

EUROPEAN AVIATION SAFETY AGENCY
ELECTRONIC FLIGHT BAG (EFB) EVALUATION REPORT



AIRBUS
FlySmart with Airbus for Windows – L5.1.4

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ACRONYMS AND ABBREVIATIONS

AMC	Acceptable Means of Compliance
AMMD	Airport Moving Map Display
CBT	Computer Based Training
CDL	Configuration Deviation List
EASA	European Aviation Safety Agency
EFB	Electronic Flight Bag
EFF	Electronic Flight Folder
EMI	Electromagnetic Interference
FAA	United States Federal Aviation Administration
FCOM	Flight Crew Operating Manual
FSTD	Flight Simulation Training Device
HMI	Human Machine Interface
LIFUS	Line Flying Under Supervision
MFD	Multi-function Display
MMEL	Master Minimum Equipment List
NAA	National Aviation Authority
OEB	Operational Evaluation Board (EASA term)
OIS	On-Board Information System
TGL	Temporary Guidance Leaflet
ROPS	Runway Overrun Protection System
ROW	Runway Overrun Warning

EXECUTIVE SUMMARY

The evaluation found that the FlySmart with Airbus for Windows software suite satisfies the guidelines of AMC 20-25. Evaluations of the FlySmart with Airbus for Windows software suite used in specific aircraft types are also addressed in appendices to this report.

This evaluation has been performed using the following methods:

- Desktop review of the software specifications;
- Review of the results from the software evaluations performed by Airbus;
- Review of Airbus compliance documents;
- Limited functional tests on sample EFBs.

Where commonalities allowed, credit from the past evaluations was taken.

Requirements contained in Commission Regulation (EU) N° 965/2012 of 5 October 2012 (Air Operations Rules) have been considered together with guidance material in AMC 20-25 (Airworthiness and Operational considerations for Electronic Flight Bags).

This report does not substitute for, or prevail over, any of the terms of the Airbus applications End User License Agreements (EULA) or other hardware and software Product Agreements. The operators must read the EULA and take the responsibility to accept the different agreements prior to using the applications.

EASA sees no technical objections to the grant by the National Authorities of an operational approval for the use of FlySmart with Airbus for Windows software applications taking the recommendations proposed in this report into account.

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1 PURPOSE AND APPLICABILITY

1.1 Purpose

This Report specifies EASA requirements and recommendations applicable to operators seeking Operational Approval to use the FlySmart with Airbus for Windows applications under Commission Regulation (EU) No 965/2012 of 5 October 2012 (referred to in this Report as “Part-OPS”), and it additionally provides guidance to National Aviation Authorities (NAAs) responsible for granting such approvals.

1.2 Applicability

This Report is applicable to the applications of the FlySmart with Airbus for Windows L5.1.4 software suite, as well as subsequent versions added via addendum or not requiring a further evaluation by EASA (see chapter 5.2).

If subsequent versions require applying the change management procedure under ARO.GEN.310(c), their evaluation can be performed by the operator itself in accordance with AMC 20-25 criteria. Parts of this report can remain applicable to those versions if it is justified that they are not impacted by the update.

Findings of compliance and recommendations of approval contained in this Report are consistent with the guidance specified in AMC 20-25.

This Report assumes that the parts not covered by this report regarding the evaluation of the compliance of the EFB will be performed by the operator and evaluated by its competent authority. Chapter 6 summarises which parts are covered by this report and which are not.

This Report includes:

- Recommendations which should be applied by the NAA when considering the grant of an Operational Approval;
- Information which is advisory in general, but is particularly recommended where the designated configurations apply for an operator.

Provisions of this Report are effective until amended, superseded, or withdrawn.

1.3 Use of the AMC 20-25 as Acceptable Means of Compliance

The requirements of Commission Regulation (EU) No 965/2012 and of AMC 20-25 have been considered during this evaluation.

The structure of this report (chapters 4 and 5) has been adapted to follow the structure of the AMC 20-25.

2 GENERAL DESCRIPTION OF THE SOFTWARE

The FlySmart with Airbus for Windows suite is composed of several different applications:

- Takeoff performance
- Landing performance
- In-Flight performance
- Loadsheet
- Operational Library Browser
- Electronic Flight Folder

2.1 Takeoff performance

The Takeoff module provides the necessary take off performance data that the flight crew needs before takeoff.

The Takeoff module provides the following takeoff performance:

- The Maximum Takeoff Weight
- The takeoff performance data for a takeoff at full thrust: V1, VR, V2, Engine Out Acceleration Altitude, limitation codes;
- The takeoff performance for a takeoff at flexible or derated thrust: Flexible temperature or Derated thrust level, V1, VR, V2, Engine Out Acceleration altitude, limitation codes;
- The optimum configuration (if applicable), the optimum engine option (if applicable);
- Additional results provided to the crew depending on administration settings on a separate page. Example of generic parameters: runway lengths used, different V1 (min, max, mean), limiting weights, minimum and maximum altitudes. Recommendations regarding the use of the detailed outputs are given during the Performance Administrator training.

2.2 Landing performance

Based on actual or selected conditions, the Landing module provides the necessary landing performance that the flight crew needs at dispatch and/or during descent preparation.

The Landing module provides the following detailed landing performance:

- The Maximum Landing Weight;
- The Limitation Code;
- The Regulatory Landing Distance or In-flight landing distances (as applicable);
- Vapp (final approach speed);
- The Landing Configuration
- The Go-around speed (if applicable)
- The Go-around gradient (if applicable)
- Additional results provided to the crew depending on administration settings on a separate page. Example of generic parameters are: weight limited by landing distance, by approach climb gradient, Actual Landing Distance, Approach Climb Speed, etc.
- The list of inoperative items for in-flight landing distance calculation with in-flight failures.

2.2 In-Flight performance

The In-Flight performance application provides the high-speed performance data previously published in tabulated form in the FCOM and QRH, and adds information for flight management and decision making by the flight crew during the flight.

The In-Flight application is made of six main calculation functions:

- Climb Performance (including climb ceiling);
- Cruise Performance (including optimum and maximum altitude);
- Descent Performance (including drift-down);
- Holding Performance;
- Plan Performance (including trip fuel calculation, alternate fuel calculation, in-cruise quick check);
- Speed & Atmosphere Calculator (including True Altitude Determination).

The application is not intended to be used for flight planning purpose.

2.3 Loadsheet

The aim of the Loadsheet module is to calculate the aircraft relevant masses and positions of the aircraft centre of gravity.

The output parameters are the zero fuel weight (ZFW), zero fuel center of gravity (ZFCG), takeoff weight (TOW), takeoff center of gravity (TOCG), landing weight (LW), landing center of gravity (LCG) and the trim setting at takeoff (THS).

The Loadsheet module checks that the center of gravity and weights are within the operational envelopes (zero fuel, takeoff, and landing).

2.4 Operational Library Browser (OLB)

The OLB application enables to consult the operational documentation. The operational documentation contains Airbus manuals and/or operator manuals (e.g. AFM, CDL, FCOM, MEL, FCTM).

2.5 Electronic Flight Folder (EFF)

The EFF application provides the flight crew with an electronic means to:

- Carry the regulatory documents on board the aircraft for the planned mission;
- Store the regulatory documents on board into the flight folder;
- Archive the required documents post-flight.

The EFF includes the Flight Follow-Up (FFU) function. The FFU provides the flight crew with an electronic mean to monitor the flight and fuel progress.

2.6 Note on Navigation Charts Applications

Navigation charts applications are not part of the Airbus FlySmart software for Windows suite, although they can be integrated to the suite and may have a similar interface.

They are out of the scope of this report.

3 EFB CLASSIFICATION

3.1 Hardware Classification

The choice of the EFB hardware platform and its operational use is under the operator's responsibility and is not covered by this report. For some aircraft (e.g. A350, see [Appendix B](#)), Airbus provides EFB installed resources such as display units, docking solutions and connectivity.

Operators must be careful about the suitability of the whole EFB solution in the cockpit of their particular aircraft types. Although performance and loadsheet applications may not be needed frequently and in all flight phases, the documentation provided by the OLB may have to be accessed at any time.

The operator's solution should ensure compliance with the AMC to CAT.GEN.MPA.180, in particular that "an electronic storage medium is acceptable if accessibility, usability and reliability can be assured".

3.2 Software Classification

All the applications (listed in section 2) proposed in the FlySmart with Airbus for Windows L5.1.4 are classified as type B, under AMC 20-25.

To achieve this classification, applications malfunctions and misuses must be properly mitigated by operator's SOPs and training as detailed in this report.

3.3 Non-EFB Applications

The EFB operating system may provide default applications not related to flight operations and may allow easy installation of additional applications.

These applications are out of the scope of this document. The EFB administrator should ensure that non-EFB software applications do not adversely impact the operation of the EFB (see chapter 4.7.4) and include them in the EFB configuration management.

It is reminded that third party applications enabling a display of own-ship position in-flight or flight parameters are considered to be avionics functions (not eligible as EFB applications) under AMC 20-25, if the present position function is not inhibited and locked by the administrator.

4 HARDWARE OPERATIONAL EVALUATION

No aspects related to the EFB hardware compliance are addressed by this report.

5 SOFTWARE OPERATIONAL EVALUATION

5.1 Risk Assessment

The Risk Assessment process of AMC 20-25 corresponds to the former Operational Risk Analysis from TGL-36.

Elements of the Risk Assessment required by AMC 20-25 §7.2 were elaborated by Airbus and are provided in a single document for each application. Specificities of each aircraft type are addressed where necessary.

The Risk Assessment documents include highlights that are intended to make the operator aware of specific recommendations regarding the crew procedures, and the EFB administration. Those recommendations should be considered while establishing the EFB policy and procedures within the operator organisation.

These elements can be reused by operators to produce a Risk Assessment tailored to their operations, as required by AMC 20-25 §7.2.

5.2 Changes to the EFB system

As stated in AMC 20-25, when the modifications made to the EFB applications do not bring change to the HMI or do not introduce new functionalities, then they do not require a supplementary approval from the competent authority. See also chapter 5.10 which contains considerations on the EFB administration.

EASA considers that version changes that are limited to bug or database fixes, as well as to minor HMI changes (HMI widget aesthetic, menu structure,...), fall within the above definition and do not require a supplementary approval from the competent authority.

Because of the validation process applied by Airbus for the introduction of a new version of the calculation algorithm onto FlySmart with Airbus for Windows Performance applications, modification of the EFB Performance applications which brings a change limited to the calculation algorithm do not require a supplementary approval from the competent authority. Refer to §5.5.

5.3 Dispatch Considerations

Airbus provides operational recommendations for addressing dispatch with inoperative EFB components. These operational recommendations may be used by the operators to define the acceptable dispatch conditions (e.g. MEL items) and the associated operational procedures as applicable..

This document is part of the compliance data specific to each solution. Refer to Appendices A and B for references to the 'Portable only' and A350 EFB systems provided by Airbus.

5.4 Human Factors and HMI Assessment

The following elements are based on a simulation session involving EASA and on supporting material provided by Airbus during the evaluation.

These elements have led to the content of the chapters below, including recommendations for the flight crew training. In addition, several HMI points raised during the evaluation were discussed with Airbus, and upon agreement several modifications were brought to the applications.

The elements provided in the chapters below are those that are independent from the EFB hardware. Further considerations may be found in the appendices to this report for specific Aircraft for which Airbus has requested an evaluation.

The HMI is deemed satisfactory and compliant with AMC 20-25 appendix D, provided the training recommendations are implemented.

The results of this evaluation may be reused by operators. It is reminded however that operators should carry out a complementary HMI assessment of the integration of the EFB in the cockpit environment (see AMC 20-25 §7.5). Depending on EFB hardware, specific considerations for this complementary HMI assessment may be found in appendices .

5.4.1 Human Machine Interface

In general, the HMI was found consistent and intuitive. Several modifications were agreed by Airbus and are planned for implementation in future versions.

5.4.2 *Legibility of Text*

Although the legibility is highly dependent on the EFB hardware solution chosen by the operator, it is expected that the text displayed on the EFB will be legible to the typical user at all likely and reasonable viewing distances. The operator should assess the legibility with his own configuration, or take into account the specific considerations found in the appendices to this report.

5.4.3 *Input Devices*

The assessment of the various input devices (touch screen or keyboard) is out of scope of the main part of this report. Specific considerations for the A350 can be found in appendix A. For other aircraft, the demonstration remains under operator's responsibility.

5.4.4 *User Interfaces Consistencies*

Consistency between EFB applications:

Airbus has developed the various FlySmart applications on Windows following a consistent set of requirements as detailed in the design principles documents for the various applications (the documents are part of the Compliance Dossier).

The consistency is deemed satisfactory.

Consistency with flight deck applications:

The applications were developed to be consistent as far as applicable with the cockpit systems. The performance applications allow in particular to display calculation results in a format similar to that of the FMS. The consistency with cockpit applications is deemed satisfactory.

5.4.5 *Messages and Use of Colours*

Use of colour:

FlySmart with Airbus on Windows application suite satisfies the guidance provided by AMC 20-25. The use of red is limited and is not deemed to be confusing.

A particular colour scheme is used within the application and is used to distinguish in particular input types from the user, from the system, or default values. It is recommended that the meaning of those colours are addressed during the initial training on the application (see 5.12).

Messages:

Although applications comply independently, there is no way to ensure at the applications level that interactions (visual and auditory) coming from other (non-EFB) applications, or from the OS, are disabled. Pop-ups, notifications and alarm sounds may be triggered unexpectedly depending on the configuration.

Thorough testing is therefore recommended to check the possible interactions of the suite of applications considered for use as part of the operator's EFB solution. Updates to the operating system may also require a re-assessment of potentially unwanted messages or pop-ups over EFB applications.

Possible work-around solutions in case of interference include turning notifications and sound off in the crew procedures. Certain pop-ups might however not be de-activated, e.g. low battery warnings.

5.4.6 *System Error Messages*

FlySmart on Windows applications are deemed compliant. Errors in the FlySmart applications trigger appropriate notifications (e.g. calculation error).

Non-EFB applications should be assessed in order to avoid the triggering of undue error messages. This is particularly true on the Windows operating system.

The stability of the FlySmart with Airbus on Windows applications has been good during the evaluation. In case of “crashes” of the EFB applications occur, it is recommended that there is a process for the crew to report this to the EFB administrator.

5.4.7 *Data Entry Screening and Error Messages*

User entry fields implement checks against erroneous formats. When a user makes an entry with a wrong format, he is advised through a message in the application.

5.4.8 *Error and Failure Modes*

5.4.8.1 *Flight Crew Error*

The applications have been designed to be consistent with Airbus cockpit systems, through the use of the colour coding and entry formats.

5.4.8.2 *Identifying Failure Modes*

Failure identification is ensured by the use of error messages (see 5.4.6 & 5.4.7).

5.4.9 *Responsiveness of Applications*

During the limited hands-on trial by EASA the responsiveness of the applications was satisfactory. It is however dependent on the hardware used by the operator and on the configuration and number of applications simultaneously running on the EFB. Ensuring that the responsiveness is acceptable therefore remains under EFB administrator responsibility.

A system busy indicator is implemented in all applications.

5.4.10 *Off-Screen Text and Content*

In the OLB, any Documentary Unit (DU) that is displayed ends by an End of DU tag (“// END” indication). This enables the user to ensure that all information contained in the DU has been displayed. Other applications more generally rely on scrollbars, which allow to identify that out of screen content exist.

5.4.11 *Active Regions*

The applications use a consistent HMI scheme and interaction means so that there is no ambiguity concerning the active regions.

5.4.12 *Managing Multiple Open Applications and Documents*

Toggling between the different FlySmart applications is conveniently ensured through a bar at the top of the screen or through the Flight Ops menu. The indication of the active application is unambiguous.

The toggling with other EFB or non-EFB applications if necessary has to be defined by the administrator and may depend on the hardware solution.

5.4.13 *Flight Crew Workload*

The crew workload evaluation can be considered out of the scope of the main part of this document since it depends on operator specificities, like other EFB applications used, positioning of the device and standard operating procedures (SOPs).

Operators and their competent authorities should evaluate the EFB positioning, stowing, and intended use during applicable phases of flight (including possible use of a viewable stowage device, and in an operationally representative situation), to ensure there is no unacceptable flight crew workload or adverse safety implications.

This evaluation should be performed taking into account the specific operators SOPs.

5.4.14 *HMI - Performance and Mass & Balance applications*

AMC 20-25 introduces a new paragraph dedicated to specific HMI requirements for performance and mass & balance applications (Appendix D, chapter D.3.2).

This has been considered during the evaluation and FlySmart on Windows is deemed to be compliant with this material.

As required by AMC 20-25 (Appendix D, chapter D.3.2), data outputs and certain inputs are deleted after a certain period of time of standby of the FlySmart Takeoff and Landing performance applications. This is to prevent the use of outdated information in particular outdated airfield data.

The data inputs and outputs of the loadsheets and the in-flight applications are not automatically cleared after a certain period of time of standby because these inputs are not dependent on data needing regular update such as airfield data. However, the loadsheet and the in-flight applications inputs and outputs are automatically cleared when entering or synchronizing the FROM/TO fields on the FLT OPS STS page (as recommended in the 'Preliminary Cockpit Preparation' section of the Airbus procedures).

The behaviour of the automatic deletion has to be emphasised during training as mentioned in 5.12.

5.5 Specific Considerations for Performance and Mass & Balance applications

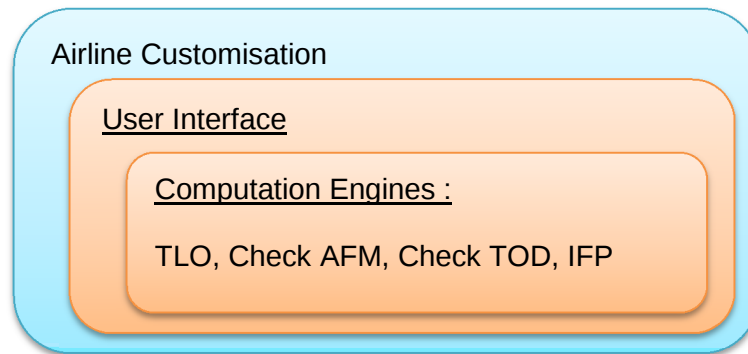
AMC 20-25 introduces in Appendix F several considerations that operators need to consider and comply with in case of use of performance and/or mass & balance applications.

These means of compliance were taken into account during the evaluation.

A specific compliance document for AMC 20-25 Appendix F is provided by Airbus in the different compliance dossier and can be used by the operator.

5.5.1 General

In operations, computations are achieved through the use of following layers:



The process is independent from the aircraft type or FlySmart software version. It was previously assessed during the A380 and FlySmart on iPad evaluations and has focused on the process used to develop and validate the two inner layers. The validation of the outer customisation layer is under responsibility of the operator and its EFB administrator (see 5.10.1).

The aircraft low speed performance databases provided by Airbus for the FlySmart Takeoff and Landing applications are based on certified AFM data.

Data given in paper documentation are envelope data while outputs from FlySmart takeoff and landing applications are optimised for the exact inputs entered by the user. As a consequence, differences may exist compared to the paper documentation, which may be more conservative.

The aircraft high speed performance databases provided by Airbus for FlySmart In-Flight application are the same as the ones used for FCOM and QRH tables computation.

Data given in paper documentation are envelope data while outputs from FlySmart in-flight application are optimised for the exact inputs entered by the user. As a consequence, differences may exist compared to the paper documentation, which may be more conservative.

The EFB administrator is responsible to ensure the compliance to the applicable OPS rules through the settings available in the performance administration tool (PAdmin).

An individual performance computation uses a chain of different algorithms designed to secure the results. Each algorithm is validated by Airbus, either through a full validation process, or through a results comparison with an already validated Windows algorithm.

Further details on the calculation verification features are provided by Airbus in the performance applications design principle documents.

The validation processes presented by Airbus of the applications interface and the computation engines are deemed satisfactory and compliant with AMC 20-25.

As required by AMC 20-25, a version number that encompasses the performance and loadsheet applications is available. It is accessible on the starting page (FLT OPS STS details).

5.5.2 *Testing*

Airbus testing method for the interface and computation engines is described in the “V&V process of FlySmart Performance and Weight and Balance Applications” document provided in the EFB compliance dossier referenced in the Appendices. The test coverage includes non-regression and validation of the changes.

The development and validation process presented by Airbus are deemed compliant with the AMC 20-25 material regarding testing. The evaluation has covered the validation and testing processes and not their results; Airbus remains responsible to ensure that the testing is performed on each version and that results are satisfactory before releasing the applications.

It is recommended that operators follow all Airbus guidelines and communications related to the continued development, maintenance, and feedback regarding the applications.

5.5.3 *Procedures (Performance and Mass & Balance)*

Although the use of the performance applications allow the crew to get accurate and optimised results, the reliance in those results over time, and the automation of the simple actions required to get them, may degrade the importance given to the critical analysis of each calculation and to the procedures used to obtain the results.

It is therefore important to remind flight crew members during training, that the procedures should be strictly applied and that results are only as good as the entries they come from. Past experience regarding performance applications show that entry errors (e.g. typing slip) are quite common.

AMC 20-25 chapter F.1.3 provides guidance to operators regarding the procedures related to the use of performance and mass & balance applications. In addition, it is recommended to follow the guidelines that Airbus provides in the compliance document to AMC 20-25 Appendix F, in the risk assessment documents , and to follow the procedures provided in the FCOM as a basis for an operator's SOPs.

Procedures should in any case incorporate independent gross error checks, such as use of cross-check function with avionics (when available) or the green dot speed check for the takeoff performance application results.

5.5.4 *Training (Performance and Mass & Balance)*

The recommendations provided in [chapter 5.12](#) and in the applicable appendices to this report cover the requirement of chapter F.1.4 of the AMC 20-25.

5.5.5 *Additional Considerations for Mass & Balance applications*

All basic data used in the Loadsheets application, such as aircraft weights, CGs, passenger and baggage weights are defined by the EFB administrator.

The EFB administrator should ensure that the applications are set up correctly and in accordance with the applicable legal requirements.

A diagram in the Loadsheets application allows to visualise the mass and CG position of the aircraft.

5.6 Flight Crew Operating Procedures

5.6.1 Procedures for using EFB systems with other flight crew compartment systems

Airbus proposes procedures in the FCOM addressing the use of EFB systems with the other cockpit systems.

Operators can base their procedures on the content suggested by Airbus, provided they are compliant to the requirements of AMC 20-25.

The procedures for using the EFB with other cockpit systems remain under the operator's responsibility.

5.6.2 Flight crew awareness of EFB Software / Databases Revisions

Flight Crew must be made aware of the applicable revision status. Operator's procedures should include the verification of the applicable software and database load.

5.6.3 Procedures to mitigate and/or control workload

Airbus proposes procedures in the FCOM to mitigate and/or control workload when using EFB systems.

Operators can base their procedures on the content suggested by Airbus, provided they are compliant with the requirements of AMC 20-25. Airbus proposes procedures in the FCOM, as well as recommendations in the Risk Assessments for each application (highlighted in yellow).

Where an operator modifies these procedures to integrate with the operating policies that define their own SOPs, the operator should ensure, and the NAA should verify, that the operator's SOPs do not compromise the operating philosophy and level of safety established by the Airbus procedures.

EFF: the procedures proposed by Airbus do not address the use of the EFF. In case the EFF application is used by the operator, those procedures have therefore to be fully developed by the operator.

5.6.4 Flight Crew Responsibilities for Performance Calculations

The procedures proposed by Airbus define the role of both crew members for the use of the performance applications. In addition, operators should have a clear defined policy defining the role of other parties involved, such as EFB performance administrator and dispatch office.

5.7 Compliance Monitoring

The operators compliance monitoring programme (required by Part-OPS, ORO.GEN.200) should include procedures related to the EFB system.

These procedures should ensure that the EFB operations and administration are conducted in accordance with all applicable requirements, standards and operational procedures.

5.8 EFB System Security

The operator's EFB Administration procedures must be capable of ensuring an appropriate level of EFB security as described in the AMC 20-25.

The operator should use technologies and/or procedures to assure that unauthorised content cannot enter the EFB system. A list of typical measures is proposed in AMC 20-25 chapter 7.9.

Credit may be taken from the built-in protections in the FlySmart applications. Integrity checks are performed during each data transfer as well as during each performance application computations

5.9 Electronic Signatures

The FlySmart with Airbus for Windows applications (in particular the EFF and loadsheet) do not have an electronic signature means that fulfils the applicable requirements.

Therefore, all documents requiring a signature per procedure or applicable regulations, must be printed-out and be signed off by hand.

5.10 EFB Administration

The administration workflows are described in Airbus document ref. X060PR0916051.

Operators are responsible to define the administrator role and appoint a suitable person.

Considerations regarding the administrator role, training, and responsibilities are contained in AMC 20-25 §7.11. In addition, the following should be considered as part of the training of the administrator:

- Importance of correctly setting up the performance and loadsheet applications, in accordance with the applicable operational regulations (see next chapter).
- In case the ADOC Web Flight Ops publication tool is used, the administrator should pay attention that no update is missed, due to the incremental update system.

5.10.1 Considerations regarding Performance and M&B software administration

The FlySmart applications suite is customisable to suit an airline needs and the specificities of its operation.

This customisation is under the responsibility of the EFB administrator, or, under delegation, of a performance administrator.

Each person involved in the administration of the performance and loadsheet applications should have an appropriate background (e.g. as a performance engineer) and should have received the adequate performance administration training on the Airbus ground tools and FlySmart applications.

During the evaluation the following items of emphasis were identified, and should be considered both during the administrator training and continuously during the process of administering the Performance / loadsheet applications:

- The management of the aircraft fleet must ensure that correct performance data (e.g. aircraft weights) are used at all time for each tail number.
- The management of the airport data is critical. The administrator is responsible for the data quality, accuracy of the runway/obstacle data and must ensure, together with the data provider, of the achievement of the data integrity.
- The administrator must set up the applications in a way that the computations are compliant with the applicable regulations (Part-CAT). This include for instance activating in the configuration some performance checks for contaminated runway results ("wet-check").
- In addition, the landing performance application should be configured to use the 15% margin recommended by Airbus for the Factored Landing Distance (FLD).

- The takeoff results page 3/3 provides additional calculation results. The results displayed are selected by the administrator according to the operator's policy. The customisation of that page should ensure that the details provided are consistent and relevant for the crew to use.
- If engine out procedures are available in the airport data set (in order to appear in the takeoff results page), it is recommended that each procedure content is prefixed by a label such as "EOSID" (for "Engine Out Standard Instrument Departures") in order to clearly characterise them and avoid confusion with standard procedures.
- It is recommended that the runway entry points are designated so as to avoid any confusion regarding correspondence with the published airport information.
- Applicable regulation on the verification of the continuous verification of the Mass & Balance output (see CAT.POL.MAB.105(b) and AMC1 CAT.POL.MAB.105(b)).

It is furthermore reminded that an operator should conduct testing related to its customisation of the applications and to any element specific to its operation. Refer to AMC 20-25 F.1.2.1.

5.10.2 *Considerations regarding EFB administration*

The role of the EFB administrator regarding the EFB is defined by Airbus in the Administrator Roles Definition document.

Those tasks should be considered by the airline in the definition of the administrator responsibilities.

It is to be noted that the transfer of avionics parameters to the EFB (for the purpose of Flight Follow-Up), if configured, has to be properly assessed and the procedures have to be adapted accordingly. This functionality was not evaluated by EASA.

5.10.3 *EFB Policy and Procedures Manual*

The EFB policy and procedures manual is under operator's responsibility. Refer to AMC 20-25 7.11.1.

5.10.4 *System updates (Windows)*

This report is not applicable to a specific Operating System (OS) version. The selection of the OS running on the EFB system has to be made by the operator, taking into account any guideline from Airbus.

Any new version of the OS should imply a complementary evaluation to verify that it has no adverse effect on the EFB applications.

It is recommended that operators implement administrator procedures to not update their devices to new major releases of the OS until such time as Airbus reports that no compatibility issues remain between the revised OS and all FlySmart applications.

It is also recommended that the administrator configures the devices in a way which prevents crew to perform updates themselves.

In all cases the configuration management responsibilities are with the EFB administrator.

5.10.5 *Non-EFB Software applications*

The OS (Windows) provides default applications not related to flight operations and allows as well to install additional applications that may be defined as "Miscellaneous" under chapter 5.2.3 and 6.2.2.3 of the AMC 20-25.

These applications are out of the scope of this report, however their use is subject to the applicable operational rules and to chapter 6.2.2.3 of the AMC 20-25.

It is recommended that the EFB administrator inhibits the possibility for the crew to install new applications, once the EFB is in the defined software configuration.

5.11 System Maintenance

The EFB system maintenance is under operator's responsibility. AMC 20-25 7.12 applies.

5.12 Flight Crew Training

Training for the use of the EFB should be for the purpose of operating the EFB itself and the FlySmart applications hosted on it, and should not be intended to provide basic competence in areas such as aircraft performance, etc. Initial EFB training, therefore, should assume basic competence in the functions addressed by the software applications installed. Where flight crew do not have the necessary experience, additional requirements may have to be applied by the NAA.

Training programmes for the EFB may take credit for previous EFB experience.

This chapter provides recommendations that are generic and aircraft-independent. Further type-specific considerations may be found in the corresponding appendices.

The training can be facilitated by the type rating courses offered by Airbus. However, these courses do not cover the EFF and loadsheet applications,. The training for those will have to be developed by the operator.

In addition to the areas provided in AMC 20-25 chapters 7.13 and Appendix E, it is recommended that the initial training include the following areas of emphasis:

Generalities:

- Hardware-related aspects, i.e. use of the EFB hardware and the need for proper adjustment of lighting when the system is used in-flight, hardware environmental limitations, management of the EFB battery and its charge.
- Basic common philosophy of the EFB applications, colour coding, default values.
- The training should emphasise the importance of executing all calculations in accordance with the SOPs, to ensure fully independent calculations and to perform the necessary cross and gross-error checks.
- The training should stress that care should be taken while performing calculations, and that upon distraction or interruption during the input sequence it should be considered to start from the beginning again.
- The importance of using and updating correctly the "FLT OPS STS" page for each flight should be emphasised. This allows in particular ensuring a fresh start for each computation.
- Limitations in use and purpose of each application.
- Responsibilities and requirements regarding the installation and use of non-EFB applications.
- Toggling between the various EFB and non-EFB applications. Exiting applications in the taskbar.

Electronic Flight Folder (EFF):

- Structure of the Flight Folder
- Loading process
- Use of the Fuel & Load panel, in particular how it fits within the performance calculation workflow. The Fuel & Load panel allows to compute the fuel quantity required for the flight based on flight planning system estimation computed on the ground. Then, once required fuel quantity is computed, it is used to compute the mass & balance sheet with the FlySmart loadsheet application.
- Use of the Flight Follow-Up (FFU) and its limitations.
- Use of the reporting tools and available forms.

Loadsheet:

- Workflow in the loadsheet application and use of the different entry modes.
- Retention of the loadsheet data (e.g. takeoff mass retained after a standby period), transfer to the performance applications.

Performance applications:

- Training on the use of the Runway Condition Assessment Matrix (RCAM) and associated runway states, reported braking actions.
- Differences between Dispatch and In-flight landing calculations and conditions of use of each mode.
- Depending on operator's customisation, content of the "EOP" area (takeoff results page 1) and of the detailed results page (results page 3).
- Use of takeoff flaps optimisation vis-à-vis company policy. If necessary the crew should be trained to the behaviour of the aircraft in any new takeoff configurations that may emerge due to the flaps optimisation.
- Use of the multiple runways calculation.
- Definition and use case of each of the different landing distance calculation outputs (e.g. LD, RLD, FLD, ROW LD)
- Use of the in-flight performance calculations as a decision aid (FMS data has precedence).

Ops Library Browser (OLB):

- The philosophy of the application should be understood, in particular the navigation inside a document and between different documents.
- Use of the OLB to access MEL or CDL items, including the selection of active MEL and CDL items as per dispatch conditions, the transfer to the performance / loadsheet applications, and the verification that all necessary items are used for the computations (see also below).
- Use of bookmarks (temporary or permanent) and selection of the level of detail.

- The OLB might not be suitable as a mean to “study” a document, compared for instance to a pdf file. This is due to the structured approach that requires to select each chapter individually, without continuous scrolling in the document.

Use of MEL/CDL items:

The training should emphasise that in case of selection of MEL or/and CDL items, it is important to entirely check the associated provisos and restrictions.

The crew should understand in particular that not all MEL/CDL items that have an impact on performance have their effect or associated limitations fully taken into account by the performance applications. Examples that may be used during the training are:

- ❖ A “NWS Inop” item does not reduce the crosswind limits in the application, nor does it disable the selection of contaminated runways runway states.
- ❖ An “ADR2 Inop” item will not prevent that an optimised takeoff calculation proposes a takeoff in configuration 1+F, which may not be allowed by the MEL (A320).
- ❖ An inoperative spoiler under MEL will not limit the configuration to 3 in the landing application (A350).

The training should in addition highlight that if available, the OLB is the preferred way of managing MEL and CDL items. Inserting items directly in the performance applications should be reserved to studying particular cases. Crews should be aware that a MEL or CDL item entered in one of the performance applications (e.g. takeoff) is not shared with the other (e.g. Landing).

The scenario of a failure with performance impact, appearing after push-back but before takeoff should be addressed.

5.13 Operational Evaluation Test

Before the granting of an Operational Approval, the operator should ensure, and the NAA should verify by means of an Operational Evaluation Test, that the guidance and recommendations of AMC 20-25 (as applicable) and those contained in this report including the applicable appendices have been satisfied.

5.13.1 Initial Retention of Paper Back Up

Where paper is initially retained as back-up for the purpose of validating the paperless-solution provided by the Ops Library Browser and/or Electronic Flight Folder from FlySmart with Airbus for Windows, the Operational Evaluation Test will consist of an in-service proving period typically performed via an operationally-appropriate number of test and evaluation flights.

The purpose of the in-service proving period is for the operator to demonstrate to the NAA that the EFB system provides an acceptable level of accessibility; usability and reliability to those required by the applicable operational requirements (see AMC1 to CAT.GEN.MPA.180). In particular that:

- The operator’s flight crew are able to operate the EFB without reference to paper;
- The operator’s administration procedures are in place and function correctly;
- The operator is capable of providing timely updates to the applications on the EFB where a database is involved;

- The introduction of the EFB without paper back up does not adversely affect the operator's operating procedures and that, when the EFB system is not available, alternative procedures for use provide an acceptable equivalent;
- The six months period dedicated to this check should take the frequency of the flights into account.

The results of the demonstration may be documented in the form of a Report from the in-service proving period on the performance of the EFB system.

The operator may then be granted an Operational Approval of the EFB to allow removal of the paper back up by their NAA if they have shown that the EFB system is sufficiently robust.

5.13.2 *Commencement of Operations Without Paper Back Up*

Where an operator seeks to start operations without paper backup, the operational evaluation test should consist of the following elements:

- A detailed review of the EFB risk assessment, tailored to the operator and based on the risk assessment proposed by Airbus in the applicable compliance dossier;
- A simulator LOFT session to verify the use of the EFB under operational conditions including normal, abnormal, and emergency conditions; and
- Observation by the competent authority of the operator's initial line flights.

The operator should demonstrate that they will be able to continue to maintain the EFB to the required standard through the actions of the Administrator and Compliance Monitoring Programme.

5.14 *Final operational report*

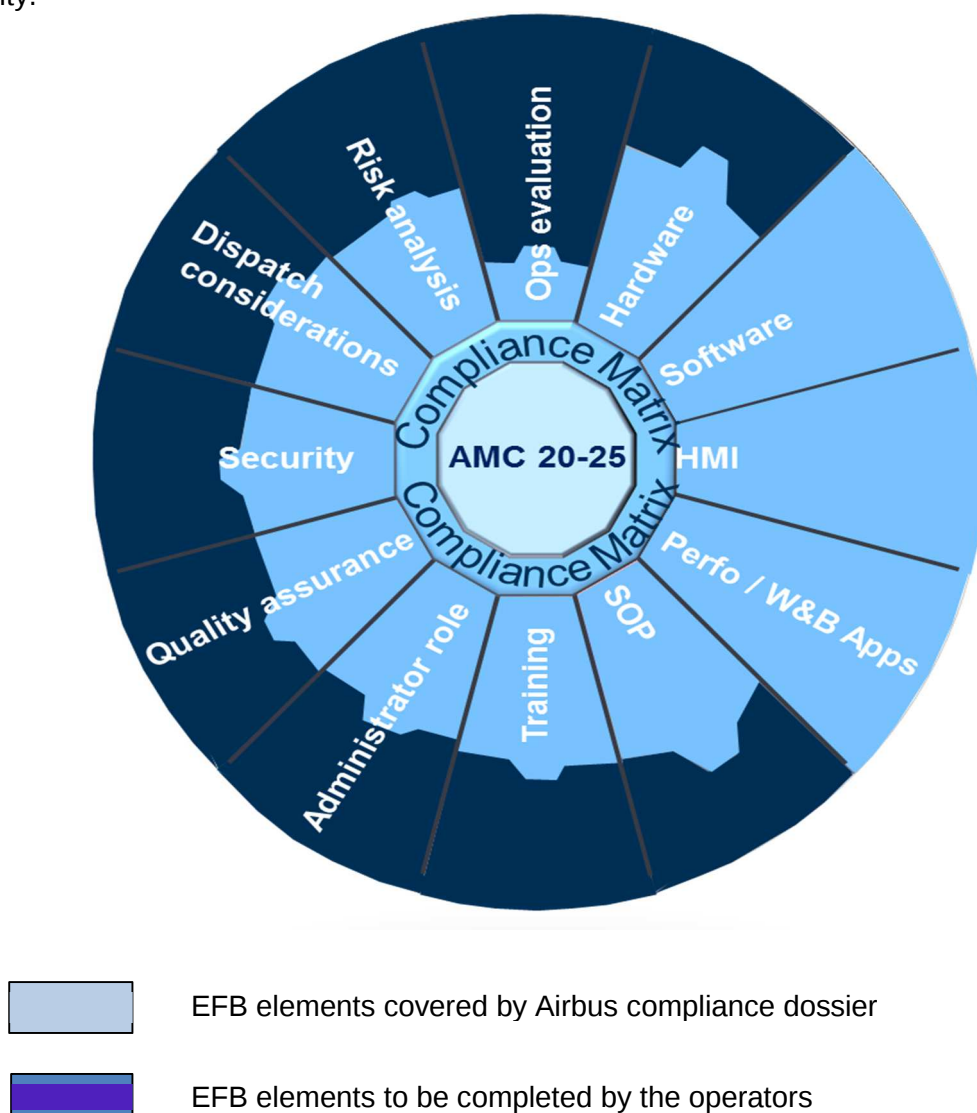
Operators should produce and retain a final operational report, which summarises all activities conducted and the means of compliance used, supporting the operational use of the EFB system. Refer to AMC 20-25 7.15 and Appendix I.

6 APPLICATION OF EFB EVALUATION REPORT

This EFB Software Evaluation Report is applicable to both operators and NAAs when considering an application for Operational Approval for use of the FlySmart with Airbus for Windows applications. EASA has found that the software as evaluated satisfies the corresponding guidance of AMC 20-25.

The evaluation of the hardware and its compliance with regulations remains a responsibility of the operators and their competent authority. The findings of this report do not constitute an Operational Approval and individual operators must obtain approval from their NAA prior to use of these applications.

In addition to all recommendations provided in this report, the following figure provides an overview of which parts have been covered with Airbus during this evaluation, and which remain under operator's responsibility.



7 AIRBUS COMPLIANCE DOSSIER

The evaluation of the FlySmart for Windows applications was supported by Compliance documents provided by Airbus and reviewed by EASA. The addendums to this report contain the references to the corresponding compliance dossiers.

A Compliance Dossier is normally composed of the following documents:

- Compliance Matrix,
- Administration Workflows,
- Administrator Role Definition,
- Dispatch Considerations,
- HMI Requirements,
- Design Principles (for each application),
- V&V Process of Performance and Weight and Balance Applications,
- Risk Assessment (for each application),
- Detailed Compliance Matrix for AMC 20-25 Appendix E,
- Detailed Compliance Matrix for AMC 20-25 Appendix F.

8 ALTERNATE MEANS OF COMPLIANCE

Alternate means of compliance to the recommendations contained in this Report may be approved by National Authorities. If alternate means of compliance are proposed, operators may be required to establish that any proposed alternate means provides an equivalent level of safety to the recommendations of AMC 20-25 and this report. Analysis, demonstrations, proof of concept testing, differences documentation, or other evidence may be required.

9 APPENDICES

The following Appendices are part of the report:

Appendix A Addendum – Portable EFB (excluding A350)

Appendix B Addendum – A350 Portable EFB

APPENDIX A: PORTABLE EFB (EXCLUDING A350)

A.1 Preamble, purpose and applicability

Airbus has applied to EASA for an operational evaluation of the FlySmart with Airbus on Windows, for the A350 (version L5.1.4).

The L5.1.4 standard can also be used on a portable EFB on another Airbus aircraft type.

This evaluation included a review of the specific compliance data provided by Airbus in the L5.1 Portable EFB Compliance Dossier, (reference X46PR1503814 issue 1.0) as well on limited functional tests on a sample portable EFB. Where commonalities allowed, credits from the past evaluations (A380) were taken.

This appendix contains addendum information that is specific to the use of the Airbus EFB solution on portable EFB, and supplemental to the main content of the report which deals with the software suite in a generic manner.

Therefore and unless otherwise specified, all recommendations made in the core of the report apply as well to the use of the EFB applications on portable EFB without installed resources.

A.2 Reserved

A.3 EFB Hardware

This appendix does not address the compliance of the EFB hardware itself, whose choice is under operator's responsibility.

Demonstration of compliance with the AMC 20-25 portable hardware provisions is under operator's responsibility.

A.4 EFB Software Applications

The software applications in the scope of this appendix are those defined in the main part of this report (see chapter 2).

A.5 Operational Evaluation

A.5.1 Risk Assessment

No additional considerations for portable EFB.

A.5.2 Dispatch Considerations

Specific dispatch considerations documents are provided in the compliance dossier for portable EFB.

A.5.3 Human Factors and HMI Assessment

A.5.3.1 Legibility of text

No additional considerations for portable EFB.

A.4.3.2 Input Devices

No additional considerations for portable EFB.

A.4.4 Specific Considerations for Performance and Mass & Balance applications

A.4.1.1 Procedures (Performance and Mass & Balance)

It is recommended to follow Airbus recommendation to compare the Green Dot speed computed by the FMS with the Green Dot speed provided in takeoff computation results. This is a mean to fulfil the gross-error check requirement from AMC 20-25 F.1.3.(c). Other gross-error checks might be considered additionally, such as comparing actual ZFW with planned ZFW.

A.5 Conclusion

EASA sees no technical objections to the grant of an operational approval for the use of FlySmart with Airbus for Windows applications on the portable EFB provided that the recommendations proposed in this report as well as those in the Compliance Dossier from Airbus are taken into account.

APPENDIX B: A350 PORTABLE EFB

B.1 Preamble, purpose and applicability

Airbus has applied to EASA for an operational evaluation of the FlySmart with Airbus on Windows, for the A350 (version L5.1.4).

This evaluation was based on the compliance data provided by Airbus in the A350 EFB Compliance Dossier, (reference V46PR1419855 issue 1.0, on limited functional tests on a sample EFB, and on two LOFTs sessions on A350 FSTDs. Where commonalities allowed, credit from the past evaluations (A380) was taken.

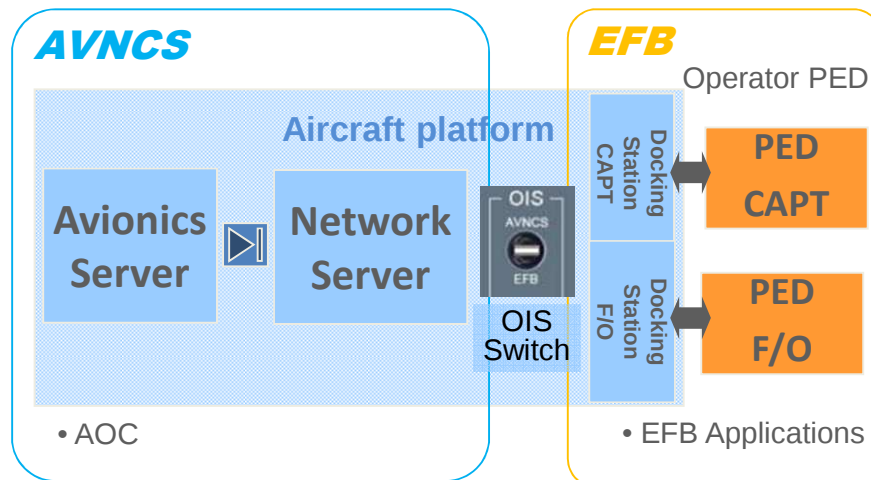
This appendix contains addendum information that is specific to the use of the Airbus EFB solution in the A350 and supplemental to the main content of the report which deals with the software suite on Windows in a generic manner.

Therefore and unless otherwise specified, all recommendations made in the core of the report apply as well to the use of the EFB applications in the A350.

B.2 General Description

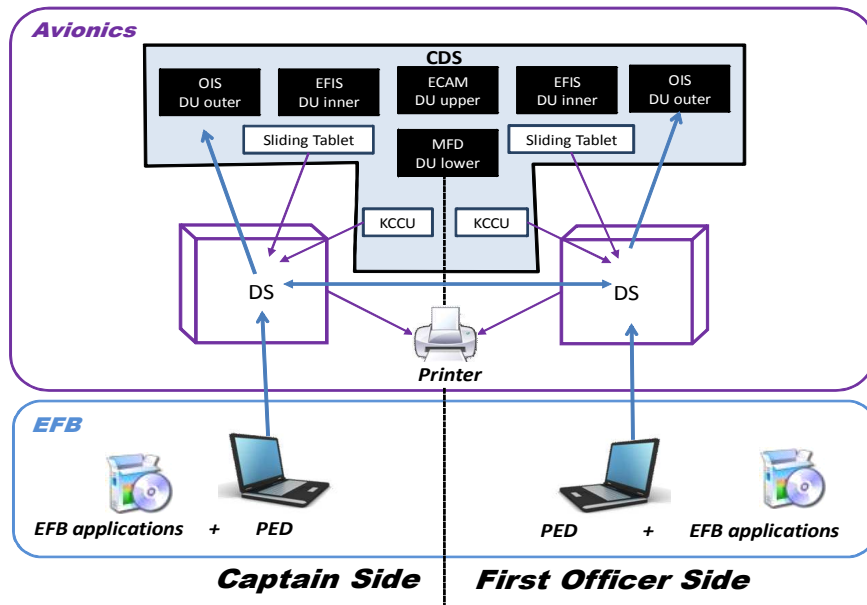
The A350 EFB is part of the A350 On-board Information System (OIS).

The OIS is formed of two parts: AVNCS side that contains the avionics and maintenance applications part and EFB side that contains the flight operations applications.. The Flight crew may use the applications that are installed on both parts, and access to each side through a dedicated OIS switch.



The A350 EFB is composed portable EFBs (C-PED) interfaced with avionics devices (installed EFB resources).

The illustration below provides a synthetic overview of the A350 EFB system architecture:



The following picture depicts the A350 EFB installed resources.



B.3 EFB Hardware

B.3.1 Portable EFB

This appendix does not address the compliance of the Portable EFB hardware itself, whose choice is left under operator responsibility. Demonstration of compliance with the AMC 20-25 portable hardware provisions is therefore under operator's responsibility. The operator must also take into account the requirements, guidelines and limitations specified in the document referenced in the AFM (Limitations Section – ATA46 – Information systems)

B3.2 A350 EFB installed resources

The A350 EFB installed resources such as the docking stations, the cockpit display units, the flight-crew interaction means (keyboards and KCCU) are part of the A350 type definition and covered by the corresponding airworthiness approval.

The A350 EFB installed resources must be used in accordance with the requirements, guidelines and limitations specified in the document referenced in the AFM (Limitations Section – ATA46 – Information systems).

B3.2.1 Strap on lateral console.

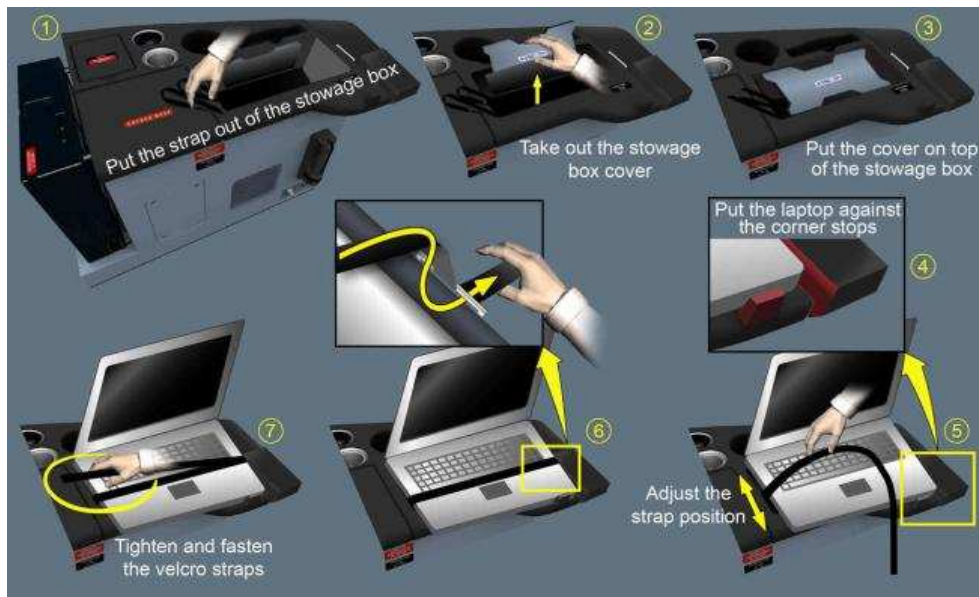
The A350 EFB installed resources also include straps on the captain and first-officer lateral consoles. In case of failure leading to loss of display of an EFB on the cockpit display units, the flight crew can unstow the affected portable EFB and strap it on the lateral console. When strapped on the lateral console, the EFB can be used during all flight phases. This strap should only be used as a back-up mean.

In case the portable EFB is a laptop, the strap may be directly used to secure it. In this configuration, the strap is considered as a mounting device.

In case the portable EFB is a tablet, the tablet must be attached to a viewable stowage (e.g. cover). In this configuration, the strap is considered as a means to secure the viewable stowage to the console. Selection and compliance of the viewable stowage is under operator's responsibility.

Demonstration of compliance with the characteristics and placement of EFB display considerations of the AMC 20-25 when using a portable EFB strapped on the lateral console is under operator's responsibility. The operator must also ensure that the straps is used in accordance with the requirements, guidelines and limitations specified in the document referenced in the AFM (Limitations Section – ATA46 – Information systems).

The following picture depicts the case of a laptop strapped on the lateral console.



B.4 EFB Software Applications

The software applications in the scope of this appendix are those defined in the main part of this report (see chapter 2), with version L5.1.4.

B.5 Operational Evaluation

B.5.1 Risk Assessment

Elements of the Risk Assessment required by AMC 20-25 §7.2 were elaborated by Airbus and are provided in a single document for each application. The specificities of each aircraft like A350 are addressed where necessary.

These elements can be reused by operators to produce a Risk Assessment tailored to their operations, as required by AMC 20-25 §7.2.

The Risk Assessment documents include highlights that are intended to make the operator aware of specific recommendations regarding the crew procedures, and the EFB administration. Those recommendations should be considered while establishing the EFB policy and procedures within the operator's organization.

In the specific frame of the A350, the backup strategy should in particular address at least the risks that are identified in the risk assessment documents. The selection of the 3rd EFB capability available as an option on the A350 might be a support to achieve the back-up requirement.

B.5.2 Dispatch Considerations

The Dispatch Considerations document from the compliance dossier is specific to the A350. It contains recommendations for use by operators in the development of their own dispatch policies and associated operational procedures.

Dispatch with inoperative docking station:

In case of an inoperative docking station, the crew have the possibility to strap the portable EFB onto the lateral console, in order to have it useable during all phases of flight.

B.5.3 Human Factors and HMI Assessment

B.5.3.1 Legibility of text

In normal conditions the EFB uses the outer or the centre avionics display units. Legibility is good and as required by AMC 20-25.

In non-normal conditions, when the Portable EFB is unstowed and strapped on lateral console, the operator is responsible to ensure for the legibility of text for its selected Portable EFB hardware in accordance with the considerations of the AMC 20-25.

B.5.3.2 Input Devices

In normal conditions, the inputs are made through avionics installed resources (KCCU, or embedded keyboard/touchpad from the tray table). The behaviour of the input devices and display on the OIS screens during ground trials was satisfactory.

In non-normal conditions, when the Portable EFB is unstowed and strapped on lateral console, the operator is responsible to ensure for the adequacy of the input devices of its selected Portable EFB hardware in accordance with the considerations of the AMC 20-25.

B.5.4 Specific Considerations for Performance and Mass & Balance applications

B.5.4.1 Procedures (Performance and Mass & Balance)

- It is recommended to follow Airbus recommendation for the A350 to use the XCHECK WITH AVNCS function to compare the takeoff computation results with FMS data. This is a means to fulfil the gross-error check requirement from AMC 20-25 F.1.3. Other checks might be considered additionally, such as comparing actual ZFW with planned ZFW.

- The A350 is equipped with the Runway Overrun Protection System (ROPS) hosted by the avionics. The landing performance application also computes a ROW (Runway Overrun Warning) Landing Distance that warns the pilot with an EXPECTED ROW ALERT message if it is predicted that the ROW alert will activate during approach. For this reason, the operator should implement the procedure provided in the FCOM if this message appears after computing the landing performance on the EFB.

B.5.4.2 Training (Performance and Mass & Balance)

The recommendations provided in chapter B.5.7 apply.

B.5.6 EFB Administration

No specific recommendation for the A350

B.5.7 Flight Crew Training

In addition to the areas provided in AMC 20-25 chapters 7.13 and Appendix E and the main part of this report, it is recommended that the initial training include the following areas of emphasis:

Hardware related aspects:

- Use of the docking stations, including the one for the spare EFB.
- Use of the OIS ON CENTER display reconfiguration, in particular for “head-in” briefings.
- Display reconfiguration in case of a display failure, correct sharing of the displays in accordance with the phase of flight.
- Transfer of displays from one side to the other in case of one EFB failure.
- Use of an EFB in ‘portable’ mode (e.g. strapped on lateral console) in case of multiple failures during flight (e.g. Cockpit Display Units) or dispatch with inoperative EFB Docking station.

Performance:

- Use of the ECAM EVENTS panel of OLB; filtering with Dispatch Messages. Import and verification of all active items before calculating performance, on both sides.
- Definition and use of the ROW landing distance (Landing performance application).
- Procedure upon EXPECTED ROW ALERT message after calculating landing performance.

B.6 Conclusion

EASA sees no technical objections to the grant of an operational approval for the use of FlySmart with Airbus for Windows applications on the A350 provided that the recommendations proposed in this report as well as those in the Compliance Dossier from Airbus are taken into account.