White Paper on Cross Crew Qualification for IATA

1. Introduction

Historically, flight crew related costs have represented a significant portion of an operator's overall operating expense. As a result, an airline's competitive position is likely to improve markedly with increased efficiencies at the flight operations and pilot training levels.

As the industry has experienced the recent, rapid advancement in manufacturing techniques and systems design and application, aircraft have become not only more efficient but also more complex. However, in appreciation of the need to address operator's flight crew training cost, OEMs have used technologies such as flight guidance computers and "fly-by-wire" control laws that produce aircraft of differing models, presenting differing aerodynamic airframes, that handle in a similar fashion and whose flight characteristics are similar. Additionally, OEMs have used technologies present in modern aircraft systems and displays to allow dissimilar airplanes to present common cockpit and systems design to pilots. Both advances provide similarities across airplanes of differing design that would allow credit to be given in the classification of airmen type ratings and in the training, checking, and currency of pilots, optimizing transition training and mixed fleet flying.

Regulators have also responded to these issues as they began to recognize the significance and importance of "cockpit commonality". Initial regulatory guidance in the mid-1980s proved these innovations to be safe and efficient. Today most national authorities provide uniform guidelines applicable to derivative aircraft and variants, particularly when crews fly mixed fleets in the daily operation.

The basic premise of cross crew qualification is that commonality "by design" consisting of:

- Similar handling characteristics with fly-by wire
- Similar cockpit environment

leads, among other elements, to:

- Similar aircraft handling qualities
- Similar normal procedures,
- Similar process and crew discipline for abnormal and emergency procedures
- Similar crew task sharing

This flight operational commonality is a strategic industrial choice enabling safe, effective and efficient transition training as well as practical and safe mixed fleet flying operations

2. Regulatory background and type rating assignment process
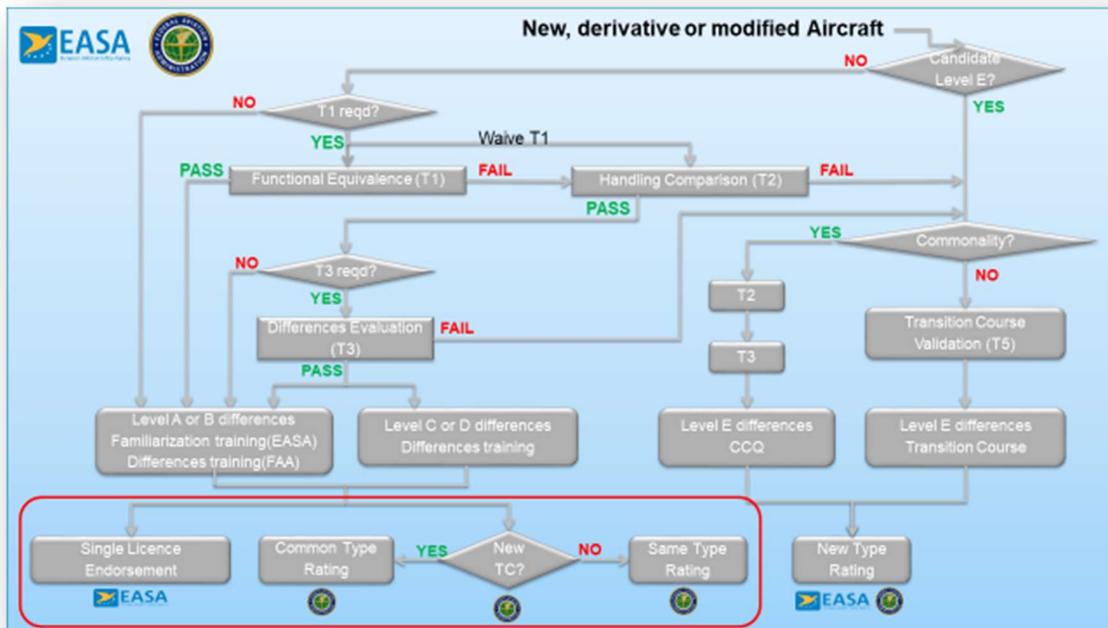
2.1 At the OEM level

For determining the level of flight operational commonality among aircraft, Authorities have developed a process which is spelled out:

- for EASA in the CS-FCD
- for FAA in the AC 120-53B Change 1
- for ANAC in the Instruction IS N°00-007
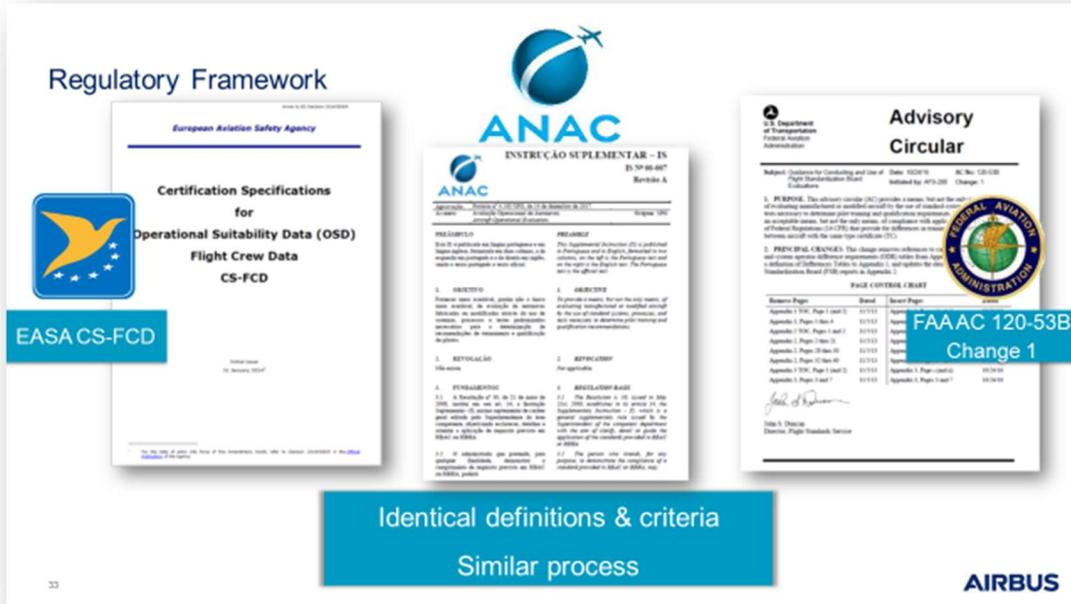
While there are some differences between EASA and FAA in the implementation of the demonstrated results because of the differences in the licensing and operational requirements for each authority, definitions and criteria are identical and the process is equivalent, allowing the OEMs to conduct a joint EASA – FAA evaluation process. Such a process is summarized below with the only difference between the EASA and FAA processes identified by the red frame.

The various Difference Levels from the above chart can be summarized as follows:

For the type rating assignment, EASA does not make a between whether the compared aircraft are under a same type certificate or on a different type certificate, while FAA does.

- For EASA, when comparing two aircraft if assessment is no more than Level D training (as per the criteria of CS-FCD) both aircraft are assigned a single license endorsement regardless the type certificate consideration.

- For FAA, when comparing two aircraft if assessment is no more than Level D training (as per the criteria of AC 120-53B which have same definition than in EASA) and if the two aircraft are on the same type certificate, then they assign a "same type rating". If the two aircraft are on different type certificate, then FAA will assign to the new aircraft a different type rating but will define both aircraft as "related" and the type rating can be considered "common", thus the term in the above chart "common type rating".

This could be illustrated as follows:
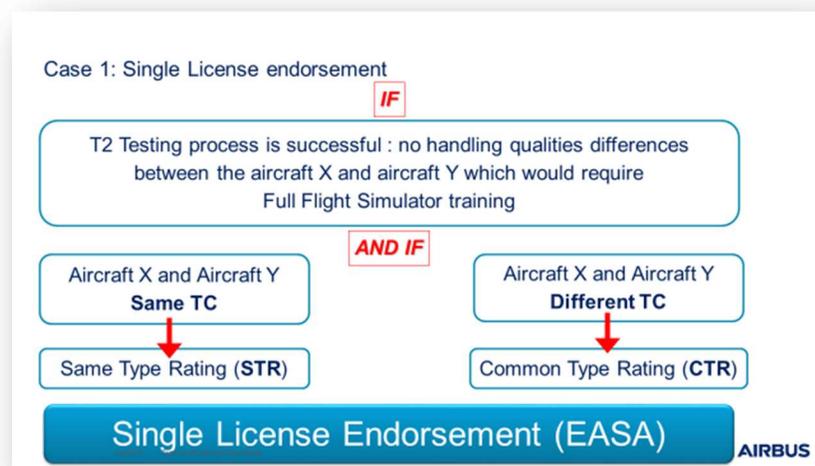
When the results of the evaluation leads to a Level E, the aircraft will be assigned both in the EASA and FAA regulatory system as a new type rating.
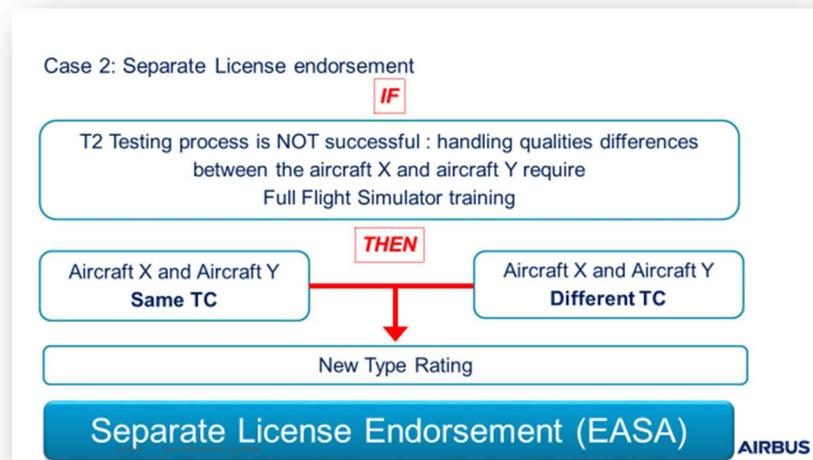
Once the evaluation is completed its results will be published:

- Under the EASA regulatory framework by the OEM's and are called OSD Flight Crew Data. These documents are approved by EASA and referenced into the aircraft Type certificate data Sheet.
- Under the FAA regulatory system, by the FAA in the form of a Flight Standardization Board Report (FSBR) which initially will be released for comments on the FAA website. Following the comment review period, a final or updated version of the FSBR will then be posted on the FAA website (FSIMS) for access by FAA inspectors and commercial operators.

2.2 At Operators' level

Depending upon the regulatory system they operate under, operators will either have to comply with the EASA - OSD which includes mandatory and non-mandatory data, or with the FAA recommendations published into the FSB Report and managed by their local FAA office.
Below is an overall scheme of both the EASA and FAA regulatory framework:
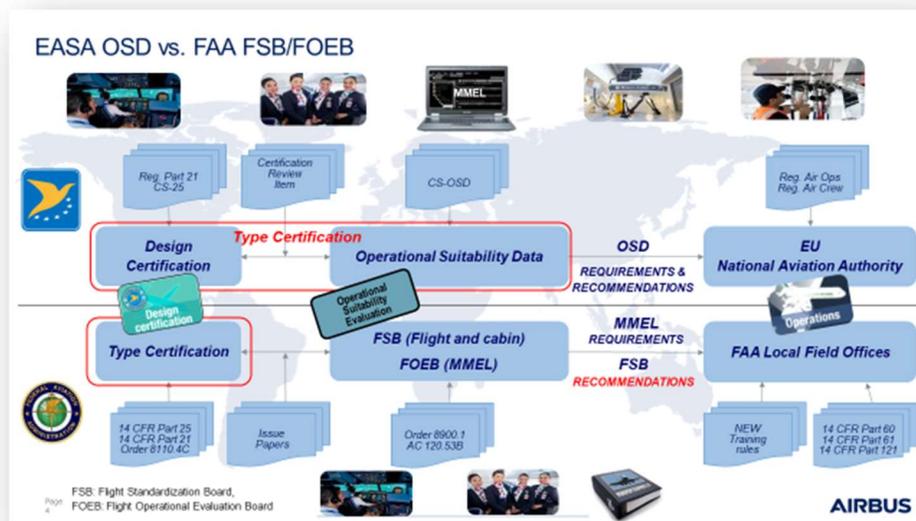
2.2.1 Operators under EASA regulatory framework

Under the EASA regulatory framework the Aircrew regulation and the AirOps regulation include reference to the use of the OSD
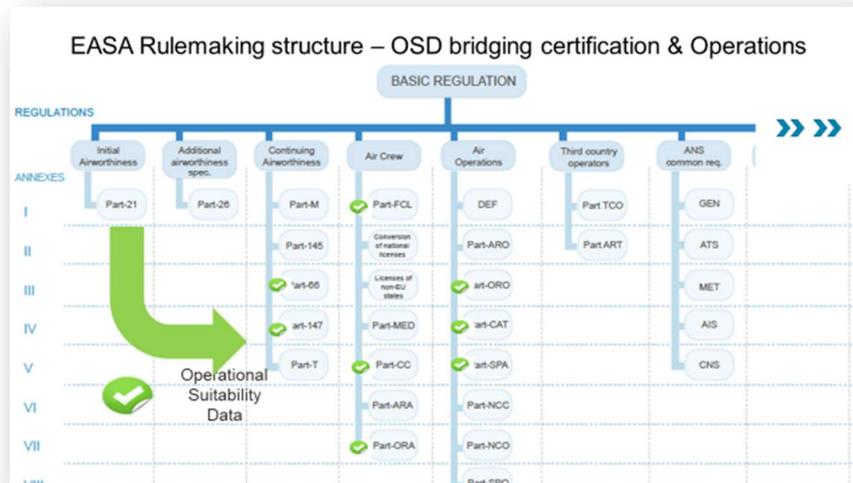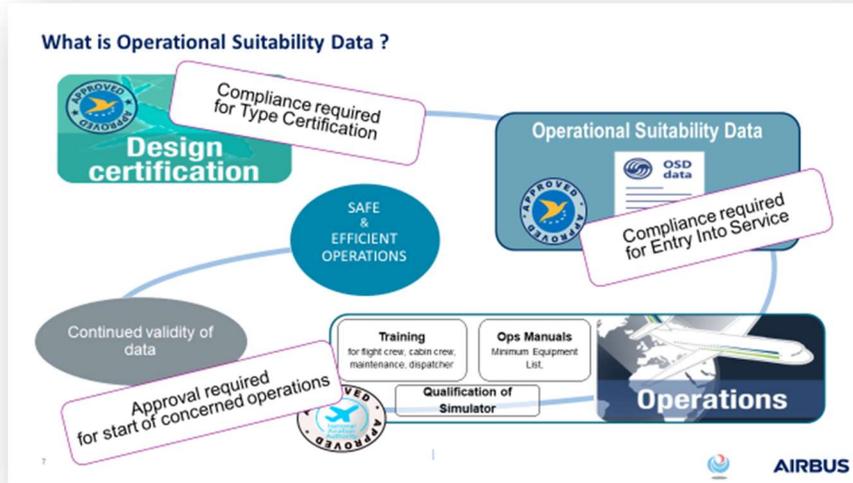
Those specific EASA AirCrew regulations that have a reference to OSD FCD are listed below:

Aircrew Part FCL:

- FCL.01 – Definitions – Type of aircraft
- FCL.060 Recent experience
- FCL.710 Class and Type
- FCL.720.A experience requirements and prerequisites for the issue of class or type ratings
- FCL.725 Requirements for the issue of class and type ratings
- FCL.725.A Theoretical knowledge and flight instruction for the issue of class and type ratings

- FCL.740 and FCL.740.A Validity and renewal of class and type rating
- FCL.915. general prerequisites and requirements for instructors
- FCL.910.TRI TRI restricted privileges
- Part FCL – Appendix 9 Training, Skill test and proficiency check for MPL, ATPL, type and class ratings, and proficiency checks fro IR.

In addition, the operator will have to comply with part ORO, and more specifically with the following paragraphs when considering the use of credit in training and operations of more than one type or variant (as in Mixed Fleet Flying) in association with the OSD FCD published by the OEM:

- ORO.FC.140,,ORO.FC.240 and associated AMCs – Operation of more than one type or variant

2.2.2 Operators under FAA regulatory framework

Operators have to comply with the final rule "Qualification, Service, and Use of Crew members and Aircraft dispatchers" which was issued on November 12, 2013. This rule includes related aircraft provisions with effectivity date of March 12, 2014.

Operators may request approval of a related aircraft designation to allow credit for training and qualification between airplanes with different type certificates. Once the related aircraft designation is approved, the air carrier may request approval of:
- Related aircraft differences training and,
- Related aircraft deviations from some qualification requirements
In this new rules some new definitions have been introduced.

Under 14 CFR 121.400 we find:

Differences training - The training required for crewmembers and dispatchers who have qualified and served on a particular type airplane, when the Administrator finds differences training is necessary before a crewmember serves in the same capacity on a particular variation of that airplane.
To be noted that this definition applies to aircraft with the same type certificate.

Related Aircraft - Any two or more aircraft of the same make with either the same or different type certificates that have been demonstrated and determined by the Administrator to have commonality to the extent that credit between those aircraft may be applied for flightcrew member training, checking, recent experience, operating experience, operating cycles, and line operating flight time for consolidation of knowledge and skills.

Related aircraft differences training -The flightcrew member training required for aircraft with different type certificates that have been designated as related by the Administrator.

Base aircraft - An aircraft identified by a certificate holder for use as a reference to compare differences with another aircraft.

14 CFR 121.418 includes the process for requesting approval from FAA of related aircraft difference training.

Based on designation of related aircraft, Operators may request deviations from 121.434, 121.439, and 121.441

121.434
- Operating experience – hours flown with check pilot
- Operating cycles - cycles flown with check pilot
- Consolidation of knowledge and skills – 100 hours of line operating flight time within 120 days of completion of proficiency check
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121.439 Pilot qualification: Recent experience
3 takeoffs and 3 landings within preceding 90 days
Reestablish recency of experience

121.441 Proficiency checks.

Note: it is important to realize that within EASA and FAA rules the terminology CCQ is never used. The term is an Airbus term that has been used for the very first evaluation in 1991 between the A320 and the A340, which stands for cross crew qualification. Other OEMs are using a similar approach and may use a different term. In FAA terminology CCQ is named related aircraft difference training, leading to a new type rating. For EASA there is no specific terminology it is a type rating course based on differences leading to the assignment of a new type rating.

3. **Study case – EASA - Airbus**

3.1 Airbus application and current status

In 1983, Airbus decided to launch the A320 with future plans to launch the A330 and the A340 several years later. This was the genesis of the Airbus concept to produce a full family of aircraft with a very high level of commonality as industrial strategic choice which was to have tremendous consequences on aircraft design and operation.

This strategic choice dictated the implementation of:

- The fly by wire system with high level control laws providing similar handling characteristics within and outside the normal envelope of all aircraft of the family
- The cockpit layout similar throughout the family
- Integrated automated systems and display units providing similar data and parameters with the same colour coding, the same operational philosophy and similar procedures.

This high level of commonality by design allows optimization of the training. A pilot trained on one of the aircraft of the family can safely control the flight path and handle the systems of any other aircraft of the family without the need for special additional skills or lengthy training. Thus the transition training need only address the essential differences.

Defining reduced training between aircraft types requires detailed evaluation of the differences and similarities between these aircraft (or variants). Airbus conducts this analysis in accordance with regulatory specifications (EASA CS-FCD and FAA AC120-53B) and publishes the results of this analysis in Operator Difference Requirement (ODR) documents.

The main content of an ODR document are tables with a corresponding list of compliance methods pertinent to training, checking and currency.

ODR compares a Base aircraft (aircraft used as a reference to compare differences) with a Candidate aircraft. The differences between a base and a candidate aircraft are graduated by "Difference levels" to be observed for the evaluation of pilot training, checking, or currency.

Key elements of ODR assessments are Flight characteristics.

Flight characteristics mean handling characteristics or performance characteristics perceivable by a pilot. Flight characteristics relate to the natural aerodynamic response of an aircraft, particularly as affected by changes in configuration or flight path parameters. Handling characteristics means the manner in which the aircraft responds with respect to rate and magnitude of pilot initiated control inputs to the primary flight control surfaces.

Analysis of difference levels and the evaluation process are conducted by Subject Matter Experts (SME's) nominated by the certification authority as per regulatory requirements. SME's consist of a representative range of pilots' expertise including ordinary line pilots.

Once the evaluation is completed result are published by Airbus into an OSD Flight Crew data document per aircraft type together with the ODR tables approved by EASA.

The Airbus CCQ and CTR (Difference training) courses are then implemented and approved as part of the Airbus ATO (Approved Training Organisation)

All Airbus Operators have access to the Airbus OSD, including ODR tables for their aircraft through Airbus World portal. The operator might have to customize the OEM ODR to suit his specific fleet and route structure before submission to his national authority.

Operators may wish to customize the recommended CCQ/CTR course to match their training media if conducted in their own company ATO. However, all items which have been identified as the result of the commonality evaluation and contained within the ODR tables, must be included in any CCQ/CTR training course in a training media corresponding to the identified training level.

The reduced training that focuses on these differences is known as CTR or CCQ and has met worldwide acceptance from regulatory authorities, operators and airline pilots alike.

Besides credit for training, the required Line Flying Under Supervision (LIFUS) or familiarization flights after completion of a CCQ/CTR course, can be reduced to as few as 4 sectors (including line check if required) on the difference aircraft based on commonality of design.

The operator may however have to adjust the minimum published into the OSD documents based on the following operational consideration:

- New routes
- Domestic/international flight operations
- Short/long range operations
- MNPS/oceanic operations
- ETOPS operations

Once qualification is completed the operator has the choice to undertake Mixed Fleet Flying (Single Fleet Flying) Operations.

Flight Operational Commonality is not a prerequisite for Mixed Fleet Operations. In other words, the same pilot can fly an ATR turboprop on one day and a B747 the day after, provided he or she complies with all the rules regarding initial qualification, recency of experience, recurrent training, and proficiency checks for each of the aircraft types.

It is worth noting that EASA limits mixed fleet flying operations to 2 aircraft types (different license endorsement) unless demonstrated and approved as OSD whereas the FAA does not impose by rule a limitation.

Until Flight Operational Commonality was introduced as an operational concept in the mid 1990s, , large-scale MFF by ordinary line pilots did not gain widespread application for two main reasons:

- Airline concern about the safe operation of more than one aircraft type by a single pilot pool.

- The prohibitive cost and loss of productivity associated with at least doubling the initial qualifications, quarterly recency requirements and bi-annual training and checking events.

Today, many of the world's regulatory authorities allow operators under their oversight to conduct MFF or SFF with the following credits:

- Pilots qualified on one aircraft type may obtain additional ratings through CCQ or CTR (40 to 90% time saving compared to the full type rating course).

- Take-offs and landings in one type may count towards recency in other types as well.

- Recurrent training, proficiency and line checks may alternate between types.

Thanks to Flight Operational Commonality of Airbus Aircraft a large number of operators currently take advantage of Mixed Fleet Flying (MFF) and Single Fleet Flying (SFF). The concept has met with worldwide acceptance from regulatory authorities, operators and airline pilots alike.

In conclusion, thanks to the Flight Operational Commonality concept, mixed fleet flying (MFF/SFF in airbus terms) can provide operators with crew scheduling flexibility, resulting in a more efficient flying roster and reduced reserve requirements.