

# Flight crew alerting new CS 25.1322

Chris Misiak

Nicolas Durandau

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# Rationale for rule change

- New CS25.1322 appeared at CS 25 amendment 11 to
  - Introduce additional senses on top of the visual one
  - Take benefit from digitalized cockpit



# Intent of the new CS 25.1322 rule

- Precise categorization of alert:
  - Advisory: flight crew awareness and may require subsequent flight crew response
  - Caution: immediate flight crew awareness and subsequent flight crew response
  - Warning: immediate flight crew awareness and immediate flight crew response
- Save the RED colour for Warning and the AMBER colour for Cautions
- Impose dual sense for Warning and Caution (immediate awareness)
- Minimize nuisance alert

# Focus on encountered non compliances

**Lack of dual sense for Caution alerts**

# Examples of Caution alerts without aural

- Categorized as **Caution** alert according to OEM assessment
- Sensor miscompare alerts:
  - miscompare between IRS / ADS / FPV / RA / deviations (ILS)
- During RNP AR approach:
  - amber flag to indicate the loss of the approach
  - lateral deviation scale flashing amber if TSE > RNP
- During LPV approach, amber flag to indicate loss of the approach

# EASA position

- Usually, EASA assess previous examples as non compliances with CS 25.1322(c) because:
- Purpose of CS 25.1322(c) is irrespective of flight crew attentiveness or workload levels
- Introduction of new 1322 recognized that despite training and familiarity, a visual indication can be missed
- It cannot induce auditory clutter because alerts must be prioritised according to their criticality and subsequent workload impacts mitigated

# Focus on encountered non compliances

Use of RED for other annunciations than Warning alerts



# Use of RED for other annunciations than Warning alerts

- Example: Loss of navigation capability
  - The expected pilot response to the loss of navigation capability depends upon when the loss occurs (e.g., before the approach has started; during the final approach but before the FAF) yet these flags have typically been red
  - If not expected to induce immediate flight crew response, those failure flags are typically not compliant under the new CS 25.1322:
    - Vertical Deviation (i.e., “G/S” presented as red text inside a red box)
    - Lateral Deviation (i.e., “VOR/LOC” presented as red text inside a red box)
    - NAV source (i.e., “VOR” or “LOC” presented as red text inside a red box)
    - CAT 2 annunciation above 200 feet (i.e., “CAT 2” presented as red text inside a red box)

# EASA position

- If the RED annunciation is an alert, this is not compliant with CS 25.1322(e)(1):
  - *(e) Visual alert indications must (1) conform to the following colour convention: (i) Red for Warning alert indications.[...]*
- Such designs require the pilot to learn and remember that under certain conditions red does not mean warning but caution (so no immediate flight crew response)
- This is often a miscategorization of the alert made by the manufacturer (should be a caution instead of a warning)

# EASA position

- If the RED annunciation is NOT an alert, this is not compliant with CS 25.1322(f):
  - *Use of the colours red, amber and yellow on the flight deck for functions other than flight crew alerting must be limited and must not adversely affect flight crew alerting.*
- AMC 25.1322 subparagraph 11(f) and (g) allows for the use of red, amber and yellow for non-flight crew alerting functions when “...*there is an operational need to use these colours to provide safety related information*” and provided that such uses are “...*limited and must not adversely affect flight crew alerting*”
- Examples of safety related information are weather radar displays and terrain displays. Also included are emergency checklist titles and limit and/or range markings on scales, tapes and dials

# Focus on encountered non compliances

**Ambiguous presentation of alert elements**

# Ambiguous presentation of alert elements

- Inconsistency between system messages/failure flags and CAS messages in terms of classification, priority and presentation (e.g., color).
  - It should be obvious to the pilot that the system message/failure flag and the CAS message are related to the same underlying event or cause.
- Examples:
  - FMS messages: text and colour between FMS messages and CAS are not consistent
  - Sensors failures: colour discrepancy with PFD failure flags and CAS messages
  - Other system failures: colour discrepancy between flags/annunciations on synoptics and CAS messages

# EASA position

- Information displayed in the flight deck associated with the alert condition
  - must facilitate the flight crew to identify the abnormal conditions (25.1322(a)(1)(i))
  - and determine the appropriate actions, if any (CS 25.1322(a)(1)(ii)).
- When designing CAS and associated flags:
  - EASA expects applicants to apply best practice interface design as recommended in AMC 25.1322 §10a, b:
  - *The colour of all visual alerting annunciations and indications must conform to the colour convention in CS 25.1322(e). Use consistent wording, position, colour and other shared attributes (for example, graphic coding) for all alerting annunciations and indications.*

# EASA position

- Applying those best practices would help to show compliant to CS25.1302(b)(1)(2):
- *(b) Flight deck controls and information intended for flight crew use must: (1) Be presented in a clear and unambiguous form, at resolution and precision appropriate to the task. (2) Be accessible and usable by the flight crew in a manner consistent with the urgency, frequency, and duration of their tasks, and*

**Increase usability thus avoiding human errors and enhance safety**

# Focus on encountered non compliances

## Aural alert inhibition



# Aural alert inhibition

→ CS 25.1322(d)(2) intent:

- to provide the pilot with a means to stop an aural (or aural) when there has been a failure in the alerting system.
- This means may be global (i.e., all aural are stopped) or specific (e.g., only aural are inhibited that affect certain systems).

# EASA position

- EASA usually concurs that a guarded switch or two-step touchscreen control could satisfy the inadvertent operation aspect of 25.1322(d)(2).
- Other means are possible but EASA expects applicants to evaluate, verify and document the effectiveness of the proposed design.
- EASA concurs that inhibition or loss of aural alerts could be mitigated via increased pilot monitoring but only if the total loss of the aural alerting function has been assessed as a Major failure condition.
- However, when aural alerts are inhibited, CAT II approaches should not be allowed because these types of approaches require the flight crew's full attention.

# Thank you for your attention

## Questions?

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