THE NETHERLANDS
MILITARY AVIATION REGULATIONS

Flight Simulation Training Devices
Acceptable Means of Compliance
& Guidance Material

NLD-MAR-FSTD
AMC & GM

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MILITARY AVIATION AUTHORITY
THE NETHERLANDS (MAA-NLD)

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AMC FSTD.100 General

(a) Introduction

(1) The purpose of this acceptable means of compliance (AMC) is to provide additional and specific information to an organisation operating flight simulation training devices (FSTDs) on how to establish a compliance monitoring programme (CMP) that enables compliance with the applicable requirements.

(b) Compliance monitoring programme

(1) Typical subject areas for inspections are the following:

(i) actual FSTD operation;

(ii) maintenance;

(iii) technical standards;

(iv) FSTD safety features.

(c) Audit scope

(1) Organisations operating FSTDs are required to monitor compliance with the procedures they have designed to ensure specified performance and functions. In doing so they should as a minimum, and where appropriate, monitor the following:

(i) organisation;

(ii) plans and objectives;

(iii) maintenance procedures;

(iv) FSTD qualification level;

(v) supervision;

(vi) FSTD technical status;

(vii) manuals, logs and records;

(viii) defect deferral;

(ix) personnel training;

(x) aircraft modifications;

(xi) FSTD configuration management.

AMC FSTD.110 Modifications

General

(a) The FSTD, where applicable, should be maintained in a configuration that accurately represents the aircraft being simulated. This may be a specific aircraft tail number or may be a representation of a common standard.

(b) Users of the device should always establish a differences list for any device they intend to use, and to identify how any differences should be covered in training. In order to ensure each device is maintained in the appropriate configuration, the organisation operating an FSTD should have a system that ensures that all relevant airworthiness directives (ADs) are introduced where applicable on affected FSTDs.

(c) ADs from the Military Aviation Authority of the Netherlands (MAA-NLD), the state of design of the aircraft and the state where the FSTD is located should be monitored.

(d) The FSTD operator should put in place processes that ensure all aircraft modifications are reviewed for any effect on training, testing and checking. This can be achieved by reviewing the aircraft manufacturer's service bulletins and may require a specific link to the aircraft manufacturer to be developed.

(e) The organisation operating FSTDs should have an internal acceptance process for modifications, to be used when implementing all modifications.

GM FSTD.110 Modifications

Examples of major modifications

The following are examples of modifications that should be considered as major. This list is not exhaustive and modifications need to be classified on a case-by-case basis:

(a) any change that affects the qualification test guide (QTG);
(b) introduction of new standards of equipment such as flight management and guidance computer (FMGC) and updated aerodynamic data packages;
(c) re-hosting of the FSTD software;
(d) introduction of features that model new training scenarios; e.g. airborne collision avoidance system (ACAS), enhanced ground proximity warning system (EGPWS);
(e) aircraft modifications that could affect the FSTD qualification; and
(f) FSTD hardware or software modifications that could affect the handling qualities, performance or system representation.

AMC FSTD.115 Installations

Minimum elements for safe operation

(a) Introduction
  (1) This AMC identifies those elements that are expected to be addressed, as a minimum, to ensure that the FSTD installation provides a safe environment for the users and operators of the FSTD under all circumstances.

(b) Expected elements
  (1) Adequate fire/smoke detection, warning and suppression arrangements should be provided to ensure safe passage of personnel from the FSTD.
  (2) Adequate protection should be provided against electrical, mechanical, hydraulic and pneumatic hazards, including those arising from the control loading and motion systems, to ensure maximum safety of all persons in the vicinity of the FSTD.
  (3) Other areas that should be addressed include the following:
    (i) a two-way communication system that remains operational in the event of a total power failure;
    (ii) emergency lighting;
    (iii) escape exits and escape routes;
    (iv) occupant restraints (seats, seat belts etc.);
    (v) external warning of motion and access ramp or stairs activity;
    (vi) danger area markings;
    (vii) guard rails and gates;

(viii) motion and control loading emergency stop controls accessible from either pilot or instructor seats;
(ix) a manual or automatic electrical power isolation switch.

GM FSTD.115 Installations

General

(a) The intent of FSTD.115 is to establish that the organisation operating an FSTD has all the necessary procedures in place to ensure that the FSTD installation remains in compliance with all requirements affecting the safety of the device and its users.

(b) Safety briefings on the FSTD provided to users and instructors should be of good quality and regular checks on the FSTD safety features should be executed.

(c) It is recognised that certain checks, such as that of the emergency stop, can have adverse impact on the FSTD if carried out in full.

(d) It is acceptable to develop a procedure that protects elements of the device by shutting them down in advance, in a more controlled manner, provided it can be shown that the procedure still demonstrates the whole device can be shut down by the operation of a single emergency stop button, when required.

AMC FSTD.200 Application for FSTD qualification

Application process

(a) An application for an FSTD qualification should be submitted, in a format according to FSTD.200, no later than 30 days before the date of intended operation, unless otherwise agreed with the MAA-NLD.

(b) The application, together with evidence of the result of all evaluations or assessments, should be presented to the MAA-NLD.

GM FSTD.200 Application for FSTD qualification

Use of footprint tests

(a) Introduction
   (1) This guidance is applicable to full flight simulator (FFS) aeroplane, flight training device (FTD) aeroplane, FFS helicopter and FTD helicopter qualifications.

(b) Terminology
   (1) Footprint test. Footprint test data are derived from a subjective assessment carried out on the actual FSTD requiring qualification. The assessment and validation of these data are carried out by a pilot acceptable to the MAA-NLD. The resulting data are the footprint validation data for the FSTD concerned.

(c) Recommendation

(1) It is permitted to use footprint data where flight test data is not available. Only when all other alternative possible sources of data have been thoroughly reviewed without success may a footprint test be acceptable, subject to a case-by-case review with the MAA-NLD, and taking into consideration the level of qualification sought for the FSTD.

(2) Footprint test data should be:

(i) constructed with initial conditions and FFS set up in the appropriate configuration (e.g. correct engine rating) for the required validation data;

(ii) a manoeuvre representative of the particular aircraft being simulated;

(iii) manually flown out by a type rated pilot who has current experience on type* and is deemed acceptable by the MAA-NLD**;

(iv) constructed from validation data obtained from the footprint test manoeuvre and transformed into an automatic test;

(v) an automatic test run as a fully integrated test with pilot control inputs; and

(vi) automatically run for the initial qualification and recurrent evaluations.

* In this context, 'current' refers to the pilot experience on the aircraft and not to the NLD-MAR-FCL standards.

** The same pilot should sign off the complete test as being fully representative.

(3) A clear rationale should be included in the QTG for each footprint test. These rationales should be added to and clearly recorded within the validation data roadmap (VDR).

(4) Where the number of footprint tests is deemed by the MAA-NLD to be excessive, the maximum level of qualification may be affected.

(5) For recurrent evaluation purposes an essential match is to be expected. Validation tests using footprint data which do not provide an essential match, should be justified to the satisfaction of the MAA-NLD.

The MAA-NLD should be consulted at the point of definition of the aircraft data for qualification prior to the procurement of the device if footprint tests need to be used.

AMC FSTD.215 Initial evaluation procedure

Initial evaluation

(a) During an evaluation of an FSTD, a series of functions and subjective tests should be conducted, that together with the objective tests complete the comparison of the FSTD with the aircraft, the class of aeroplane or type of helicopter.

(b) The main focus of objective testing is the QTG. In order to avoid time being wasted during the initial qualification process, the content and acceptability of the validation tests contained in the QTG data package should be verified, well in advance of the evaluation date. The acceptability of all tests depends upon their content, accuracy, completeness and recency of the results.

(c) Functions tests verify the acceptability of the simulated aircraft systems and their integration. Subjective tests verify the fitness of the FSTD in relation to training, checking and testing tasks.

(d) The FSTD should provide adequate flexibility to permit the accomplishment of the desired and required tasks while maintaining an adequate perception by the flight crew that they are operating in a real aircraft environment. Additionally, the instructor operating station (IOS) should not present an unnecessary distraction from observing the activities of the flight crew whilst providing adequate facilities for the tasks.

(e) It is important that the organisation operating an FSTD understands what to expect from the routine of FSTD functions and subjective tests. Part of the subjective tests routine for an FSTD should involve an uninterrupted fly-out (except for FTD level 1) comparable with the duration of typical training sessions in addition to assessment of flight freeze and repositioning.

(f) Organisations operating FSTDs, who are unfamiliar with the evaluation process should contact the MAA-NLD or a department with adequate expertise in this field.

Composition of the evaluation team

(a) A technical team to evaluate an FSTD in accordance with a structured routine to gain a qualification level should be appointed. The team should normally consist of at least the following personnel:
   (1) A technical FSTD inspector, qualified in all aspects of flight simulation hardware, software and computer modelling or a person designated by the MAA-NLD with equivalent qualifications; and
   (2) One of the following:
      (i) a flight inspector, who is qualified in flight crew training procedures and holds a valid type rating on the aeroplane/helicopter (or for flight navigation procedures trainer (FNPT) and basic instrument training device (BITD), class rated on the class of aeroplane/type of helicopter) being simulated; or
      (ii) a flight inspector who is qualified in flight crew training procedures, assisted by a type rating instructor holding a valid type rating on the aeroplane/helicopter (or for FNPT and BITD, class rated on the class of aeroplane/type of helicopter) being simulated; or
      (iii) a person designated by the MAA-NLD who is qualified in flight crew training procedures and holds a valid type rating on the aeroplane/helicopter (or for FNPT and BITD, class rated on the class of aeroplane/type of helicopter) being simulated and sufficiently experienced to assist the technical team. This person should fly out at least part of the functions and subjective test profiles.

(b) For a FTD level 1 and FNPT type I, one suitably qualified inspector may combine the functions in (a)(1) and (a)(2).

(c) Additionally, the following persons should be present:
   (1) for a FFS, FTD and FNPT a type or class rated instructor from the organisation operating the FSTD or from the main FSTD user;
   (2) for all types, sufficient FSTD support staff to assist with the running of tests and operation of the IOS.

GM FSTD.215 Initial evaluation procedure

Initial evaluation

(a) A useful explanation of how the validation tests should be run is contained in the 'RAeS Aeroplane Flight Simulator Evaluation Handbook' (February 1995 or as amended) produced in support of the ICAO Doc 9625, 'Manual of Criteria for the Qualification of Flight Simulators'.

(b) A useful explanation of functions and subjective tests and an example of subjective test routine checklist may be found in the 'RAeS Airplane Flight Simulator Evaluation Handbook' Volume II (February 1995 or as amended) produced in support of ICAO Doc 9625, 'Manual of Criteria for the Qualification of Flight Simulators'.

AMC FSTD.220 Continuation of an FSTD qualification

Recurrent evaluation

(a) The FSTD recurrent evaluation should take place within the 60 days prior to the end of the 12-month recurrent evaluation period.

(b) The evaluation report should be submitted no later than 14 days before the end of the 12-month recurrent evaluation period, unless otherwise agreed with the MAA-NLD.

AMC FSTD.230 Changes to the qualified FSTD

Updating and upgrading existing FSTDs

(a) An update is a result of a change to the existing device where it retains its existing qualification level. The change may be certified through a recurrent inspection or an extra inspection if deemed necessary by the MAA-NLD according to the applicable requirements in effect at the time of initial qualification.

(b) If such a change to an existing device would imply that the performance of the device could no longer meet the requirements at the time of initial qualification, but that the result of the change would, in the opinion of the MAA-NLD, clearly mean an improvement to the performance and training capabilities of the device altogether, then the MAA-NLD might accept the proposed change as an update while allowing the device to retain its original qualification level.

(c) An upgrade is defined as the raising of the qualification level of a device, or an increase in training credits, which can only be achieved by undergoing an initial qualification according to the latest applicable requirements.

(d) As long as the qualification level of the device does not change, all changes made to the device should be considered to be updates pending approval by the MAA-NLD.

(e) An upgrade, and consequent initial qualification according to the latest applicable requirements, is only applicable when the organisation requests another qualification level (recategorisation) for the FSTD.

(f) The application for a change, including appropriate extracts from the QTG indicating proposed amendments should be submitted to the MAA-NLD. This application should be submitted no later than 30 days before the date of intended change, unless otherwise agreed with the MAA-NLD.

GM FSTD.230 Changes to the qualified FSTD

Qualification of new technology or systems

Where an update to an FSTD involves a change of technology or the addition of a new system or equipment that is not covered by the qualification basis used for the existing qualification, an evaluation of such changes may not be possible using this original qualification basis. For these cases, the specific changes can be qualified by using newer Certification Specifications, new AMCs or alternative means of compliance, that apply to these changes, without affecting the overall qualification of the FSTD. This approach should be documented.

AMC FSTD.240 Record-keeping

FSTD records

(a) FSTD records to be kept should include the following, for the lifetime of the device:
  (1) the master QTG (MQTG) of the initial evaluation;
  (2) the qualification certificate of the initial evaluation; and
  (3) the initial evaluation report.

(b) FSTD records to be kept should include the following, for a period of at least 5 years (in paper or electronic format):
  (1) recurrent QTG runs;
  (2) recurrent evaluation reports;
  (3) reports of internal functions and subjective testing;
  (4) technical log;
  (5) audit schedule;
  (6) evaluation programme;
  (7) management evaluation reports;
  (8) obsolete procedures and forms.

AMC FSTD.305 Qualification basis

(a) As basis for FSTD qualification the following data can be used for performance comparison (in order of preference):
  (1) flight test data;
  (2) flight manual data;
  (3) engineering analysis;
  (4) subjective opinion by expert(s).

(b) International Civil Aviation Organisation (ICAO) Doc 9625 'Manual of Criteria for the Qualification of Flight Simulators', provides a means to evaluate an FSTD. This document is acceptable to the MAA-NLD.

FINAL CLAUSES

The Hague, 20 October 2021

For the Minister of Defence,
The Director Military Aviation Authority – The Netherlands,

J.P. Apon,
Air Commodore