

Implementation of CCO/CDO procedures at the Libreville Léon Mba International Airport

By Larissa Pamela Dianga Nzengue (Gabon)

PROJECT PURPOSE

Since 2015, Gabon has benefited from the Joint Assistance Project of the International Civil Aviation Organization (ICAO) and the European Union (EU) “Capacity Building for CO₂ Mitigation from International Aviation.” Within this context, Gabon submitted to ICAO in April 2016 its action plan for reducing CO₂ emissions from international aviation. The plan contains fifteen mitigation measures from the Basket of Measures proposed by ICAO, with the majority of the measures related to improvements in air traffic management.

It is in the framework of objective 3 of the ICAO/EU Project that in September 2016, Gabon, together with Burkina Faso, was one of the States selected to benefit from technical and financial support for the implementation of a pilot project to establish Continuous Climb Operations (CCO) and Continuous Descent Operations (CDO) at the Libreville Léon Mba International Airport. These correspond to the M3 and M4 measures from the National Action Plan for the reduction of CO₂ emissions.

In order to implement this pilot project, ICAO turned to the Agency for Air Navigation Safety in Africa and Madagascar (ASECNA), an air navigation service provider, given its competence and expertise in the field of air navigation in several African States and in Gabon and for possessing a flight procedure design service. Thus, a Memorandum of Understanding was signed between ICAO and ASECNA and a business plan was agreed upon for the deployment of these CCO/CDO procedures.

This pilot project is organized around three main phases: the initial phase comprising a design part, the design phase and the validation, approval, publication and evaluation phase.

PROJECT'S ENVIRONMENTAL FOOTPRINT AND COST/BENEFIT ADVANTAGE

The ICAO Environmental Benefit Tool (EBT) was used to estimate the amount of fuel consumed from the data provided in 2014 by four Gabonese airlines operating international flights.

The following table shows the results obtained for CCO and CDO operations:

	Total number of operations taken into account	Fuel savings (tonnes)	Emissions reduction* (tCO ₂ /year)
CDO	2005	120.30	380.14
CCO	2005	200.50	633.58
Total	4010	320.80	1013.72

*1 Kg of fuel generating approximately 3.16 kg of CO₂

The implementation of CCO/CDO represents environmental benefits equivalent to a reduction of approximately 1013.72 tonnes of CO₂ emissions in the atmosphere per year from international traffic alone handled by these national airlines.

Considering that CCO/CDO will be deployed for all flights to and from Libreville, it is highly likely that the benefits in terms of reducing CO₂ emissions will increase.

IMAGE 1: Involvement of military personnel in the project



IMAGE 2: Communication between a pilot and an air traffic controller



RELATED QUANTITATIVE/ QUALITATIVE BENEFITS

The use of CCO/CDO helps improve safety, flight regularity and airspace capacity, while reducing perceived ground noise, fuel consumption, emissions and the frequency of controller-pilot communications. It also provides better organization of air traffic flows which leads to a reduction in the workload of controllers and pilots.

Aside from the expected benefits mentioned above, this project's implementation has made it possible:

- to strengthen cooperation between civil aviation and military aviation;
- to reinforce cohesion between the appropriate civil aviation authority and the aviation industry;
- to increase communications between controllers and pilots;
- to find significant support for the project from stakeholders, as well as for the events organized by the National Civil Aviation Authority (ANAC) on environmental protection;

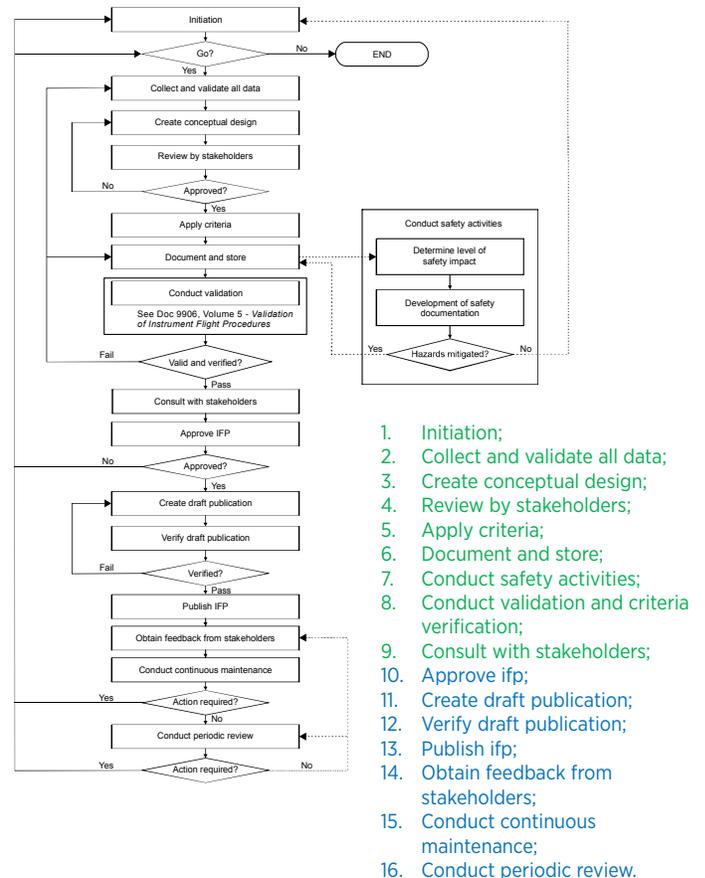
- to lead to substantial progress in the implementation of the M10 mitigation measure aimed at implementing flexible procedures for a common use of airspace by civil aviation and military aviation.

PROJECT IMPLEMENTATION

Activities related to the implementation of these operations were carried out in accordance with the provisions of ICAO Doc 9906 – *Quality Assurance Manual for Flight Procedure Design* and were included in the Gabonese Aviation Regulations RAG 7.2.2, Chapter 2 of which defines the reference framework for the process of establishing instrument flight procedures in the context of quality assurance.

The flow diagram below shows the 16 stages of the process. Project implementation is currently at Stage 9.

FIGURE 1: Instrument flight procedure process flow diagram



Stage 1 Initiation

The choice of retaining CCO/CDO operations as CO₂ emission mitigation measures and the decision to retain Gabon as the beneficiary State to receive funding are the main components of the process start-up phase.

Following the various administrative formalities, the project commenced with the joint ASECNA/ICAO exploratory mission in Libreville in October 2017, with the support of ANAC. This mission made it possible to meet the main stakeholders: the ministry responsible for civil aviation, the military authorities, the Libreville airport management, the airlines (domestic and foreign), and the local ASECNA authorities.

Information sessions were organized with each of the stakeholders, which helped to identify the constraints related to project implementation, including the existence of two special status areas. This stage came to a close with terms of reference being defined for the establishment of a national team to ensure project support and monitoring.

Stage 2 Collect and validate all data

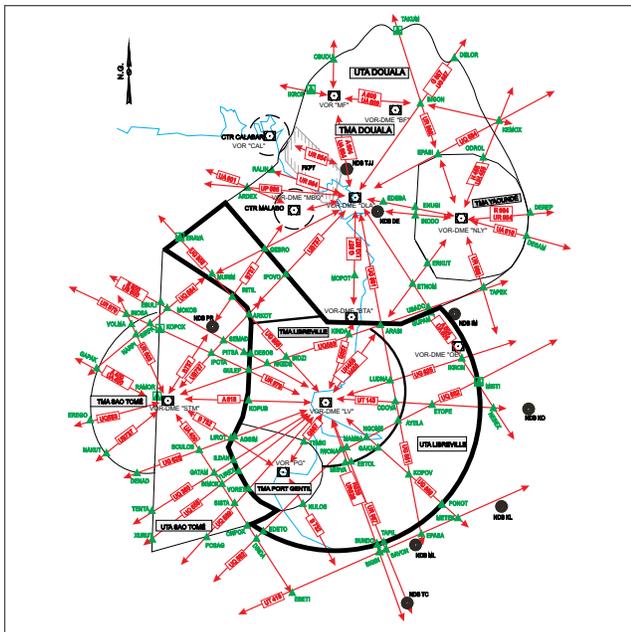
Since ASECNA had been designated by Gabon to manage its airspace and to provide air navigation services, it already possessed much of the data required to design the procedures: field data, obstacle data, aerodrome data, aeronautical data, navigation aid data, and the important issues that exist for local navigation. Additional data was collected from the airlines that fly to the Libreville airport, including data on aircraft types and their fuel consumption.

Stage 3 Create conceptual design

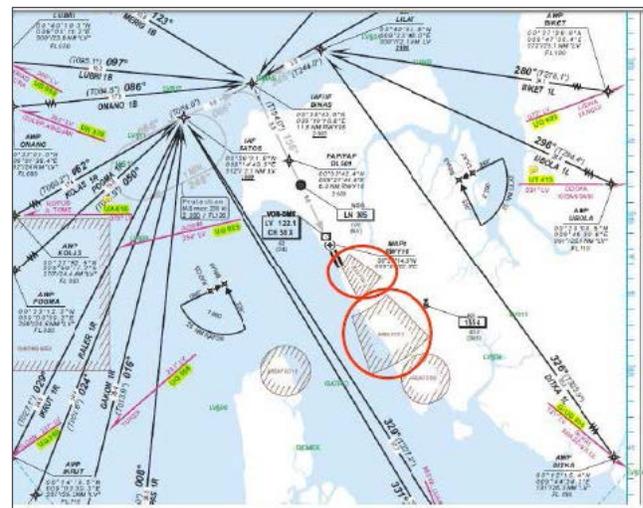
Following the exploratory mission, a project launch seminar was held in Libreville from 23 to 27 October 2017. The intent of that seminar was to train approximately 50 participants from civil and military aviation on notions regarding performance-based navigation (PBN), on CCO/CDO concepts, on quality assurance in the flight procedure design process, on the safety review procedure, and on the ASECNA environmental impact assessment approach.

The seminar also enabled the conceptual design to be developed according to ICAO Doc 8168. Baseline data used to create the conceptual design were:

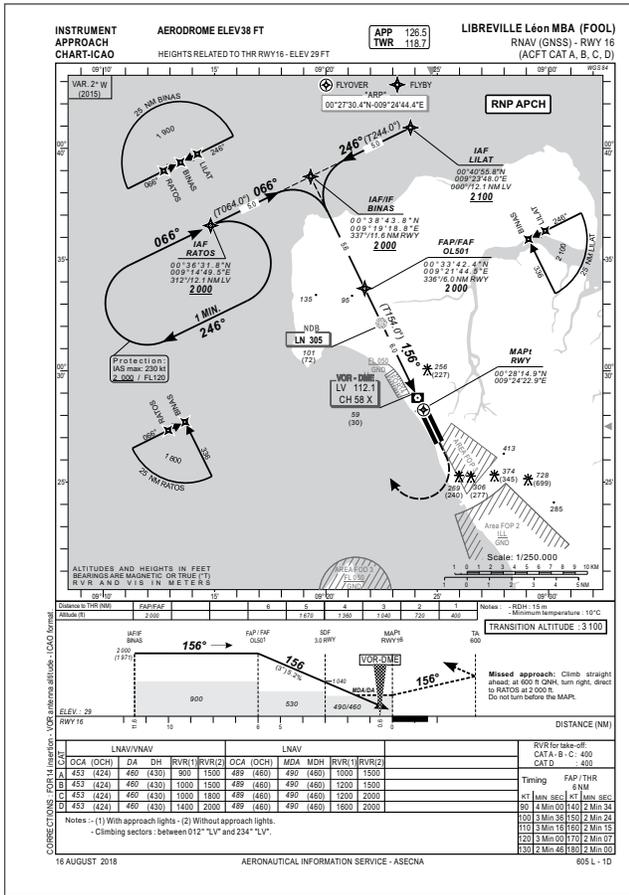
Libreville airspace organization (CTR, TMA, UTA) with neighbouring spaces



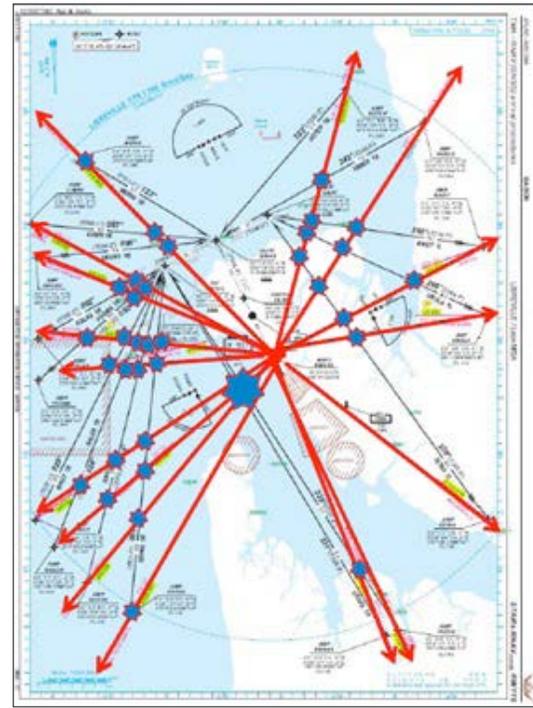
The existence of two (2) special status areas, which constituted the major risk that was taken into account for the implementation of a CCO optimized departure path.



RNAV GNSS procedures available on runway 16 (RNAV GNSS RWY 16°)



The existence of STAR RNAV RW 16, of several ATS routes for departures and arrival-departure interactions



CCO/CDO project launch seminar



Participants

- MINISTRY**
 - Ministry of Transport and Logistics
- ORGANISME**
 - ANAC, OACI, CEAAC
- ORGANIZATION**
 - Designers, Controllers, AIM
- AIRPORT OPERATOR**
 - ADL
- AIRLINES OPERATORS**
 - AIR FRANCE, SOUTH AFRICA AIRWAIS, RWANDAIR, NRT, SOLENTA, AFRIJET



Stage 4 Review by stakeholders

The draft conceptual design was presented to all the stakeholders and was the subject of discussions, which led to its formal approval by the entities concerned. Below is a reproduction of the approved conceptual design.

Following the seminar, the Committee responsible for CCO/CDO project implementation follow-up, composed of 21 members, was established with the following mandate:

- ensuring the coordination of actions and facilitating project implementation at the national level;
- identifying the challenges associated with project implementation and making recommendations;
- ensuring technical follow-up;
- reviewing project evaluation and progress.

The Committee met four times since the launch of the project and continues to ensure project follow-up activities.

Stage 5 Apply criteria

Armed with the conceptual design, the competent ASECNA authority was able to carry out the design activity based on the criteria defined for designing the RAG 7.22 procedures – *Procedures for air navigation services - technical operation of aircraft* (PANS -OPS) and relevant ICAO documents.

Stage 6 Document and store

Documents supporting the procedure design process such as spreadsheets, drawings and other relevant files are held by ASECNA and ANAC during the entire life cycle of CCO/CDO procedures.

Stage 7 Conduct safety activities

To meet the needs of safety-related activities, a workshop was organized by ICAO/ASECNA on the safety study and environmental impact assessment from 26 to 30 March 2018 in Libreville.

Safety and Environmental Impact Assessment Workshop



Thirty-one participants took part in this workshop, including one from the centre adjacent to Douala.

In accordance with the ASECNA safety impact procedure, the brainstorming activities helped to identify eight hazards related to the implementation and operation of the procedures by controllers and pilots in an environment where the air traffic control service is rendered without radar surveillance capability. The participants identified six hazards related to air traffic management (ATM) and two related to the means of communication (COM).

The work also enabled the identification of risk mitigation methods (MM) for hazards that included risks deemed unacceptable or tolerable. These recommended MMs led

to the development of safety requirements for procedures and human factors.

Following this workshop, the safety file developed and approved by the participants was submitted to ANAC.

Stage 8 Conduct validation and criteria verification

Validation and criteria verification began with controller training. This training entitled “capacity-building on CCO/CDO flight operation procedures” took place in Libreville from 18 June to 21 July 2018. The training was conducted in two stages: theoretical training and practical simulator-based training.

All the air traffic controllers, some civilian and military pilots, as well as the staff from the authority responsible for the approval of the said procedures benefited from the training.

To meet the needs related to simulator-based testing, CCO/CDO procedures were tested on a simulator provided by the Air France airline thanks to a partnership agreement between Air France and the ICAO-EU project.

Following this test, a meeting was held in Libreville between the Air France focal point in charge of testing and the project monitoring committee. This meeting provided an opportunity to discuss the progress of the project and

the points to be improved for an optimal use of CCO/CDO operations.

Stage 9 Consult with stakeholders

The project is currently at this stage.

A first meeting between the Air France focal point and the CCO/CDO project monitoring committee helped to provide an opinion on the procedures. The report of this meeting containing the comments made was submitted to the ASECNA (designer) for consideration.

FUTURE DEVELOPMENT OF THE PROJECT (OVER 3 YEARS)

As the project is in its final phase, phase 3, specifically at the procedure approval stage, the next activities will include the publication and evaluation of the procedures. Consequently, testing could begin with the airlines that have been chosen, including Air France.

In the short term, we hope that the M10 measure will be effectively implemented and that the Memorandum of Understanding between ASECNA and the Air Force Chief of Staff (EMAA) will be adopted by the beginning of 2020.

In addition, one- to two-hour meetings will be organized on a regular basis between pilots and controllers to enable better ATM management.

REFERENCES

<http://anacgabon.org/site/wp-content/uploads/2016/04/plandactions-co2.pdf>

<http://anacgabon.org/site/wp-content/uploads/2017/12/maganac-35.pdf>

<http://anacgabon.org/site/wp-content/uploads/2018/06/maganac-37.pdf>

<https://ais.asecna.aero/pdf/atlas/gabon/libreville/pdf/libreville-01c.pdf>

<https://ais.asecna.aero/pdf/atlas/gabon/libreville/pdf/libreville-01d.pdf>

<https://ais.asecna.aero/pdf/enr/2-enr/enr2-1/07enr2-1-05.pdf>

ICAO DOC 9906, Quality Assurance Manual for Flight Procedure Design, Volume 1 Flight Procedure Design Quality Assurance System; Chapter 6 Instrument Flight Procedure Process

ICAO Doc 9750, 2016–2030 Global Air Navigation Plan, Chapter 2, Environmental gains through PBN terminal procedures — CDO and CCO