

# Structures Introduction

**AMP Reference:** IAL/777/T Revision 00 Initial

## SCOPE

This section of the MPD outlines the scheduled maintenance tasks for the Structural Maintenance Program. This program is designed to provide timely detection and repair of structural damage which may occur in the fleet during commercial operations. Detection of corrosion, stress corrosion, minor accidental damage and fatigue cracking by visual and/or Non-Destructive Test (NDT) procedures is considered. Major accidental damage such as that caused by bird strike or large ground handling equipment is considered readily detectable. Additionally, indications such as fuel leaks, loose fasteners, loss of cabin pressure, etc. are considered readily detectable and continue to be an essential part of the Structural Maintenance Program.

This baseline program is intended to serve as a guide for airlines to develop individual maintenance programs. The tasks listed herein constitute the initial minimum requirements and manufacturer's recommendations for all 777 airplanes. Operators are cautioned that time extensions for their fleet should be based on service bulletin status as well as service experience.

Notes applicable to the Structural Maintenance Program are followed by explanations of the operating rules, fatigue related inspection program, corrosion prevention and control program, reporting of structural maintenance tasks, and the page format.

## NOTES

1. Tasks for detecting corrosion, stress corrosion, minor accidental damage and fatigue damage using visual and/or Non-Destructive Test (NDT) procedures are specified. After discrepancies are found, repair or modification action may be required to assure continuing airworthiness of the airplane.

### 2. INSPECTION

An examination of an item against a specific standard to detect irregularities and discrepancies such as wear, deterioration, damage, corrosion, cracking, etc.

#### INSPECTION TASK DEFINITIONS:

- **INSPECTION - GENERAL VISUAL**

A visual examination of an interior or exterior area, installation or assembly to detect obvious damage, failure or irregularity. This level of inspection is made from within touching distance, unless otherwise specified. A mirror may be necessary to enhance visual access to all exposed surfaces in the inspection area. This level of inspection is made under normally available lighting conditions such as daylight, hangar lighting, flashlight or drop-light and may require removal or opening of access panels or doors. Stands, ladders or platforms may be required to gain proximity to the area being checked.

- INSPECTION - DETAILED

An intensive visual examination of a specific structural area, system, installation, or assembly to detect damage, failure or irregularity. Available lighting is normally supplemented with a direct source of good lighting at an intensity deemed appropriate by the inspector. Inspection aids such as mirrors, magnifying lenses, etc. may be used. Surface cleaning and elaborate access procedures may be required.

- INSPECTION - SPECIAL DETAILED

An intensive examination of a specific item(s), installation, or assembly to detect damage, failure or irregularity. The examination is likely to make extensive use of specialized inspection techniques and/or equipment. Intricate cleaning and substantial access or disassembly procedures may be required.

## OPERATING RULES

1. All airplanes in an operator's or group of operators' fleet shall be subject to the provisions of this section. These include requirements for external and internal structural inspections, corrosion prevention and control tasks, and fatigue related inspections.
2. Intervals for the structural maintenance program are expressed in calendar time and/or flight cycles. Any interval change would be substantiated by service experience and handled by FAA approved program revision procedures as applicable to each operator or group of operators.
3. Each task is to be performed only in the zone(s) listed, regardless of if the item extends into an adjacent zone.
4. Supplemental structural inspection requirements listed in the Airworthiness Limitations Section 9 should be maintained by an alternate FAA approved routine program revision procedure.
5. Section 9 of the MPD also specifies the structural safe-life limited parts.
6. Special Detailed inspections are to be used when specified for inspecting hidden details or may be used as alternatives to detailed visual inspections. Hidden details requiring NDT procedures are listed under appropriate zones either internally or externally. Procedures for conducting these Special Detailed inspections are given in the Boeing Non-Destructive Test Manual (D634W301).
7. Normal clean-up procedures are to be used prior to conducting general visual or detailed inspections. Specified clean-up procedures are to be used for special detailed inspections. Sealant and corrosion protection finishes should only be removed when specified and restored in accordance with the Corrosion Prevention Manual (D6-82560) after the task is completed.
8. Excessive dust, debris, or overspray of corrosion inhibiting compounds, found during any inspection, are considered to be unsatisfactory condition possibly reducing the fire

resistance of the airplane design. Clean-up of these materials should be a standard part of maintenance activity. (Reference Service Letter 777-SL-25-018).

## FATIGUE RELATED INSPECTION PROGRAM

Where the initial scheduled maintenance program does not ensure timely detection of potential fatigue damage in a structural item, supplemental fatigue related inspections will be required for all of the 777 fleet. Such supplemental inspections will begin after the threshold defined in Section 9 of this document is reached and must be accomplished within one repeat interval of the threshold.

One feasible supplemental inspection program has been developed for all affected structure, using the Damage Tolerance Rating (DTR) System. The resulting inspections are identified by the letter "F" (For Fatigue) in the program (PGM) column. These inspections must be accomplished prior to reaching the fatigue task threshold. All fatigue task threshold intervals vary and are included in Section 9 for that item. In addition, they are based on the initial structures task interval.

The fatigue inspections developed from the MPD Section 9 and DTR document requirements included in this section are currently only applicable to the 777-200, 300 and 200ER models. The remaining derivatives will be incorporated into this section at a minimum of two years prior to the fleet leader reaching the earliest applicable fatigue threshold contained in section 9 of this document. Based on fleet utilization the incorporation of the 777 derivatives are as follows:

- 777-200 = currently available
- 777-300 = currently available
- 777-200ER = currently available (Also identified as 777-200IGW)
- 777F = See Appendix N
- 777-300ER = See Appendix N
- 777-200LR = See Appendix N

Escalation of the initial inspection flight cycle intervals requirement may affect some fatigue-related items and/or cause additional requirements to satisfy the required DTR. Therefore, when each airplane reaches the threshold per Section 9 for the fatigue related inspections, the task intervals for items in Section 2 must be reduced back to the initial MPD intervals shown.

Additionally, the ISC has escalated the flight cycle parameter of the interval of some tasks, based on operator service data. These items must also be returned to the original interval used at the time of certification. Appendix L contains the list of these tasks, and the interval that must be used for these tasks upon reaching the defined supplemental fatigue inspection threshold in order to be in compliance with the damage tolerance certification requirements.

At the time specific fatigue related inspection programs are being developed, a sampling program may be considered provided it meets the intent of the published program.

Procedures other than the DTR approach to develop the fatigue related inspection programs require approval of FAA engineering.

## CORROSION PREVENTION AND CONTROL PROGRAM

Structural maintenance requirements are determined on the basis of continual maintenance to preserve or restore the inherent corrosion preventive measures and structural surface finishes.

Should corrosion be detected or should the CIC exhibit signs of deterioration during a corrosion prevention inspection, the Aircraft Maintenance Manual (AMM), Chapter 51, should be referred to for appropriate corrective action. The AMM provides general information and procedures on inspection, detection and removal of corrosion as well as preventative maintenance practices for corrosion control affecting the Boeing Model 777 airplane. Tasks in which periodic application of corrosion inhibiting compounds are recommended or required are contained in this section of this document.

The Corrosion Prevention and Control Program (CPCP) is an integral part of the Structural Maintenance Program. The objective of the CPCP is to control corrosion found on all structure listed in the Structural Maintenance Program to Level 1 or better.

The CPCP basic task consists of the following items:

1. Remove all systems, equipment and interior furnishings, etc. (e.g. toilets, galleys, lining, insulation) as necessary to accomplish item 3. It is not necessary to remove bushings unless specified in the task description, or if there is an indication of corrosion, or that the bushing has migrated.
2. Prior to inspection, clean the area as necessary to accomplish item 3. It is not necessary to remove normal amounts of sealant/levelling compound unless it has deteriorated to the point where moisture can penetrate down to the metal. A light uniform film of corrosion inhibiting compound (CIC) that has not accumulated dirt or debris will normally allow adequate inspection of the structure without removal. CIC may require removal if there are multiple layers and/or accumulations of dirt or debris.
3. Visually inspect (General Visual inspection) all structure listed in the Structural Maintenance Program. The inspection method is as specified in each task description. Use additional non-destructive inspections or visual inspections following partial disassembly if there are indications of hidden corrosion, such as bulging skins, or corrosion running into splices, or under fittings, etc. In the task area, check the integrity of any sealant/levelling compound to determine if removal is required, and check corrosion inhibiting compound, particularly at faying surfaces, to determine if additional application is required per item 6.
4. Remove all corrosion, evaluate damage, and repair or replace all discrepant structure as necessary, including restoration of protective finishes.

5. Clear any blocked holes or gaps that may hinder drainage, as applicable.

6. Apply suitable approved water-displacing/anti-corrosion compounds, as necessary.

NOTE: Optional procedures for applying these compounds are given in the Boeing CPM (D6-82560).

A. The minimum requirement for all areas (except as noted in 6c) is a single coat of water displacing/anti-corrosion compound that penetrates faying surfaces and displaces moisture, e.g. a single coat per BMS 3-23 or BMS 3-35, where the initial or previous coat has been disturbed or removed.

B. In areas with high potential for severe corrosion, where the initial or previous coat has been disturbed or removed, the application of water displacing/anti-corrosion compound(s) that penetrates faying surfaces, displaces moisture and forms a durable barrier after drying is recommended (but optional). This can be achieved by applying a single coat per BMS 3-23 or BMS 3-35 covered with a topcoat per BMS 3-26 Type II.

C. Water displacing/anti-corrosion compounds should not be applied in the following areas:

- Cables, pulleys, wiring, plastics, elastomers, oxygen systems.
- Lubricated or Teflon surfaces (e.g. greased joints, sealed bearings).
- Adjacent to tears or holes in insulation blankets.
- Areas with electrical arc potential.
- Interior materials, including cargo liners.
- Engine strut cavities, cowlings panels or pod.
- APU or any structure in direct contact with the APU.
- Fiberglass ducts where temperature exceeds 220 degrees Fahrenheit.

7. Dry wet insulation blankets prior to re-installing, or replace with new, as applicable.

- CORROSION LEVEL 1:

Corrosion occurring between successive inspections that is local and can be reworked/blended-out within manufacturers' allowable limits (e.g., SRM, Service Bulletin, etc.).

or

Corrosion occurring between successive inspections exceeds allowable limit but is local and can be attributed to an event not typical of operator usage of other aircraft in the same fleet (e.g., Mercury spill).

Or

Operator experience over several inspections has demonstrated only light corrosion between each scheduled inspection but the latest inspection and cumulative blend-out now exceeds allowable limits.

The terms "local corrosion" and "light corrosion" are model specific and will be determined by the manufacturer and published in appropriate maintenance documents.

- **CORROSION LEVEL 2:**

Corrosion occurring between successive inspections that requires a single re-work / blend-out which then exceeds allowable limits, requiring a repair / reinforcement, or complete or partial replacement of structure listed in the Baseline Program, or, Corrosion occurring between successive inspections that is widespread and requires a single blend-out approaching allowable rework limits.

- **CORROSION LEVEL 3:**

Corrosion found during the first or subsequent inspections, which is determined (normally by the operator) to be an urgent airworthiness concern, requiring expeditious action.

NOTE: When LEVEL 3 corrosion is found, consideration should be given to action required on other airplanes in the operator's fleet. Details of the corrosion finding and planned action(s) should be expeditiously reported to the appropriate regulatory authority.

AN EFFECTIVE PROGRAM IS ONE THAT CONTROLS CORROSION OF ALL STRUCTURE LISTED IN THE BASELINE PROGRAM TO LEVEL 1 OR BETTER.

Level 2 corrosion findings in an area require a program adjustment to reduce damage to Level 1 or better. Level 3 findings require timely inspections to verify the structural integrity of the remaining aircraft in the operator's fleet. Reporting of CPCP findings is per FAR 121.703.

## REPORTING RESULTS OF STRUCTURAL INSPECTIONS

Reports of structural significant defects, as defined by the FAA SDR process (Part 121.703), shall be submitted by operators operating under FAA regulations.

Operators which are not required to submit SDRs shall make equivalent reports to Boeing Commercial Airplanes (BCA).

In addition to the above, all significant structural discrepancies found during scheduled fatigue related inspection tasks shall also be reported to BCA on a Discrepant Structure Report form (or any suitable alternative which contains the same information).



STRUCTURAL MAINTENANCE PROGRAM										
MPD NUMBER	AMM REFERENCE	PGM	ZONE	ACCESS	INTERVAL		APPLICABILITY		MAN-HOURS	TASK DESCRIPTION
					THRESHOLD	REPEAT	APL	ENG		
XX-XXX-XX										AIRPLANE MAINTENANCE MANUAL PROCEDURE (CHAPTER, SECTION, SUBJECT) WHICH SUPPORTS THE MPD REQUIREMENT.
										MPD Sequence number
										MPD Sequence number
										First two digits = ATA Chapter
										Maintenance Program Type (C = Corrosion, F = Fatigue, S = Structures)
53-501-00		S	112	112AL NOTE	16000 FC 3000 DY NOTE	0 FC 0 DY NOTE	ALL	ALL	1.30	INTERNAL-GENERAL VISUAL: AREA FORWARD OF NOSE LANDING GEAR WHEEL WELL LOWER LOBE SKIN PANELS-FORWARD OF BODY STATION 246. LONGITUDINAL SKIN LAP SPLICES. FORWARD ACCESS HATCH-CUTOUT STRUCTURES including skin within 20 inch periphery of cutout. FORWARD ACCESS HATCH-CUTOUT STOP FITTINGS AND BACKUP STRUCTURE. FORWARD PRESSURE BULKHEAD BODY STATION 132.5. NOSE GEAR WHEEL WELL-FORWARD BULKHEAD. FLOOR BEAMS.  INSPECTION NOTE: 126.5 to 180.5 "ONLY"  INTERVAL NOTE: Whichever comes first. Repeat interval satisfied by corrosion Items 3-653 and 53-65.  ACCESS NOTE: Insulation blanket removal/displacement required.

Figure 2-1 STRUCTURES MAINTENANCE PROGRAM EXAMPLE PAGE

## PAGE FORMAT EXPLANATION

### 1. MPD ITEM NUMBER

Each task is given a unique MPD number. The first and second digit is the ATA number. The third, fourth, fifth, sixth and seventh digits denote the MPD sequence number.

### 2. AMM REFERENCE

Airplane Maintenance Manual procedure (Chapter, Section, Subject) which supports the MPD requirement.

### 3. PGM

Indicates program, i.e. S = Structures item, C = Corrosion item, and F = Fatigue item.

### 4. ZONE

The Zone identifies where the task is performed on the airplane.

### 5. ACCESS

The access panel or door number required to be opened when performing the task. Refer to the AMM 20-10-12 for removal of any vinyl decal, marker or applique which inhibits access to the periphery, fasteners, or any other feature (e.g. latches) of the access panel or door which is required to be opened.

### 6. INTERVAL

Task intervals are expressed in terms of frequency and usage parameter such as calendar time and cycles.

A. Threshold: The initial interval that the task is to be performed.

B. Repeat: The repeat interval after the threshold interval has been reached.

- FC = Airplane Flight Cycles
- DY = Days
- ENG CHG = Engine Change
- LDG CHG = Landing Gear Change
- LIF LIM = Life Limited
- NAT REQ = Regulatory Authority Requirement

## 7. INTERVAL-VERSION

- 1.1 - Threshold/Repeat 8000 cycles/ 8000 cycles
- 1.2 - Threshold/Repeat 1500 days / 1500 days
- 2.1 - Threshold/Repeat 28000 cycles / 4000 cycles
- 2.2 - Threshold/Repeat 5250 days / 750 days

The initial threshold of the task is 8000 cycles or 1500 days, whichever comes first. The task is initially repeated every 8000 cycles or 1500 days, whichever comes first, until the threshold of 28000 cycles or 5250 days, whichever comes first, is reached. The task is performed and then repeated at 4000 cycles or 750 days, whichever comes first.

## 8. APPLICABILITY

Airplane (APL) Model:

- ALL = All Airplanes
- 200 = 777-200
- 200ER = 777-200ER
- 300 = 777-300
- 200LR = 777-200LR
- 300ER = 777-300ER
- 777F = 777 Freighter
- NOTE= Airplane Applicability Note

Engine (ENG):

- GE90 Series = 75B, 76B, 85B, 90B, 94B
- GE100 Series = GE90-110, GE90-115B
- Pratt & Whitney PW4000 Series = PW4074, PW4077, PW4084, PW4090
- Rolls-Royce Trent 800 Series = 875-17, 877-17, 884-17, 892-17, 892B-17, 895



- Note = Engine Applicability Note

## 9. MANHOURS

Estimated labour hours required to perform the task. The estimates do not include labour hours for performing the following functions:

- Docking the aircraft
- Positioning/removing work stands
- Access door/panel removal and installation
- Cabin equipment, lining, floor panel and insulation removal and installation
- Defueling, purging and refuelling fuel tanks
- Correcting discrepancies found while performing the task

The estimates are based on the use of skilled personnel and assume that inspections in the same zone with a common frequency will be performed together.

## 10. TASK DESCRIPTION

The type of inspection that is accomplished and a description of the task to be performed. Applicability, Access and Interval notes are listed here to provide additional explanation for the other columns where "NOTE" is used.