Proposed Special Condition on "Lateral Trim Function through Differential Flap Setting"

Applicable to Airbus A350-941

Introductory note:

The following Special Condition has been classified as an important Special Condition and as such shall be subject to public consultation, in accordance with EASA Management Board decision 12/2007 dated 11 September 2007, Article 3 (2.) of which states:

"*2. Deviations from the applicable airworthiness codes, environmental protection certification specifications and/or acceptable means of compliance with Part 21, as well as important special conditions and equivalent safety findings, shall be submitted to the panel of experts and be subject to a public consultation of at least 3 weeks, except if they have been previously agreed and published in the Official Publication of the Agency. The final decision shall be published in the Official Publication of the Agency.*"

Statement of Issue

For the A350 a lateral trim function is intended to be performed once during Climb and once during Cruise. Objective will be to compensate the small asymmetry which can exist on aircraft and which is compensated today by the ailerons, then mechanically by a flap trimming procedure. The lateral trim order will be computed by the Primary Flight Control System, according to the aileron position.
This function will replace the traditional mechanical asymmetric rigging by providing an intended asymmetry controlled by the High Lift System. Although this function operates under normal conditions within the insignificant range of the traditional rigging, there may be failure cases leading to a significant out of range asymmetric condition. An asymmetry threshold will protect the system against excessive flap asymmetry.

CS 25.701requires in subparagraphs (a) and (d) that:

"(a) Unless the aeroplane has safe flight characteristics with the flaps or slats retracted on one side and extended on the other, the motion of flaps or slats on opposite sides of the plane of symmetry must be synchronised by a mechanical interconnection or approved equivalent means.
…
(d) The interconnection must be designed for the loads resulting when interconnected flap or slat surfaces on one side of the plane of symmetry are jammed and immovable while the surfaces on the other side are free to move and the full power of the surface actuating system is applied."

The A350 does not fulfil the requirement of CS 25.701 by commanding the flaps asymmetrically. The asymmetrical use of the flaps to ensure a lateral trim function is unconventional and CS 25 does not contain adequate safety standards for such operations.
As the basic intent of CS 25.701 does not cover this new function, a special condition is required for the aspects of a function used to command an intended asymmetry. In accordance with IR 21A.16B (a) (1), a special condition has been defined on the A350 programme to address the flaps asymmetry operations.

Airbus A350-941 - Special Condition D-20

- Lateral Trim Function through Differential Flap Setting -

In lieu of the current CS 25.701 (a) and (d) paragraphs, the following conditions are applicable:

1. Airbus must demonstrate that an unsafe condition is not created by using the flaps asymmetrically.
2. The degree of acceptable asymmetry must be defined and justified for all flight phases with respect to :
   - CS 25.701 (b) and (c), with the worst case asymmetric flap configurations, and
   - Providing equivalent protection against excess asymmetry in the same manner as CS 25.701 provides to systems that are synchronized or use another equivalent means to prevent asymmetry.
3. The lateral trim function is a flight control system and therefore must show compliance to both general system requirements as well as general flight control requirements. Therefore, the function must be demonstrated:
   - To comply with CS 25.671 , 25.672 and CS 25.1309
   - Not to embody, where practicable, significant latent failures
   - Where significant latent failures are unavoidable, to satisfy the minimum requirements as it is proposed in the CDD and 1/1000 criteria for the flight controls