



RELIABILITY PROGRAMME REQUIREMENT AND PROGRAMME APPROVAL CHECKLIST

- 1. MAINTENANCE CONTROL BY RELIABILITY METHODS represents an improved maintenance management technique. The basic goals of such a programme are:**
 - a. To recognize, assess, and act upon meaningful symptoms of deterioration before malfunction or failure; and
 - b. To establish and monitor the maintenance control requirements.

- 2. EACH PROGRAMME MUST CONTAIN THE FOLLOWING BASIC ELEMENTS:**
 - a. Programme application
 - b. Organization structure.
 - c. Data collection system.
 - d. Methods of data analysis and application to maintenance controls.
 - e. Procedures for establishing and revision of performance standards.
 - f. Definitions of significant terms.
 - g. Programme displays and status of corrective action programmes.
 - h. Procedures for programme revision.
 - i. Procedures for maintenance control changes.

- 3. A PROGRAMME WHICH IS VERY GENERAL**

may lack the details necessary to satisfy the above requirements. The following information should be applied to the specific needs of a simple or complex programme:

 - a. Programme Application.**

- (1) The components, system, or complete aircraft controlled by the programme must be clearly defined. Individual systems and / or components must be identified by ATA Specification 100. In the case of components, a list of all components

controlled by the programme must be included as an appendix to the programme document.

- (2) The portion of the maintenance programme; e.g., overhaul and / or inspection and check periods to be controlled by the programme must also be clearly defined.

b. Organizational Structure.

- (1) Organizational chart which depicts the relationship of elements responsible for the administration of the programme must be included.
- (2) Lines of authority and responsibility must be clearly delineated.
- (3) Authority delegated to each organizational element for the enforcement of policy and to assure corrective action followup must be adequately described.

c. Data Collection System.

- (1) A description of the data collection system relating to the aircraft and / or system / component to be controlled must be fully described. The following must be adequately covered:
 - (a) Flow of information.
 - (b) Identification of sources of information.
 - (c) Description of steps of data development from source to analysis.
 - (d) Organizational responsibilities for each step of data development.
- (2) Data Collected.
 - (a) Must be accurate and factual to support a high degree of confidence in any derived conclusion.
 - (b) Must be obtained from units functioning under operational conditions.
 - (c) Must be directly related to the established levels of performance. This particular point cannot be overemphasized since it represents programme accomplishment.

- (3) Typical source of information are: Unscheduled removals, confirmed failures, pilot reports, sampling inspections, shop findings, functional checks, bench checks or other sources the operator may consider appropriate.
 - (a) All of the above may not necessarily be covered in each and every programme.
 - (b) However, the availability of this additional information will provide a span of invaluable operating history to the operator for determining success or failure in meeting programme goals.
- (4) Samples of data to be collected must be included in the programme document: e.g. powerplant disassembly and inspection reports, component condition reports mechanical delay and cancellation reports, flight log reports, (pireps) engine shutdown reports, etc.

d Methods of Data Analysis and Application to Maintenance Controls.

- (1) A description of the data analysis system to be employed must be included. The following must be adequately covered:
 - (a) Effects upon maintenance controls: e.g., overhaul time, inspection and check periods or content of overhaul and/ or inspection procedures.
 - (b) The types of action appropriate to the trend or level of reliability experienced must be described. Such action might be:
 - 1 Actuarial or engineering studies employed to determine need for maintenance programme changes.
 - 2 Maintenance programme changes involving inspection frequency and content, functional checks, overhaul procedures and time limits.
 - 3 Aircraft, aircraft system or component modification or repair.
 - 4 Changes in operating procedures and techniques.
 - 5 Other actions peculiar to the condition that prevails.
 - (c) Procedures for evaluating critical failures as they occur must be included.
 - (d) Documentation used to effect changes in maintenance programme must be described. These should include at least those which document maintenance programme changes, modifications and special inspections of fleet campaigns. A reference to the operator's manual which provides the handling procedures for these documents must be included.
 - 1 Results of corrective action programmes must become evident in a reasonable period of time. Depending on the implication of the problem this might be immediately, or as long as an overhaul cycle.

- 2 Each corrective action plan or programme must be made a matter of record. Samples of forms used to implement these actions should be included in the programme document.
 - 3 Each corrective action programme must have a planned completion date.
- (e) Statistical techniques used to determine operating reliability levels must be described.
- (2) Organizational Responsibilities.
- (a) The manner in which information is exchanged between organizational elements must be described. This may be portrayed systematically in a diagram.
 - (b) The activities and responsibility of each organizational element (Engineering, Quality Control, Flight Operations, etc.) and / or reliability control committee must be defined. This must include:
 - 1 Committee membership (if appropriate).
 - 2 Meeting frequency.
 - 3 Reliability programme responsibilities must be clearly delineated this section must include:
 - a The identification of the two organizational elements responsible for approving changes to maintenance controls. Note- one must exercise inspection or quality control responsibility or have overall programme responsibility.
 - b Duties and responsibilities for initiating maintenance programme revisions.
- (3) Programme must include a graphic portrayal of programme operation.
- (a) It should be a closed loop and show source data, data collection and analysis programme performance achievements, and applicability to the maintenance controls.
- e. Procedures for establishing and revising performance standards.**
- (1) Each programme must include an initial performance standard that defines the area of acceptable reliability for each aircraft, system (s), and / or components controlled by the programme.
 - (a) Various methods may be used to evaluate and control performance; e.g., premature removal rates, in-flight shutdown rates, confirmed failure rates, mechanical delay/ cancellation rates, internal leakage rates, etc.

- (b) In some cases upper and lower limits may be established. This represents a reliability band or range and provides the standard by which the operator intends to interpret or explain equipment reliability. The corrective action or follow-up requirements for each limit must be fully explained in the document.
- (c) In other cases, target numbers may be set to specify aircraft system or component reliability performance levels which the operator expects to achieve. These standards are usually associated with product improvement programmes. A fully explanation of these requirements must be included in the document.
- (2) Each programme must describe the methods and data required for establishment of the performance standard. This might include but is not limited to:
 - (a) Past and present operating experience of an individual operator or of the industry may be used. However , in those cases where industry experience is used, the programme must include a provision that the standard will be review after the operator has gained one year's operating experience.
 - (b) Analyses of performance of similar equipment currently in service.
 - (c) Aircraft manufacturers' or equipment manufacturers' reliability engineering analyses.
 - (d) History of experience wherein reliability standards were acceptable to the airline industry.
- (3) Each programme must contain procedures for monitoring and revising the prescribed performance standard.
 - (a) The standard established must be responsive and sensitive to the level of reliability experienced.
 - 1. It should be "stable" without being "fixed."
 - 2. It should not be so high that even abnormal variations would not cause an alert, or low that it is constantly exceeded in spite of the best known corrective action measures.
 - (b) The organizational element (s) responsible for monitoring and revising the performance standard must be specified.
 - (c) The what, when, and the how of revising the performance standard must be explained.
 - (d) The performance standard for each aircraft, aircraft system or component controlled by the programme must be included in the document.

F. Definition of Significant Terms.

- (1) Each programme must clearly define the significant terms used in the programme.
- (a) Term definitions must reflect their intended use in the programme. Therefore, definitions will vary from programme to programme.
- (b) Acronyms or abbreviations peculiar to the programme must also be defined.
- (c) Common terms used throughout the industry need not be defined as long as the same meaning is intended.
- (d) Terms which are clearly defined in the text of the programme need not be included.

g. Programme Displays and Status of Corrective Action Programmes.

- (1) Each programme must describe the reports, charts, and / or graphs used for documenting operating experience. Responsibilities for reports must be established and reporting elements must be clearly identified and described.
- (a) The display must contain essential information for every aircraft, aircraft system, and component controlled by the programme.
- (b) Each system and component must be identified by the appropriate ATA Specification 100 system code number.
- (c) Display must show trends as well as the current month's performance.
 - 1 Graphical or tabular presentations may be used.
 - 2 Generally a minimum of six (6) months experience must be shown. In the case of certain large complex systems, such as the propulsion system, a minimum of twelve (12) months must be presented.
 - 3 The reliability performance standards (alert values) must also be displayed; e.g., shutdown rate, premature removal, etc.
- (d) The status of corrective action programmes must be included. This includes corrective action programmes implemented since the last reporting period.

h. Procedures for Programme Revision.

- (1) Each programme must contain procedures for implementing changes to the programme.
- (a) Procedures must be described in sufficient detail to identify and isolate areas which require NCAA approval. The areas requiring NCAA approval are:
 - 1. Reliability measurement.
 - 2. Changes involving performance standards, including instructions relating to the development of these standards.

3 Data collection system.

4 Data analysis methods and application to maintenance programme

- (b) If the operator proposes that all revisions to the programme document will be approved by the NCAA then no need for isolation of areas NCAA approval is not required. However, the document must recognize each of the above requirements and must contain procedures for adequately administering and implementing changes required by these actions.
- (c) Programme must identify the organizational element(s) responsible for the approval of amendments to the programme.
- (d) Programme must provide for a periodic review to determine that established performance standards is still realistic. The who, what, when, and how to implement these changes should be adequately described.
- (e) Programme must provide procedures for distribution of approved revision.
- (f) Programme must contain a reference to operator's manual which contains the overhaul and inspection periods, work content, and other maintenance programme activities controlled by the programme. The who, what, and how to implement changes to these requirements must be adequately described.

I Procedures for Maintenance Control Changes.

- (1) The programme must describe the procedures to be used for making changes to maintenance controls. These actions must be made a matter of record.
- (2) The organizational elements responsible to prepare substantiation reports to justify maintenance control changes must be identified.
 - (a) At least two separate organizational elements are required, one of which exercises inspection or quality control responsibility for the operator.
- (3) The specific parameters used to determine changes in maintenance controls must be spelled out; i.e, samples, functional checks, unscheduled removal, etc.
- (4) If sampling is used, the method, number of samples, time on exhibits used as samples, when they will be taken, and at what interval must be clearly explained.
- (5) Procedures must be provided to cover all maintenance programme activities controlled by the programme; e.g., overhaul times, periodic services, routine and service checks, phase checks and / or block overhauls.
- (6) If appropriate, procedures must be included for changing from hard time to on condition maintenance (Note – this requires NCAA approval).
- (7) If appropriate, procedures must provided for changes in maintenance programme requirements for emergency equipment.

- (8) Procedures must be included relative to manual revisions concerning time increases and what will be required prior to pursuing a subsequent time increase.
- (9) Procedures must be provided for revision to the Operations Specifications when and if required.
- (10) Procedures must be provided to assure that any TBO adjustment or other maintenance programme change does not conflict with a corrective action programme established by a previous reliability analysis.
- (11) Programme document must recognize critical failure and contain instructions for taking corrective action.
- (12) Programme must contain a statement that the NCAA will be advised when increases to time limitations or other programme changes of systems / components controlled by the programme occur.
- (13) Operators should be encouraged to include a graphic display of major system / component (airframe / engine) TBO escalation.

4. APPLICATION FOR APPROVAL OF MAINTENANCE RELIABILITY PROGRAMMES

will be made by each certificate holder "IN WRITING" to the assigned NCAA / inspector having certificate responsibility.

a. Programme approval or disapproval will be accomplished by the assigned inspector in accordance with handbook procedures.

- (1) Coordination will be made with the Deputy Director, Flight Safety.
- (2) Programmes which significantly deviate from the instructions contained in aircraft manufacturer manual shall be forwarded, with appropriate comments and recommendations to the NCAA.
- (3) Each application submitted for approval must be accompanied by a document which describes the programme operations. The document must contain the essentials of operations as described in paragraphs 2 and 3.

b. Each approved programme must be incorporated into the operator's overall maintenance programme by approval of Operations Specifications –Aircraft Maintenance

- (1) The entire programme need not be on the Operations Specifications. The certificate holder may identify the document and refer to it in Operations Specifications by proper identification.
- (2) The Operations Specifications must contain:
 - (a) A statement authorizing the reliability programme. These generally fall into two categories:

- 1 Those which control the entire aircraft or complete systems; e.g. hydraulics, pneumatics, etc.
 - 2 Those which control individually selected items within a system; e.g. pumps, valves, etc.
-
- (b) The programme document must be properly and adequately identified; e.g., by name, number, and date. Each revision number and date must also be included on the preface page.
 - (c) The means to identify individually selected items must be specified on the preface page.
 - (d) The preface page may serve as the sole control as far as Operations Specifications for an entire aircraft, powerplant or system. In those cases, there is no need to list the individual items on the aircraft maintenance specification pages.
 - (e) A reference to the operator's manual which contains the maintenance controls (e.g., inspection, check and overhaul limitations) must be included on the preface page.
 - (f) A statement that in the event the programme document referenced is canceled, the maintenance programme covered by the said document will be completely re-evaluated and maintenance and overhaul time limits established must be included on the preface page.

To establish uniform Operations Specifications for all operators utilizing provisions of a reliability programme, the instructions and format must be standardized