

# *Extended Diversion Time Operations Workshop*



Alternate

Destination

ETP1

ETP2

Departure

## **Module 7** *Continued Surveillance*



ICAO

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**AIRBUS**





**Module 1**  
Course Introduction

**Module 2**  
EDTO Foundation

**Module 3**  
Approval Process

**Module 4**  
Type Design & Reliability  
Considerations

**Module 5**  
Flight Operations  
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 understand the shared responsibility of continued surveillance of EDTO operations by manufacturers, type design authorities, operators and national authorities in charge of operational approval.

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



- Chapter 1:
  - 1.5 Continuity of EDTO Certification (Two Engine Aeroplanes)
  - 1.6 Continuity of EDTO Authorization
- Chapter 2:
  - 2.2.3 EDTO Significant Systems
  - 2.2.5 Continued Validity of EDTO Certification
- Chapter 4:
  - 4.6 EDTO Significant Systems
  - 4.10 Reliability Programme
  - 4.11 Propulsion System Monitoring
  - 4.14 Engine Condition Monitoring Programme
  - 4.15 Oil Consumption Monitoring Programme
  - 4.16 APU In-flight Start Monitoring Programme



## Annex 6, Part 1

### Operation of Aircraft

Section 8.5

Aeroplane Maintenance, Continuing Airworthiness Information



## Annex 8

### Airworthiness of Aircraft

Section 4.2

Responsibilities of Contracting States in respect to continuing airworthiness



***Continuing Airworthiness is a Surveillance Function***

**Doc 7300**      **Convention on International Civil Aviation**  
Article 83*bis*      Transfer of certain functions and duties

**Doc 8335**      **Manual of Procedures for Operations Inspection, Certification and Continued Surveillance**  
Part IV      Continuing Safety Oversight of the Operator by the State of the Operator

**Doc 9734, Part A**      **Safety Oversight Manual**  
Chapter 3      8 Critical Elements of Safety Oversight

**Doc 9760**      **Airworthiness Manual**  
Chapter 5, 5.4      Continuing Surveillance for EDTO

## ***Contracting State EDTO Surveillance and Reporting Requirements***





- Part I — Stakeholder Interfaces and Responsibilities**
- Part II — Surveillance for EDTO Type Design & Reliability
- Part III — Surveillance for EDTO Operations
- Part IV — Practical Exercise



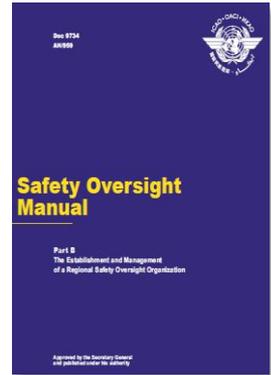
Q7.1 Which ICAO Critical Element (CE) of a Safety Oversight System requires Contracting States to conduct Continued Surveillance?

- CE-3
- CE-4
- CE-7
- CE-2



## Doc 9734: Safety Oversight Manual

### Part A, Chapter 3: 8 Critical Elements (CEs) of a Safety Oversight System



Doc 9734



## Annex 8, Section 4.2

### Responsibilities of Contracting States in respect to continuing airworthiness

4.2.1 State of Design

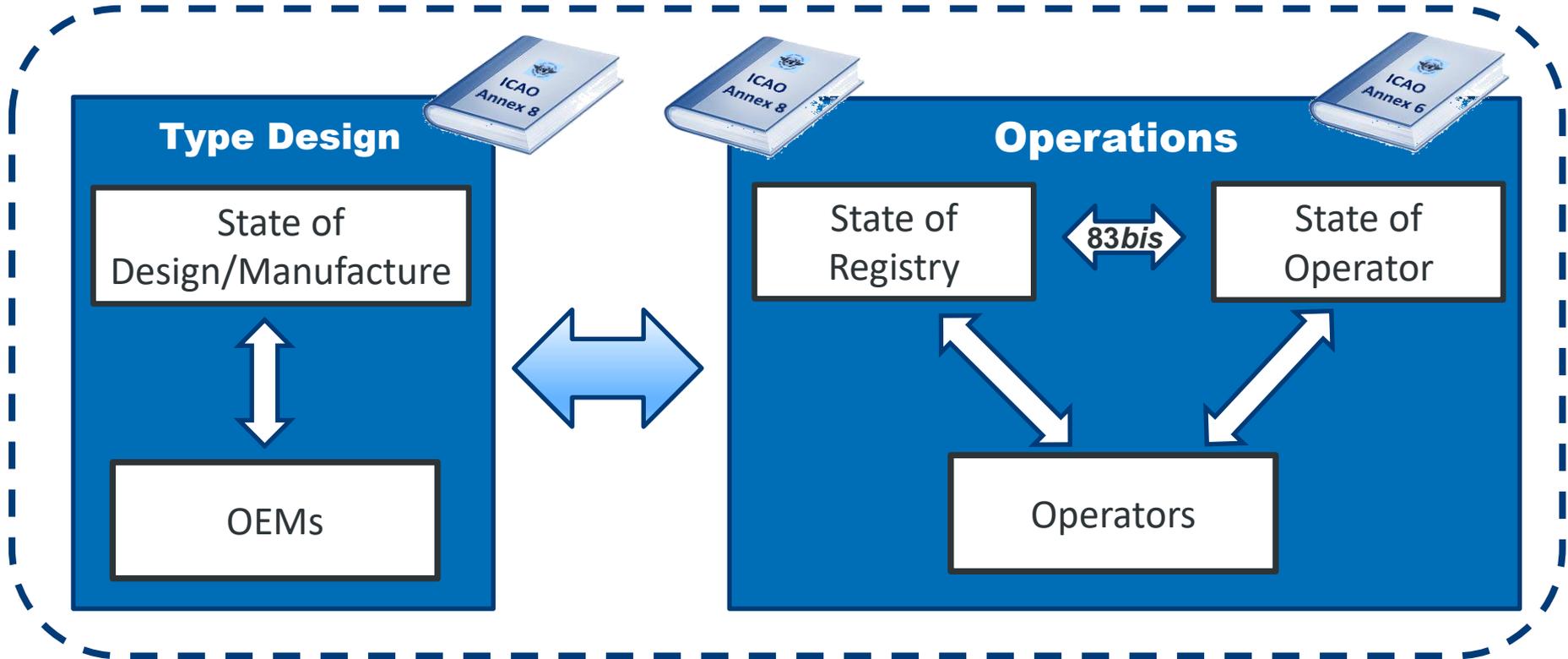
4.2.2 State of Manufacture (when not the State of Design)

4.2.3 State of Registry

4.2.4 All Contracting States

*Each Contracting State shall establish, in respect of aeroplanes over 5 700 kg and helicopters over 3 175 kg maximum certificated take-off mass, the type of service information that is to be reported to its airworthiness authority by operators, organizations responsible for type design and maintenance organizations.*

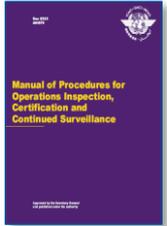
*Procedures for reporting this information shall also be established.*





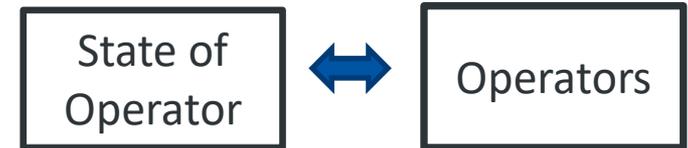
## Doc 8335, Part IV

### Continuing Safety Oversight of the Operator by the State of the Operator



1.1 Continuing safety oversight of an operator by the State of the Operator is inherent in the system of certification. It is an essential part of the responsibility of a State to ensure that the required standard of operation is maintained in order to provide a safe and reliable commercial air transport service to the public.

Authority for this continuing process should be contained in the provisions of the basic aviation law of the State.

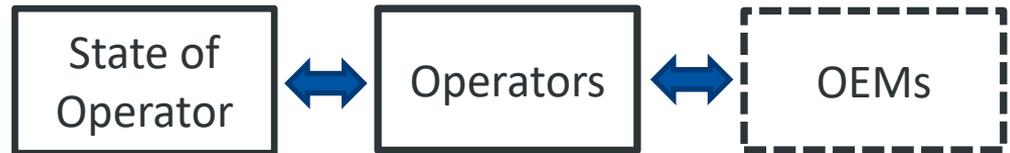


## Doc 9760 – Part IV, Chapter 5

### Airworthiness Requirements for Extended Diversion Time Operations

#### 5.4 Continuing Surveillance

The State of the Operator should monitor all aspects of the operation it has authorized in order to ensure that the level of reliability achieved in EDTO remains at the necessary level and that the operation continues to be conducted safely. In the event that an acceptable level of reliability is not maintained, that significant adverse trends exist or that significant deficiencies are detected in the design or the conduct of the operation, the State of the Operator should initiate a special evaluation, impose operational restrictions, if necessary, and stipulate corrective action....

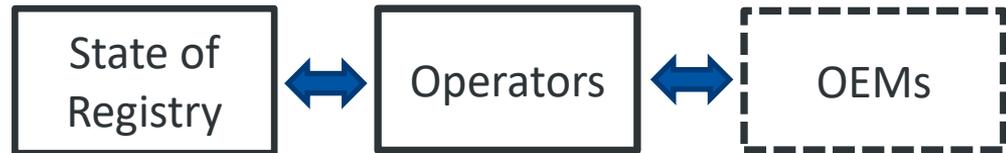


## Annex 6, Part 1 - Section 8.5

### Aeroplane Maintenance, Continuing Airworthiness Information

8.5.1 The operator of an aeroplane over 5700 kg maximum certificated take-off mass shall monitor and assess maintenance and operational experience with respect to continuing airworthiness and provide the information as prescribed by the State of Registry...

8.5.2 The operator of an aeroplane over 5700 kg maximum certificated take-off mass shall obtain and assess continuing airworthiness information and recommendations available from the organization responsible for the type design and shall implement resulting actions considered necessary in accordance with a procedure acceptable to the State of Registry.





- Part I — **Stakeholder Interfaces and Responsibilities**
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## Section 1.5: Continuity of EDTO Certification (Two Engine Aeroplanes)



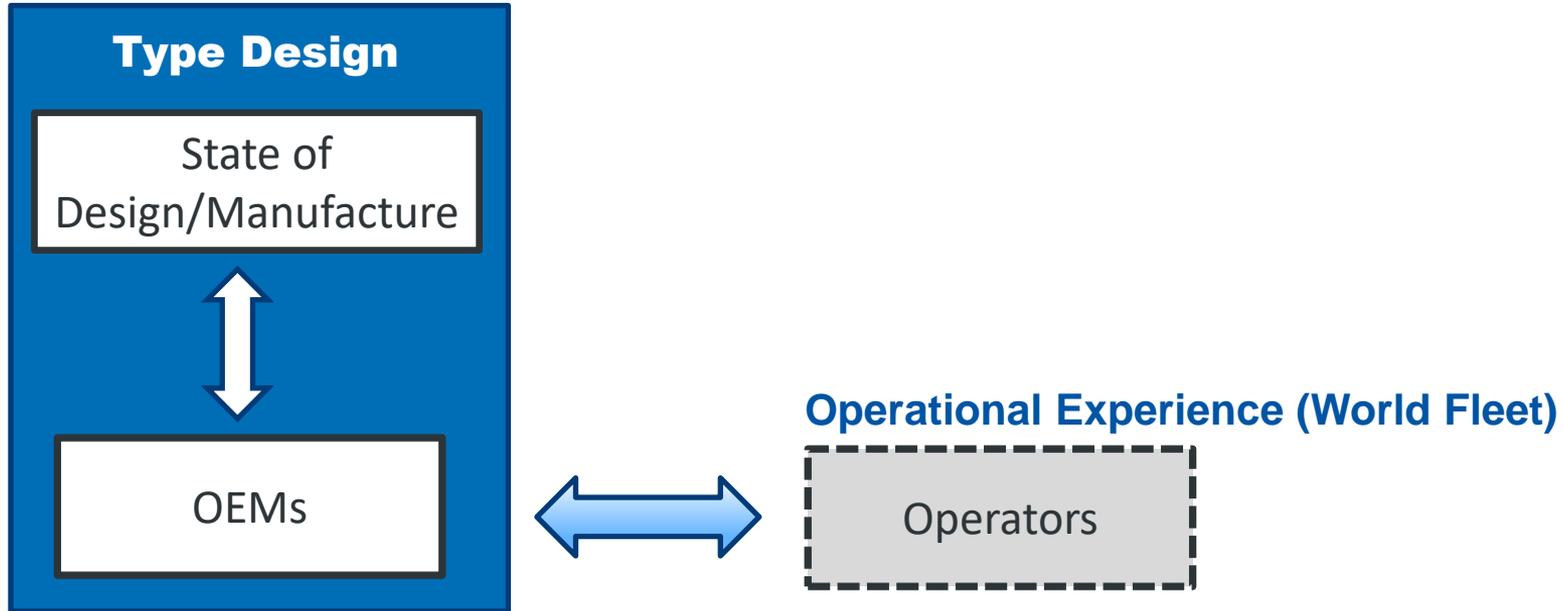
*“The EDTO certification is not granted permanently. It is submitted to a continued surveillance by the State of Design of the in-service reliability of the worldwide fleet of the concerned aircraft model/type.”*

*The certified EDTO capability of the aircraft may therefore be reduced, suspended or even revoked if no solution exists to a major problem...”*





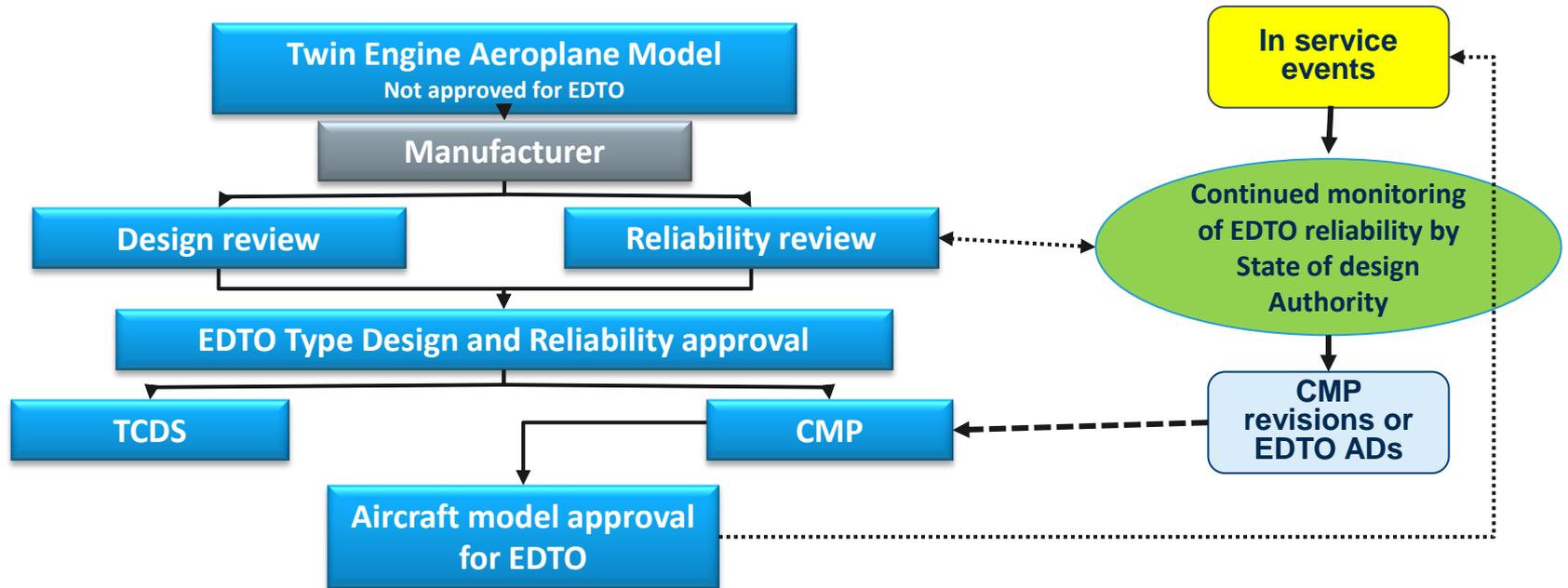
### State of Design Reporting Requirements (e.g. 14 CFR § 21.4)





## A/C Type EDTO Capability – Two Engine Aeroplanes

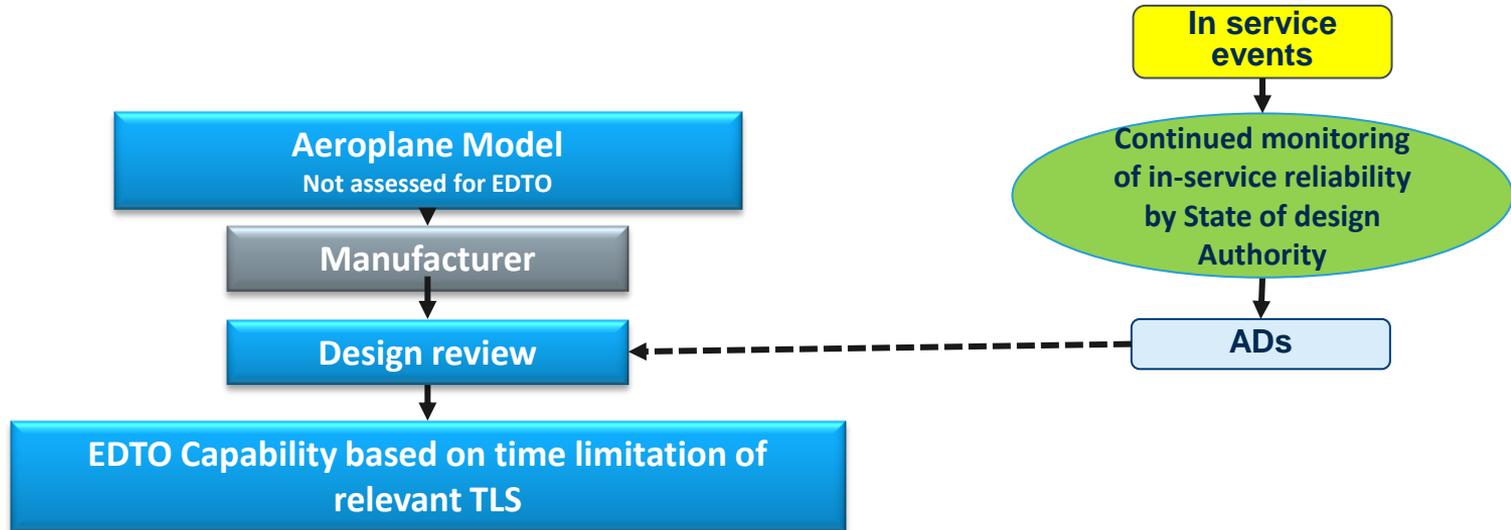
Aeroplane model approval for EDTO (Type Design Approval + Reliability demonstration)





## A/C Type EDTO Capability – Aeroplanes with more than 2 engines

Aeroplane model assessed for EDTO





### 14 CFR § 21.4(a) - Early ETOPS Reporting Requirements

- IFSDs, except planned IFSDs performed for flight training.
- For two-engine airplanes, IFSD rates.
- Inability to control an engine or obtain desired thrust or power.
- Precautionary thrust or power reductions.
- Degraded ability to start an engine in flight.
- Inadvertent fuel loss or unavailability, or uncorrectable fuel imbalance in flight.



***Event reporting required for a minimum of 250,000 in service engine hours***



### 14 CFR § 21.4(a) - Early ETOPS Reporting Requirements (cont'd)



- Turn backs or diversions for failures, malfunctions, or defects associated with an ETOPS group 1 significant system.
- Loss of any power source for an ETOPS group 1 significant system, including any power source designed to provide backup power for that system.
- Any event that would jeopardize the safe flight and landing of the airplane on an ETOPS flight.
- Any unscheduled engine removal for a condition that could result in one of the reportable occurrences listed in this paragraph.

***Event reporting required for a minimum of 250,000 in service engine hours***

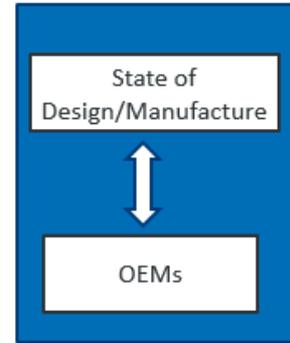


### 14 CFR § 21.4(b)(1) – Reporting of two-engine airplane in-service reliability



The holder of a type certificate for an airplane approved for ETOPS and the holder of a type certificate for an engine installed on an airplane approved for ETOPS must report monthly to their respective FAA type certificate holding office on the reliability of the world fleet of those airplanes and engines...

...The responsible type certificate holder must investigate any cause of an IFSD resulting from an occurrence attributable to the design of its product and report the results of that investigation to its FAA office responsible for administering its type certificate.





### 14 CFR § 21.4(b)(2) – World fleet IFSD rate for two-engine airplanes

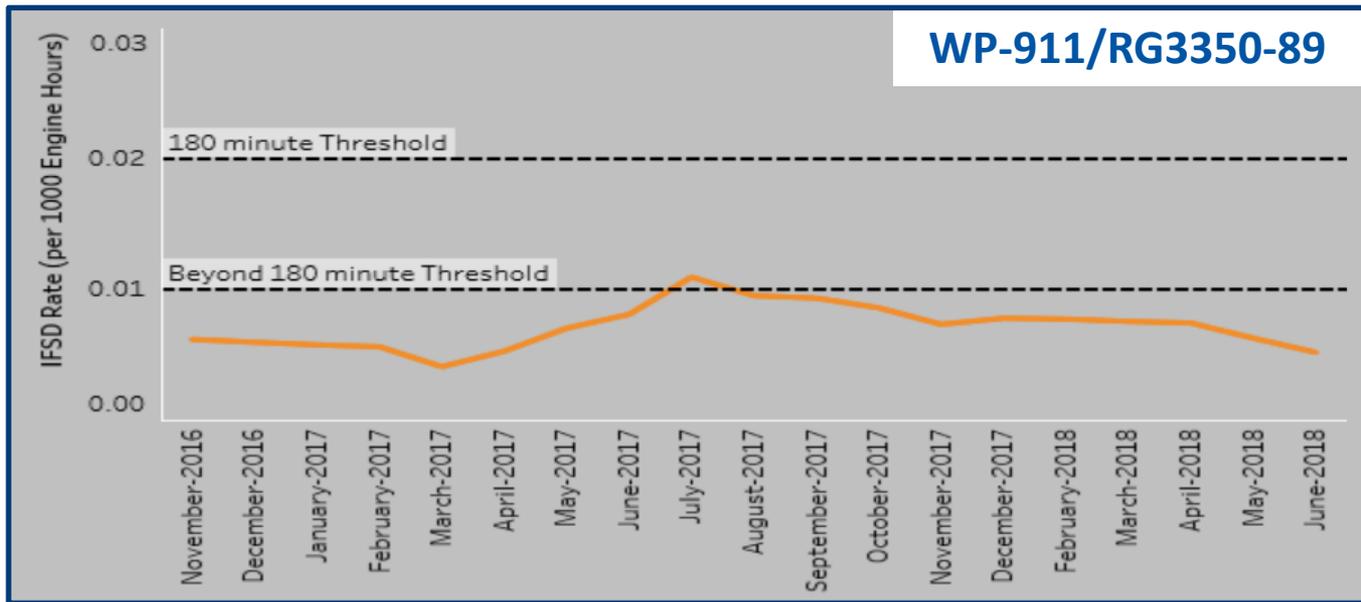


EDTO Type Design Approval	<u>World Fleet IFSD Rate Target*</u>
Up to and including 120-minutes	≤ <b>.05</b> per 1,000 engine hours
Up to and including 180-minutes (including 207-minutes)	≤ <b>.02</b> per 1,000 engine hours
Beyond 180-minutes (excluding 207-minutes)	≤ <b>.01</b> per 1,000 engine hours

*\* Based on a 12 month rolling average*



### Type Design Reporting Example – IFSD Rates\*



\* Based on a 12 month rolling average

**Example**

### Type Design Reporting - EDTO Events



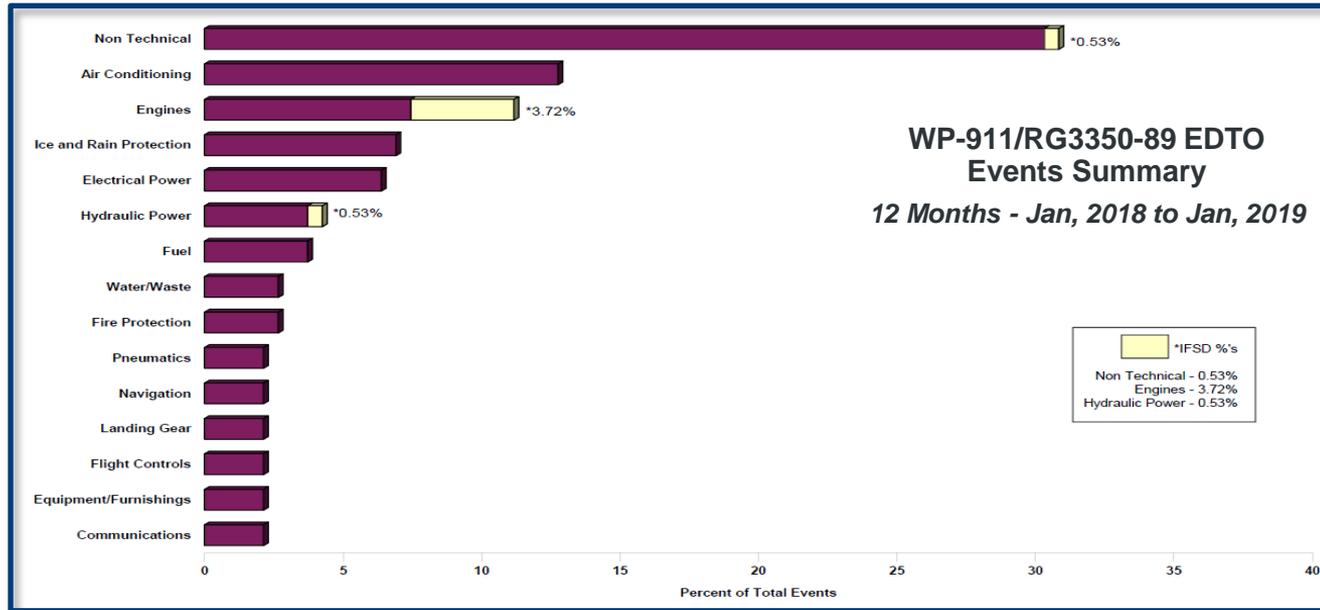
#### **‘EDTO Relevant Event’** (Expanded **WonderPlanes®** Definition)\*

“Any system malfunction, degradation or other in-flight event, either technical or non-technical, that requires the crew to make a decision whether to turn back, divert or continue the flight under an increased level of alertness.”

***\* Most EDTO Relevant Events have non-technical causes such as weather, passenger medical, bird strikes or other operational factors***



### Type Design Reporting Example - EDTO Events\*



188 reported EDTO events out of 255,700 WP-911 EDTO Flights. Less than 5% involved an engine IFSD.

\* WP-911 EDTO events are rare and usually not engine related

**Example**



- Part I — **Stakeholder Interfaces and Responsibilities**
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- Part III — **Surveillance for EDTO Operations****
- Part IV — **Practical Exercise**

## Section 1.6: Continuity of EDTO Authorization



*“The EDTO authorization is not granted permanently. It is submitted to a continued surveillance by the CAA of the operator’s in service reliability (concerning the EDTO fleet of aircraft).”*

*The operator’s procedures and training for EDTO are required to be maintained once an EDTO specific approval is issued.”*





- **All aeroplanes**

- Continued surveillance of EDTO operational programs is governed by the basic operator surveillance provisions of the ICAO Annexes and related Guidance Materials. These provisions are not unique to EDTO, but apply equally to EDTO operations.



- **Two engines aeroplanes**

- The EDTO maintenance program includes specific monitoring and reporting requirements to support continued surveillance of EDTO operations.



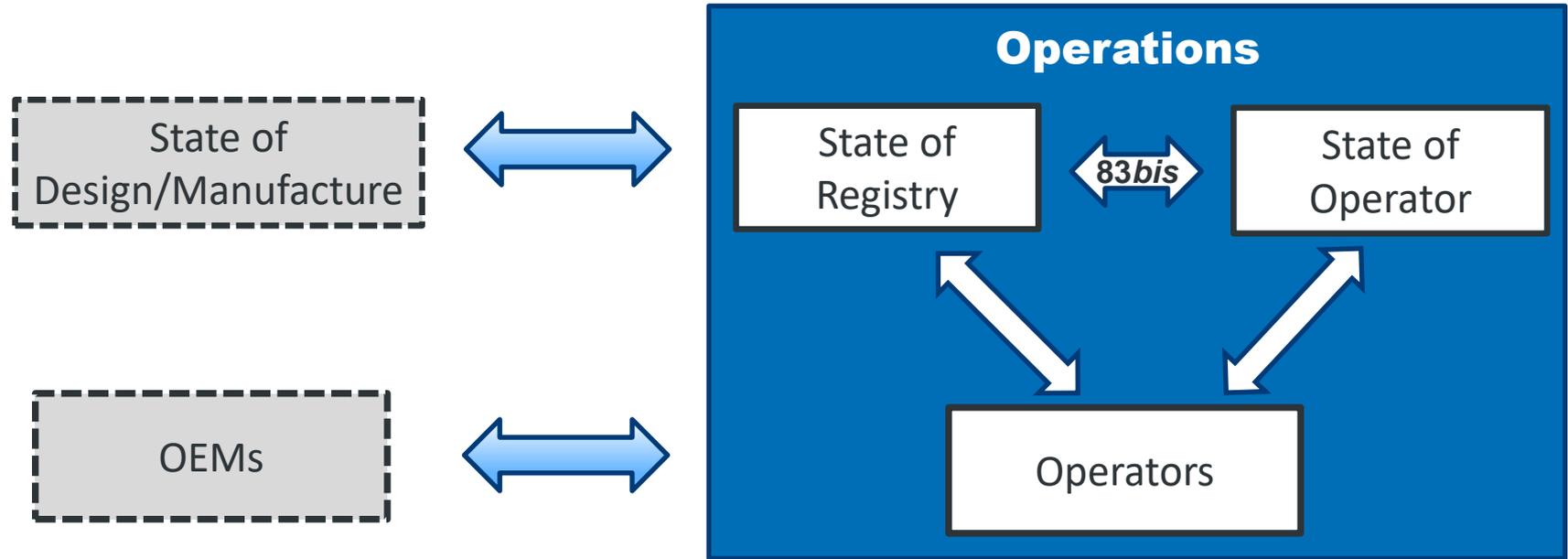
- **Aeroplanes with more than two engines**

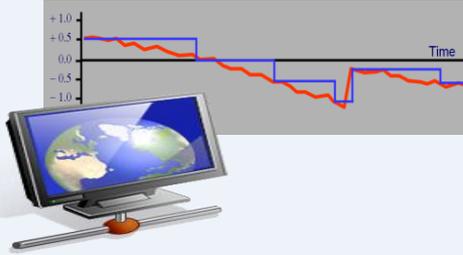
- EDTO maintenance program continued surveillance requirements are not applicable.



# EDTO Continued Surveillance Interfaces

## EDTO Operations





- APU In-flight Start Monitoring

- EDTO Significant Systems



- Oil Consumption Monitoring
- Engine Condition Monitoring
- Propulsion System Monitoring

- EDTO Reliability Programme



# EDTO Reliability Program

## Reporting Standards

 Airlines

The airline should establish the list of events to be reported to the authorities.

TECHNICAL LOGBOOK					
ITEM	PILOT REMARK	ITEM	STATUS	ACTION	ACCOMP. BY
15		15	OPEN CLOSED <input checked="" type="checkbox"/>		SIGNATURE
	IDG1 overheat action disconnected			Aircraft dispatched per MEL	SIGNATURE 

The EDTO Significant Systems List can be used as a guide to help defining the events.

### Examples

ATA 49	<ul style="list-style-type: none"> <li>Uncommanded shut down</li> <li>Significant overspeed / over EGT</li> <li>Uncontained burst (compressor / turbine cooling fan)</li> <li>Severe fuel / oil leak in the APU compartment</li> <li>No reflight in flight</li> </ul>
ATA 70	<ul style="list-style-type: none"> <li>Commanded or uncommanded in flight shut down</li> <li>Uncommanded power loss / changes</li> <li>Nacelle fire warning</li> <li>Oil / fuel leaks</li> </ul>



## Typical State established operator IFSD rate thresholds (14 CFR § 121.374(i))

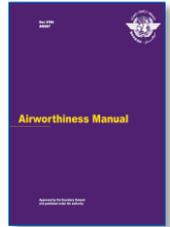
EDTO Operational Approval	<u>Operator IFSD Rate Target*</u>
Up to and including 120-minutes	≤ <b>.05</b> per 1,000 engine hours
Up to and including 180-minutes (including 207-minutes)	≤ <b>.03</b> per 1,000 engine hours
Beyond 180-minutes (excluding 207-minutes)	≤ <b>.02</b> per 1,000 engine hours

*\* Based on a 12 month rolling average*



## Doc 9760 Section 5.4 - Continued Surveillance

5.4.2: Causes of engine in-flight shutdown or other engine/propulsion system problems may be associated with design problems and/or maintenance and operation procedures applied to the aeroplane.



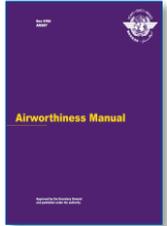
It is important to identify the root cause of events so that the appropriate corrective action is implemented. An operator should not be considered responsible for the occurrence of a design-related event in its fleet. However, maintenance or operational problems may be wholly or partially the responsibility of the operator. If an operator has an unacceptable engine in-flight shutdown rate attributed to maintenance or operational practices, then action tailored to that operator may be required by the State of the Operator.



## Doc 9760 Section 5.4 - Continued Surveillance (cont'd)

5.4.3: A high rate of engine in-flight shutdowns for a **small fleet** may be due to the limited number of engine operating hours and may not be indicative of an unacceptable rate. The underlying causes for such a jump in the rate will have to be considered by the State.

5.4.4: The State of the Operator should alert the State of Design when a special evaluation is initiated and provide for its participation independent of the determined cause.





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# EDTO Workshop

End of Module 7 - Continued Surveillance

