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European Union Aviation Safety Agency

# Introduction to the new CS-FSTD


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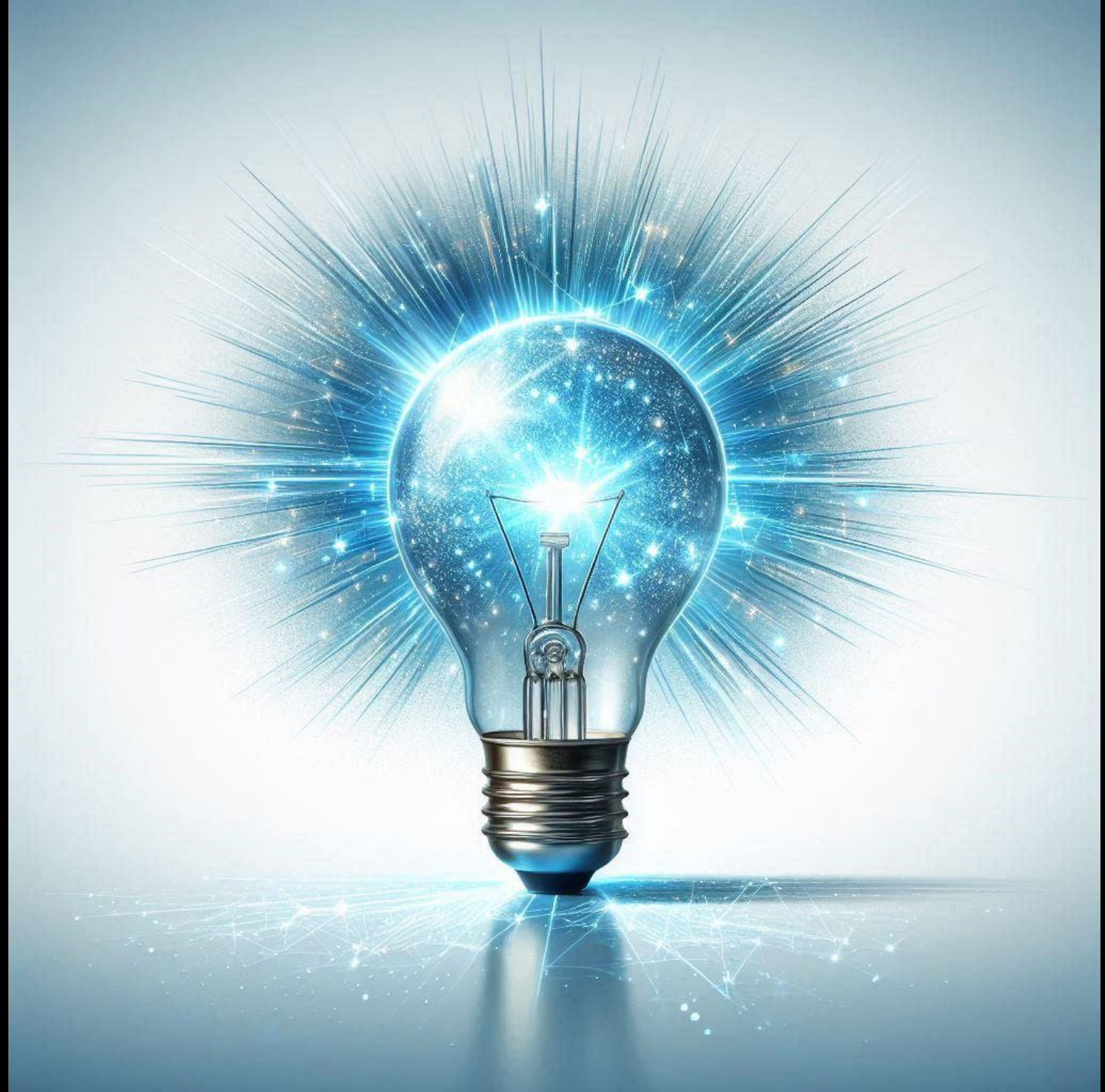

| | Features in NPA 2020-15 |
|---|---|
| 1. | Flight deck layout and structure |
| 2 | Flight model (aero and engine) |
| 3 | Ground handling |
| 4 | Aeroplane systems |
| 5 | Flight controls and forces |
| 6 | Sound cues |
| 7 | Visual cues |
| 8 | Motion cues |
| 9 | Environment – ATC |
| 10 | Environment – Navigation |
| 11 | Environment – Weather |
| 12 | Environment – Aerodromes and terrain |

| | Features in CS-FSTD |
|---|---|
| 1. | Flight Deck Layout And Structure |
| 2 | Flight Controls Forces And Hardware |
| 3 | Flight Control Systems Operation |
| 4 | Aircraft Systems |
| 5 | Performance And Handling - On Ground (GND) |
| 6 | Performance And Handling - In Ground Effect (IGE) |
| 7 | Performance And Handling - Out Of Ground Effect (OGE) |
| 8 | Sound Cueing |
| 9 | Vibration Cueing |
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**S - Specific**

**R - Representative**

**G - Generic**


**N - None**

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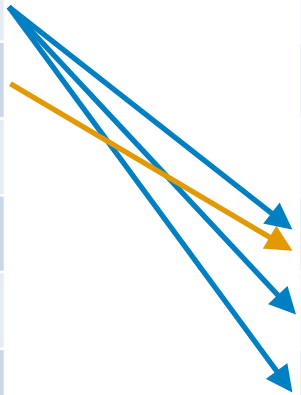

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# Major differences to NPA 2020-15

| | | | FSTD features | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Aircraft | | | | | Cueing | | | Environment | | | |
| FSTD type | FSTD level | ICAO equivalent type | Flight deck layout and structure | Flight model (aero and engine) | Ground handling | Aeroplane systems | Flight controls and forces | Sound cues | Visual cues | Motion cues | Environment — ATC (*) | Environment — Navigation | Environment — Atmosphere and weather | Environment — Aerodromes and terrain |
| FFS | D | VII | S | S | S | S | S | S | S | S | S | S | R | R |
| FTD | B | V | S | S | S | S | S | R | R | N | G | S | R | R |
| | A | N/A | G | R | G | S | G | G | N | N | N | S | G | N |
| FNPT | E | VI | R | R | R | R | R | R | S | R | S | S | R | R |
| | D | IV | R | G | G | R | G | G | G | N | G | S | G | R |
| | C | III | R | R | R | R | R | G | R | N | N | S | G | G |
| | B | II | G | G | G | R | G | G | G | N | G | S | G | G |
| | A | I | R | R | R | R | R | G | R | N | N | S | G | R |
| | | | FSTD feature fidelity levels | | | | | | | | | | | |

CS-FSTD does not use FSTD types (FFS, FTD or FNPT).

CS-FSTD uses only the FCS concept, i.e. G, R and S for the features.

# Major differences to NPA 2020-15

| FEATURE GENERAL REQUIREMENTS | | FEATURE FIDELITY LEVEL | | | COMMENTS |
|---|---|---|---|---|---|
| | | G | R | S | |
| 12 | ENVIRONMENT – AERODROMES AND TERRAIN | | | | |
| 12.S | *Reserved for future use- N/A.* | | | ✓ | |
| 12.R | Specific airport models with topographical features to support the intended use.<br>Correct terrain modelling, runway orientation, markings, lighting, dimensions and taxiways. Visual terrain and enhanced ground proximity system (EGPWS) databases should be matched to support training to avoid controlled flight into terrain (CFIT) accidents.<br>Where the device is required to perform low-visibility operations, at least one airport scene with functionality to support the required approval level, e.g. low-visibility taxi route with marker boards, stop bars, runway guard lights plus the required approach and runway lighting.<br>Airport details must be developed using airport pictures, construction drawings, maps, or other similar data, or developed in accordance with published regulatory material. | | ✓ | | Note. The requirements should be read in conjunction with CS FSTD(A).FST.105, paragraph 12 (Visual system function and subjective tests) to fully understand the details to be provided. |
| 12.G | Generic airport models with topographical features to support the intended use.<br>Correct terrain modelling, runway orientation, markings, lighting, dimensions and taxiways. | ✓ | | | Note. The requirements should be read in conjunction with CS FSTD(A).FST.105, paragraph 12 (Visual system function and subjective tests) to fully understand the details to be provided. |

CS-FSTD uses G, R and S for <u>every</u> feature.

The requirements for fidelity levels are different between NPA 2020-15 and CS-FSTD.

# Major differences to NPA 2020-15

Specific level ≈ Today's FFS

Generic level > Today's FNPT II

# Major differences to ICAO Doc 9625

| TESTS | | TOLERANCE | FLIGHT CONDITIONS | FEATURE FIDELITY LEVEL | | | RELEVANT FEATURES |
|---|---|---|---|---|---|---|---|
| | | | | G | R | S | |
| 1. | PERFORMANCE | | | | | | |
| 1.a | TAXI | | | | | | |
| 1.a.1 | Minimum radius turn. | ± 0·9 m (3 ft), or<br>± 20 % of aeroplane turn radius. | Ground | | | ✓ | FLT<br>GND<br>SYS<br>FCF |
| 1.a.2 | Rate of turn versus nosewheel steering angle (NWA). | ± 10 %, or<br>± 2°/s turn rate. | Ground | | | ✓ | FLT<br>GND<br>SYS<br>FCF |

CS-FSTD does not require the same fidelity levels because it limits the number of possible FCSs.

# Major differences to ICAO Doc 9625

| FEATURE GENERAL REQUIREMENTS | | FEATURE FIDELITY LEVEL | | |
|---|---|---|---|---|
| | | G | R | S |
| **5.** | **FLIGHT CONTROLS AND FORCES** | | | |
| 5.S | Control forces and control travel should correspond to those of the aeroplane to support the intended use.<br>Control displacement should generate the same effect as the aeroplane under the same flight conditions.<br>Control feel dynamics should replicate the aeroplane simulated. | | | ✓ |

CS-FSTD isolates the features carefully.

For example, CS-FSTD considers flight controls as *inputs* to the flight model (i.e. control position vs. surface deflection). Flight model then *generates the effect* of the control displacement.

# Major differences to ICAO Doc 9625

CS-FSTD merges aeroplane and rotorcraft requirements into one document.

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# Subpart A – General

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# CS-FSTD Subpart A

## CS FSTD.GEN.001 Applicability

(a) This certification specification (CS-FSTD) is intended to be applicable for the initial qualification of all fixed wing and rotary wing aircraft Flight Simulation Training Devices (FSTDs).

## GM1 CS FSTD.GEN.001 Guidance on the use of CS-FSTD

(a) The structure and suggested use of this certification specifications (CS-FSTD) are the following:

(1) Based on training needs identified in compliance with relevant regulations (e.g. Part-FCL), an applicable FSTD Capability Signature (FCS) is identified. This applicable FCS is used in order to determine the applicable requirements, as explained below.

(2) The applicable FCS is used to define:

(i) The applicable FSTD general requirements. See Subpart B.

(ii) The necessary design and validation data roadmap (VDR). Note that CS-SIMD under OSD may be applicable. See Subpart C.

(iii) The applicable objective tests. See Subpart D.

(iv) The applicable functions and subjective tests. See Subpart E.

(v) Any other applicable requirements. See Subpart F.

(b) Requirements on the application process, testing of the FSTD and associated documentation are further described in Part-ORA.

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# Subpart B – Qualification basis

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# CS-FSTD Subpart B

## CS FSTD.QB.010 Requirements for an FCS

(b) This CS gives criteria for fidelity levels G, R and S for each feature. To gain a certain level for a certain feature, all the requirements in this CS and in its subparts applicable to that level shall be fulfilled. As an exception, the individual aircraft systems may be at different fidelity levels which again affects the Aircraft Systems feature in the FCS. The documentation of the FSTD shall clearly define the fidelity level of each applicable aircraft system.

Basic principle: <u>All</u> the requirements shall be fulfilled. There is no '*almost S*' level.

# CS-FSTD Subpart B

## GM1 CS FSTD.QB.010 Requirements for an FCS

(c) The Aircraft Systems may have individual systems modelled at different fidelity levels. For example, the flight management and auto-flight systems of an FSTD may be at specific level, while the pressurisation system is only at representative level. The aircraft systems cannot always be treated in isolation since they often integrate with other systems. This may result in having to alter some of the aircraft systems in order to have a proper integration of aircraft systems in the FSTD. As an example, the flight management system (FMS) and flight director (FD) system may be integrated in the real aircraft and consequently the integration of these in the FSTD may not be achieved if one of them is at the Generic fidelity level while the other one is at the Specific level.

(d) Individual features and their fidelity levels cannot be treated in isolation. The training device will be used in an integrated manner and certain features may have a dependency upon other features for integrated operation. The features and systems should operate and correspond appropriately, meaning that for example a TCAS traffic shown on the flight deck display should appear correspondingly in the visual system, if a visual is fitted.

Guidance material explains that features and systems can't be considered in isolation.
The integrated FSTD shall make sense.

# CS-FSTD Subpart B

## CS FSTD.QB.020 Statements of justification

(a) All the general requirements included in this subpart shall be presented by the organisation operating the FSTD in Statements of Justification (SoJ).

‘Statements of Justification’ replace the old ‘Statements of Compliance’.

# CS-FSTD Subpart B

## CS FSTD.QB.102 FSTD general requirements for Flight Control Forces and Hardware (CLH)

**2: FLIGHT CONTROL FORCES & HARDWARE**

Defines the physical, flight controls appearance, travel, tactile feel, and force feedback operation.

Note: Primary flight controls are the controls that are required for immediate control of the aircraft. For a typical aeroplane, typically identified as column, wheel, pedal, engine/thrust control levers (e.g. throttles, propeller levers, etc.), tiller and toe brakes. For a typical helicopter, identified as cyclic, collective and pedals.

Note: The individual flight controls may be at different fidelity levels (N/G/R/S).

The general requirements for the Flight Control Forces and Hardware feature are presented in the table below (where hardware is fitted).

| 2: FLIGHT CONTROL FORCES & HARDWARE | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| FEATURE GENERAL REQUIREMENTS | | FEATURE FIDELITY LEVEL | | | VERIFICATION & VALIDATION | | |
| | | G | R | S | QTG (A) | QTG (H) | F&S |
| 2.1 | PRIMARY CONTROL FORCES AND TRAVEL | | | | | | |
| 2.1.1 | Primary flight controls shall be fitted that are characteristic in appearance and tactile feel of the simulated aircraft type and variant.<br><br>Primary flight controls forces and travel shall react in the same manner as in the simulated aircraft type and variant under the same flight and system conditions throughout the flight envelope. | | | ✓ | 2.a | 2.a | ✓ |

# CS-FSTD Subpart B

## GM1 CS FSTD.QB.102 FSTD general requirements for flight control forces & hardware

Summaries of the fidelity levels for the Flight Control Forces and Hardware feature are presented in the table below. These summaries are provided for guidance.

| 2: FLIGHT CONTROL FORCES & HARDWARE |
| --- |
| Specific:<br>Flight controls appearance, tactile feel, forces and travel replicate the simulated aircraft throughout the flight envelope. |
| Representative:<br>Flight controls appearance, tactile feel, forces and travel are characteristic of the simulated aircraft throughout the flight envelope. |
| Generic:<br>Flight controls appearance, tactile feel, forces and travel are characteristic of the simulated aircraft class or group. Flight control forces do not have to change as flight conditions such as configuration or airspeed changes. |

Immediately below the general requirement, there is a guidance material explaining the high-level contents.

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# Subpart C – Engineering justification

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# CS-FSTD Subpart C

## CS FSTD.ENG.010 Engineering Report

This section provides standards for the Engineering Report (ER), which justifies the data and methods used to design and verify an FSTD against the requirements in this CS. The ER is required for all FSTDs, regardless of fidelity level, and shall be part of the MQTG.

Refer to CS FSTD.ENG.015 for a description of acceptable sources of validation data for each feature fidelity level.

CS-FSTD requires a VDR and ER for all the FSTDs.

# CS-FSTD Subpart C

Sources marked (✔) should be used sparingly, as they may lack the necessary fidelity or level of detail for assessing tolerances. Where a check mark is not listed, the type of validation data may be used as a secondary source to support the Engineering Report justification.

| Validation Data source | G | R | S | Comments |
|---|---|---|---|---|
| Flight Test Data | ✔ | ✔ | ✔ | Conventional flight test program |
| Published Performance Data | ✔ | ✔ | ✔ | AFM and RFM charts, OEM performance calculators, etc. |
| Engineering Simulation Data | ✔ | ✔ | ✔ | Refer to CS FSTD.ENG.030 |
| Predictive and Theoretical Data | ✔ | ✔ | (✔) | Permissible for S in isolated cases, with proper rationale |
| FSTD Qualification Baseline Data | ✔ | (✔) | (✔) | Permissible for S in isolated cases, with proper rationale |
| Alternative Flight Test Data | ✔ | ✔ | | Limited-scope flight test program |
| FAA Alternative Data for FTDs | ✔ | (✔) | | Refer to 14 CFR Part 60 Appendix B |
| Public Domain Data | ✔ | (✔) | | |
| Aircraft Certification Specifications | ✔ | (✔) | | |
| Approved Subjective Development (i.e. footprint data) | ✔ | (✔) | | |

The CS-FSTD clearly specifies which validation data sources are acceptable.

# CS-FSTD Subpart C

Table 7. Excerpt of an imaginary VDR for an FSTD simulating a single-engine piston aeroplane with the feature 'Performance and Handling - Out of Ground Effect' at Generic (G) fidelity level.

| Test No | Test name | Validation data source | | | | | Additional information on the validation data source. Detailed justification is presented in the Engineering Report. |
|---|---|---|---|---|---|---|---|
| | | Flight test data | AFM | Public domain data | CS-23 | Subj devel | |
| 2.c.8 | Approach-to-stall characteristics for 2nd segment climb (normal climb and power-on stall event), cruise (straight and turning flight), landing | ✔ | ✔ | | | | FSTD manufacturer's flight test in real aircraft (Cessna 172, registration PH-ISH) for time-history data. Stall speed data also validated by Cessna 172 AFM data. |
| 2.c.9 | Phugoid dynamics | | | ✔ | | | Time-history data from NASA Document ID 19660030615 Figure 19b. |
| 2.c.10 | Short period dynamics | | | | ✔ | ✔ | Footprint method is used. Subjective development was performed to fulfil requirements in CS 23.2145 for stability. |
| 2.d.1 | Minimum control speed, air (Vmca) | | | | | | Not applicable to a single engine aircraft. See rationale #2. |
| 2.d.2 | Roll response rate | | | | ✔ | ✔ | Footprint method is used. Subjective development was performed to fulfil requirements in CS 23.157 for roll rate. |

The CS-FSTD gives guidance on the new requirements.

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# Subpart D – Objective tests

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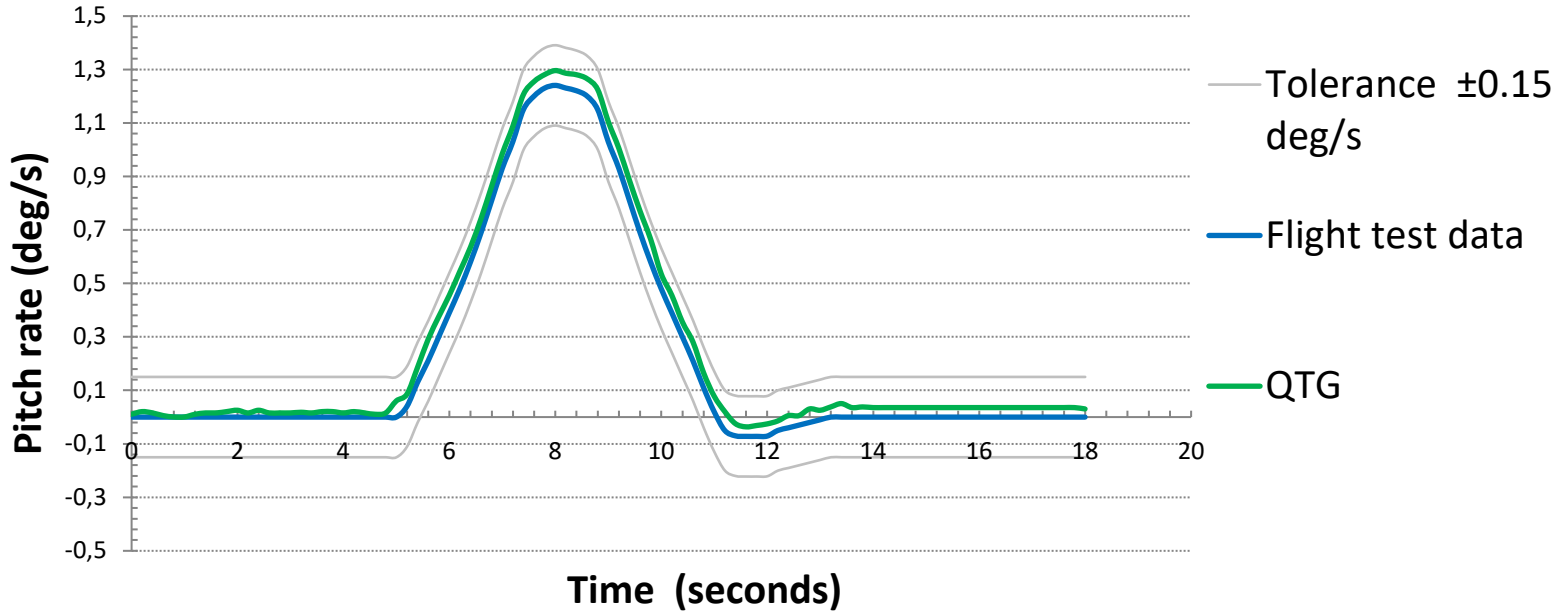
# CS-FSTD Subpart D

**CS FSTD.QTG.005 Definition of applicable objective tests**

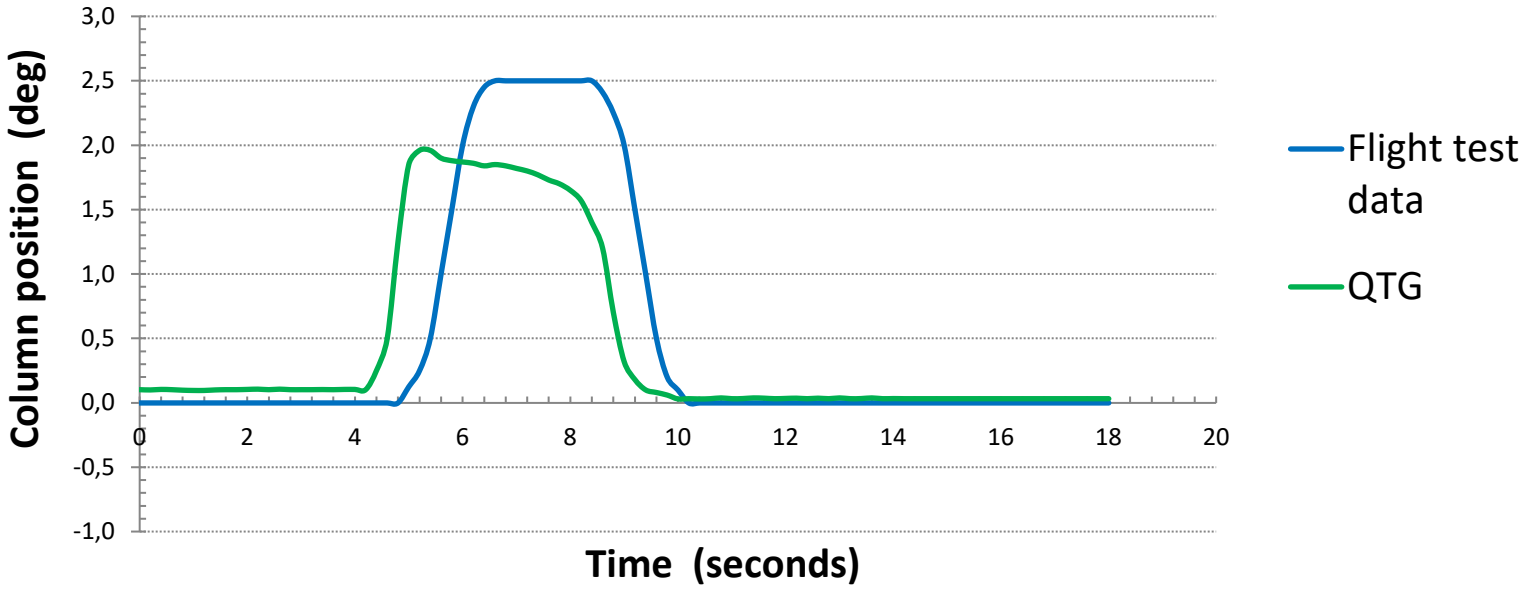
(d) The primary feature validated by a test as defined in the tables of objective tests is dependent on other FSTD features being modelled to a sufficient level of simulation detail to support validation of the primary feature fidelity level. In the case where FSTD features that interact and contribute to the objective test result are simulated at the same fidelity level, the test shall be within the applicable tolerances. In cases where some FSTD features are modelled at lower fidelity levels, the simulation detail may not be sufficient to achieve an objective test result within the applicable tolerances. In such cases, the simulation of those supporting features shall be enhanced (e.g. through the use of higher fidelity design data, or enhanced simulation etc.) to improve the objective test result to be within the applicable tolerances. Note that enhancement of an FSTD feature will not affect the FCS unless all requirements for the higher fidelity level of the enhanced feature are met.

Features may be at different levels, but simulation has to be enhanced if the tests are not in tolerances due to features at different levels.

# CS-FSTD Subpart D




Tolerances are on the *output*.
But the *inputs* must match too.



# CS-FSTD Subpart D

## GM1 CS FSTD.QTG.020 Conducting objective tests

(a) Initial qualification

(1) Principles of test inputs affecting test outputs

(i) For any objective test, demonstration that the test inputs used for setting up initial conditions and any further snapshots, or for driving pilot controls either open or closed loop throughout a time history, show an appropriate match to the validation data is fundamental in being able to reliably assess the FSTD outputs.

Tolerances are on the *output*.
But the *inputs* must match too.

# CS-FSTD Subpart D

## CS FSTD.QTG.A.200 Handling Qualities Static Control Checks - Aeroplane

This CS provides standards of the objective tests for aeroplane static control checks.

| 2.a: Handling Qualities Static Control Checks | | Test Conditions | Tolerance Parameter | Primary Feature(s) Validated | Tolerances | | |
|---|---|---|---|---|---|---|---|
| | | | | | G | R | S |
| 2.a.1 | Pitch controller position versus force and surface position calibration | Ground | Breakout force | CLH | | Init: CT&M<br>Rec: ±0.9 daN (2 lb) | Init: ±0.9 daN (2 lb)<br>Rec: same as Init |
| | | | Force | CLH | | Init: CT&M<br>Rec: ±2.2 daN (5 lb), or ±10% | Init: ±2.2 daN (5 lb), or ±10%<br>Rec: same as Init |
| | | | Elevator angle | CLO | | Init: CT&M<br>Rec: EM | Init: ±2°<br>Rec: EM |
| | Pitch controller position versus force | Approach | Breakout force | CLH | Init: CT&M<br>Rec: ±0.9 daN (2 lb) | | |
| | | | Force | CLH | Init: CT&M<br>Rec: ±2.2 daN (5 lb), or ±10% | | |

# CS-FSTD Subpart D

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# CS-FSTD Subpart D

If the ‘Flight control forces and hardware’ (**CLH**) and ‘Flight controls systems operation’ (**CLO**) features are at level **G**, the upper test is not applicable. But the lower is applicable.

## CS FSTD.QTG.A.200 Handling Qualities Static Co

This CS provides standards of the objective tests for aeroplane static co

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| | | | Elevator angle | CLO | | Init: CT&M<br>Rec: EM | Init: ±2°<br>Rec: EM |
| | Pitch controller position versus force | Approach | Breakout force | CLH | Init: CT&M<br>Rec: ±0.9 daN (2 lb) | | |
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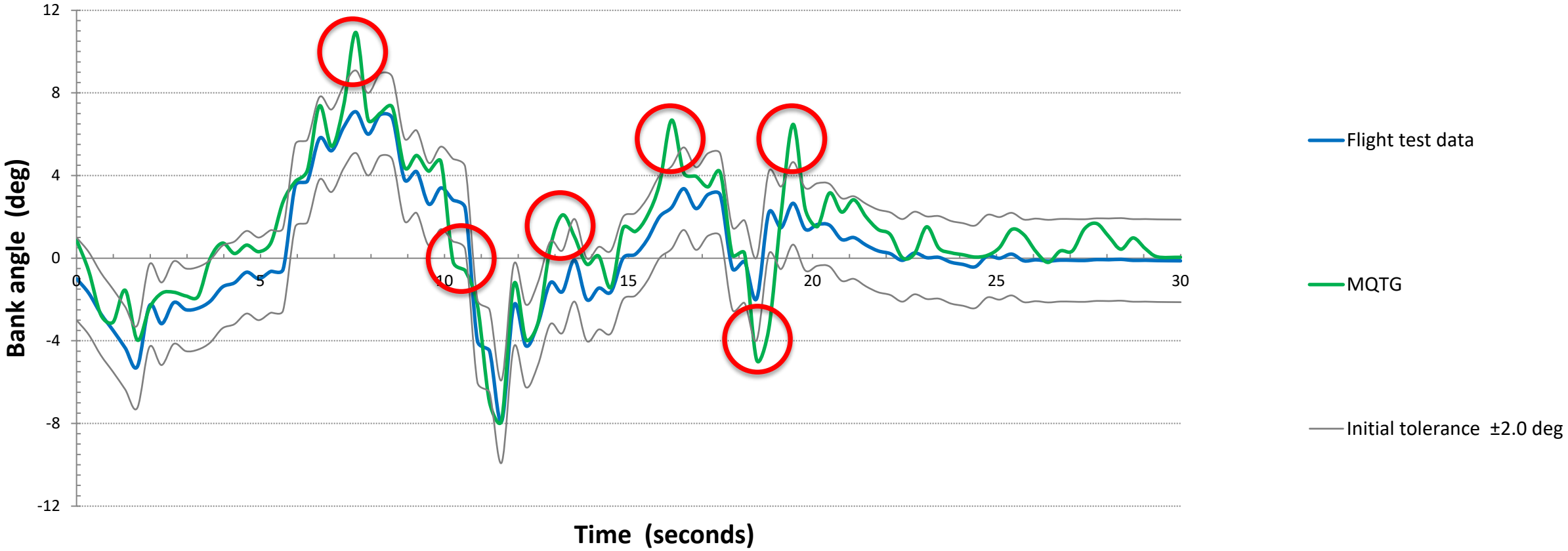
# CS-FSTD Subpart D



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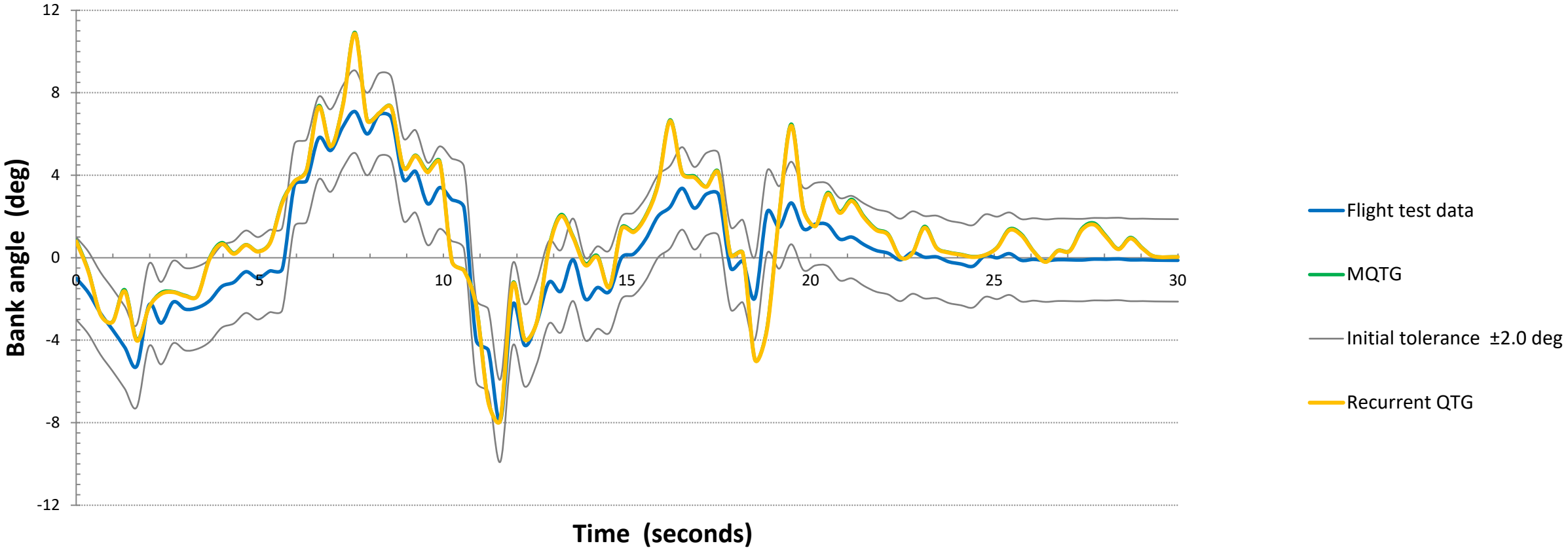
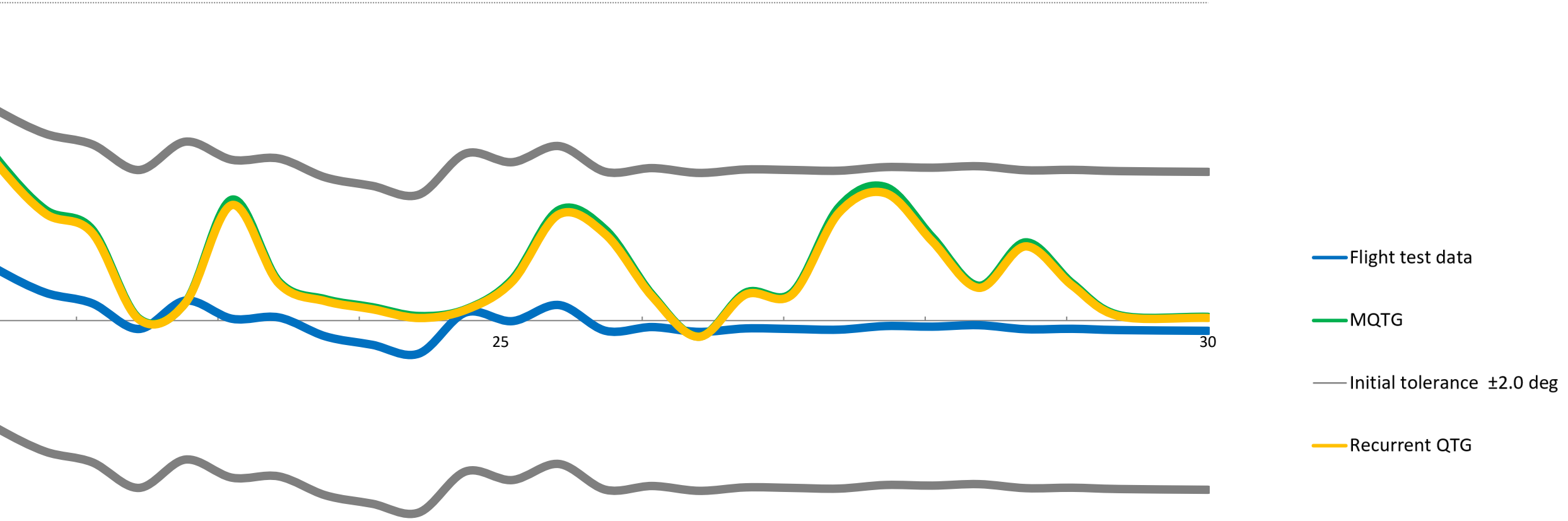



Recurrent QTG shows an Essential Match to the MQTG.

# CS-FSTD Subpart D




Recurrent QTG shows an Essential Match to the MQTG.

# CS-FSTD Subpart D

## CS FSTD.QTG.A.200 Handling Qualities Static Control Checks - Aeroplane

This CS provides standards of the objective tests for aeroplane static control checks.

| 2.a: Handling Qualities Static Control Checks | | Test Conditions | Tolerance Parameter | Primary Feature(s) Validated | Tolerances | | |
|---|---|---|---|---|---|---|---|
| | | | | | G | R | S |
| 2.a.1 | Pitch controller position versus force and surface position calibration | Ground | Breakout force | CLH | | Init: CT&M<br>Rec: ±0.9 daN<br>(2 lb) | Init: ±0.9 daN<br>(2 lb)<br>Rec: same as Init |
| | | | Force | CLH | | Init: CT&M<br>Rec: ±2.2 daN<br>(5 lb), or ±10% | Init: ±2.2 daN<br>(5 lb), or ±10%<br>Rec: same as Init |
| | | | Elevator angle | CLO | | Init: CT&M<br>Rec: EM | Init: ±2°<br>Rec: EM |
| | Pitch controller position versus force | Approach | Breakout force | CLH | Init: CT&M<br>Rec: ±0.9 daN<br>(2 lb) | | |
| | | | Force | CLH | Init: CT&M<br>Rec: ±2.2 daN<br>(5 lb), or ±10% | | |

# CS-FSTD Subpart D

(a) Requirements for all the aeroplane static control checks:

| 2.a: Handling Qualities Static Control Checks | Test requirements |
|---|---|
| All static control checks | 1. Plots of **pitch, roll and yaw controller position versus force and time shall be measured at the control.**<br>a. An alternative method in lieu of external test fixtures at the flight controls is to have recording and measuring instrumentation built into the FSTD. The force and position data from this instrumentation shall be directly recorded and matched to the aeroplane data.<br>b. Provided the instrumentation was verified by using external measuring equipment while conducting the static control checks, or equivalent means, and that evidence of the satisfactory comparison is included in the QTG, the instrumentation could be used for both initial and recurrent testing for the measurement of all required control checks. |

(b) Individual Test Requirements: The individual test requirements defined in the table below are applicable to all fidelity levels unless otherwise stated.

| 2.a: Handling Qualities Static Control Checks | | Test requirements |
|---|---|---|
| 2.a.1 | Pitch controller position versus force and surface position calibration | 1. Uninterrupted control sweep to stops over approximately 100 s.<br>2. Test results shall be validated from in-flight data from tests such as longitudinal static stability, stalls, etc. |
| | Pitch controller position versus force | 1. The test shall validate aerodynamic effects on controls.<br>2. For aeroplanes with reversible flight controls, the test will need to be run at a suitable airspeed condition. |

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# Subpart E – Functions & subjective testing

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# CS-FSTD Subpart E

## GM1 CS FSTD.FST.005 Testing methods

(a) The FCS may have features with different fidelity levels. It is important that the organisation and the individuals testing the FSTD understand the applicable general requirements for the requested FCS. The general requirements indicate what is expected from the simulation. Each feature must be assessed and tested to ensure that the device complies with the general requirements for that feature. But also the interaction and integration of the features must be assessed for every functions and subjective test item.

Greater flexibility requires a deeper understanding from the FSTD organization.

# CS-FSTD Subpart E

## CS FSTD.FST.010 Table of applicable functions and subjective tests

This CS defines the procedure to be used for the determination of the functions and subjective tests applicable to an FSTD.

(a) The organisation operating the FSTD shall prepare a functions and subjective testing table applicable for the FSTD. The table shall include all applicable test items to demonstrate compliance with Subpart B.

(b) For any FSTD, the organisation operating the FSTD shall prepare a table of functions and subjective tests by the following steps:

(1) Start with the table in CS FSTD.FST.100;

(2) Remove the tests that are not applicable for the simulated aircraft or for the requested FCS;

(3) Expand the list of tests to cover all the applicable general requirements in Subpart B for the requested FCS;

(4) Expand the list of tests to cover the Aircraft Systems operation;

(5) If applicable, expand the list for additional features and capabilities (CS FSTD.QB.017) of the FSTD;

(6) If applicable, expand the list of tests to cover the training areas of specific emphasis (TASE) as applicable to the simulated aircraft and presented in the Operational Suitability Data (OSD) Report; and

(7) If applicable, add any items covered by Special Conditions.

(c) If the FSTD has a missing function or capability based on the simulated aircraft and FCS, a rationale shall be provided.

Operators create their own F&S tables.

# CS-FSTD Subpart E

## GM1 CS FSTD.FST.010 Table of applicable functions and subjective tests

(g) Examples on cases where functions and subjective test items of CS FSTD.FST.100 are not applicable:

(1) If the feature 'Motion Cueing' is at level N, then the motion testing is not applicable.

(2) If the FSTD does not have flight control hardware (i.e. feature 'Flight Controls Hardware' is at level N), then the items requiring manual flying are not applicable.

(3) If the FSTD simulates a single-engine aircraft, then the items applicable only to multi-engine aircraft are not applicable.

(4) If the FSTD does not have an autopilot, then items related to the use of autopilot are not applicable.

(5) If the FSTD is not equipped with a TCAS system, then TCAS tests are not applicable.

(6) If the installed avionics do not support 3D RNP approaches, then tests involving this type of approach are not applicable.

(7) If the FSTD does not have the applicable equipment for CAT III approaches, then tests involving this type of approach are not applicable.

(8) If the FSTD has the feature 'Atmosphere And Weather' at a level that does not require windshear simulation, then windshear tests are not applicable.

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# Subpart F – Miscellaneous

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# CS-FSTD Subpart F

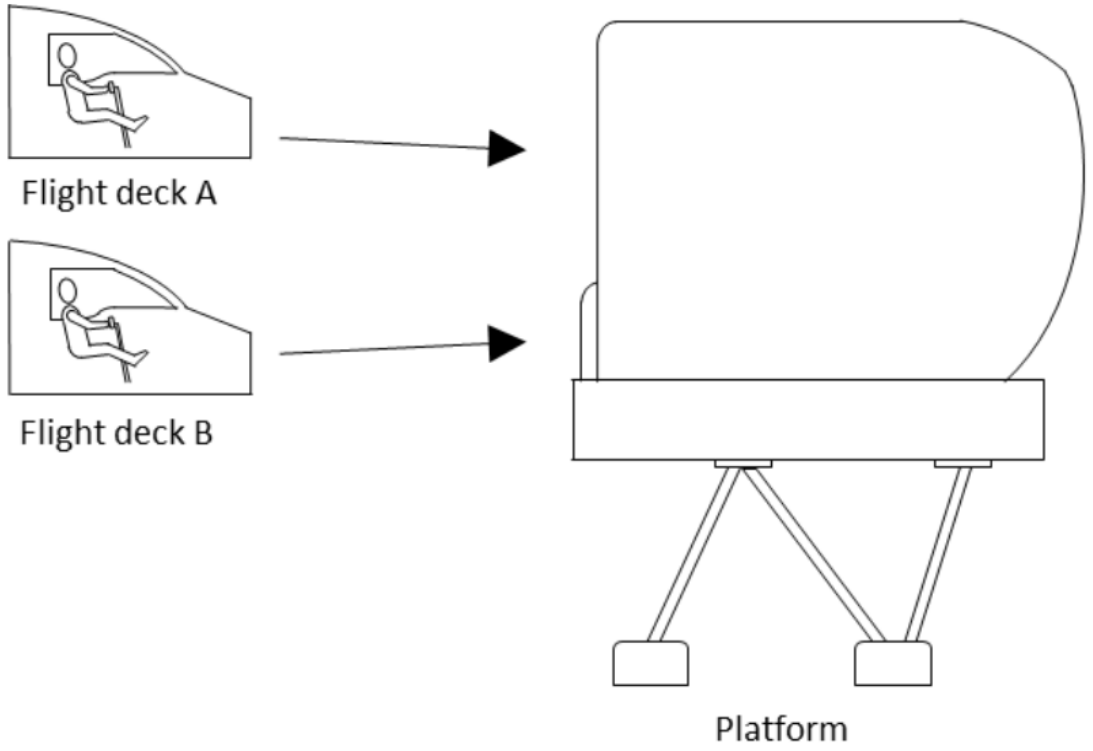


Figure 1: Example of a device with two interchangeable flight decks

# CS-FSTD Subpart F

## CS FSTD.MISC.050 Qualification of an FSTD with an XR System

(a) Applicability

(1) FSTDs may use a Head Mounted Display (HMD) as part of the FSTD for the use of Extended Reality (XR). XR based environments include the use of a Virtual Reality (VR) display, an Augmented Reality (AR) display, or otherwise Mixed Reality (MR) displays. Where an XR system is used, Special Conditions may be used to define adequate or appropriate standards for the FSTD as part of the Qualification Basis.

(2) Extended Reality [XR] is an encompassing term to refer to Virtual Reality, VR; Mixed Reality, MR; and Augmented Reality, AR.

(i) Virtual Reality, VR – The environment is completely represented virtually on a head mounted display (HMD).

(ii) Augmented Reality, AR – The real world element is enhanced with a virtual overlay component using a see-through head mounted display (HMD).

(iii) Mixed Reality, MR – The real environment (including camera perceived) elements and computer-generated elements are merged. Physical and virtual content are presented to the observer on a head mounted display. All elements may co-exist in MR and interact in real-time. (For example, the image from a head mounted camera system is presented within a virtual environment, VE).

(b) FSTD standards: The special conditions of the qualification basis shall take into account the general requirements for XR systems included in Subpart B of this CS: Flight Deck Layout And Structure (CS FSTD.QB.101), Visual Cueing (CS FSTD.QB.111) and Miscellaneous (CS FSTD.QB.115).

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