

Checklist and guidelines for inspecting documentation for the initial FSTD qualification

Operator name:	
Device level:	
Device type:	
Device ID or serial number:	
Name of the person responsible for the assessment:	
Date of this assessment:	

See GM3 ORA.FSTD.100 paragraph (c) and Traficom's leaflet "*Guidance for FSTD operators*".

All the items in the checklist below must be satisfactory before an initial evaluation may be performed. Mark an 'X' to the checklist items.

The checklist items are not in chronological order. For chronological order, see FSTD work instruction associated with initial FSTD evaluation, and Traficom's leaflet 'Guidance for FSTD operators' that is available in the internet at:

<https://www.traficom.fi/en/transport/aviation/flight-simulators-and-other-fstds>

Application part A

An application for the qualification part A. See AMC1 ORA.FSTD.200. The application should clearly indicate:

- What type, engines and avionics (e.g. what AFM supplements) are simulated.
- What capabilities are requested to be included in the FSTD Qualification Certificate (e.g. RNP approach to LNAV or LNAV/VNAV minima).

Satisfactory: Yes No

Notes on this item:

Application part B

An application for the qualification part B. See AMC1 ORA.FSTD.200. This part should confirm and state that the FSTD operator have assessed the proposed MQTG itself and states that the MQTG is acceptable to them. The assessment must have conducted been carefully by a competent person(s). If there are things still to be modified in the QTG tests, they should be listed and indicated what and when will be done to them.

Satisfactory: Yes No

Notes on this item:

Application part C

An application for the qualification part C. See AMC1 ORA.FSTD.200. This part should clearly declare that the FSTD has been tested carefully by competent persons and that the device is fully ready to be qualified.

Satisfactory: Yes No

Notes on this item:

Management of change

For non-complex organization see AMC1 ORA.GEN.200(a)(1);(2);(3);(5).

For complex organization see AMC1 ORA.GEN.200(a)(3).

The organization should manage safety risks related to a change. The management of change should be a documented process to identify external and internal change that may have an adverse effect on safety. It should make use of the organization's existing hazard identification, risk assessment and mitigation processes.

The management of change should identify also risks applicable to this individual project (i.e. this operator, FSTD type, manufacturer, etc.) and not only 'generic' risks.

Satisfactory: Yes No

Notes on this item:

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Technical specification

Technical specification should indicate for example how the following requirements are fulfilled:

- Appendix 1 to CS FSTD(A).300 in case of aeroplane FSTD
- Appendix 1 to CS FSTD(H).300 in case of helicopter FSTD

These requirements present long tables with requirements concerning cockpit layout, computer system and so on. The technical specification should indicate how those requirements are fulfilled.

Also ARINC report 434-1 paragraph 3.2 gives a list of information that the specification should give:

- All expectations of the design and build.
- Aspects of quality, maintainability and reliability.
- At what level the FSTD and its systems correspond to the real aircraft.
- Hardware architecture of the FSTD (e.g. dimensions, computer arrangements and interconnections, etc.).
- Navigation database arrangements.
- Overview of major software aspects (e.g. architecture and main modules) and software support utilities.

Satisfactory: Yes No

Notes on this item:

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Flight and avionics manuals (including appropriate supplements)

Flight and avionic manuals serve as reference material during the evaluation. The operator should confirm that they are the best reference manuals for the FSTD in question and correspond to the FSTDs configuration. The manuals should include all relevant supplements, annexes and so on to cover all the simulated systems.

Note: Often the manuals are part of the data package provided by the original equipment manufacturer (OEM, i.e. aircraft manufacturer). Therefore, the operator should ask the manuals from the training device manufacturer (TDM) who again asks them from the OEM.

The manuals should also give information on PBN capabilities (see GM1 NCC.IDE.H.250 for guidance).

The initial evaluation should include lots of (random) samples on system simulation and the mentioned manuals should be used as reference material (i.e. to compare the FSTD against hard data).

Satisfactory: Yes No

Notes on this item:

Proposed MQTG

CS-FSTD(A/H) presents requirements for the MQTG. Refer to those requirements for the inspection of the MQTG.

For initial evaluation, the requirements are:

- CS-FSTD(A) issue 2 for aeroplane FSTDs
- CS-FSTD(H) initial issue for helicopter FSTDs

The technical inspector (TI) carefully checks the MQTG for example for the following aspects:

- Preamble text to include required information. See whole CS-FSTD(A/H) and especially:
 - AMC1 FSTD(A).300 (paragraph (a)(6)) for aeroplane FSTDs
 - AMC1 FSTD(H).300 (paragraph (a)(6)) for helicopter FSTDs
- Statements of compliance are as required. See whole CS-FSTD(A/H) and especially:
 - Appendix 1 to CS FSTD(A).300 for aeroplane FSTDs
 - Appendix 1 to CS FSTD(H).300 for helicopter FSTDs
- That all required tests are included in the MQTG. See CS-FSTD (A/H) 'Table of FSTD Validation Tests'.
- That the tests include required elements. See whole CS-FSTD(A/H) and especially:
 - AMC1 FSTD(A).300 (paragraph (a)(6)(ii)(I)) for aeroplane FSTDs
 - AMC1 FSTD(H).300 (paragraph (a)(6)(ii)(I)) for helicopter FSTDs
- That all tests are within tolerances.
- That tests comply with CS-FSTD(A/H) and RAeS Aeroplane Flight Simulator Evaluation Handbook Volume I.

Use the following checklists to assess the MQTG:

- FSTD Form F14 for aeroplane FSTD or FSTD Form F15 for helicopter FSTD
- FSTD Form F10 for aeroplane FFS level C or D devices. This checklist is used to ensure that CS-FSTD(A) issue 2 elements on UPRT are considered in MQTG and in all other aspects.

Note: The assessment of proposed MQTG is a very big task. Even for a simple FNPT it takes easily a few days for an experienced TI. And for an FFS it takes easily more than a week to review the MQTG appropriately. Therefore, enough time should be allocated for this task!

Satisfactory: [] Yes [] No

Notes on this item:

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VDR or engineering report

CS-SIMD and CS-FSTD(A/H) present requirements for the VDR. Refer to those requirements for the inspection of those documents. See EASA Type Certificate Data Sheet to see if OSD for simulator data concerns this type. If OSD concerns this type, then EASA will be the authority to assess the VDR and data. If OSD does not concern this type, then the national aviation authority is the authority to assess the VDR and data (see Appendix 2 to AMC1 FSTD(A/H).300 saying '*The respective Member State's civil aviation authority is the final authority to approve the data to be used as validation material for the QTG.*').

The basic idea of VDR is to easily see a summary of the validation data source for each QTG test. The TI should use good judgement to analyze if the data sources are acceptable. For example, if too many tests (or too many tests in a certain section only) are based on engineering data, the VDR may not be acceptable.

(TI needs experience and competency on this area. Therefore, initial evaluations are performed only by experienced TIs named for the task.)

FFS and FTD:

Appendix 2 to AMC1 FSTD(A/H).300 presents information on approval of VDR. Quote from there: '*A VDR should be submitted to the competent authority as early as possible in the planning stages for any FSTD planned for qualification to the standards contained herein. The respective Member State's civil aviation authority is the final authority to approve the data to be used as validation material for the QTG.*' So the competent authority must be satisfied with the VDR. It is being approved as part of the MQTG.

Check that:

- VDR has clear revision information.
- VDR clearly states which organization is responsible for it.
- VDR includes information on all applicable tests.
- VDR states all the required information, explanations and rationales. See Appendix 2 to AMC1 FSTD(A/H).300 and especially its paragraph:

"The document should include rationale or explanation in cases where data or parameters are missing, engineering simulation data are to be used, flight test methods require explanation, etc., together with a brief narrative describing the cause/effect of any deviation from data requirements. Additionally, the document should make reference to other appropriate sources of validation data (e.g. sound and vibration data documents)."

- Requirements of Appendix 7 to AMC1 FSTD(A/H).300 are fulfilled. Very important is the following text in this requirement:

"Where these flight test data are genuinely not available, alternative sources of data may be acceptable using the following hierarchy of preferences:

First: as defined in flight testing at an alternate but near equivalent condition/configuration.

Second: data from an audited engineering simulation.

Third: aircraft performance data.

Fourth: Where no other data are available, in exceptional circumstances only, the following sources may be acceptable subject to a case-by-case review with the competent authorities concerned taking into consideration the level of qualification sought for the FSTD:

- unpublished but acceptable sources e.g., calculations, simulations, video or other simple means of flight test analysis or recording; or*
- footprint test data from the actual training FSTD requiring qualification validated by subjective assessment by a pilot appointed by the competent authority."*

These rationales should be clearly recorded within the validation data roadmap (VDR).

The mentioned appendix explains these principles and refers to other requirements, so be sure to study the whole Appendix 7 to AMC1 FSTD(A/H).300.

- If engineering validation data is to be used, it has to fulfill requirements of AMC7 FSTD(A).300 and AMC8 FSTD(A).300 for aeroplanes and AMC6 FSTD(H).300 and AMC7 FSTD(H).300 for helicopters. Note especially the following principles on the use of engineering validation data:
 - It is confined to changes that are incremental in nature and that are both easily understood and well defined.
 - Representative set of integrated proof-of-match cases is required.

FNPT only:

- CS-FSTD(A/H) presents that the validation data of FNPT must be approved as a separate process. The data should be presented in an engineering report. The report should justify how each 'footprint' is representative. See:
 - AMC1 FSTD(A).300 paragraph (a)(5)(iv) for aeroplanes
 - AMC5 FSTD(H).300 paragraphs (e)(4) for helicopters
- More details on this approval and on the process is presented in:
 - AMC3 FSTD(A).300 paragraph (b)(4) for aeroplanes
 - AMC5 FSTD(H).300 paragraphs (b)(4) for helicopters

Satisfactory: [] Yes [] No

Notes on this item:

Functions and subjective testing

Manual or document for subjective testing of the device should cover all aspects of the device so that the authority can be convinced that the operator (and/or manufacturer) has thoroughly checked the device to fulfill the applicable requirements (i.e. PRD and possible additional features described in the technical specification) and is ready for evaluation. This testing shall include among other things all the subjective tests required by CS-FSTD A/H and all FSTD systems and IOS features.

Normally the testing consist of the following elements:

- Unique testing manuals for this device and its (avionics and engine) configuration. Manuals are often hundreds of pages long and may be called for example as 'Acceptance test manuals' or 'Integration test manuals'. This testing is focused especially on the type related features.
- Checking of malfunctions. Each malfunction should be described in a document called for example as 'Malfunction definition manual'. Each malfunction should be checked to function as expected.
- CS-FSTD(A/H) 'Table of functions and subjective tests'. This testing is about both type related features and also subjective feel of flying.

The testing should use methods presented by RAeS Aeroplane Flight Simulator Evaluation Handbook volume II.

Satisfactory: Yes No

Notes on this item:

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Plan for annual QTG testing

The testing plan should list the target schedules for QTG tests (e.g. quarter of the year) and separate tests in a progressive manner. Ensure that all tests within the MQTG are listed in this plan. Ensure that static control checks are planned to be performed in appropriate manner (i.e. manual QTG testing is preferred but automatic testing can be acceptable also if appropriate).

Satisfactory: Yes No

Notes on this item:

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Plan for annual functions and subjective testing

The testing plan should list the target schedules for subjective tests (minimum two testing sessions per year). Also the program should be presented and it should divide items to be tested evenly between the test sessions. Ensure that all tests required by CS-FSTD A/H are listed in the program. Note that additional features not required by CS-FSTD A/H should be included in the testing also. Note that PBN items should be presented in adequate detail (e.g. not only as RNAV approach, but with information of LNAV or LNAV/VNAV or LPV minima, capability of RNP AR approach, etc.).

Satisfactory: Yes No

Notes on this item:

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Program and documentation for preventive maintenance

The FSTD manufacturer should recommend a certain program for periodic preventive maintenance. The FSTD operator should prepare its own program based on the program that the manufacturer recommends. The logging system should be established.

The preventive maintenance should have elements and checklists for example as:

- Daily readiness check
- Weekly/monthly checks
- Annual checks

The checklists should refer to maintenance manuals for detailed instructions on how to perform the tasks.

The operator should provide a list of all the maintenance related documentation that it has. This includes but is not limited to schematics, illustrated parts, maintenance manual volumes, etc. (see ARINC report 434-1 paragraphs 4.1 and 7.1 and 7.2)

Satisfactory: Yes No

Notes on this item:

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IOS manual

IOS manual must give adequate information on the use of the instructor station. The purpose of such a document is to share it with all the instructors. Therefore, the criteria to inspect the manual can be for example to answer the question that is it possible for an instructor to easily comprehend how to use the IOS by reading that manual.

Note that this document is often 'generic' in nature. In other words, the FSTD manufacturer may provide a manual that is not 100% exactly customized for the device in question but rather serves as a manual to describe IOS of the whole FSTD product family of the manufacturer. If this is the case, the manual should still be precise enough to give a clear picture of the IOS and its philosophy.

Satisfactory: Yes No

Notes on this item:

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List of malfunctions and their definitions

List of simulated malfunctions may often be included in the IOS manual. Note that CS-FSTD(A/H) and the training requirements do not explicitly list all the required malfunctions. There should be enough and such malfunctions that all the required training items can be performed and that all the subjective tests required by CS-FSTD A/H can also be performed. It is still strongly recommended to have a lot more malfunctions than just the minimum amount since it is always more efficient to train such features in an FSTD than in a real aircraft.

Each malfunction should be described: what failure is simulated and what consequences it should have. ARINC report 442 paragraph 4.7 gives the following guidance on this list:

"The description should contain the following elements:

- *Malfunction Designation, normally referenced to ATA chapter.*
- *Component failure or condition that caused the failure including any secondary effects.*
- *The malfunction should be based on the most likely component failure to occur and/or specific training exercises.*
- *Failure Detection: Description of how the affected system detected the failure.*
- *System Effects: This section should contain details explaining how the system reacts to the malfunction.*
- *Flight Deck Effects: These include, but are not limited to, effects on handling, a list of applicable Fault Warning messages, flight deck indicators, aural warnings, changes in system synoptic, maintenance pages, and fault reports.*
- *Maintenance Messages: Description of the BITE response to the malfunction, including any stored fault reports in the onboard maintenance computer or health management system, where applicable."*

Satisfactory: [] Yes [] No

Notes on this item:

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List of genuine aircraft parts and use of SimSoft

List of genuine aircraft parts concerns mainly only FTD and FFS devices that are type related devices. The list should indicate what real parts/computers are used and what are the real aircraft computer software used (i.e. rehosted). It is important also to get to information if SimSoft (Arinc 610) has been used or not within the avionics boxes/firmwares/software.

By using this information, the inspectors get a good idea of the possible weaknesses of the device. For example, if the FMGC is a real genuine aircraft box (i.e. computer with a real software), it can *probably* be expected that this FMGC will have less problems than a fully simulated (i.e. software simulated) FMGC. On the other hand, a real FMGC is often more prone to problems during repositions or when using extended simulation lapse rate. This information helps the inspectors to focus the evaluation on the most or more critical items of the device. This is part of the risk based oversight. Inspector's experience and expertise is required to fully understand the big picture here.

Satisfactory: Yes No

Notes on this item:

List of visual databases

Lists of custom and specific visual databases help to plan the subjective flight routes. The operator should define what are the 'certification scenes', i.e. those specific databases that are used to demonstrate compliance with CS-FSTD(A/H) 'Table of functions and subjective tests' section 'Visual'.

All the certification scenes shall be used during the evaluation and it is recommended to use many different runways on them.

Satisfactory: Yes No

Notes on this item:

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FSTD operator's management system or procedures manual

A revision may be needed to the manual to reflect all new or changed procedures or processes that the new FSTD requires. The manual (or its appendixes) should give information especially on how configuration control system functions with the new FSTD.

Satisfactory: Yes No

Notes on this item:

Training plan to FSTD maintenance personnel

The FSTD maintenance personnel should receive adequate training so that they are competent to maintain the new device. Also, they should be adequately familiarized with the simulated aircraft type so that they can operate the FSTD and tell if something is wrong with it.

Satisfactory: Yes No

Notes on this item:

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Any other information

If applicable.

Satisfactory: Yes No

Notes on this item: