to military base operators.

REVIEW OF TRAINING COURSES PROVIDED BY S2P

Agents from the Safety, Performance and Planning Division provided training on helipad design and helicopter operations, with a particular focus on performance classes and the different types of operation for these aircraft, for engineering students, masters students and continuing education students. They have also run training courses on apron safety. Training courses on technological developments to improve airport safety, capacity and accessibility, and on the assessment and treatment of obstacles as part of the INGEAIRES training programme, and a contribution to the Plan de Servitudes Aéronautiques course for the DSAC (French Civil Aviation Authority). Courses on airport capacity were also given to the ICNA, IENAC and Master MSAM at ENAC.

REVIEW OF TRAINING PROVIDED BY ENV

In 2022, the Environment Division provided a number of training courses on behalf of ENAC.

Experts in the areas covered by the division (air quality, noise, de-icing, animal hazards and biodiversity) provided input for the airport technical induction training.

In the field of noise, two IMPACT software training courses were given to the network of modellers, including a tailor-made course for 5 agents from the New Caledonia DAC. Military engineers and ENAC engineers also received training in noise and modelling. The dissemination of knowledge within the modellers' network continued via an information day in collaboration with Eurocontrol.

Finally, experts in the field of biodiversity and animal risk prevention took part in 11 training courses for air traffic controllers, surveillance inspectors, DGAC agents, military personnel and airfield operators. One of these courses was aimed at animal hazard prevention officers from Cameroon, as part of a collaboration with France Aviation Civile Services (FRACS).

OUR FACILITIES

STAC BEE BREEDING REGISTER

Bonneuil-sur-Marne site

Since 2019, the Bonneuil-sur-Marne site has been home to 6 hives containing bees with characteristics similar to the black bee.

The hives are maintained by Les Ruchers parisiens, to whom STAC grants a right of use free of charge. In return, Les Ruchers parisiens pays 15% of the harvest and is responsible for potting. As part of the promotion of biodiversity, this partnership provides for an environmental awareness session on domestic bees for STAC employees during the honey harvest.

For 2022, here is a summary of the information collected in the breeding register:

- 3 colonies were classified as very strong, 5 as strong and 7 as average.
- Harvest: 103 kg for the whole of 2022, broken down as follows: 30 kg of honey on 25 May; 73 kg of honey on 10 August.
- 130 endowment pots and 50 120g pots were given to the STAC for redistribution to agents.
- The weakest hives were fed in September, for a total of 70 kg of liquid sugar for the whole apiary.

The agreement between Les Ruchers parisiens and STAC will be renewed in April 2023.

HUMAN RESOURCES & FINANCIAL

WORKFORCE

WORKFORCE AT 31 DECEMBER 2021 (before reform of support functions)	
Technical staff	
IPEF	3
IEEAC	25
ITPE	22
IESSA	4
TSEEAC	31
TSDD	12
Contract agents and RIN	11
TOTAL TECHNICAL STAFF	108

Administrative staff	
Ancillary	4
Assistants	6
Assistants	9
TOTAL ADMINISTRATIVE STAFF	19

Workers	
AC workers	12
Defence Worker	2
TOTAL WORKER STAFF	14
GRAND TOTAL	141

BUDGET EXECUTION

DTA - BOP 614-1	k€
Environmental and safety studies	143
Aeronautical pavement heritage	274
Airport access control management system and various security systems	195
Laboratory for the detection of liquid and homemade explosives	306
Training	111
IT - Telecommunications	309
Documentation Dissemination of knowledge	42
Logistics	776
Staff travel expenses	184
Ancillary staff costs	36
TOTAL	**2 379**
DSAC - BOP 614-2	
Safety and environmental studies	157
Aeronautical pavements	111
Beaconing and ARFF test centres	90
Operation of safety test centres	324
Quality - Metrology	27
TOTAL	**709**
SDP - BOP 613	
Workers' compensation	38
TOTAL	**38**
DCSID MILITARY BUDGET BOP 212	
Maintenance of BAN/Auscultation/PEB stop strands	1 339
Logistics	210
Staff travel expenses	10
TOTAL	**1 559**
DTA Civil budget P203 Nantes Atlantique	**376**
REVENUE	
Certification and surveillance fees	576
ADP (product allocation)	63
TOTAL	**639**

STAC ORGANISATION CHART
June 2023

ORG/STAC/DIR/NAME CHART VERSION 33

SCIENTIFIC AND INTERNATIONAL ADVISOR	G. ROGER
PROGRAMMES AND PARTNERSHIPS MANAGER	E. VIDAL
QUALITY MANAGER	S. LY
RADIATION PROTECTION COMPETENT PERSONN	C. FUCHÉ
HEAD OF INNOVATION	J. SCHMIT
SECURITY OFFICER	L. FELGINES
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Responsible for budget preparation, monitoring and performance
L. GAY-NÈGRE

Administration and knowledge capitalisation division
F. MERCIER

Project support and information management division
L. FELGINES

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N.

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G. CASTERAN

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A. GAMA

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L. EYGLUNENT

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GLOSSARY

A

AAP: *Call for projects*
ACN: *Aircraft Classification Number*
ACR: *Aircraft Classification Rating*
ADS: *Security agent*
ADS-B: *Automatic dependent surveillance-broadcast*
AESA: *European Aviation Safety Agency*
AFIS: *Aerodrome Flight Information Service*
AFNOR: *Association française de normalisation*
AIP: *Aeronautical Information Publication*
AIT: *Transport Innovation Agency Call*
AMI: *Call for expressions of interest*
APIDS: *Automated Prohibited Items Detection System*
APPSA 3D: *Preliminary design for a 3D aeronautical easement plan*
APU: *Auxiliary Power Unit*
AWARD: *All Weather Autonomous Real logistics operations and Demonstration*

B

BTP : *Building and civil engineering*

C

CAEP: *Committee for Aviation Environmental Protection*
CALIPSO: *Classification of light aircraft according to their noise performance index*
CBR: *California Bearing Ratio*
CDE: *Explosive Detection Dogs*
ECAC: *European Civil Aviation Conference*
CEP MG: *Common Evaluation Process – Management Group*
CEREMA: *Centre for studies and expertise on risks, the environment, mobility and development*
CFL: *Coefficient of longitudinal friction*
CMP: *Performance Hold Control*
COFRAC: *French Accreditation Committee*
CORIFER: *Steering committee for research and innovation in the rail industry*
CTM: *Common testing methodology*

D

DCSID: *Central Directorate of Defence Infrastructure Services*
DGAC: *French Civil Aviation Authority*
DGAMPA: *Directorate-General for Maritime Affairs, Fisheries and Aquaculture*
DGITM: *Directorate-General for Infrastructure, Land and Mobility*
DGR: *Reasoned global diagnosis*
DREAL: *Regional directorate for the environment, development and housing*
DRIAS: *Giving access to French regional climate scenarios for the Impact and Adaptation of our Societies and Environment (DRIAS project)*
DSAC: *Civil Aviation Safety Directorate*
DSNA: *Directorate of Air Navigation Services*
DTA: *Air Transport Division*

E

EB: *Energy and lighting*
EDS SG: *Explosive detection dogs study group*
EDSCB: *European Environment Information and Observation Network*
EDSHB: *Explosive detection system for hold baggage*
ENAC: *French National Civil Aviation School*
ESSOP: *Environment, Systems and Operations Safety, Planning*
ETD: *Explosive trace detector*
EVS: *Enhanced vision system*
e-VTOL: *electric vertical take-off and landing*

F

FRACS: *France aviation civile services*
FWD: *Falling Weight Deflectometer*

G

GART: *Group of transport authorities*
Groupe ADP: *Aéroports de Paris Group*

H

HME: *Home made explosive*
HWD: *Heavy Weight Deflectometer*

I

ICNA: *Air navigation control engineer*
IEEAC: *Civil Aviation Studies and Operations Engineer*
IENAC: *National Civil Aviation School Engineer*
IFBS: *Screening of hold baggage*
IMAG: *Automatic Instrument for Grip Measurement*
IMPACT: *An Integrated Aircraft Noise and Emission Modeling Platform*
IPEF: *Engineer of water bridges and forests*
IRIT: *IToulouse Institute for Research in Computer Science*
ISO 9001: *International Organization for Standardization*

J

JOP 2024: *Olympic and Paralympic Games 2024*

L

LCEP: *Pyrotechnic Certification and Evaluation Laboratory*
LEDS: *Liquids explosives detection system*
LIDAR: *Light Detection and Ranging*
LMOPS: *Optical Materials, Photonics and Systems Laboratory*
LPO: *League for the Protection of Birds*
LRES: *Networks, Equipment and Systems Laboratory*
LRPC: *Regional road and bridge laboratory*

M

MSAM: *Master in Airport Management*
MTE: *Ministry for Ecological Transition*

N

NIR: *Near InfraRed*
NIT: *Technical Information Note*
NVS: *Night vision system*

O

ICAO: *International Civil Aviation Organisation*
OECD: *Organisation for Economic Co-operation and Development*
OLSTF: *Obstacle Limitation Surfaces Task Force*
ONERA: *French space agency*
OTS: *Object Test Security*

P

PCN: *Pavement Classification Number*
PCR: *Pavement Classification Rating*
PIAF: *Avian information platform in France*
PICA: *Animal Collision Information Programme*
PFUE: *French Presidency of the European Union*
PNACC: *National Climate Change Adaptation Plan*
PPV: *Photovoltaic panels*

Q

QC SG: *Quality Control Study Group*

R

RATP: *Parisian public transport authority*

S

S2P: *Safety performance and planning*
SATT: *Technology transfer acceleration company*
SED-SMD: *Shoe explosive/Metal detection system*
SIA: *Aeronautical information service*
SG: *General Secretariat*
QMS: *Quality Management System*
SNCF: *French National Railways Company*
SRD: *Sub-Directorate for Safety and Defence*
SSLIA: *Aircraft Rescue and Firefighting Service*
STBA: *Technical service of air bases*

T

TTF: *Technical Task Force*

U

UAF & FA: *Union of French and associated French-speaking airports*
USAIRE: *Union of Aerospace Companies and Associated Industries Represented in Europe*

V

VNF: *French navigable waterways*

W

WGGM: *Working group on guidance material*
WTMD: *Walk through metal detector*

Z

ZSM: *Zone of major sensitivity*

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