International Maintenance Review Board Policy Board (IMRBPB)
Issue Paper (IP)

Initial Date: 15-Feb-2013
IP Number: IP 131
Revision 1 / Date: 26-Apr-2013

Title: Acceptance of FEC 8 without tasks

Submitter: Airbus

Issue: TCHs have encountered examples where no applicable and effective task can be selected to satisfy an FEC8 analysis. In an increasing number of cases, redesign is not an appropriate solution and thus the MRBs have been asked to approve a result that is contrary to MSG-3 logic. This Issue Paper proposes to introduce text that will allow MRBs to accept FEC 8 without task provided that it is justified and supported by the ISC.

Problem:
Para 2-3-6.4 states
"*The Hidden Function Safety Effect requires a task(s) to assure the availability necessary to avoid the safety effect of multiple failures. All questions must be asked. If there are no tasks found effective, then redesign is mandatory*.
MSG-3 provides no opportunity to deviate from the requirement to redesign if no applicable and effective task satisfies FEC 8 logic. This negates certain design solutions introduced to minimise exposure to hidden faults.

Example 1 (Airbus):
A design provides an automatic test facility that allows detection of the concerned failure during flight phase 12 (taxiing to the gate). There could however be some case(s) where the conditions are not met to satisfy the automatic test initiation. In these cases the crew is provided with a cockpit indication that the autotest has not run. This is recorded in the tech log and will lead to a "manually initiated" test being performed within 10 days max (typical MMEL relief). If the concerned failure is present it will thus be detected within 10 days and there is thus no justification for a scheduled MRBR task. It may be noted that the introduction of this design philosophy substantially reduces the exposure time to hidden failures that previously were detected only by MRBR tasks at intervals much longer than 10 days.

Example 2 (Bombardier)
To meet certification requirements, a flap brake unit is designed with an autotest that physically applies and confirms brake function every 40 FC. In addition, there is a bite check that ensures the 40 FC brake application test has been successfully accomplished. Crew notification by a CAUTION level message is sent if either test fails.
Since 40 FC are not accomplished daily this functional failure is hidden and it is safety related as the additional failure results in flap asymmetry. However, this test meets certification requirements and the ISC consider that it would preclude any effective form of scheduled maintenance task. Furthermore, additional testing would lead to premature wear/ failure of the unit.

Example 3 (Airbus)
In an engine anti-ice system there are some failures that will prevent nacelle inlet anti-icing. In the worst case, this might lead to engine shut down in case of icing conditions being encountered. These failures are considered as hidden because the system may not be used on a daily basis. In consideration of ETOPS, such failures on one engine have a safety impact when combined with failure of other engine.
Although nacelle anti-icing may not be used on a daily basis, it is used "regularly" and the failure will be detected and annunciated to the crew as soon as the system is selected on. The

ISC typically does not consider it justified to select a scheduled MRBR task which will address a failure that is evident at system initiation and will lead to flight crew procedures to avoid the safety related impact. Furthermore, it would be considered highly unlikely that the aircraft would be used on routes for the period of an appropriate MRBR task without engine anti-icing being required.

Other examples have been postulated where it is not as evident as in example 3 that the function will be operated within the interval of an appropriate MRBR task. These include the operation of flight deck windows, windscreen wipers and washers. It is not the intention of this IP to declare which examples are valid and which are not. It is written to highlight that there may be good justification that a scheduled task is not justified to address an FEC8 analysis and that it is inappropriate to require mandatory redesign. Providing this justification is found acceptable to both the ISC and MRB then the result should be declared compliant with MSG-3.

In paragraph 2-3-6.4, replace:
'If there are no tasks found effective, then redesign is mandatory'.

by

If there are no tasks found effective, then justify in the analysis that this is acceptable based on

- *the design philosophy (e.g. availability of an auto test),*
  or
- *frequent initiation of function by operating crew within the interval of a potential scheduled task that provides an acceptable exposure of the hidden failure*

or

Redesign is mandatory

In Figure 2-3-6.4 'Functional Failures that have Hidden Function Safety Effects' replace the statement 'REDESIGN IS MANDATORY' by 'REDESIGN IS MANDATORY' UNLESS NO TASK IS JUSTIFIED AS PER 2-3-6.4'

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Recommendation after PB discussion (including Implementation):

In paragraph 2-3-6.4, replace:

'If there are no tasks found effective, then redesign is mandatory'.

by

*'If there are no tasks found effective, then redesign is mandatory unless it can be justified in the analysis that no task selection is acceptable based on the design philosophy (e.g. existence of an auto-initiated test). The use of this design philosophy must provide the timely detection for the failure. In addition th*e ~~is~~ *function of the detection capability must be analyzed within the appropriate MSI.* ~~*considered within the concerned MSI.*~~

In Figure 2-3-6.4 'Functional Failures that have Hidden Function Safety Effects' replace the statement 'REDESIGN IS MANDATORY' by 'REDESIGN IS MANDATORY' UNLESS IT IS JUSTIFIED TO SELECT NO TASK AS PER 2-3-6.4'

IMRBPB Position:

Date: 26 April 2013
Position: Examples 1 and 2 have been validated to further develop the MPIG recommendation for paragraph 2-3-6.4. Example 3 has not been accepted by the IMRBPB and therefore the 2-3-6.4 recommendation will not apply to this type of scenario.

Status of Issue Paper (when closed state the closure date): Closed as IP 131, April 26, 2013.

Recommendation for implementation: Incorporation into the next revision of MSG-3, Volume I and II.

Important Note: The IMRBPB positions are not policy. Positions become policy only when the policy is issued formally by the appropriate National Aviation Authority.