

# Extended Diversion Time Operations Workshop



Alternate

Destination

ETP1

ETP2

Departure

## Module 3

### Approval Process



ICAO

Proudly in partnership with

**AIRBUS**





**Module 1**  
Course Introduction

**Module 2**  
EDTO Foundation

**Module 3**  
Approval Process

**Module 4**  
Type Design & Reliability  
Considerations

**Module 5**  
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Considerations

**Module 6**  
Maintenance  
Considerations

**Module 7**  
Continued Surveillance

**Module 8**  
Implementing EDTO  
Regulations

**Module 9**  
Assessment

**Module 10 – Wrap Up**



*At the end of this module, participants will be able to understand the major elements of the EDTO approval process and related requirements.*

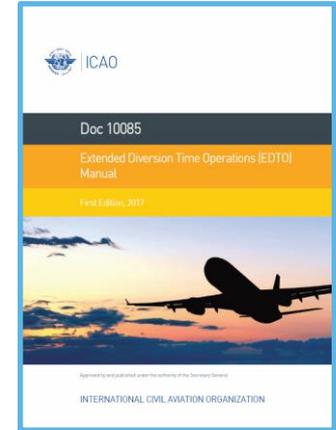
## Doc 10085: Extended Diversion Time Operations (EDTO) Manual

### Definitions

1.4 – Authorization Procedures

1.5 – Continuity of EDTO Certification

1.6 – Continuity of EDTO Authorization



The following symbol indicates a reference to the EDTO Manual throughout this module:





- Annex 6, Part 1:** Operation of Aircraft  
Chapter 1: Definitions  
**Section 4.7:** Additional requirements for operations by aeroplanes with turbine engines beyond 60 minutes to an en-route alternate aerodrome including extended diversion time operations (EDTO)
  
- Annex 8:** Airworthiness of Aircraft, Part 1. Definitions
  
- Doc 7300:** Convention on International Civil Aviation (Chicago Convention)
  
- Doc 8335:** Procedures for Operations Inspection, Certification and Continued Surveillance
  
- Doc 9734:** Safety Oversight Manual, Part A
  
- Doc 9760:** Airworthiness Manual, Part III and V
  
- Doc 10059:** Manual on the implementation of Article 83 *bis* of the Chicago Convention



**Part I** —

**EDTO Approval Major Elements**

**Part II** —

**Responsibilities of Contracting States**

**Part III** —

**EDTO Type Design Approval Process**

**Part IV** —

**EDTO Operational Approval Process**

**Part V** —

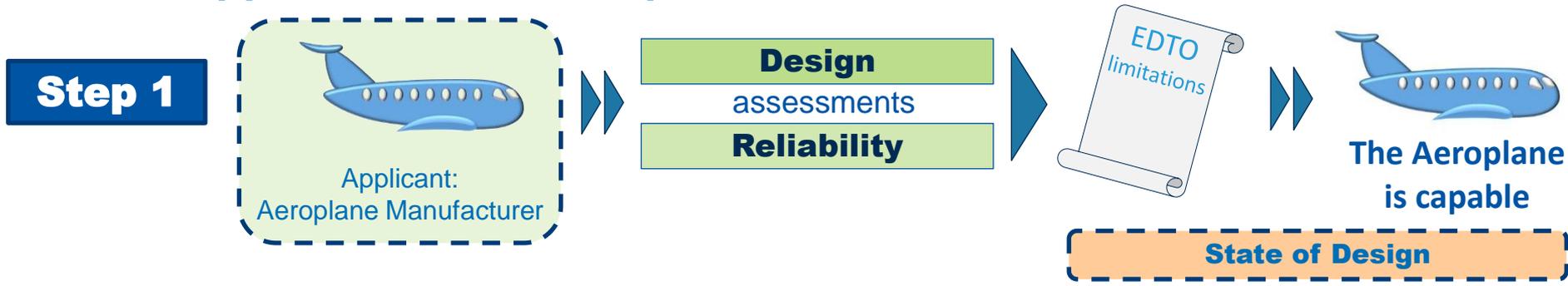
**Review Questions**

**Part VI** —

**Practical Exercise**



## EDTO Approval is a Two Step Process



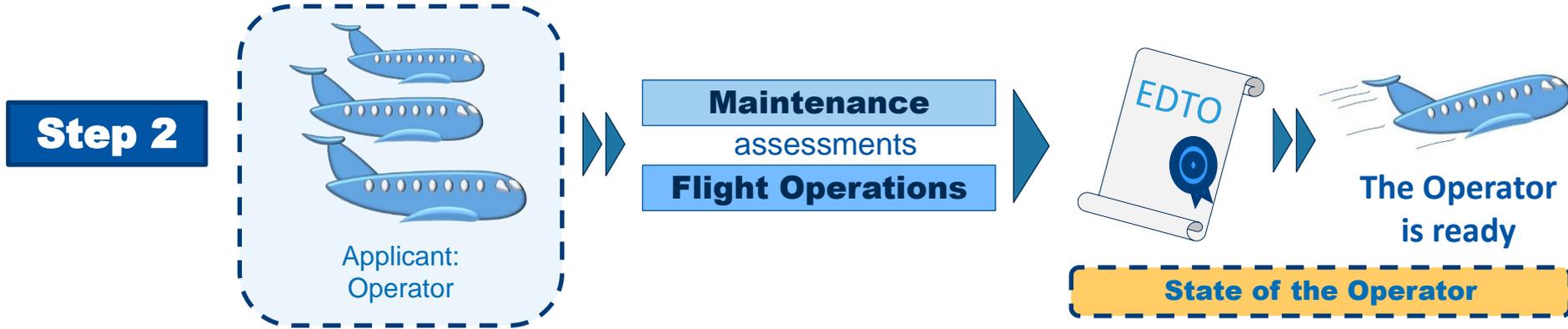
- Aeroplane manufacturers must perform a **Type Design & Reliability Assessment** of the aeroplane/engine combination for approval or validation by the Type Design Authority.

### The Aeroplane is Capable

- This step is referred to as '**EDTO Type Design Approval**' in this module and throughout the EDTO workshop to describe aeroplanes **certified** for EDTO capability



## EDTO Approval is a Two Step Process

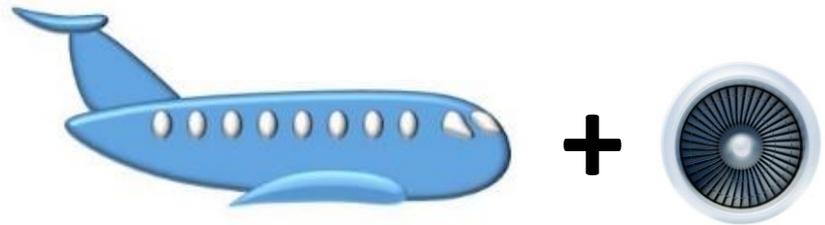


- Airline operators must apply for authorization from their local authority in order to fly EDTO routes with an **EDTO capable aeroplane/engine combination (AEC)**.

### The Airline is Ready

- This authorization constitutes a **Specific Approval** which is referred to as '**EDTO Operational Approval**' in this module and throughout the EDTO workshop.

- A combination of aeroplane model and engine model which has been identified for the purpose of EDTO certification (also called type design and reliability approval) or authorized for EDTO...
  - Substantially common minor model variants may be grouped into a single EDTO authorization or approval





## Two-step approval process supports EDTO philosophy



### PRECLUDE : Avoid the diversion



Enhanced  
**aeroplane/engine reliability standards**  
(e.g. IFSD rate)

Enhanced  
**airline maintenance practices**  
(e.g. Dual Maintenance Limitations)

### PROTECT : Ensure that the diversion is safe



Enhanced  
**aeroplane/engine design standards**  
(e.g. independent electrical sources)

Enhanced  
**Dispatch Planning**  
(e.g. EDTO Fuel Reserves, Weather)  
and **Flight Crew training and awareness**



To operate beyond EDTO Threshold, two conditions must be met:

## EDTO Type Design (AEC) Evaluation

(Certification required for Twins only)

Applicant:

**MANUFACTURER**



Annex 8 + EDTO Manual



CS 25 + AMC 20-6



FAR 25/33 + AC25XX (TBC)

**Prime Certification Authority**

+

**Validation Authorities**



## EDTO Operational Evaluation

Applicant:

**OPERATOR**



Annex 6 + EDTO Manual



AIR OPS + AMC 20-6



FAR121/135 + AC120-42B



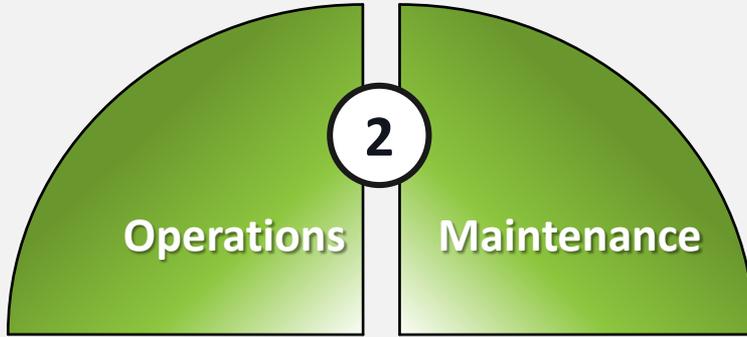
NAA Rules

**National Aviation Authority**

EDTO Type Design Evaluation must be completed **before** granting of operational approval of Operator for EDTO

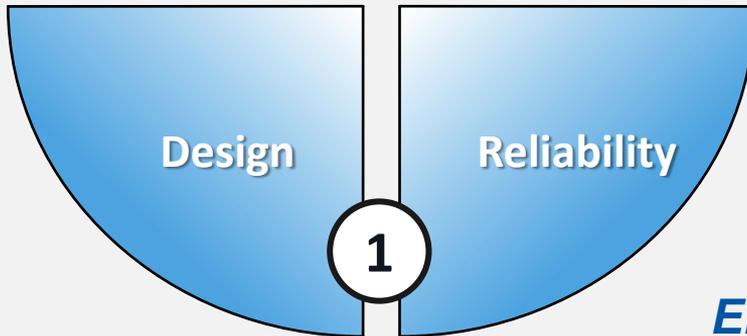


# Elements of EDTO Assessment



**Compliance demonstration:**  
**Responsibility of the Operator**

***EDTO Operational Capability Assessment***



**Compliance demonstration:**  
**Responsibility of the Manufacturer**

***EDTO Type Design & Reliability Assessment***



## • Operational Approval

- State regulations and guidance materials for EDTO operational approval are applicable at **time of operations**
- EDTO operators must comply with the latest (current) issue of applicable regulatory material for EDTO operations



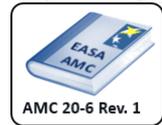
*Current*



*Current*

## • Type Design Approval

- State regulations and guidance materials for EDTO type design and reliability approval are applicable at **time of application**
- Follow-on derivative aeroplanes and/or increases in EDTO capability may be subject to later standards



*Before 2011*



*Before 2007*



Part I —	<b>EDTO Approval Major Elements</b>
<b>Part II —</b>	<b>Responsibilities of Contracting States</b>
Part III —	<b>EDTO Type Design Approval Process</b>
Part IV —	<b>EDTO Operational Approval Process</b>
Part V —	<b>Review Questions</b>
Part VI —	<b>Practical Exercise</b>



*This section provides a review of ICAO contracting State responsibilities which is not unique to EDTO, but applies equally to EDTO as with all areas of the Standards related to airworthiness determination and operational authorization.*

## Annex 6, Part 1 and Annex 8 Definitions:

**State of Design:** The State with jurisdiction over the organization responsible for the type design.

**State of Manufacture:** The State with jurisdiction over the organization responsible for the final assembly of the aircraft.

**State of the Operator:** The State where the operator's principle place of business is located or, where the operator's permanent residence is.

**State of Registry:** The State on whose register the aircraft is entered.



## Q3.1 Which ICAO State categories apply to your State?

- State of Design
- State of Registry
- State of Operator
- State of Registry & State of Operator
- All of the above



- State of Design** → Primary Responsibility for EDTO Type Design Approval and Reliability Assessment (TCDS)
- \*State of Operator** → Primary Responsibility for EDTO Operational Approval and Oversight (OpSpec)
- \*State of Registry** → Primary Responsibility for EDTO Continued Airworthiness Program Approval and Oversight and acceptance/validation of EDTO Type Design (C of A)

\* Note: When the State of Registry and State of the Operator are different, shared safety oversight responsibilities may be established and filed through an **Article 83 bis agreement**

## Article 83 *bis* - Transfer of certain functions and duties

... when an aircraft registered in a contracting state is operated pursuant to an agreement for the lease, charter or interchange of the aircraft ... by an operator who has his principle place of business... in another contracting State, the State of registry may, by agreement with such other state, transfer to it all or part of its functions and duties as State of Registry...

**The State of Registry shall be relieved of responsibility in respect of the functions and duties transferred.**

The transfer shall not have effect in respect of other contracting States before either the agreement... has been registered with the Council... or the existence and scope of the agreement have been directly communicated to the authorities of the other contracting State or States concerned

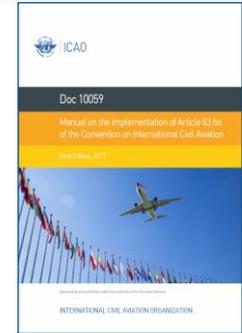


Doc 7300  
Chicago Convention



## Doc 10059, Manual on the implementation of Article 83 *bis* of the Convention on International Civil Aviation.

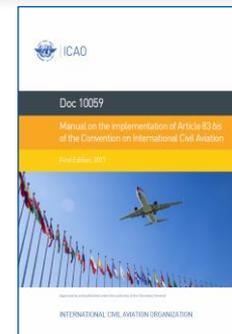
- Chapter 1. Definitions, abbreviation and overview of key terms
- Chapter 2. Rationale of Article 83 *bis*
- Chapter 3. Appropriate use of Article 83 *bis*
- Chapter 4. Preparation for negotiation of an Article 83 *bis* agreement
- Chapter 5. Content of an Article 83 *bis* agreement
- Chapter 6. Rules for registration of an Article 83 *bis* agreement
- Chapter 7. Safety oversight responsibilities
- Chapter 8. Surveillance by other States - Ramp inspections
- Chapter 9. States not party to Article 83 *bis* - implications
- Chapter 10. Responsibilities on the termination or amendment of an Article 83 *bis* agreement
- Appendices



**Doc 10059**  
**First Edition, 2017**

## Doc 10059, Appendix C. Example of record of State of Registry and State of the Operator Duties and Functions...

ICAO Annex Reference	Subject	Primary responsibility (SoR or SoO)	State of Registry (SoR) duties and functions	State of the Operator (SoO) duties and functions	Liaison scope	Liaison frequency
Annex 6, Part I, Attachment D para, 2.4	Special operations approvals	SoO	Evaluate aircraft equipment suitability, reliability and maintenance and inform SoO.	Evaluate operational procedures, qualifications and training and issue special operations approvals following verification with SoR that applicable airworthiness certification standards have been incorporated.	Coordinated evaluation between SoR airworthiness inspectors/SoO flight operations inspectors.	To be agreed between the two States.
Annex 6, Part I, para. 4.7.2.6	Extended diversion time operations (EDTO) maintenance	SoR	Issue airworthiness certification of EDTO.  Approve the EDTO maintenance programme requirements.	Issue operational approval of EDTO.  Inform SoR of propulsion system reliability.	Liaison between SoR airworthiness inspectors/SoO flight operations inspectors.	To be agreed between the two States.  To include a review of the maintenance programme and reliability reports.



**Doc 10059**  
**First Edition, 2017**

### Overview of States Safety Oversight Obligations (ICAO Doc 9734 – Safety Oversight Manual, Part A):

#### 2.3.3.1 **State of Design** Obligations

- a) It issues a **type certificate** which defines the design of an aircraft type and certifies that this design meets the appropriate airworthiness requirements of that state.
  
- b) It transmits any generally applicable information necessary for the continuing airworthiness and safe operation of the aircraft to:
  - every Contracting State which has advised the State of Design that it has entered the aircraft on it's register; and
  - any other Contracting State upon request...

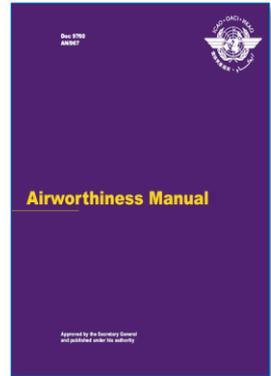


Doc 9734, Part A

### Type Certification Activities: **State of Design** (ICAO Doc 9760 – Airworthiness Manual, Part V)

2.3.1.2 There are five key activities associated with a type certification process, namely:

- a) establishing the certification basis;
- b) establishing the means or methods of compliance;
- c) demonstration and findings of compliance;
- d) certifying the type design; and
- e) post certification activities.



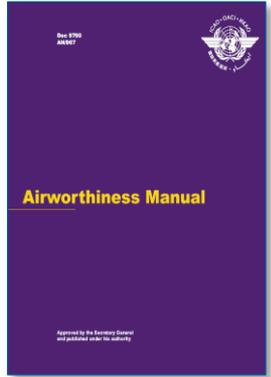
Doc 9760, Part V

### Type Certification Activities: **States other than the State of Design**

(ICAO Doc 9760 – Airworthiness Manual, Part V):

2.4: Annex 8, Part II, Chapter 3 states that the issuance, or rendering valid, a Certificate of Airworthiness, must be based on satisfactory evidence that the aeroplane complies with the design aspects of the appropriate airworthiness requirements of the **State of Registry...**

*The satisfactory evidence used by the majority of Contracting States is the Aircraft Type Certificate*



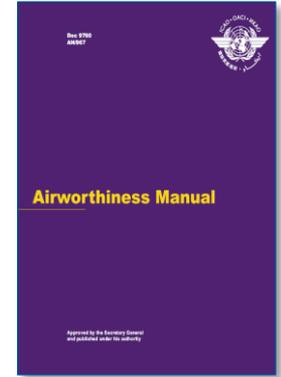
Doc 9760, Part V

### Type Certification, Validation and Acceptance (ICAO Doc 9760 – Airworthiness Manual, Part III, Chapter 4)

A Certificate of Airworthiness shall be issued by a Contracting State on the basis of satisfactory evidence that the aircraft complies with the design aspects of the appropriate airworthiness requirements.

In order to meet these requirements the **State of Registry** has to have satisfactory evidence that the design of the aircraft meets its airworthiness requirements. This can be achieved in three ways:

- a) Type certification;
- b) Type validation; or
- c) Type acceptance

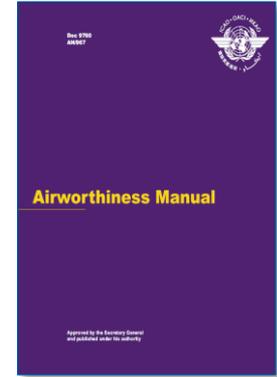


Doc 9760, Part III

### Type Certification Activities: **States other than the State of Design**

(ICAO Doc 9760 – Airworthiness Manual, Part V)

2.4 (cont'd): *It is not expected nor encouraged that States of Registry perform the same in-depth determinations of compliance that the State of Design has already done.* Instead, States are encouraged, through regulations, bilateral agreements or policy, to give maximum credit to the type certification work already done by the State of Design and, minimize duplicate or redundant testing that adds little or no value to the overall airworthiness of the aeronautical product.



Doc 9760, Part V



Q3.2: Which approach is used by your State for the import of new aeroplane types?

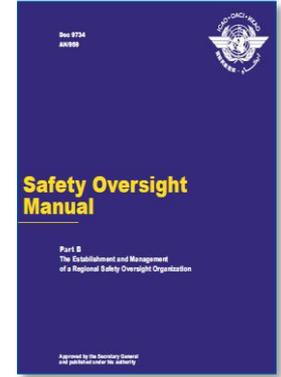
- Type Certification
- Type Validation
- Type Acceptance
- Not Sure



# Contracting State Responsibilities

## Operational Approval and Oversight

Doc 9734: Safety Oversight Manual  
Part 1, Chapter 3: 8 Critical Elements (CEs) of a Safety Oversight System



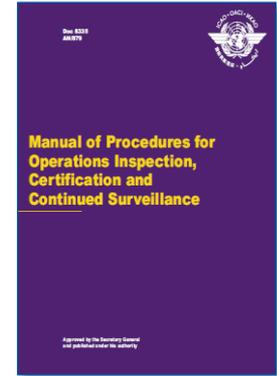
Doc 9734

Doc 8335: Manual of Procedures for Operations Inspection, Certification and Continued Surveillance

**Operations Specifications:** *The authorizations, conditions and limitations associated with the AOC and subject to the conditions in the operations manual...*

### Part III. The AOC - Application, Evaluation and Certification (5 Phase Process)

- Chapter 1. General
- 1 Chapter 2. Pre-application phase
- 2 Chapter 3. Formal application phase
- 3 Chapter 4. Document evaluation phase
- Chapter 5. Operational demonstration and inspection phase
- 4 Chapter 6. Maintenance control demonstration and inspection phase
- 5 Chapter 7. Certification phase



Doc 8335



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### ICAO Annex 6, Part 1, Section 4.7.2

#### Requirements for Extended Diversion Time Operations (EDTO)



- Two engine aeroplanes

- Paragraph 4.7.2.3(b) requires that a two engine aeroplane be '**EDTO certified**' (EDTO Type Design Approved) to conduct EDTO operations.



- Aeroplanes with more than two engines

- While some States (e.g. FAA) have elected to establish EDTO type design requirements, there are no provisions under the ICAO standards.



- All aeroplanes

- Paragraph 4.7.2.3(a) requires identification of the most limiting EDTO significant system time in the aeroplane flight manual.
- This necessitates an aeroplane capability **assessment** for EDTO



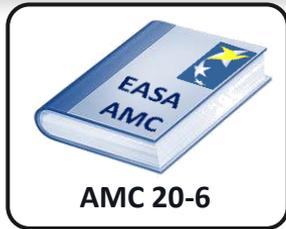
# EDTO Type Design Approval

## Two Engine Aeroplanes



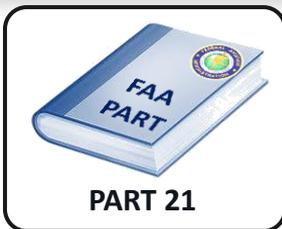
ICAO Annex 6

EDTO certification and assessment of EDTO time limited systems

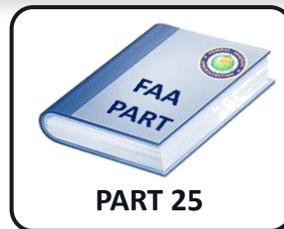


AMC 20-6

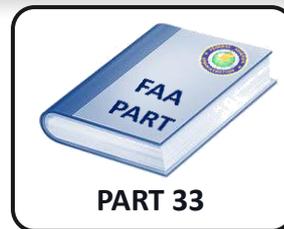
Chapter II, Type Design Approval Considerations



PART 21

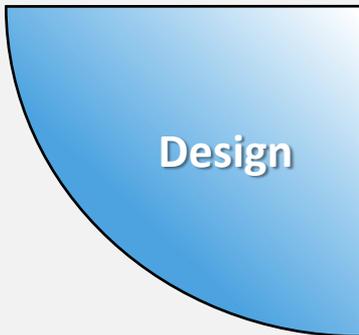


PART 25

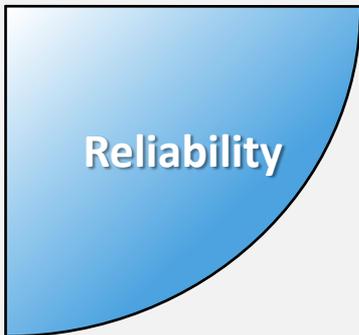


PART 33

These FAA ETOPS Certification rules have superseded AC 120-42A in 2007  
Additional guidance in new AC for Part 25 still pending



Design



Reliability

**Compliance demonstration:**  
**Responsibility of the Manufacturer**

**EDTO Type Design & Reliability Approval**



# EDTO Type Design Assessment

## Aeroplanes with More than Two Engines



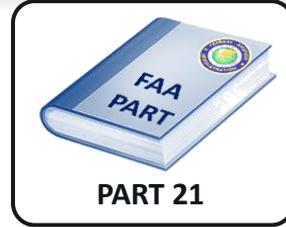
ICAO Annex 6

Assessment of EDTO time limited systems

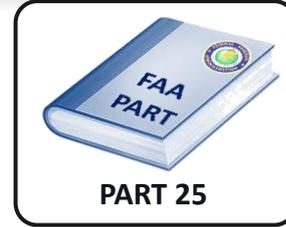


AMC 20-6

Chapter II, Type Design Approval Considerations



PART 21

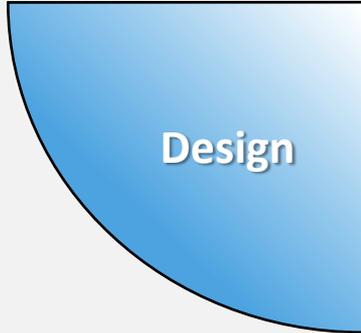


PART 25

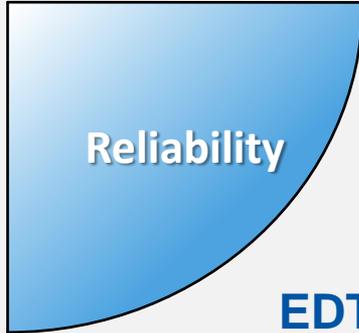


PART 33

2007 FAA ETOPS Certification rules introduced requirements for passenger aeroplanes manufactured after February, 2015



Design



Reliability

**Compliance demonstration:**  
**Responsibility of the Manufacturer**

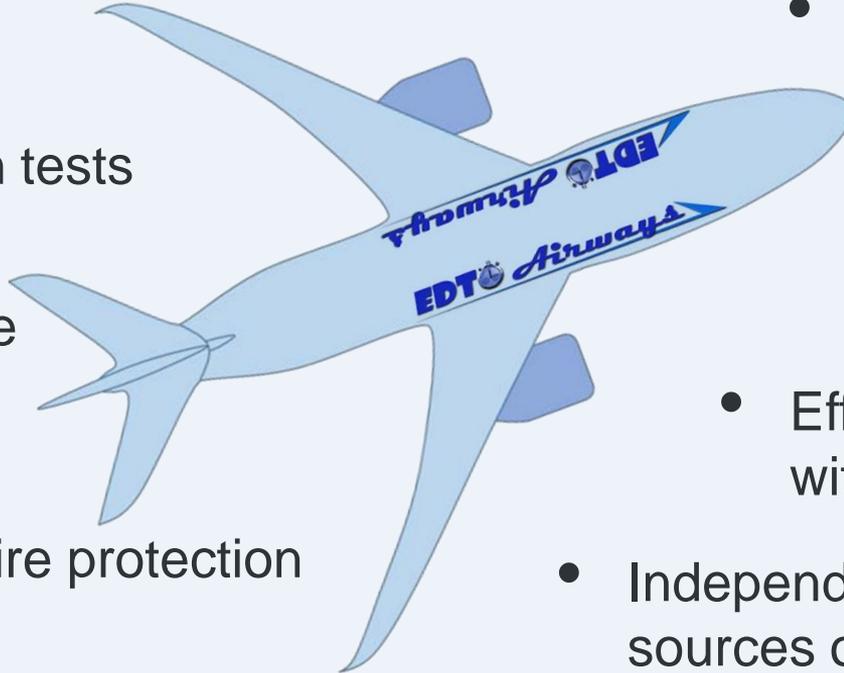
**EDTO Type Design & Reliability Assessment**



# EDTO Type Design Approval

## Two Engine Aeroplanes

- Design to fail-safe criteria
- Manufacturer demonstration tests
- In-service experience (world fleet)
- Cargo fire protection
- Fuel management
- Analysis of failure effects
- Equipment cooling
- Effect of operation with a failed engine
- Independent sources of AC power





## Basic concepts:

- EDTO type design approval is a pre-requisite to operational approval
- Each aeroplane/engine combination is approved separately
  - Approvals may be grouped by minor model series
  - Derivative airplanes require additional approval
- EDTO type design approval levels
  - Up to 180 minutes (e.g. 90, 120, 180)
  - Greater than 180 minutes (up to EDTO significant system time capability)



## Approval methods:

- Early EDTO Method
  - EDTO type design approval obtained with no or reduced service experience on the candidate aeroplane/engine combination
- Five (5) Early EDTO Process Elements:
  - Design for EDTO
  - Relevant Experience
  - Maintenance and Operations Procedures Validation
  - EDTO Testing (APU, Engine, Aeroplane)
  - Problem Tracking and Resolution



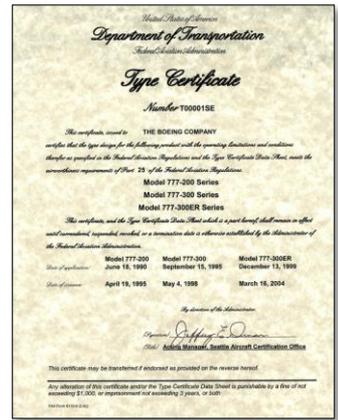
## Approval methods (cont'd):

- Service Experience Method
  - A minimum of 100,000 (EASA) or 250,000 (FAA) world fleet in-service engine hours on the candidate aeroplane/engine combination prior to EDTO approval (may be reduced with consideration for compensating factors)
- Combined Service Experience and Early EDTO Method
  - A minimum of 15,000 world fleet in-service engine hours on the candidate aeroplane/engine combination
  - +
  - Early EDTO requirements (except for some aeroplane demonstration tests)



## Substantiation Documents

- EDTO type design approval substantiation is published in three primary certification documents:
  - Aeroplane Flight Manual (AFM)
    - May be a customer option on some aeroplane models
  - Aeroplane and Engine Type Certification Data Sheets (TCDS)
  - EDTO Configuration, Maintenance and Procedures Document (CMP)





### Typical AFM Language:

<p>WonderPlanes WP-911SP+</p> <p>AEROPLANE FLIGHT MANUAL</p>	<p>APPENDICES AND SUPPLEMENTS</p> <p>EXTENDED DIVERSION TIME OPERATIONS (EDTO)</p>
--	--

The type design reliability and performance of this airplane/engine combination has been evaluated in accordance with 14 CFR 25.1535 and found suitable for **greater than 180 minutes** extended diversion time operations (EDTO) when configured in accordance with WonderPlanes Document WP911001 "MODEL WP-911 EDTO Configuration, Maintenance, and Procedures".

This finding does not constitute approval to conduct extended diversion time operations.

### System Time Capabilities:

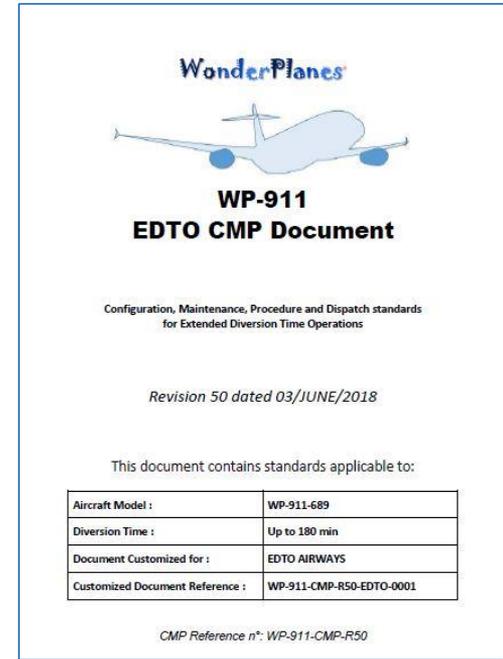
The most limiting EDTO significant system time (other than cargo fire suppression) is **### minutes**.

The most limiting cargo fire suppression system time is **### minutes**.



### Configuration, Maintenance and Procedures (CMP)

- A document approved by the **State of Design** that contains minimum configuration, operating, and maintenance requirements, hardware life-limits, and Master Minimum Equipment List (MMEL) constraints necessary for an aeroplane/engine combination to meet EDTO type design approval requirements.
- The CMP document is aeroplane model specific and defines the minimum configuration standard for EDTO *(further discussion to be provided in Module 4)*.





### Basic concepts:

- EDTO type design approval is not required for aeroplanes with more than two engines to operate beyond the EDTO threshold under ICAO standards.
  - Some States may require EDTO type design approval provided related design and reliability criteria have been defined.
  - FAA for example requires EDTO type design approval for passenger aeroplanes with more than two engines manufactured after Feb, 2015 to operate beyond 180 minutes from an adequate aerodrome.



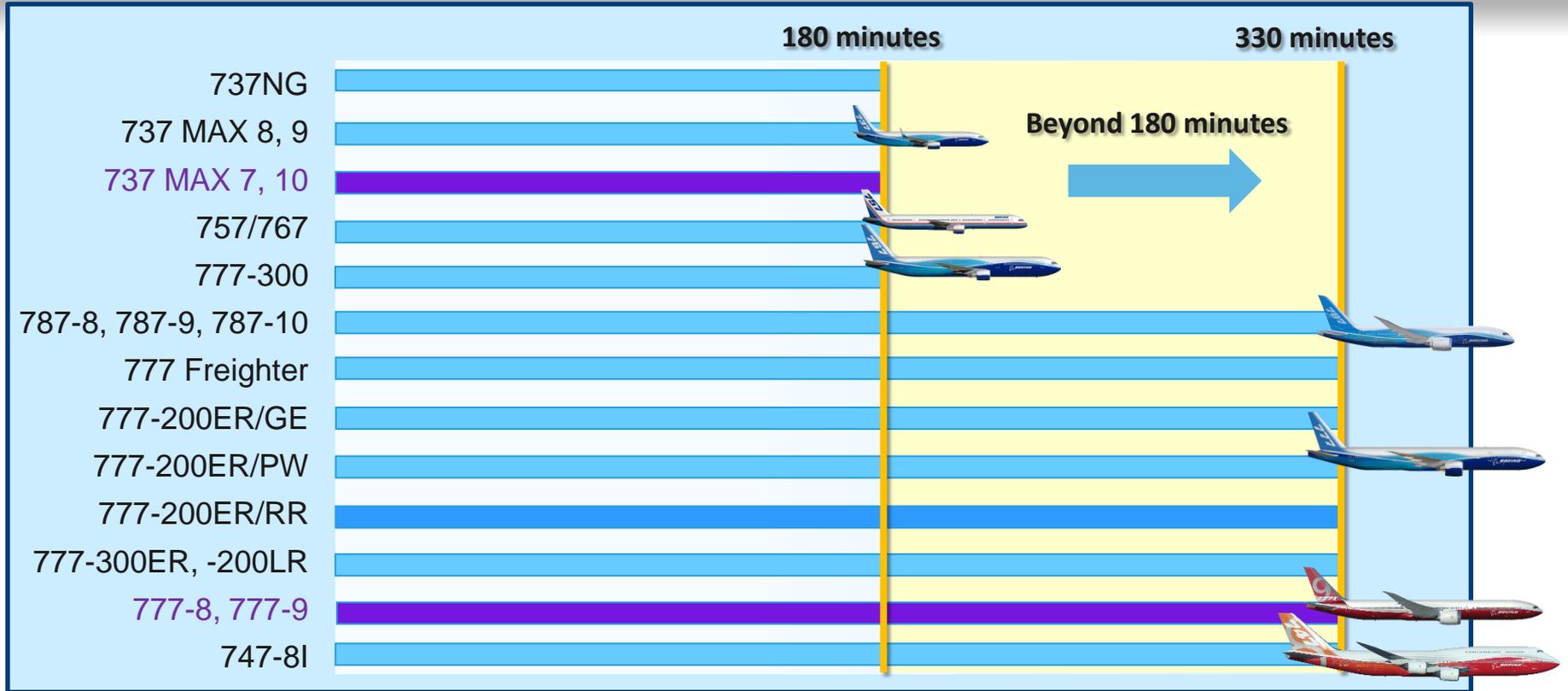
### Basic concepts (cont'd):

- An assessment of aeroplane time limited systems relevant to EDTO is required to support operations beyond the EDTO threshold
  - The capability of the cargo fire suppression system usually defines the applicable limitation for EDTO
- As per ICAO standards, there are no additional EDTO maintenance requirements for aeroplanes with more than two engines
  - Operational approval and EDTO flight operations program elements remain applicable for operations beyond the EDTO threshold.



# EDTO Design Capabilities Summary

As of January 1<sup>st</sup>, 2019



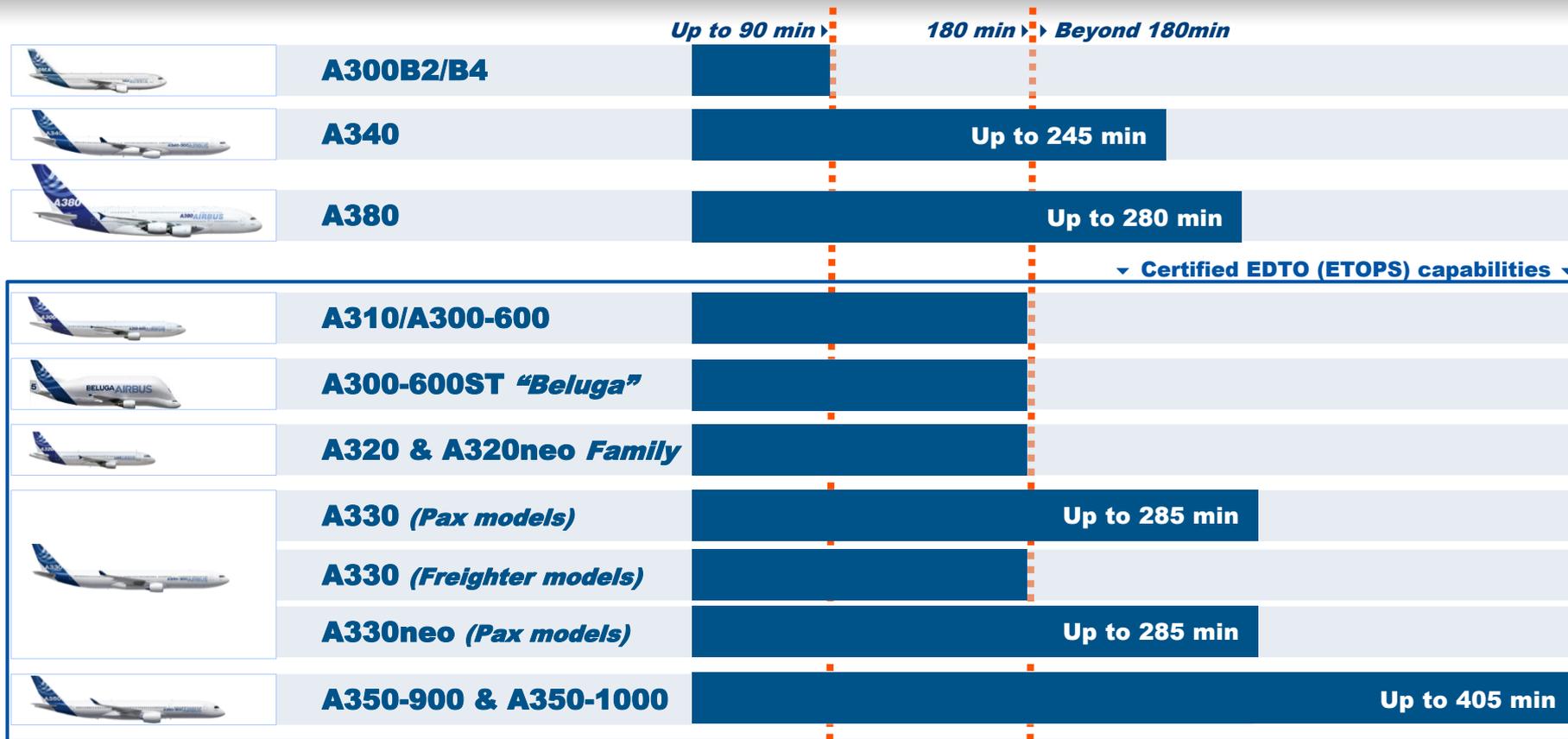
Current capability

Future objective



# EDTO Design Capabilities Summary

As of July 1<sup>st</sup>, 2019





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Q3.3: What is the Maximum EDTO Diversion Time (MDT) which has been approved by your State?

- Up to 90 minutes
- 120 or 180 minutes
- Greater than 180 minutes
- Never approved EDTO



Operations

Maintenance

**Compliance demonstration:**  
**Responsibility of the Operator**

**EDTO Operational Approval**

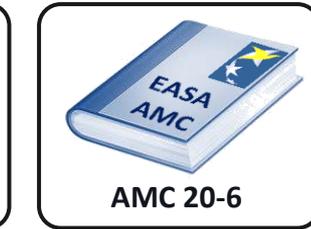


ICAO Annex 6

Additional guidance  
in EDTO Manual Doc  
10085



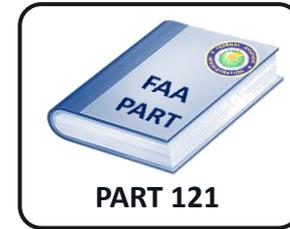
AIR OPS Part SPA  
(Subpart F)



Chapter III,  
Operational Approval  
Considerations

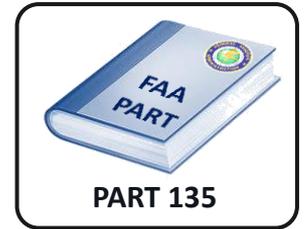


AMC 20-6



PART 121

These FAA ETOPS Ops rules have superseded  
AC 120-42A in 2007  
Additional guidance now provided in AC 120-42B



PART 135

## Considerations:

- EDTO capable/configured aeroplane
- Approval application
- Operator EDTO programs and documentation
  - Maintenance (Twins only)
  - Flight Operations
- Company training
- Operational validation (e.g. validation flight)
- Operations Specification

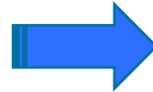


### Configuration, Maintenance & Procedures (CMP)

- Ensure compliance with EDTO configuration requirements.

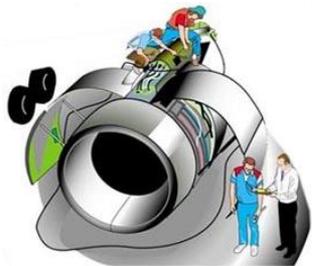
### EDTO Significant Systems List

- Identify systems with heightened maintenance program emphasis



### Supplemental Maintenance Program

- EDTO Maintenance Document
- EDTO Pre-departure Service Check
- Limitations on Dual Maintenance
- Verification Program
- Task Identification
- Centralized Maintenance Control
- EDTO Parts Control
- EDTO Reliability Program
- Monitoring Programs  
(*IFSD Rate, ECM, Oil Consumption, APU Start*)
- EDTO Maintenance Training
- Procedural Changes



→ EDTOM Chapter 4

## Approval Route Planning

- Define EDTO Routes
- Identify Adequate Enroute Alternates
- Determine EDTO Diversion Time and Speed
- Establish EDTO Area of Operations



## Dispatch Planning

- EDTO Flight Planning System
- Identify EDTO Alternate Aerodromes
- Communication/Flight Following
- Establish EDTO Area of Operations

## Documentation and Training

- EDTO MEL Provisions
- APU Inflight Start Procedures
- EDTO Check Airman Program
- EDTO Operating Procedures
- Flight Crew & Dispatcher Training





- **Service Experience Method:**

- EDTO operational approval obtained after some minimum non-EDTO service experience on the candidate aeroplane/engine combination, typically:
  - 12 months minimum non-EDTO experience for 120 minute approval
  - 12 months experience at 120 minutes for 180 minute approval
  - Additional experience for beyond 180 minutes approval
- Legacy (conventional) EDTO approval methodology
- Still an approval option today depending on time constraints and operator experience
- Initial application should typically be submitted at least *60 days* before start of EDTO



- **Accelerated EDTO Method:**

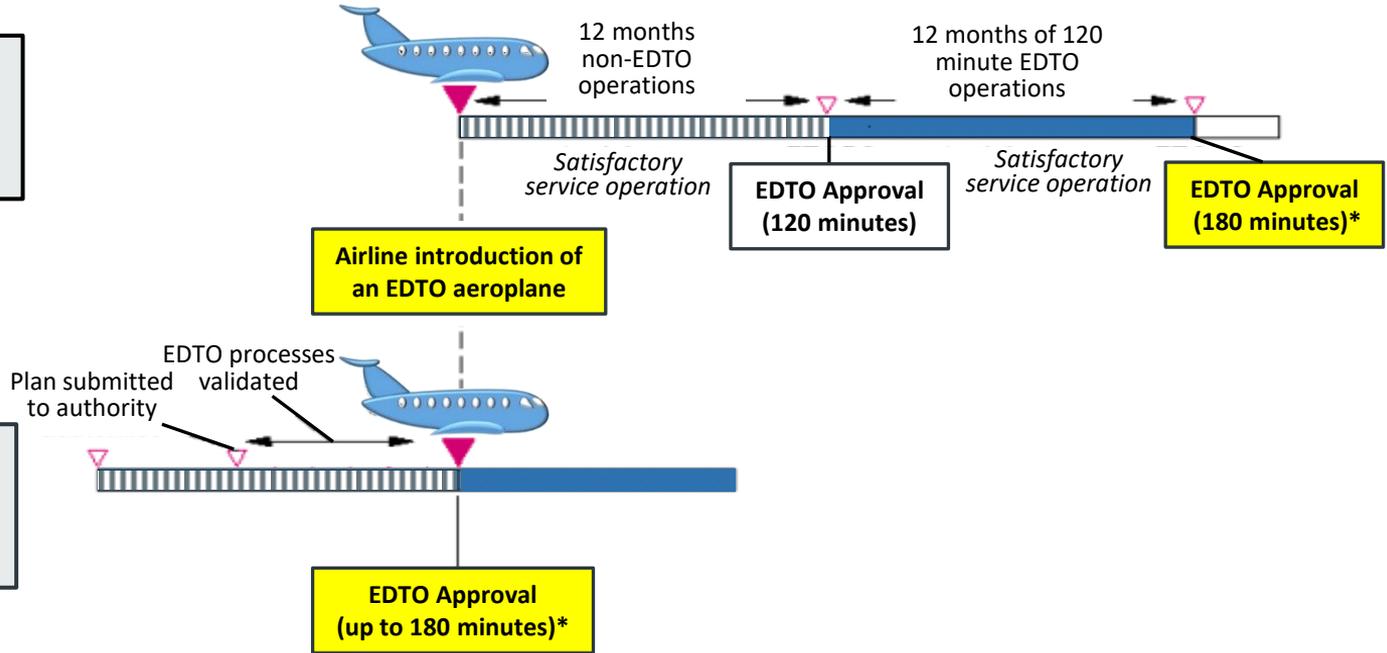
- EDTO operational approval obtained without gaining non-EDTO service experience or with reduced non-EDTO service experience on the candidate aeroplane/engine combination
- Primary focus is on EDTO **process validation** and **compensating factors**
- Allows up to 180 minute EDTO at initial service entry. Prior EDTO service experience is typically required for approval of EDTO beyond 180 min.
- Policy jointly created by JAA/FAA and included in most State EDTO standards (e.g. EASA AMC 20-6, FAA AC 120-42B, TCCA TP6327E, CASA CAO 82.0...)
- Has become the industry standard for EDTO operational approval
- Initial application should be submitted at least *6 months* before start of EDTO



# EDTO Operational Approval Methods Comparison

## In-service Method

Initial application at least 60 days before start of EDTO



## Accelerated Method

Initial application at least 6 months before start of EDTO

Note: Approval for beyond 180 minute EDTO requires prior authorization for 180 minute EDTO



- **Either the Service Experience or Accelerated EDTO approval methods may be used:**
  - **Both methods:** Unlike two engine aeroplanes, there is no upper limit (e.g. 180 minutes) for initial EDTO approval. Operators may apply for approval up to the maximum EDTO capability of the candidate aeroplane/engine combination.
  - **Service Experience Method:** Unlike two engine aeroplanes, there are no specific service experience time requirements or ‘steps’ in diversion time approvals.  
Any amount of non-EDTO experience on a candidate aeroplane/engine combination may therefore be credited in the EDTO approval application.
  - **Accelerated Method:** This method would be selected to achieve EDTO approval with no or reduced prior service experience with the candidate aeroplane/engine combination.  
As with two engine aeroplanes, process validation and compensating factors should form the basis of the EDTO approval application



## Accelerated EDTO Approval Considerations

- What **compensating factors** might be considered for an experienced EDTO operator seeking EDTO approval on another aeroplane/engine type?
- What **compensating factors** might be considered for an operator applying for a first time EDTO approval?



### In-service EDTO approval :

- No special strategy is required (Action plan only needed in case of non compliance)
- No compensating factors are required
- Judgment criteria straight forward: **experience with candidate aircraft**

### Accelerated EDTO approval:

- Defined strategy and open communication needed between airline & authority
- **Compensating factors** and **process validation** are basis of approval
- **Facts and engineering judgment** are used to determine “EDTO capability”

### Compensating factors:

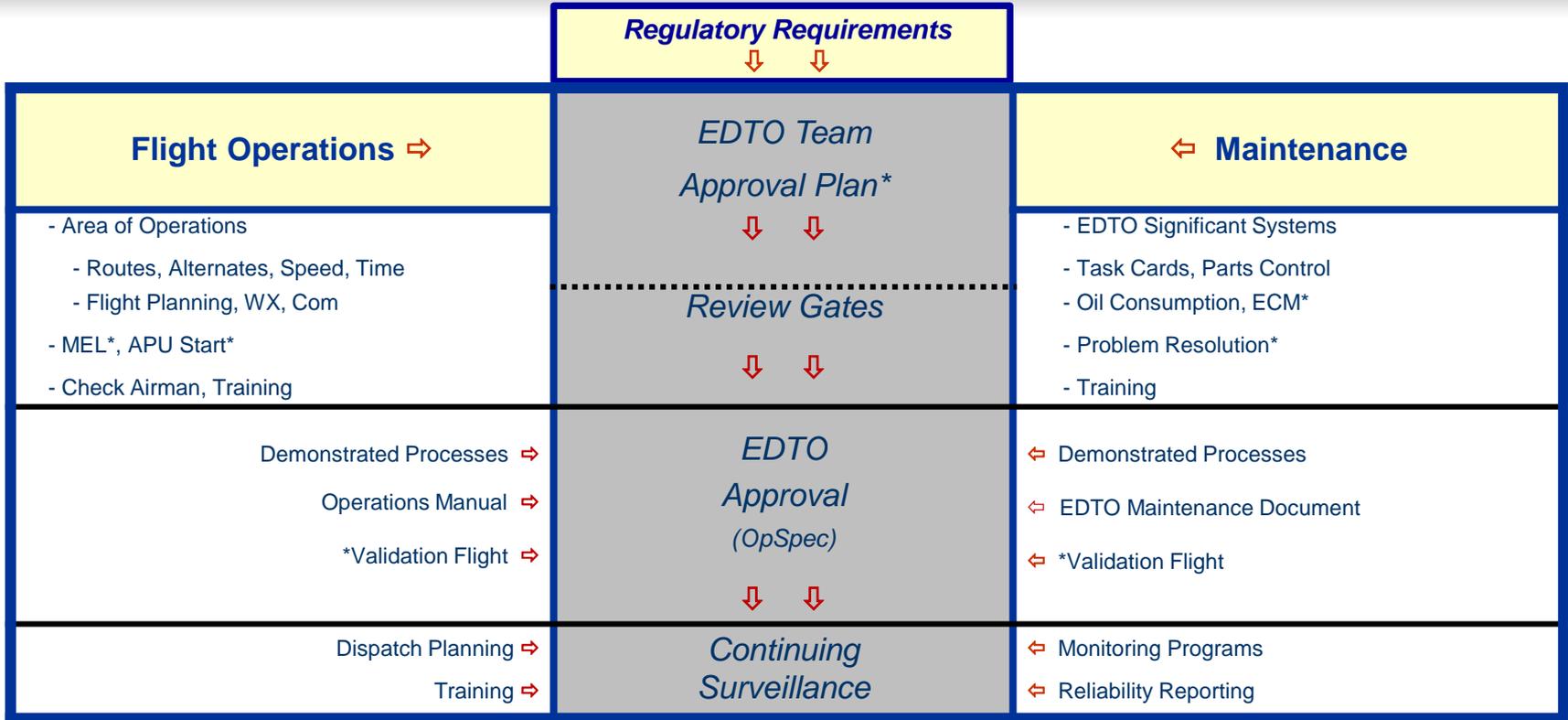
- Previous experience with other airframe or engines of similar technology
- Previous EDTO experience (related experience)
- Specific EDTO training
- EDTO simulation
- ...

Required amount of compensating factors depends on:

- EDTO objectives (max DT, operational experience at start of EDTO, ...)
- Organization (Current vs EDTO)
- Experience
  - EDTO / long range / route(s) / aircraft-engine technology
  - Experience with EDTO procedures from any real or simulated EDTO program
- ...



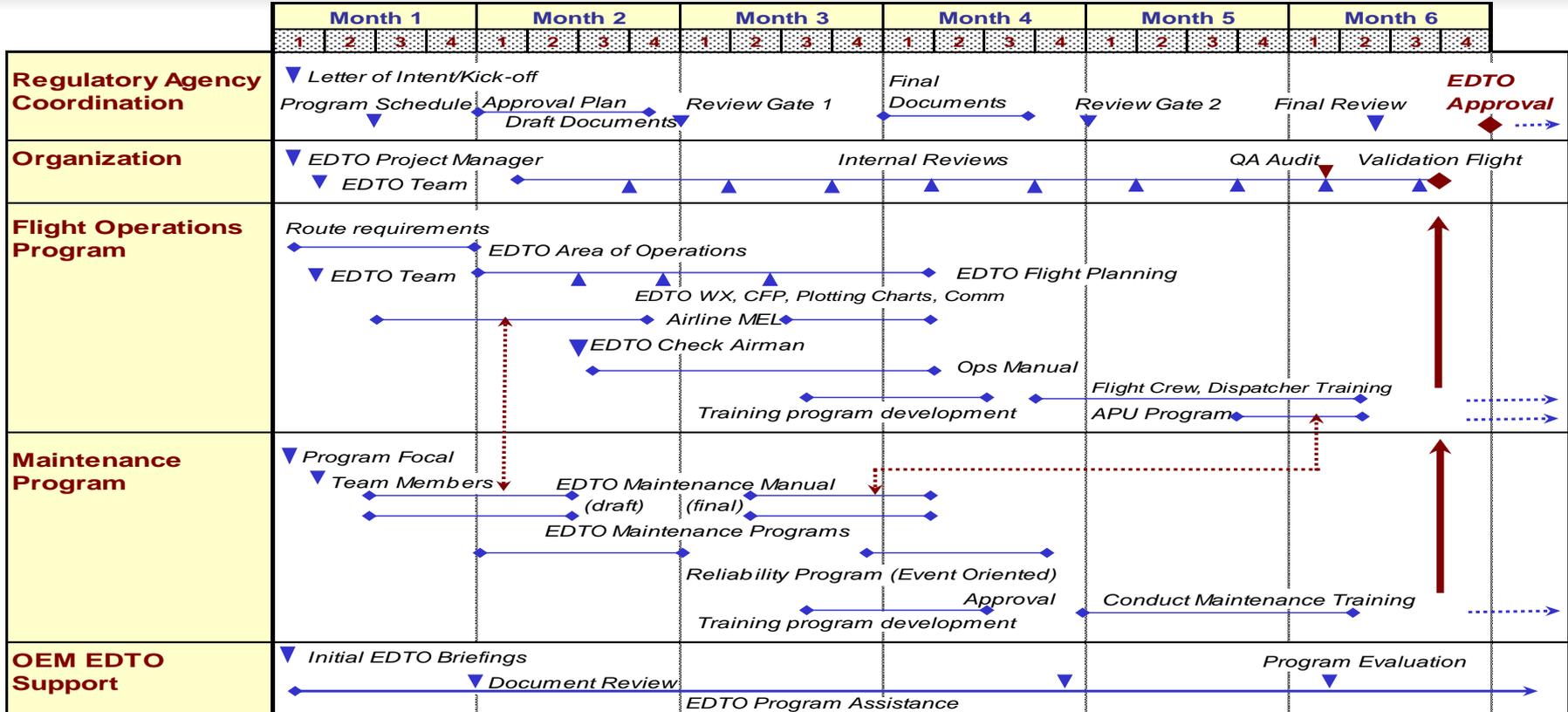
# EDTO Operational Approval Process



\* *Involves coordination between departments*



# EDTO Operational Approval Timeline Example





EDTO operational authorization constitutes a ‘Specific Approval’ which should be listed in the Operations Specification for each approved aeroplane type:

**OPERATIONS SPECIFICATIONS**  
(subject to the approved conditions in the operations manual)

ISSUING AUTHORITY CONTACT DETAILS<sup>1</sup>

Telephone: \_\_\_\_\_ Fax: \_\_\_\_\_ Email: \_\_\_\_\_

AOC#<sup>2</sup>: \_\_\_\_\_ Operator name<sup>3</sup>: \_\_\_\_\_ Date<sup>4</sup>: \_\_\_\_\_ Signature: \_\_\_\_\_

Disa trading name: \_\_\_\_\_

Aircraft model<sup>5</sup>: \_\_\_\_\_

Types of operation: Commercial air transportation  Passengers  Cargo  Other<sup>6</sup>: \_\_\_\_\_

Area(s) of operation<sup>7</sup>: \_\_\_\_\_

Special limitations<sup>8</sup>: \_\_\_\_\_

SPECIFIC APPROVAL	YES	NO	DESCRIPTION <sup>9</sup>	REMARKS
Dangerous goods	<input type="checkbox"/>	<input type="checkbox"/>		
Low visibility operations				
Approach and landing	<input type="checkbox"/>	<input type="checkbox"/>	CAT <sup>10</sup> : _____ RVR: _____ m DH: _____ ft	
Take-off	<input type="checkbox"/>	<input type="checkbox"/>	RVR <sup>11</sup> : _____ m	
Operational credits	<input type="checkbox"/>	<input type="checkbox"/>	"	
RVSM <sup>12</sup>	<input type="checkbox"/>	<input type="checkbox"/>		
EDTO <sup>14</sup>	<input type="checkbox"/>	<input type="checkbox"/>	Threshold time <sup>15</sup> : _____ minutes Maximum diversion time <sup>15</sup> : _____ minutes	
AR navigation specifications for FBN operations	<input type="checkbox"/>	<input type="checkbox"/>	"	
Continuing airworthiness	<input type="checkbox"/>	<input type="checkbox"/>	"	
EFB	<input type="checkbox"/>	<input type="checkbox"/>	"	
Other <sup>16</sup>	<input type="checkbox"/>	<input type="checkbox"/>		



**OPERATIONS SPECIFICATIONS**  
(subject to the approved conditions in the operations manual)

Aircraft model<sup>5</sup>: \_\_\_\_\_

Area(s) of operation<sup>7</sup>: \_\_\_\_\_

SPECIFIC APPROVAL	YES	NO	DESCRIPTION <sup>9</sup>	REMARKS
EDTO <sup>14</sup>	<input type="checkbox"/>	<input type="checkbox"/>	Threshold time <sup>15</sup> : _____ minutes Maximum diversion time <sup>15</sup> : _____ minutes	

**EDTO Related Content**

Annex 6, Part 1 - Appendix 6  
Operations Specification Template

*Some States have implemented different OpSpec formats*



OPERATIONS SPECIFICATIONS				
(subject to the approved conditions in the operations manual)				
Aircraft model <sup>5</sup> :				
Area(s) of operation <sup>7</sup> :				
SPECIFIC APPROVAL	YES	NO	DESCRIPTION <sup>9</sup>	REMARKS
EDTO <sup>14</sup> <input type="checkbox"/> N/A	<input type="checkbox"/>	<input type="checkbox"/>	Threshold time <sup>15</sup> : ___ minutes  Maximum diversion time <sup>15</sup> : ___ minutes	

- Notes:-
5. Insert the CAST/ICAO designation of aircraft make, model and series or master series, if a series has been designated (e.g. Boeing-737-3K2 or Boeing-777-232). The CAST/ICAO taxonomy is available at <http://www.intlaviationstandards.org/>.
  7. List the geographical area(s) of authorized operations (by geographic coordinates or specific routes, flight information region or national or regional boundaries).
  9. List in this column the most permissive criteria for each approval or the approval type (with appropriate criteria)
  14. If extended diversion time operations (EDTO) approval does not apply based on the provisions of of Chapter 4, 4.7 select "N/A". Otherwise a threshold time and maximum diversion time must be specified.
  15. The threshold time and maximum diversion time may also be listed in distance (NM) as well. Details of each particular aeroplane-engine combination for which the threshold time is established and maximum diversion time has been granted may be listed under 'remarks'. One line per approval may be used if different approvals are granted.



- **Maximum Diversion Time (MDT):** Approval time levels and use conditions may vary among State regulations

- Specific approval time levels up to 180 minutes (e.g. 75 min, 90 min, 120 min...)
- Specific approval time levels above 180 minutes (e.g. 240 minutes, beyond 240 minutes...)
- Operational extension on a flight by flight exception basis (e.g. 138 minutes, 207 minutes)
- Regional applicability

SPECIFIC APPROVAL	YES	NO	DESCRIPTION	REMARKS
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>		
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>	MDT 138 min, 207 min, or ...	
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>	MDT 138 min	
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>	MDT 207 min	
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>	MDT 138 min, 207 min	
Operational extension on a flight by flight exception basis	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Operational extension on a flight by flight exception basis	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Operational extension on a flight by flight exception basis	<input type="checkbox"/>	<input type="checkbox"/>		

- **Threshold Time:** Not intended to be AEC or area specific absent special circumstances. Typically a single value should be listed in the Operations Specification based on applicable State regulations, even when different MDT approval levels are specified.



**Example**

### OPERATIONS SPECIFICATIONS

(subject to the approved conditions in the operations manual)

Operator name: **EDTO Airways**

Aircraft Model: **WonderPlanes WP-911 and WP-911SuperPlus**

Area(s) of Operation: **Atlantic Ocean NAT/MNPS, North Pacific**

SPECIFIC APPROVAL	YES	NO	DESCRIPTION	REMARKS
EDTO <input type="checkbox"/> N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Threshold time: <u>60</u> minutes  Maximum diversion times: <b>WP-911/RG3350-89: <u>240</u> minutes</b> <b>WP-911SuperPlus/RG3350-SP: <u>180</u> minutes</b>	<b>WP-911/RG3350-89:</b> <ul style="list-style-type: none"> <li>240 minutes authorization applies to the North Pacific area for use on a flight by flight exception basis. Authorization is otherwise limited to 180 minutes.</li> </ul>

EDTO MDT Approvals by AEC

Example State Use Condition



# Operations Specifications for EDTO Time Limited System (TLS) Considerations

**Annex 6, Part 1 - 4.7.2.3:** When approving the appropriate maximum diversion time for the operator of a particular aeroplane type engaged in extended diversion time operations, the State of the Operator shall ensure that:

a) *for all aeroplanes:* the most limiting EDTO significant system time limitation, if any, indicated in the aeroplane flight manual (directly or by reference) and relevant to that particular operation is not exceeded.

- For EDTO beyond 180 minutes, Maximum Diversion Time (MDT) and Time Limited System (TLS) capabilities should be listed separately:
  - TLS diversion planning is based on forecast winds whereas MDT planning is a still air consideration, so the two times are not directly comparable.
  - TLS planning considers both AEO (cargo fire suppression) and OEI (other most limiting system) diversion flight conditions, so again represents a separate planning consideration from EDTO MDT.
  - Listing TLS and MDT capabilities separately for EDTO beyond 180 minutes removes potential confusion while preserving intent of Annex 6 language
  - Additional discussion on TLS planning considerations will be provided in Module 5

DESCRIPTION*	YES	NO	REMARKS
EDTO - TLS	<input type="checkbox"/>	<input type="checkbox"/>	
EDTO - MDT	<input type="checkbox"/>	<input type="checkbox"/>	
EDTO - AEO	<input type="checkbox"/>	<input type="checkbox"/>	
EDTO - OEI	<input type="checkbox"/>	<input type="checkbox"/>	

**Example**

OPERATIONS SPECIFICATIONS (subject to the approved conditions in the operations manual)				
Operator name: EDTO Airways				
Aircraft Model: WonderPlanes WP-911 and WP-911SuperPlus				
Area(s) of Operation: Atlantic Ocean NAT/MNPS, North Pacific				
SPECIFIC APPROVAL	YES	NO	DESCRIPTION	REMARKS
EDTO <input type="checkbox"/> N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Threshold time: <u>60</u> minutes  Maximum diversion times: WP-911/RG3350-89: <u>240</u> minutes WP-911SuperPlus/RG3350-SP: <u>180</u> minutes	<b>WP-911/RG3350-89:</b> <ul style="list-style-type: none"> <li>240 minutes authorization applies to the North Pacific area for use on a flight by flight exception basis. Authorization is otherwise limited to 180 minutes.</li> <li><b>Diversion planning may not exceed the following EDTO time limited system capabilities:</b>  <b>Cargo Fire Suppression: ### Minutes</b>  <b>Other most limiting system: ### Minutes</b></li> </ul>

Example TLS listing for beyond 180 Minutes



ICAO

SAFETY

# EDTO/ETOPS Worldwide Operations





# Boeing EDTO/ETOPS Operations

As of September 30<sup>th</sup>, 2018

Airplane Model	FleetSize		Initial Delivery Month	Current EDTO Approvals	EDTO			
	Total	EDTO			Flight Cycles		Flight Hours	
					Month	Cumulative	Month	Cumulative
737-3/4/500	1,988	10	Jul 1986	7	59	309,843	206	1,030,116
737-6/7/8/900	7,011	1,005	Mar 1998	63	10,796	1,340,549	44,834	5,617,607
737-MAX	390	55	Jun 2017	10	1,092	7,104	6,117	41,729
<b>737 Model totals</b>	<b>9,389</b>	<b>1,070</b>		<b>70*</b>	<b>11,947</b>	<b>1,657,496</b>	<b>51,157</b>	<b>6,689,452</b>
757/PW	433	71	Nov 1984	10	1,206	313,308	6,901	1,478,332
757/RR	617	142	Mar 1983	25	2,723	616,425	17,269	3,762,327
<b>757 Model totals</b>	<b>1,050</b>	<b>213</b>		<b>31*</b>	<b>3,929</b>	<b>929,733</b>	<b>24,170</b>	<b>5,240,659</b>
767/GE	791	305	Nov 1982	46	5,700	2,706,978	43,923	22,101,834
767/PW	315	132	Aug 1982	21	4,112	1,726,966	32,551	13,819,640
767/RR	31	1	Feb 1990	1	2	145,849	14	1,255,875
<b>767 Model totals</b>	<b>1,137</b>	<b>438</b>		<b>51*</b>	<b>9,814</b>	<b>4,579,793</b>	<b>76,488</b>	<b>37,177,349</b>
777/GE	1,207	1,103	Nov 1995	85	26,633	2,852,408	269,086	28,836,152
777/PW	174	94	May 1995	13	2,165	613,263	19,211	5,304,062
777/RR	226	150	Mar 1996	18	2,861	978,796	24,141	8,920,408
<b>777 Model totals</b>	<b>1,607</b>	<b>1,347</b>		<b>61*</b>	<b>31,659</b>	<b>4,444,467</b>	<b>312,438</b>	<b>43,060,622</b>
787/GE	532	429	Mar 2012	43	12,297	422,541	113,119	3,828,854
787/RR	328	266	Sep 2011	27	6,887	209,049	60,275	1,819,916
<b>787 Model totals</b>	<b>860</b>	<b>695</b>		<b>49*</b>	<b>19,184</b>	<b>631,590</b>	<b>173,394</b>	<b>5,648,770</b>
<b>Fleet totals</b>	<b>14,043</b>	<b>3,763</b>		<b>161*</b>	<b>76,533</b>	<b>12,243,079</b>	<b>637,647</b>	<b>97,816,852</b>



\* Model total and Fleet total EDTO approvals reflect unique operators (operators of multiple models are only counted once)

# Airbus EDTO/ETOPS Operations

As of 1<sup>st</sup> QTR 2019

Aircraft Family	Total FH	Nb of operators	Aircraft delivered	EDTO FH	EDTO FH in %	EDTO operators in %	EDTO aircraft in %
A310 A300-600	25,000,000	63	567	2,900,000	<2%	~10%	~10%
<b>A320</b>	230,000,000	323	8,512	3,000,000	<2%	~15%	~30%
<b>A330</b>	50,400,000	144	1,427	17,600,000	~35%	~90%	100%
<b>A350</b>	1,500,000	23	240	500,000	~30%	100%	100%
<b>Fleet Totals</b>	<b>306,900,000</b>		<b>10,746</b>	<b>24,000,000</b>			



Part I	EDTO Approval Major Elements
Part II	Responsibilities of Contracting States
Part III	EDTO Type Design Approval Process
Part IV	EDTO Operational Approval Process
<b>Part V</b>	<b>Review questions</b>
Part VI	Practical Exercise



## Q3.4: EDTO operations for **two engine aeroplanes** requires:

- EDTO Type Design Approval
- EDTO Operational Approval
- EDTO Flight Operations Program
- EDTO Maintenance Program
- Both EDTO Operational Approval and EDTO Flight Operations Program
- All of the above





Q3.5: EDTO operations for **aeroplanes with more than two engines** requires:

- EDTO Type Design Approval
- EDTO Operational Approval
- EDTO Flight Operations Program
- EDTO Maintenance Program
- Both EDTO Operational Approval and Flight Operations Program
- All of the above





**Q3.6: EDTO Type Design Approval** is the responsibility of:

- The State of the Operator
- The State of Registry
- The State of Design
- ICAO Headquarters





Q3.7: Which of the following does not apply to the early EDTO type design process?

- EDTO Testing
- Operational Procedures Validation
- Problem Tracking and Resolution
- Stall Speed Certification





## Q3.8: EDTO **Operational Approval** is the responsibility of:

- The State of the Operator
- The State of Registry
- The State of Design
- ICAO Regional Office





Q3.9: Chose the most appropriate definition of the term **'AEC'**:

- ARINC to Ethernet Converter
- Aeroplane/Engine Combination
- Adaptive Echo Cancellation
- Aft Electronics Center





Q3.10: Chose the most appropriate definition of the term '**CMP**':

- Configuration, Maintenance and Procedures
- Celestial Mapping Program
- Certification Management Plan
- Condition Monitoring Panel





- Part I — **EDTO Approval Major Elements**
- Part II — **Responsibilities of Contracting States**
- Part III — **EDTO Type Design Approval Process**
- Part IV — **EDTO Operational Approval Process**
- Part V — **Review Questions**
- Part VI — Practical Exercise**



# EDTO Workshop

End of Module 3 - Approval Process

