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1.0 Introduction

The guidance in this document is intended for use by those Original Equipment Manufacturer/TC Holder (OEM/TCH) and Maintenance Review Board (MRB)/Industry Steering Committee (ISC) members who are involved with the evolution/optimization of tasks in a current MRB Report (MRBR). This guidance shall be applied for evolution / optimization activities where no letter of intent/application has been forwarded to the airworthiness authorities or for activities to be finalized after April 2009. The following framework is provided as guidance within which proposals to amend the MRBR shall be developed and assessed.

The initial MRB report for any new aircraft is developed essentially in the absence of actual in-service experience. As a result the tendency is to be very conservative in the decision making process. As service experience is accumulated, task intervals (thresholds/repeats) should be adjusted to reflect the results of actual in-service data.

Note: When intervals are stated in this document it includes both threshold and repeat values.

2.0 Purpose

While this guidance is not intended to be exhaustive it shall be utilized as the basis for a Policy and Procedures Handbook (PPH) procedure when the OEM/TCH, MRB, and ISC wish to proceed with evolution / optimization regarding the MRBR process.

Evolution / Optimization of a task through the management of data is a means to assure the continued applicability and effectiveness of the task while at the same time improving the integrity of the MRB process. This policy allows the OEM/TCH to develop and use a process that serves as a continuous analysis and Evolution/Optimization for MRBR. It is based on performance data and experience for model-specific fleets flown by multiple operators under a variety of operating conditions and environments.

3.0 Policy Description

OEM/TCH must meet the policy requirements defined by the regulatory Authorities of the country of origin; and shall define further details and procedure clarifications in the PPH.

When applicable PPH revisions shall be coordinated and approved by the MRB/ISC.

In-service data both scheduled and unscheduled maintenance findings related to the intent of the MSG-3 task should be evaluated.

Relevance and significance of findings should be weighed.

Data format and content should be standardized (SPEC2000 or equivalent).

Data quality, integrity, completeness and clarity must be ensured.

Each and every task in a given package shall be accounted for.

Original design and engineering specs shall be consulted.

All information's related to continued airworthiness should be reviewed (AD, SB, In-service reports/letters, modifications/repairs, etc.)

MRBR task Evolution / Optimization should be based on worldwide representative samples that spans the operating environment and age groupings of the aircraft.

Interval Evolution / Optimization should be made based on risk management (safety management) principle at the OEM level.

Statistical models should be applied to support continuous analysis and surveillance of in-service data.

In a data-driven statistical decision making process, data size is determined based on the level of confidence.

Confidence level refers to the likelihood that the overall fleet performance lies within the range specified by the sample fleet performance. The confidence level is usually expressed as a percentage. For example, a 95% confidence level implies that the probability that the fleet parameter lies within the confidence interval is 0.95.

For a given confidence level, data size may vary depending on the fleet size and variability of in-service data.

Sufficient data must be collected by the OEM/TCH that would support the expected confidence level. However, engineering judgment will remain a part of the evaluation.

Statistical analysis should be supported and validated by engineering judgment.

Task effectiveness should be measured and demonstrated. i.e. ability to:

- detect/prevent defects prior to loss of function/structural integrity
- Mitigate risk of exposure to hidden defects

Operator's and regulator's feedback shall be recorded and dispositioned.

The effectiveness and integrity of the process is ensured by collecting in-service data in a SPEC2000 format or equivalent, analyzing it, and comparing the results with existing MRBR task requirements.

This policy allows for Evolution/Optimization of MRBR, scheduled maintenance tasks, intervals, and enhances the use of reliability-driven maintenance analysis processes.

The MRBR is adjusted based on performance data and analysis processes. However, operator reliability programs should still continue to ensure continuous Evolution/Optimization of their maintenance programs.

The OEM/TCH Evolution/Optimization process does not assume any operational control over air carrier's maintenance program intervals, or Continuous Analysis and Surveillance System (CASS) and reliability programs.

4.0 Responsibilities

Regulatory Authorities shall be notified in writing by the OEM/TCH Applicant of their intent to begin an evolution / optimization process. This will be in the form of an official correspondence as defined by the domestic regulatory authority.

The Regulatory Authorities will respond, in writing, to the OEM/TCH of their intent to participate in the Evolution/Optimization exercise for a given fleet or model.

4.1 OEM/TCH (PPH Amendment and ISC/MRB Acceptance /Approval)

OEM/TCH shall include within the PPH the policy requirements and criteria as contained within this document. OEM/TCH shall further define the details and procedural actions necessary to conduct the Evolution / Optimization exercise.

These guidelines must be reflected in the PPH and PPH revisions should be coordinated and approved by the MRB/ISC.

Where "Incorporated By Reference" is used within the PPH, any changes to referenced documents must be updated in the PPH by document number and revision number.

4.2 OEM/TCH Data Collection

The OEM/TCH system must include a data quality, data integrity, data quantity, audit system, and historical data tool as defined in the next steps.

4.3 Data Format

The OEM/TCH shall utilize in-service data in a standardized format (Spec 2000 format or equivalent), as deemed acceptable by the regulatory authority, to ensure data quality and integrity. SPEC2000 is an industry-sanctioned maintenance reliability data communication format. In order to use this format operators would have to transition to this type of format or the OEM/TCH would have to convert the operator data into this standardized format.

4.4 Regulatory Authorities

It is incumbent on the OEM/TCH to demonstrate to the Regulatory Authorities compliance with these guidelines for all and any Evolution/Optimization MRB task adjustments.

5.0 Data Quality

The OEM/TCH should have a quality management system in place that allows for the collection of data found during operator's task accomplishment that can be delivered to the OEM/TCH and then entered in a standardized format into their data collection system.

The data collected and used by the OEM/TCH regarding Evolution/Optimization should include the following information:

5.1 Aircraft Age

Aircraft age (since delivery) is measured in calendar days, flight hours, or flight cycles, as applicable. MRB Task evolution should be based on in-service data collected from a representative sample of older aircraft as well as newer aircraft incorporating more current production standards and modifications. Fleet age representation should be summarized in the analysis report.

5.2 Geographical or Operational Environment Representation, as appropriate

MRB task interval adjustments should be based on in-service data collected from a representative sample which spans all operating environments. The data should be in proportion to the specific model fleet size of each geographical area; however, it is not necessary to sample all geographical regions nor is it required to collect data from all extreme operating conditions (e.g., extremely hot and sandy (desert), extremely cold (arctic)). A brief summary of the operating environments of the sampled aircraft should be provided in the report.

5.3 Number of Tasks Accomplished

The number of times the task has been accomplished including "no defects" should be captured and used in the evaluation. Participating airlines should provide check findings or non-routine write-ups for the sample fleet.

5.4 Interval of Tasks findings applied

Actual task interval of each participating operator should be captured and evaluated.

Note: The actual intervals may vary between operators and may be different from MRBR requirement. The impact of these variations should be assessed and accounted.

5.5 Component Data (Shop Findings, No-Fault-Found Removals and Failures), as applicable.

Information regarding component removal and replacement activity and vendor repair documents should be evaluated, as applicable. This information provides the data necessary to perform component failure-mode and life-cycle analysis which is necessary to support the Evolution / Optimization of the tasks associated with the component.

5.6 Correct Mapping to the MRBR task, if applicable.

Non-routine write-ups and in-service findings should be linked to appropriate MRBR tasks, as applicable. Only findings related to the MSG-3 task intent are relevant

5.7 Failure effect category considerations

MRBR task interval optimization is based on safety management principles that reflect the criticality of airplane systems, components, identified during MSG-3 analysis. Failure Effect Categories should be accounted for during the analysis.

5.8 Operational Representation Flight Hour vs. Cycles, Calendar time

Aircraft utilization (flight hours or cycles, as applicable) should be measured and evaluated. Representative data from high time and/or high cycle airplanes should be included in the sample. Summary of fleet wide service experience [high time aircraft (hours, cycles, years), time in-service, daily utilization (high, low, average), etc shall be included in the report.

5.9 Consecutive tasking requirements, if available


To the extent possible, consecutive checks data should be captured to assess reliability of airplane systems, components, or structural elements related to the MRBR task.

Note that, this requirement may be applied to lower check tasks. Consecutive check data can be impractical for heavy checks.

5.10 Unscheduled maintenance findings, as applicable

Mechanical irregularities and the resulting corrective actions captured from pilot reports and maintenance reports should be reviewed, as applicable.

5.11 Scheduled maintenance findings:

a. Routine maintenance tasks that generate no findings. These clean checks are as important as tasks that generate findings in determining failure-mode and life-cycle analysis. 

b. Routine tasks that generate non-routine cards. These findings, which require corrective action, involve structures, area/zonal, and aircraft systems categorized by ATA chapter.

5.12 Unrelated significant findings, if applicable

Operators should capture significant non-routine write-ups generated in the course of an unrescheduled maintenance task, if applicable. These findings, which require corrective action, do not correlate to a routine maintenance task. Unscheduled maintenance is a prime indicator of the effectiveness of the scheduled maintenance program.

5.13 Four digit ATA code, if available

To the extent possible, operators should provide four digit ATA code for unrescheduled maintenance write-ups to facilitate transfer of unrelated significant findings to appropriate MRBR tasks.

5.14 Serial Number of Aircraft

Aircraft manufacturer serial number or registration number that uniquely identifies each aircraft in the sample fleet should be provided.


~~4.0~~ Data Integrity

~~4.1~~ Data Validation

OEM/TCH shall have a data validation system which:

- a. verifies that operator data is delivered in SPEC2000 or equivalent standard format
- b. ensures that all required data elements and attributes are satisfied for submitted data.

~~4.2~~ Audit system

The audit system must ensure that all data must can be traced to its original source. 

~~5.0~~ Data Review

~~5.1~~ Analysis Schedule - Evolution/Optimization timeline

MRB task interval adjustments should be considered after sufficient service experience is accumulated since entry into service. Subsequent task interval adjustments should be considered after additional service experience data has been accumulated since the last interval adjustment. In both cases, data sufficiency is measured by the level of confidence as stipulated in these guidelines.

5.2 Statistical Analysis

OEM/TCH shall develop and implement a statistical analysis system to determine the scheduled maintenance performance of airplane systems and structures and to identify trends that fall outside established requirements or normal parameters. The OEM shall provide justification that a 95% level of confidence has been achieved.

NOTE: Data Quantity shall be dictated by the required level of confidence.

5.3 Engineering analysis

Engineering analysis will verify that findings are relevant to the scheduled task under evaluation. Non-routine write-ups will be evaluated to determine the significance or severity of findings. Pilot reports and component reliability reports will also be examined to account for line maintenance activities that may be relevant to the task under evaluation. The severity of the findings shall be considered and evaluated.

Note: Scheduled servicing (e.g. lubrication /oil replenishment) task data do not result in reported related findings, therefore cannot (usually) support an evolution/optimization. Negative long-term effects (e.g. corrosion) resulting from inappropriate servicing intervals must be considered.

5.4 Modification Status, AD, SB, SL, etc.

All information's related to continued airworthiness (service bulletins, Airworthiness Directives, service letters, and other in-service reports/resolutions, as applicable) should be reviewed.

Fleet configuration, age, operating environment, and operational utilization (Flight Hrs Vs Cycles Vs Calendar days) should also be assessed.

5.5 Internal Review

OEM/TCH shall develop and implement internal process to review and validate MRBR revision recommendations as defined in the PPH

6.0 Data Correlation

MTBUR, MTBF, PIREPS, non-routines, technical follow-up on open technical issue, and all other pertinent data, as applicable, should be correlated..

6.1 Working Group Activity - Interval Recommendation to the ISC (Increase, decrease, remain the same, introduction of new task, or task deletion).

MRB task intervals can be escalated based on the results of in-service experience. In addition, tasks should be de-escalated when in-service data supports interval reductions.

Task may also be deleted when it is determined that the task is ineffective or the failure mode for which the task was selected never developed due to effective design provisions.

Task deletion, addition, or modification of it requires new/revised MSG-3 analysis for the particular system under consideration. However, complete re-analysis of the MSG-3 package is not required. Any decision together with justification shall be recorded and traceable in the associated MSG-3 analysis. Applicability and effectivity criteria as specified in MSG-3 shall be observed.

Failure Finding intervals should not be moved out beyond the expected failure (PF). Consecutive checks should be assessed to show that failures are not occurring before the new initial interval.

Interval determination should be validated with a Maintenance Engineering Analysis based on consideration of all the items listed in the Quality and Quantity of Data.

The process shall be referred or mentioned in the PPH for ISC and Regulatory Acceptance.

(a) ISC Review Acceptance of MRBRP

ISC shall insure all PPH guidance has been followed and applied.

i) MRBRP Review Approval Acceptance By MRB

MRB shall insure all PPH guidance has been followed and applied.

(1) MRBR Release

Appendix A

Issue 44 Working Group Members

EASA	Francois Jouvard Markus Janischosky
FAA	Kenneth Kerzner Tom Newcombe Lynn Pierce Rick Ralston
TCCA	Cliff Neudorf Bruce Hawes Allan Howell
ANAC	Ademir Antonio da Silva Jose Augusto B. Meirelles

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