

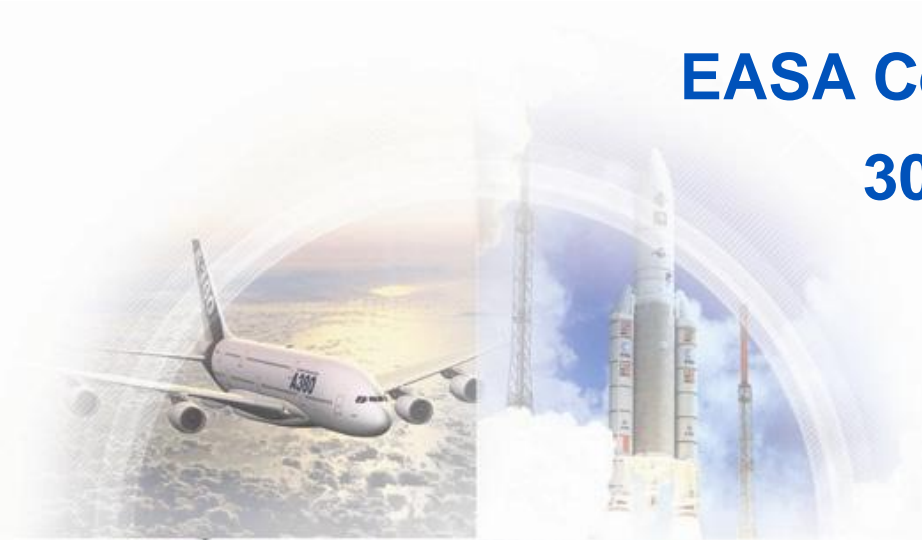


AeroSpace and Defence
Industries Association of Europe

EASA Certification Workshop

30th January 2014

Cologne



Rolls-Royce Civil Large Engines
- Level of Involvement - Pilot
study



EASA Certification Workshop

30th January 2014 – Cologne

Rolls-Royce Derby - Level of Involvement - Pilot study

- EASA published a concept paper identifying a means by which DOA organizations could potentially have more privileges with respect to certification and modification approvals.
- This was called “Level of Involvement” (LOI).
- The paper recommended undertaking pilot studies to investigate this concept and determine the practical aspects of how this could be achieved and controlled.
- The Rolls-Royce airworthiness office undertook to participate in this study and to assess the application of LOI to certification and modifications in conjunction with EASA PCMs.
- Pilot study 1 - Certification aspects, the Trent XWB 97K
- Pilot study 2 - Modifications, a Major change to the HP/IP support structure on the Trent 900

These studies are both underway but still ongoing.



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Rolls-Royce Derby - Level of Involvement - Pilot study

Pilot Study 1 - Certification aspects Trent XWB 97K

EASA's concept paper identified key elements in assessing certification verification.

These been adopted to help establish a structured approach to determining which aspects of the certification submission are to be submitted for EASA verification and which elements can be considered as non- verified by EASA (i.e. verified under DOA privilege).

The criteria were

- Novelty.
- Criticality - **FMECA Criticality.**
- Means of Compliance - Complex or Simple.
- Type of Programme.

N.B. A Fifth Criteria – The level of performance of the design organisation is assumed to be determined by EASA and therefore has not been considered as a variable in this evaluation to date.



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Rolls-Royce Derby - Level of Involvement - Pilot study

Pilot Study 1 (cont'd)

The structured approach developed is as follows:-

- A definition has been established which encompass the key elements listed on slide one. This relates to the attributes of the certification item.
- A weighting has been applied to each definition relative to each certification item.
- An arithmetic summation has been carried out on the weighting established for each certification element.

This then supports the rationale for submission of the items which it is proposed for EASA verification and which items can be considered as non- verified by EASA (i.e. verified under DOA privilege).

The definitions developed are given in Slide 3.

Examples of the weightings applied are given in Slide 4.



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Rolls-Royce Derby - Level of Involvement - Pilot Study

Pilot Study 1 (cont'd)

- **FMECA Criticality – determined directly from the subsystem FMECA**

- **Demonstration of Compliance**

Complex and Novel – Multifaceted analysis and/or test evaluation involving methods which are novel relative to industry standard practices

Complex but Established - as above but involving methods which are considered to be industry standard practices.

Simple but Novel – Direct test or calculation but involving methods which are novel relative to industry standard practice

Simple and Established - As above but using a methods which is considered to be the industry standard practice.

Via Read-across – Evidence is taken directly from similar previous submissions which have been accepted by the authority.

Via publication – No testing or analysis is required but demonstration that appropriate publication or configuration control is in place.

- **Type of Programme – As per Part 21 definitions**



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Pilot Study 1 (cont'd)

FMECA Criticality (F) – Weighted value applied to each predicted consequences

Hazardous - 15

Major - 3

Minor - 1

Demonstration of Compliance (D) - Weighted value applied to reflect level of assessment required

Complex and Novel – 5

Complex but Established - 3

Simple but Novel – 4

Simple and Established - 2

Via Read across – 2

Via publication – 1

Type of Programme (T) – Weighted value applied to reflect Part 21 definitions of level of change

New Engine type - 3

Derivative Engine, Substantial change - 3

Derivative Engine, Significant change - 2

Derivative Engine, Non significant change - 1

Overall weight (OW) = $F \times D \times T$

Interpretation :- V if (OW) is greater than or equal to 30.

S if (OW) is less than 30 or greater than or equal to 15.

NV if (OW) is less than 15.



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Rolls-Royce Derby - Level of Involvement - Pilot Study

Pilot Study 1 - Experience to-date

Development of definitions provides significant advantage in preparing rationale in support of identifying issues which are EASA verified and those which are non-verified

The decision process still requires discussion to determine any specific attributes or concerns with respect to each certification item which is not reflected in the weighting process.

The process also appears appropriate with respect to assisting determining LOI for Modification programs as well as certification programs (see slide 7)

Next steps

The detailed list of certification reports required to support verification of the XWB 97K is almost complete. (This includes analysis and assessment via test).

The normal process of agreeing which reports can be considered as non-verified by EASA is ongoing.

A shadow process will be carried out to determine the outcome of applying the process described here and the differences evaluated.



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Rolls-Royce Derby - Level of Involvement - Pilot Study

Pilot Study 2 - Major change to the HP/IP bearing structure

Experience to-date

A Major change to HP/IP bearing structure was chosen for the pilot study with respect to LOI for modifications.

EASA have provided a CAI which identifies the modification background and the proposed LOI activity.

Rolls-Royce have evaluated the compliance strategy using the weighting method described previously and included the results of this in the CAI.

The conclusions have been reviewed and discussed with EASA and were generally agreed.

Next steps

To determine a method by which this mechanism can be practically applied, specifically in circumstance where verification of the modification covers multiple regulations some of which EASA will require to be verified and some that could be considered non-verified.

A less complex modification is to be assessed to this method.