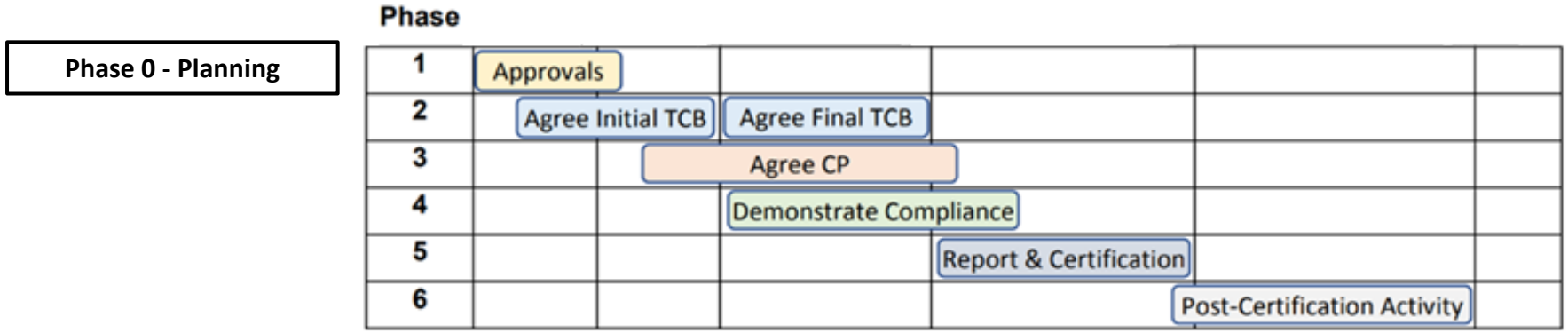
Military Air System Certification Process: Awareness Training Day 1- Phase 0

MACP Phase 0 - Planning

Phase 0 - Overview



During Phase 0, the DT establishes or reviews the fundamental building blocks for certification.

Elements we will cover are:

- Airworthiness Strategy
- Type Certification Strategy
- Certification Specification
- User and System Requirements Document (URD & SRD)
- Statement of Operating Intent (and Usage) (SOI/SOIU)
- Design Safety Target
- Form 30

What is Airworthiness?

Airworthiness is:

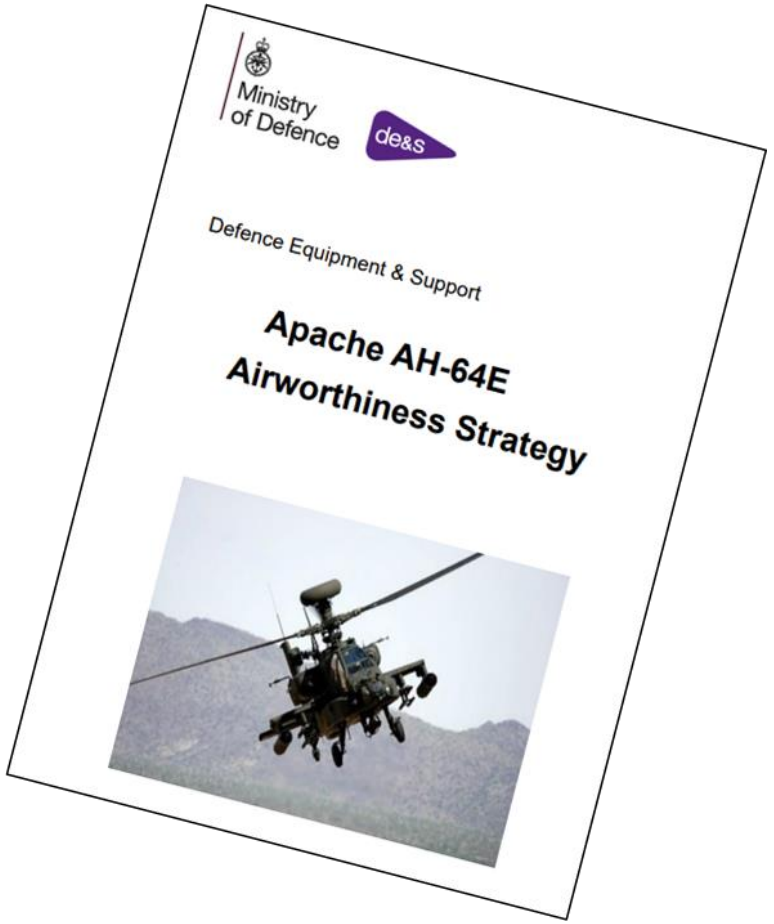
"the ability of an Air System or other airborne equipment or system to be operated in flight and on the ground without significant hazard to aircrew, ground crew, passengers or to third parties; it is a technical attribute of materiel throughout its lifecycle".

[Source: MAA02]

MAA02 MAA Master Glossary

Type Airworthiness Strategy

The Type Airworthiness Strategy explains how the TAA's principal responsibilities are addressed for an in-service Air System and should be used by the Duty Holders as part of their overarching Air System Safety Case (ASSC) and also to satisfy regulatory requirements.



RA5010 Type Airworthiness Strategy

Type Airworthiness Strategy

The Airworthiness Strategy should:

a. Explain how Airworthiness will be established and maintained.

b. Explain the principles that will ensure the Air System will remain airworthy.

c. Confirm the viability (fitness for purpose and deliverability) of the TAA's arrangements for compliance with the MRP.

d. Form a foundation, upon which the DT develops all its Airworthiness policies, processes, procedures, people and products.

e. Describe the tools and activities required to populate the Type Airworthiness Safety Assessment (TASA).

AET Tool 0F:
Type Airworthiness Strategy
Template and Guide

Type Certification Strategy

The purpose of a Military Type Certification Strategy is to define the approach to be taken with the Certification process and to enable and coordinate stakeholder involvement.

Content of the Type Certification Strategy

AET Tool 8G provides guidance on the development of a Certification Strategy.

Use the AET Tool 8G template to identify the major elements of a Cert Strategy:

- Introduction
- Aim
- Overview of the Air System
- Route to Certification
- Detail on the seven Phases (includes Phase 0)
- Safety Assessment
- ADS
- Configuration Management
- Release To Service
- Assurance

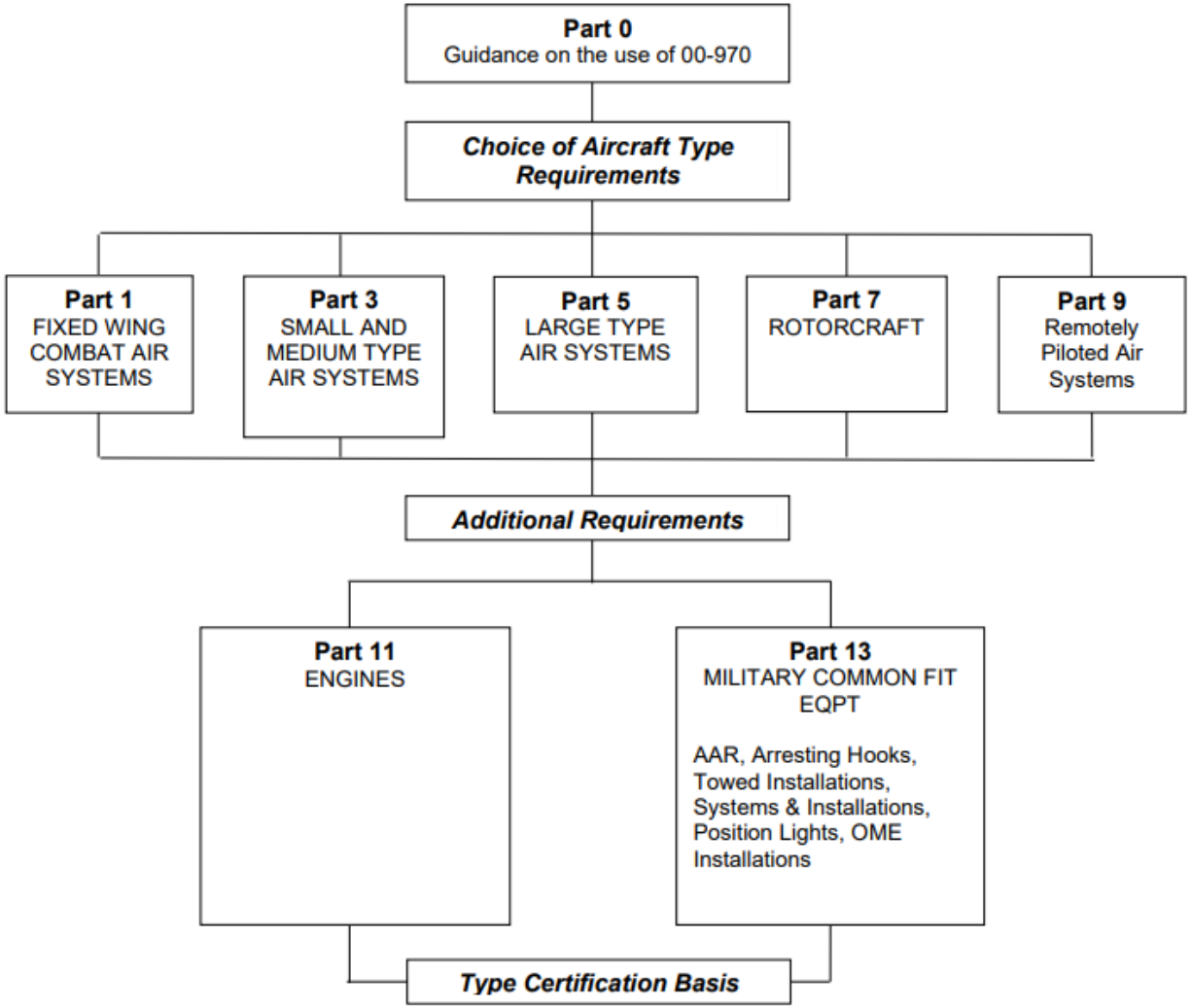
AET Tool 8G:
Military Type Certification Strategy Guide

Air System Categories: Def Stan 00-970

Def Stan 00-970 Benchmark Certification Specification for UK Defence
Based on EASA Certification Specifications (CS23, CS25, CS29, CSE)

Part	Applicability
0	Guidance on the use of Def Stan 00-970
1	Fixed Wing Combat Air Systems
3	Small and Medium Type Air Systems
5	Large Type Air Systems
7	Rotorcraft
9	RPAS
11	Engines
13	Military Common Fit Equipment

Def Stan 00-970 Part 00 – Structure of DefStan 00-970



Def Stan 00-970 Benchmark Certification Specification for UK Defence

Based on EASA Certification Specifications (CS23, CS25, CS29, CSE)

Contains a number of Parts, to be used to construct a Type Certification Basis (TCB) as shown.

Type Design Definition

The minimum set of approved design information necessary to define the product type.

[Source: MAA02]

Could include:

- Drawings, calculations, assessments, reports. Anything necessary to define the configuration and features of the Air System
- Information on material/process/methods of manufacture and assembly of the Air System
- An approved airworthiness limitations section of the instructions for Type Airworthiness
- Any other data necessary to allow, by comparison, the determination of the airworthiness of later Air Systems of the same type.

MAA02 MAA Master Glossary

Military Air System Certification: Awareness Training Day 1

Major - Minor Design Change Classification

Design changes (modifications) are classified as Major or Minor dependent on impact on Airworthiness. Airworthiness is required to ensure Air Safety.

A **Minor** Change is a change that has no appreciable effect on the:

Mass,

Balance,

Structural strength,

Operational characteristics,

Armament System, or

other characteristics affecting Airworthiness.

[Source: MAA02]

All other changes are **Major** changes.

MAA02 MAA Master Glossary

Major Change sub-classification

Substantial: so extensive that a substantially complete investigation of compliance is required.

Significant: relates to one or more of the following:

- general configuration,
- principles of construction,
- or the assumptions used for Certification (including usage).

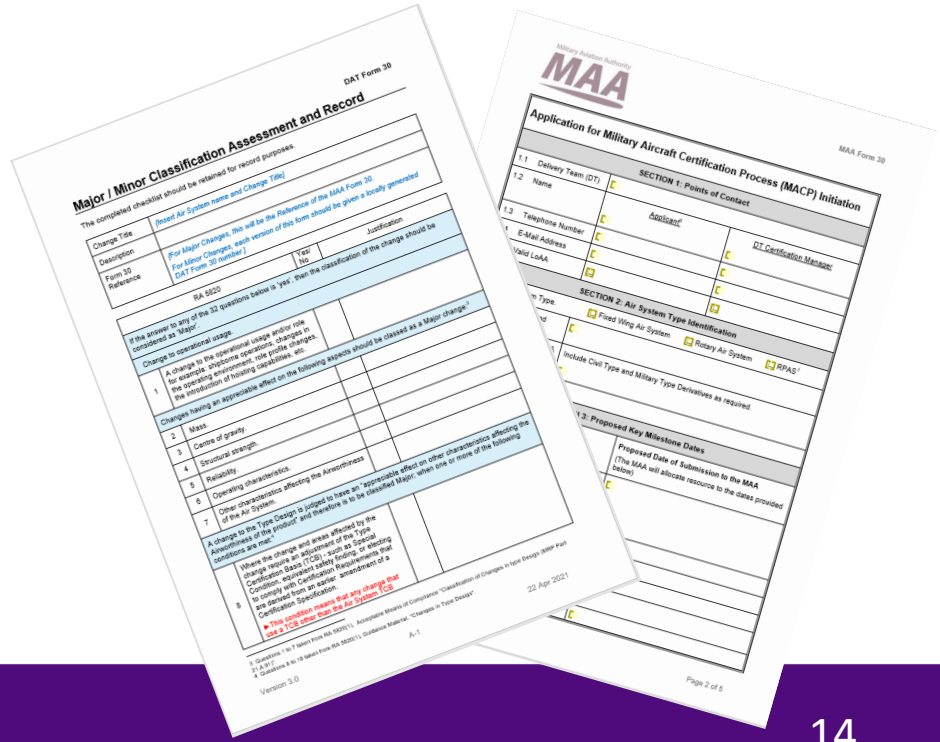
Non Significant: all other Major Type Design changes.

MMAC Table 4: Examples of Substantial, Significant and Not Significant Changes

MAA and DAT Form 30

The MAA Form 30 is the method by which TAAs apply to the MAA for Certification assurance of new Type Designs or Major Changes to existing Type Designs.

For Minor Change to Type Design, TAAs can elect to use the DE&S ASPIRE-based 8I Major Minor Change Record Template - DAT Form 30.



RA 5820 - Changes in Type Design (MRP Part 21 Subpart D)
MMAC Table 1- Glossary of Certification Specific Terms

AET Tool 8I:
Major/Minor Change Record Template

Major Changes – MAA Form 30

For new Type Designs or Major Changes to existing Type Designs, TAAs apply to the MAA for Certification assurance using MAA Form 30.

The TAA may propose assuring the Major Change themselves, if so, the MAA will review the MAA Form 30 and notify the TAA whether the Major Change will be subject to MAA Certification assurance activity.

Major Changes – MAA Form 30

MAA Form 30 application should include:

- Description of the change:
  - Configuration of the Air System including configuration of Programmable Elements
  - All areas of the Type Design affected by the change
  - The Certification Specifications

RA 5820(2) - Changes in Type Design (MRP Part 21 Subpart D)

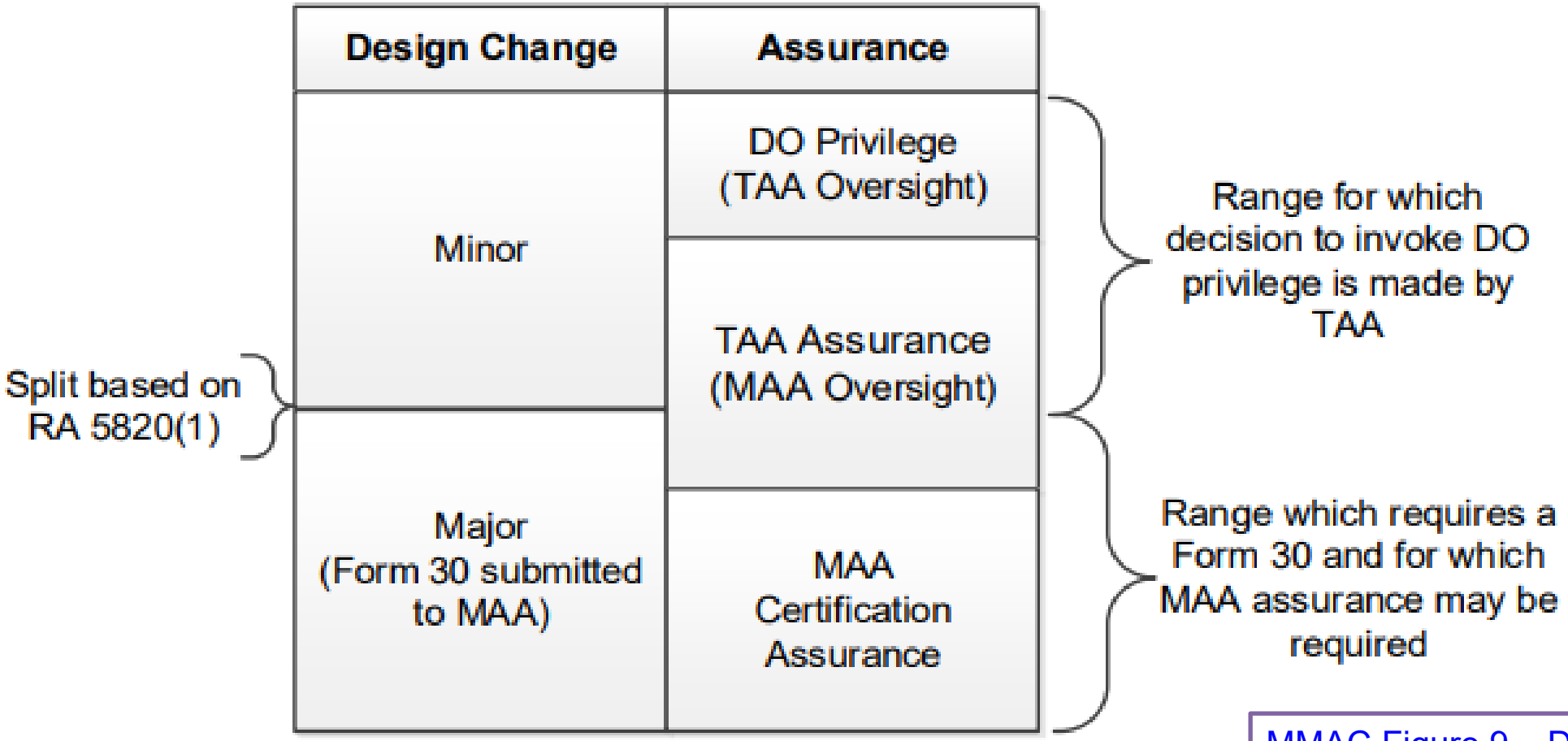
- Justification of the Major Change Classification:
  - Identify the condition(s) listed in the MMAC that has driven the Major classification
  - Detail why a Major classification is appropriate
  - Specify whether the change is a Substantial, Significant or Not-Significant change

- Investigations necessary to demonstrate compliance of the change with the Type Certification Basis (TCB).

Minor Changes – 8I Major Minor Change Record Template - DAT Form 30

For Minor Changes to a Type Design, TAAs are to use the DE&S ASPIRE-based 8I Major Minor Change Record Template - DAT Form 30.

Levels of MACP Assurance



MMAC Figure 9 – Design Change and Assurance Level

User/System Requirement Doc (URD and SRD)

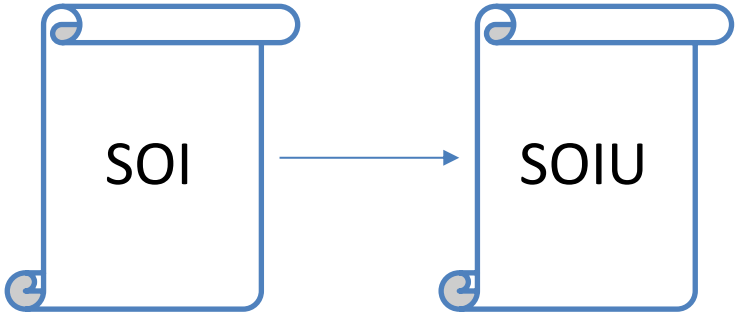
- The User Requirement Document (URD) defines the expected performance of an Air System or piece of equipment via a list of requirements.
- Applicable for new systems and changes to existing systems.
- The System Requirement Document (SRD) is derived from the URD and lists the requirements for each system in order to meet the requirements of the URD.
- Both documents are used to formally agree requirements for an Air System between the customer and the supplier.

MAA02 MAA Master Glossary

Statement of Operating Intent and Usage

AET Tool 18I:
SOI/SOIU Template

- Assessment of the operating conditions, configuration and usage is a major input to the development of the Type Certification Basis (TCB).
- The Statement of Operating Intent (SOI) is how the Aircraft Operating Authority (AOA) formally conveys this information to the TAA.
- The SOI is converted into a Statement of Operating Intent and Usage (SOIU) as soon as sufficient representative in-service usage data is accumulated, no later than 3 years after In-Service Date (ISD).



RA1310(1) The Air System Document Set
RA5726(4) Integrity Management – Validating Integrity

Design Safety Target

Design safety targets provide a level of assurance that a design can achieve specific safety criteria. They are agreed with the operator and regulator.

Applicable to:

- Design solutions for new Air Systems
- Design Changes to new and existing Air Systems
- Associated equipment and software

Caveat: Unless overriding statements for Airworthiness are contained in the specification or contract, with the prior agreement of the MAA.

RA1230(1) Design Safety Target - Criteria

Design Safety Target

Recent update to RA1230 has introduced two regulations RA1230(2) & (3) and new requirements for Design Safety Targets.

RA 1230(2):

For Air Systems not yet in-service, RA requires the “the SRO shall establish suitable design Safety Targets”. This leaves the approach open, however directs to Failure Condition classification and analysis in line with the civil approach presented by ARP4761 and CS/FAR xx.1309.

RA 1230(3):

This covers in-service Air Systems and requires the TAA to declare a Design Safety baseline. This allows for the current approach to continue, i.e. a DST of $1x10^{-6}$ pfh and demonstrated through a Loss Model.

RA1230(1) Design Safety Target - Criteria

Type Design Change - Classification

Minor → Major (Not Significant) → Major (Significant) → Major (Substantial)

- A **Minor** change has no appreciable effect on the mass, balance, structural strength, reliability, operational characteristics, or other characteristics affecting the Airworthiness of the Air System.
  - **Failure of a Minor change cannot result in a Critical or Catastrophic outcome.**
- All other changes are **Major** changes.
  - A Major Type Design change is considered **Substantial** if it is so extensive that a substantially complete investigation of compliance with the applicable TCB is required.
  - A Major Type Design change is considered **Significant** if the change relates to one or more of the following:
    - General configuration, Principles of construction, Certification assumptions (including usage).
  - …otherwise, the change is considered **Not Significant**.

Type Design Change - Classification

Minor → Major (Not Significant) → Major (Significant) → Major (Substantial)

IFE Upgrade
'No appreciable effect' on Airworthiness

Minor

ElecMech → Digital
Maintains existing Av architecture, TCB OK

Not Significant

Wheels → Skis
General configuration

Significant

Propellor → Jet
Re-investigation of Compliance reqd

Substantial

Phase 0: Inputs and Outputs

Phase 0 Inputs:

Initial Informal Project Liaison between the TAA and the MAA

Generation of:

- Airworthiness Strategy
- Type Certification Strategy
- Design Safety Target
- Selected Certification Specification
- URD & SRD
- SOI/SOIU
- Design change classification

Phase 0 Output:

- MAA F30 Application (Major Design Changes)
- DAT F30 Major/Minor Change Record Template
- Technical familiarisation brief
- MAA's F30 Response letter

Get your dominoes in a row!

Phase 0 Planning- Summary

The Awareness Course covered:

- Airworthiness
- Airworthiness and Type Certification Strategies
- Major/Minor Design Change Classifications
- The URD and SRD,
- The SOI/SOIU,
- Design Safety Targets
- F30

Break