MPIG have repositioned the paragraphs so that they appear in numerical order. These pages replace the text starting at '2-3-1 MSI Selection' in original IP96 dated 9 Apr 2008.

Black text: MSG-3 rev 2007
Red text: EASA original IP96 proposal
Blue text: MPIG counter-proposal
Blue text in italics: MPIG comments

1-3-2. Working Groups

One or more Working Groups, consisting of specialist representatives from the participating operators, the prime manufacturer, and the Regulatory Authority, may be constituted. The Industry Steering Committee, alternatively, may arrange some other means for obtaining the detailed technical information necessary to develop recommendations for scheduled maintenance in each area. Irrespective of the organization of the working activity, written technical data must be provided that supports its recommendations to the Industry Steering Committee. After approval by the Industry Steering Committee, these analyses and recommendations shall be consolidated into a final report for presentation to the Regulatory Authority.

EASA
Note: If separate Working Groups are constituted, means of cooperation need to be established to assess items that do not clearly fall into one category. (i.e. landing gear)

MPIG
Note: If separate Working Groups are constituted, means of cooperation need to be established to assess items that fall into both SSI and MSI definitions (landing gear, doors, etc). If similar tasks are developed in the separate working groups, coordination between the working groups must occur to avoid task duplication (e.g. a reference to the other working group's task can be inserted in the analysis).

2-3-1. MSI Selection

Before the actual MSG-3 logic can be applied to an item, the aircraft's significant systems and components must be identified.

Maintenance Significant Items (MSIs) are items fulfilling defined selection criteria (see Step 3., below) for which MSI analyses are established at the highest manageable level.

This process of identifying Maintenance Significant Items is a conservative process (using engineering judgment) based on the anticipated consequences of failure. The top-down approach is a process of identifying the significant items on the aircraft at the highest manageable level.

The MSI selection process is outlined below:

1. Step 1.

The manufacturer partitions the aircraft into major functional areas; ATA Systems and Subsystems. This process continues until all on-aircraft replaceable components have been identified.

~~Note:~~ ~~Items within the Structural ATA Chapters (51-57) that lend themselves to System analysis (e.g., flight control hinge bearings, fuselage drains, door hinge and mechanisms, etc.) should be included in this step and coordinated with the Structures Working Group in accordance with established transfer policy and procedures. In addition, all safety/emergency systems or equipment should also be included.~~

EASA

• Structural items not designed to carry significant loads but having important functions (i.e. firewalls, shields, integral fuel tank boundaries) need to be included in the MSI selection process.

• Items within the Structural ATA Chapters (51-57) that lend themselves to System analysis (e.g., flight control hinge bearings, fuselage drains, door hinge and mechanisms, etc.) should be included in this step and coordinated with the structures analysis.

• Items within the Systems ATA Chapters that carry significant loads and whose failure could affect the structural integrity necessary for the safety of the aircraft (System parts that would meet SSI definition, i.e. THS spindle actuators or landing gear retraction actuators that also act as side stay) need to be analyzed as MSI and coordinated with the structures analysis

• All safety/emergency systems or equipment should also be included

MPIG

1. Structural items, whether designated as SSI or Other Structure, having system related functionality (e.g. firewalls, shields, integral fuel tank boundaries, flight control hinge bearings, drains, door hinges) need to be addressed through coordination between Systems and Structures Working Groups.

2. System components that contribute significantly to carrying flight, ground, pressure or control loads and whose failure could affect the structural integrity necessary for the safety of the aircraft should be analyzed in consultation with the Structures Working Group.

3. All safety/emergency systems or equipment should also be included.

(The 1st bullet of the MPIG proposal is intended to cover the bullet 1+2 of the EASA one, with the aim to indicate that the same process should be followed for SSI and Other Structure parts.
Additionally, item 2 of the reworded note could be considered for relocation in another paragraph of the System logic section, since it is not directly related to the MSI selection (items will already be included in an MSI), but rather to the way these parts should be analyzed).

3.1 *Applicability Criteria*

Reduced resistance to failure must be detectable, and there exists a reasonably consistent interval between a deterioration condition and functional failure.

EASA

Note: If the deterioration identified is mainly structural (e.g. corrosion), an applicable inspection task to detect deterioration (inspection level and interval) could be developed by using the structure analysis procedure described in chapter 2-4.
The other steps of the MSI analysis and development of the final task is done by use of the Systems logic.

MPIG

Note: If the deterioration identified is of a structural nature (e.g. corrosion) the Structures Working Group could be consulted to help determine an applicable inspection task and interval.

(MPIG considered that the wording proposed by EASA could be too restrictive, since it could be interpreted that the system WG will have to apply structure logic for those cases; it would be preferable to refer to a communication (transfer sheet process) between System and Structure WGs to seek advice on those task intervals.)

2-3-2. Analysis Procedure

After the MSI's have been selected, the following must be identified for each MSI:

a) Function(s) - the normal characteristic actions of an item
b) Functional Failure(s) - Failure of an item to perform its intended function within specified limits
c) Failure Effect(s) - what is the result of a functional failure
d) Failure Cause(s) - why the functional failure occurs

Defining some functional failures may require a detailed understanding of the system and its design principles. For example, for system components having single element dual load path features, such as concentric tubes or back-to-back plates, the function of both paths should be analyzed individually.
The degradation and/or failure of one path may not be evident.

When listing functions, functional failures, failure effects, and failure causes, care should be taken to identify the functions of all protective devices. These include devices with the following functions:

a) to draw the attention of the operating crew to abnormal conditions
b) to shut down equipment in the event of a failure
c) to eliminate or relieve abnormal conditions which follow a failure
d) to take over from a function that has failed

Protective function statements should describe the protective function itself, and should also include the words "if" or "in the event of" followed by a brief description of the events or circumstances that would activate or require activation of the protection. For example, "To open the relief valve to atmosphere in the event of system X pressure exceeding 300 psi."

Tasks and intervals required in the scheduled maintenance are identified using the procedures set forth herein. Both the economic and safety related tasks are included so as to produce initial scheduled maintenance tasks/intervals.

All available Vendor Recommendations (VR) should be fully considered, discussed in the MWG meetings, and accepted only if they are applicable and effective according to MSG-3 criteria.

Prior to applying the MSG-3 logic diagram to an item, a preliminary work sheet will be completed that clearly defines the MSI, its function(s), functional failure(s), failure effect(s), failure cause(s) and any additional data pertinent to the item; e.g., ATA chapter reference, fleet applicability, manufacturer's part number, a brief description of the item, expected failure rate, hidden functions, need to be on M.E.L., redundancy (may be unit, system or system management), etc. This work sheet is to be designed to meet the user's requirements and will be included as part of the total MSG-3 documentation for the item.

EASA
When defining failure effect(s), secondary failure to structure, either long term (i.e. degradation of surface protection due to hydraulic leaks, fluid accumulation due to drainage system failure) or immediate (i.e. overload due to failure of a load limiting device or heat damage due to leaking bleed air) needs to be identified and taken into account for the structures analysis.

MPIG
If system failure may affect structural integrity then details relating to the failure should be passed to the Structures Working Group (or equivalent body) for consideration. Examples could include, but are not limited to, failure of load limiting devices, hydraulic leaks and bleed air leaks

(This counter-proposal has the aim to better clarify the sharing between System and Structure WG. MPIG interpretation is that the system task assessment shouldn't be affected by the fact that the system failure could endanger the structure.)

The approach taken in the following procedure is to provide a logic path for each functional failure. Each functional failure and failure cause must be processed through the logic so that a judgment will be made as to the necessity of a task. The resultant tasks and intervals will form the initial scheduled maintenance.

2-4-5. Rating Systems for Structural Significant Items

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2-4-5-1: Rating Accidental Damage

Accidental damage rating systems should include evaluations of the following

a. Susceptibility to minor (not obvious) accidental damage based on frequency of exposure to and the location of damage from one or more sources, including:

1. Ground handling equipment
2. Cargo handling equipment
3. Those resulting from human error during manufacture, maintenance, and/or operation of the aircraft, that are not included in other damage sources.
4. Rain, hail, etc.
5. Runway debris
6. Lightning strike
7. Water entrapment (proposed to be changed to 'Fluid spillage' in IP97)
~~8. System failure~~

(The EASA proposal to add damage source "System failure" is not supported by MPIG since it is considered in conflict with the AD definition in the glossary, which excludes damage sources coming from the aircraft itself. If the purpose would be to cover the system failures due to human errors, the current 3rd bullet already covers these cases)

2. Rating Environmental Deterioration (metals)

Environmental deterioration rating systems should allow for evaluations of susceptibility to and timely detection of corrosion and stress corrosion.

Susceptibility to corrosion is assessed on the basis of probable exposure to an adverse environment and adequacy of the protective system. For example:

a. Exposure to a deteriorating environment such as cabin condensation, galley spillage, toilet spillage, cleaning fluids, leakage from systems, etc.

b. Contact between dissimilar materials (potential for galvanic activity).

c. Breakdown of surface protection systems; for example, deterioration of paint, primer, bonding, sealant, corrosion inhibiting compounds and cladding systems with the resulting corrosion of metallic materials or fluid incursion into permeable non-metallic materials, etc.

EASA *(the deleted note should be shown in red)*

~~Note:~~ ~~When rating exposure to a deteriorating environment and breakdown of surface protection systems, leaks from systems (i.e. hydraulic lines, toilets) or failure of drainage systems have to be taken into account. Functional Failure(s) and Failure Effect(s) and frequency of occurrence identified during MSI analysis could be used as input to rate the environmental conditions caused by system failure. If such leaks or fluid accumulation are accepted during system analysis (i.e. no task was found to be economic), this information needs to be taken into account for ED assessment.~~

MPIG

The proposed additional note is not supported by MPIG since:

- *The scope of the first sentence is considered as covered by the addition of 'leakage from systems' in bullet a) and for the drainage system part, this is already the duty of the SWG. Moreover, guidance about drainage system consideration is already included in the IP 97 proposal.*
- *The frequency of occurrence will not be available, so the Structure WG has to take a conservative hypothesis covering all the cases. The CPCP will allow adjusting to the right interval.*

- *The scope of the third phrase is considered as covered by the Transfer Sheet process from System to Structure WG.*

Material characteristics, coupled with the likelihood of sustained tensile stress, are used to assess susceptibility to stress corrosion.

Timely detection is determined by sensitivity to relative size of damage and visibility of the SSI for inspection.

NOTE: Rating system evaluations should be made taking into account the requirement for each operator to control the aircraft structure at corrosion Level 1 or better.

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