The oldest 757s and 767s in service are more than 30 years old. The 757/767 fleets' utilisation is still within its MPD FC and FH parameters. Sandra Everest presents an overview of the MPD and higher FC tasks coming due.

Ageing 757 & 767 airframe maintenance requirements

Ageing airframe maintenance may refer not only to years of service, but also the accumulated flight hour (FH) and flight cycle (FC) utilisation. The 757 and 767 maintenance planning document (MPD) focuses on a base check programme of an 18-month (MO) repeat interval, with corresponding FH or FC backstops to each task to cover the varied utilisations. This results in a cycle of four base checks through a six-year period to cover the main grouping of repeat inspections. The fourth check generally has the larger structural inspections. As with FH and FC parameter-based MPDs, reduced repeat interval and high initial threshold inspections will escalate the base check inputs when moving through and beyond these six-year (YE) cycles.

As a fleet ages in terms of utilisation, high FC tasks begin to come due, and so must be monitored. These tasks will include supplemental fatigue-based inspections with terminology such as damage tolerance rating (DTR) and flight length sensitive (FLS).

Previous ageing 757 and 767 articles *(see Assessing the 757's Ageing Maintenance Requirements, Aircraft Commerce, February/March 2012, page34;* and *Assessing the 767's ageing maintenance, Aircraft Commerce, April/May 2012, page 38)* have detailed the fleets' escalating check structure format and costings. Here, the current MPD task breakdown, complex repeat intervals requirements, and approaching high FC inspections are analysed.

Fleet overview

The 757 family entered service in January 1983, with production ceasing in 2004. The original 757-200 variant was followed by additional models, including: the 757-200PF (production freighter) in 1987; the 757-200M (combi) in 1988; the 757-200SF (special freighter - passenger-to-freighter conversion variant) in 2001; and the 757-300 (stretched version) in 1999. The 757 is classed as a large narrowbody, and 1,049 were built. The 757-200SF passenger-to-freighter conversion is still being carried out.

The 767 family entered service in September 1982. The -300F series is still in production. The 767-200 was followed by the - 200ER (extended range) variant in 1986, the 767-300 (first stretched version) also in 1986, and then by the 767-300ER (extended range variant of the -300) in 1988. The 767-300PF entered service in 1995, the 767-400ER (further stretched version) in 2000, and the 767-300BCF (Boeing Converted Freighter) in 2008. Classed as a mid-to-large sized widebody, over 1,105 767-300Fs have been produced, with orders of over 60 aircraft still to be fulfilled.

Between the two models, 1,581 passenger and freighter aircraft are still in service or stored *(see table, page 22).*

The current 757 fleet comprises 713 757-200 series aircraft: 320 active passenger (including eight combi); 289 active freighter; 98 stored passenger; and six stored freighter aircraft. For the 757-300 series there are 55 active aircraft, all of which are passenger-configured.

The current 767 fleet comprises 95 767-200 aircraft: 12 active passenger, 60 active freighter, and 23 stored passenger aircraft. For the 767-300 model there are 681 aircraft: 420 active passenger, 200 active freighter, 58 stored passenger and three stored freighters. There are 37 767-400s, all in passenger configuration.

757 fleet age and utilisation

The oldest of the 757-200s still in service are now nearing 35 years of age. A 757-200SF currently working for FedEx, line number (L/N) 15, at 34.9 years is the oldest, and has accumulated 85,797FH and 31,609FC. The current listed previous annual utilisation is 2,940FH and 1,041FC.

The highest 757-200FH utilisation in service is L/N 281 with 107,288FH at nearly 28 years old. It is operated by TACV – Cabo Verde Airlines, and is managed by Icelandair with a last annual utilisation of 2,965FH, and 723FC.

The highest 757-200 FC utilisation active aircraft is L/N 46 with 45,653FC at 33 years of age. This aircraft is operated by ATI, Air Transport International, and managed by Cargo Aircraft Management, with a last annual utilisation of 784FH and 583FC.

For stored aircraft the highest 757-200FH utilisation airframe is L/N 66, with 96,960FH. At almost 33 years old, this aircraft is operated and managed by Delta Air Lines. The highest FC stored aircraft is L/N 41 at almost 34 years of age, with 45,664FC, also with Delta.

The 757-300 entered service in 1999 with Condor, so the oldest aircraft are now only just over 19 years old and remain in its passenger service. The two oldest aircraft, L/N 839 and L/N 849, have accumulated 60,430FH/21,213FC, and 59,631FH/20,454FC. L/N 839 is also the highest 757-300 utilisation aircraft in terms of FH and FC. This works out to be an average of 3,180FH and 1,116FC per year over the life of the aircraft.

More details of the active and stored aircraft age, FH, FC and average utilisation are provided *(see table, page 22).*

767 fleet age and utilisation

The oldest 767-200 aircraft off the production line are now reaching 35-36 years of age. The oldest is a 36-year-old 767-200SF, L/N 6, operated by ABX Air

757 IN SERVICE PASSENGER & FREIGHTER FLEETAGE & UTILISATION CHARACTERISTICS

AIRCRAFT SERIES	NO. ACTIVE	OLDEST ACTIVE	AVG AGE	FH/YR RANGE	FC/YR RANGE	AVG FH/YR	AVG FC/YR	AVG FH:FC	AVG FH/DY	AVG FC/DY	HIGH CUM FH	HIGH CUM FC	MAIN CURRENT OPERATORS
757-200	312	30.4	21.1	224-4,550	77-2,024	2,994	840	3.6:1	8.20	2.30	107,288	38,937	DL, UA, AA
757-200PF	79	30.5	24.6	506-2,510	498-1,118	1,204	760	1.6:1	3.30	2.08	97,722	33,508	UPS, DHL
757-200SF	210	34.9	25.4	389-4,358	59-2,032	2,208	891	2.5:1	6.05	2.44	90,294	45,653	FEDEX, DHL
757-200 Combi	8	29.6	26.0	546-4,020	222-1,338	1,544	466	3.3:1	4.23	1.28	61,568	24,222	ATI, Nepal Airlines
757-300	55	19.5	16.3	1,972-4,001	698-1,207	3,050	951	3.2:1	8.36	2.61	60,430	21,213	Condor, DL, UA
Total	**664**												

767 IN SERVICE PASSENGER & FREIGHTER FLEET AGE & UTILISATION CHARACTERISTICS

AIRCRAFT SERIES	NO. ACTIVE	OLDEST ACTIVE	AVG AGE	FH/YR RANGE	FC/YR RANGE	AVG FH/YR	AVG FC/YR	AVG FH:FC	AVG FH/DY	AVG FC/DY	HIGH CUM FH	HIGH CUM FC	MAIN CURRENT OPERATORS
767-200BDSF	44	36	33	462-2,253	233-1,207	1,387	682	2.0:1	3.80	1.87	91,132	50,147	ABX Air, Atlas Air, DHL
767-200ER/EM	12	29.9	22.9	1,203-4,370	220-990	3,312	579	5.7:1	9.07	1.59	109,350	20,712	Air Zimbabwe, UTAir
767-200ER/EM BDSF/SF	16	32.5	35.2	648-4,168	476-1,389	1,920	868	2.2:1	5.26	2.38	88,802	33,359	Star Air, Atlas Air, Aero Union
767-300	34	31	22.6	461-4,100	328-2,597	2,596	1,617	1.6:1	7.11	4.43	82,158	41,486	ANA, JAL, Delta
767-300ER	386	29.8	18.5	405-5,694	112-2,195	3,496	691	5.1:1	9.58	1.89	131,764	43,240	ANA, Air Canada, AA, BA, DL, JAL,UA
767-300ER BCF	23	28.7	23	1,007-3,830	311-1,465	2,387	975	2.5:1	6.54	2.67	108,362	22,404	CargoJet Airways, SF Airlines
767-300ER BDSF	44	29.7	25	233-4,155	76-1,600	1,902	708	2.7:1	5.21	1.94	112,807	31,883	Kalitta Air, ABX Air
767-300ERF	133	22.6	9	613-4,314	243-1,526	3,055	884	3.5:1	8.37	2.42	86,030	26,322	FedEx, UPS, DHL, Polar Air Cargo
767-400ER	37	18.3	16.8	3,257-4,838	488-616	4,213	571	7.4:1	11.54	1.56	75,096	14,078	DL, UA
Total	**729**												

757& 767 STORED AIRCRAFT AGE & UTILISATION

AIRCRAFT SERIES	NO. STORED	OLDEST ACTIVE	AVG AGE	HIGH CUM FH	HIGH CUM	MAIN FC	CURRENT OPERATORS
757-200	97	33.5	24.6	41	96,960	45,664	
757-200SF	6	32.3	28.4	4	88,638	36,276	
757-200 Combi	1	23.8	23.8	N/A	34,478	18,811	
767-200	2	34.9	33.75	1	79,143	35,968	
767-200ER/ERM	21	35.9	28.5	8	99,162	27,099	
767-300	7	31.4	30.3	N/A	93,083	37,256	
767-300ER	51	31.2	23.7	7	130,090	32,524	
767-300ER BDSF	2	25.7	23.8	N/A	96,691	16,482	Atlas Air, Northern Air Cargo
767-300ERF	1	19.4	19.4	N/A	92,177	21,541	LATAM Cargo Chile
Total	**188**						

and managed by Cargo Aircraft Management. The aircraft has accumulated 87,265FH and 41,555FC, with a last annual utilisation of 1,323FH and 614FC.

The highest 767-200 FH utilisation in-service aircraft is a 30-year-old, L/N 208, with 109,350FH, operated and managed by Meridiana. Its last annual utilisation is listed as 3,592FH and 668FC.

The highest 767-200 FC utilisation active aircraft is with ABX Air, managed by Cargo Aircraft Management. This is L/N 110 with 50,147FC at almost 33 years of age, and with a last annual utilisation of 1,700FC and 764FC.

For stored aircraft the highest FH utilisation aircraft is L/N 306 with 99,162FH, at nearly 28 years old. This is operated and managed by KMW Leasing.

For the 757 and 767 fleets, varied flight times, geographical location, and passenger/freighter configurations result in a wide range of total accumulated FC compared to the age of the aircraft.

The highest FC stored aircraft is L/N 118, also with KMW Leasing, and nearing 33 years old with 35,968FC,

The oldest in-service 767-300 aircraft are now nearing 30 years old. These are L/N 215 and L/N 219, flying as passenger aircraft for Air Canada. Their current utilisation is 131,764FH/23,504FC and 130,757FH/23,380FC respectively. The last recorded annual utilisations are L/N 215 with 4,070FH and 918FC, and L/N 219 with 3,766FH and 854FC.

The highest 767-300FH utilisation is L/N 215 with 131,764FH, as previously mentioned. The highest 767-300FC utilisation aircraft is L/N 687 with 43,240FC. At 20 years of age, the aircraft is currently operated and managed by Air Do and last annual utilisation is listed as 2,678FH and 2,057FC.

For stored aircraft the highest 767-300FH utilisation airframe is L/N 213 with 130,090FH at almost 30 years. It is operated and managed by Air Canada. The highest in terms of FC is L/N 193 at 30 years of age with 37,256FC. It is with Orient Thai Airlines, and managed by Grandmax Group.

As the 767-400ER entered service in 2000, the older aircraft are now turning 18 years old. The highest FH aircraft is L/N 805 at 17.5 years, with United Airlines at 75,096FH. The highest FC aircraft is L/N 801 also at 17.5 years, with Delta at 14,078FC. The average utilisation for the -400 over the last year is 4,213FH/571FC.

More details of the active and stored aircraft age, FH, FC and average utilisation are given *(see table, page 22)*.

MPD development

The current revision of the 757's MPD was released on January 20th, 2018, and the current revision of the 767's MPD on December 22nd, 2017. These are constantly evolving documents that factor in fleet service experience and maintenance philosophy changes.

One major change to the MPDs was integration of the corrosion prevention and control programme (CPCP) into the main tasks. CPCP tasks were previously listed separately in Section 10 of the MPD, and have been incorporated in the Structural Section 2 and Zonal Section 3 inspection requirements since May 2006 for the 757 and August 2005 for the 767.

A more recent change was removal of industry-familiar letter checks from the threshold and repeat interval task parameters. "This occurred in May 2010 for the 757, and April 2012 for the 767," says Peter Cooper, maintenance consultant at Civil Aviation Services. "Inspection tasks at this time also inherited new reference numbers, but the industry still refers to the cycle of checks as 'A' and 'C' checks for packaging FC/FH/calendar threshold and repeat interval inspections to be performed.

"An exception to this is Boeing's low utilisation maintenance programme (LUMP) for operators that accumulate fewer than 100FH per month per aircraft, or 1,200 FH per year," says Elizabeth Jorsey, president of aviation consultancy Wingspan Aero. "Boeing's LUMP MPD still uses calendar checks, 1C to 4C."

For the older fleet, in 2014 the 767 MPD was changed in response to industry requests for clarification of FLS supplemental inspection tasks for 300 passenger-to-freighter converted aircraft. The industry asked for not only reduced annual utilisation of aircraft to be taken into consideration when determining initial thresholds for structural inspections, but also increased stress loadings. The change introduced a 'combined threshold' to consider time served as a passenger aircraft.

MPD content overview

The 757 and 767 MPDs follow the MSG-3 pattern of a mix of FH, FC and calendar thresholds and repeat intervals for each scheduled maintenance task. These tasks are outlined in three main groups: Section 1 'Systems and Powerplant', Section 2 'Structures', and Section 3 'Zonal'. Section 2's structural inspection requirements form the baseline structural inspection programme for all structural significant items (SSI).

It is from these three sections that much of the scheduled maintenance check content of a base check cycle will be determined. Also included in these sections is the method of inspection required, such as general visual inspection (GVI), detailed inspection (DET) or special detailed inspection (SDI).

The inspection's basic requirement includes enhanced zonal analysis procedure (EZAP), electrical wiring interconnect system (EWIS), or CPCP.

The objective of the EZAP is to identify maintenance and inspection tasks that minimise the accumulation of combustible materials and detect EWIS component defects. The objective of the CPCP is to preserve or restore corrosion preventative finishes applied to the aircraft structure.

For the ageing fleet, Section 9 of the MPD is important, because it contains information on airworthiness limitation (AWL) structural inspections which create the higher FC maintenance requirements that appear in Section 2. The 757's Section 9 information sits within the MPD, but the 767's is referenced and moved to a separate set of controlled documents.

The AWL structural supplemental inspection programme (SSIP) tasks

757 & 767 BASE CHECK GUIDE & CURRENT MPD TASK BREAKDOWN

System tasks	MPD initial threshold	MPD repeat threshold	757 MPD tasks	767 MPD tasks	NOTES
1C	6,000FH/18MO	6,000FH/18MO	159	245	
2C	12,000FH/36MO	6,000FH/18MO *	1		
	12,000FH/36MO	12,000FH/36MO	86	106	
	3YE or 36MO	3YE or 36MO		5	
3C	18,000FH/54MO	18,000FH/54MO	12	17	
4C	6YE	6YE	3		
	24,000FH/72MO	24,000FH/72MO	87	113	
	12,000FC/72MO	12,000FC/72MO	4	2	
6C	9YE	9YE		1	
	36,000FH/108MO	36,000FH/108MO	11	20	
	10YE	10YE	8	11	
8C	12YE	12YE	1	1	
	48,000FH/144MO	48,000FH/144MO	15	22	
A checks	A check tasks	Varied	172	227	
OOP tasks	Varied	Varied	33	35	
As req	ENG/APU/IDG CNG	At opportunity	6	6	
At opp	SHP VST/VEN REC/LIF LIM		33	61	
As req	LISTED AS 'NOTE'	Varied	24	13	
Total			**655**	**885**	

Zonal tasks	MPD initial threshold	MPD repeat threshold	757 MPD tasks	767 MPD tasks	NOTES
1C	6,000FH/18MO	6,000FH/18MO	98	119	
	3,000FC/18MO	3,000FC/18MO		3	
2C	12,000FH/36MO	12,000FH/36MO	14	8	
	6,000FC/36MO	6,000FC/36MO		2	
3C	18,000FH/54MO	18,000FH/54MO	N/A	N/A	
4C	24,000FH/72MO	24,000FH/72MO	40	43	
	12,000FC/72MO	12,000FC/72MO	7	2	
6C	36,000FH/108MO	36,000FH/108MO	N/A	N/A	
8C	24,000FC/144MO	24,000FC/144MO		3	
A check tasks			14	8	
At opp	ENG/APU.T.REV CNG		10	1	
As req	LISTED AS 'NOTE'			3	
Total			**183**	**192**	

Struct tasks	MPD initial threshold	MPD repeat threshold	757 MPD tasks	767 MPD tasks	NOTES
S1C	3,000FC/18MO	3,000FC/18MO	78	81	
S2C	6,000FC/36MO	6,000FC/36MO	88	45	
S3C	9,000FC/54MO	9,000FC/54MO	16	6	
S4C	12,000FC/72MO	6,000FC/72MO *	1	4	
	12,000FC/72MO	12,000FC/72MO	100	70	
S6C	18,000FC/108MO	18,000FC/108MO *		1	
	18,000FC/108MO	18,000FC/54MO *	4		
S8C	24,000FC/144MO	6,000FC/36MO *	5		
	24,000FC/144MO	12,000FC/72MO *	20	46	
	24,000FC/144MO	24,000FC/144MO		5	
S10C	30,000FC/180MO	12,000FC/72MO *	8		
	30,000FC/180MO	15,000FC/90MO *	2		
	30,000FC/180MO	18,000FC/108MO	2		
S12C	36,000FC/216MO	12,000FC/72MO *	29	7	
	36,000FC/216MO	18,000FC/108MO *	7		
	36,000FC/216MO	24,000FC/144MO *	4		
	36,000FC/216MO	36,000FC/216MO	2	1	
OOP tasks			9	35	
At opp	ENG/LDG GEAR CNG		8	3	
SSIP	25,000FC	12,000FC	1		
SSIP	50,000FC	2,000-12,000FC	301	1	
FLS	Listed as 'NOTE' - Flight Length Sensitive	Listed as 'NOTE' - Varying Repeat Intervals	43	24	See page 28 for high FC tasks
SSIP	Listed as 'NOTE' - numerous thresholds	Listed as 'NOTE' varied repeat intervals		399	
Total			**728**	**728**	

* = Different repeat interval to initial threshold

provide fatigue damage detection above that of the initial baseline programme. This includes inspection tasks with set initial thresholds, and FLS tasks that use FC versus FH utilisation to determine the initial inspection threshold.

Many of the AWL SSIP tasks use a DTR check form system. Damage tolerance refers to a structure's ability to sustain defects safely until it can be repaired. The DTR check documents determine the inspections and repeat intervals necessary to provide adequate fatigue damage detection by defining a required DTR (a numerical value) that must be achieved. The resulting SSIP inspections are covered in Section 2 of the MPDs, with a 'NOTE' to their DTR check documents in the tasks description.

"Some of the items in the structural section of the MPDs with a 'NOTE' for DTR, are higher interval items (that is, 50,000FC) that allow the operator to review the DTR after initial compliance and determine the inspection versus repeat interval they wish to track at," explains Jorsey. "For example, if a choice is a visual inspection, the repeat interval could be only 500FC. But if a non-destructive testing (NDT) inspection is chosen, then it could be a repeat of 10,000FC. It is the operator's choice."

Other safety-critical inspections referenced in Section 9 are AWL systems inspections, which relate to fuel tank safety in preventing ignition sources, and certification maintenance requirements (CMR), which are inspections identified as being critical to flight safety. CMR tasks must be monitored carefully for interval variations.

"CMR tasks are covered by the systems section inspections requirements. Sometimes, however, the CMR frequency interval stated in Section 9 differs from that stated in Systems Section 1," says Cooper. "Operators may choose to enter the Section 9 reference of the task into their approved maintenance programme (AMP) so that it is not missed. Regulators watch out for these tasks."

Base check planning

For both aircraft types the basic 'C' check parameters and frequencies of 6,000FH/18MO, 12,000FH/36MO, 18,000FH/54MO, and 24,000FH/72 MO are used to complete one base check cycle over a 6YE period. Large quantities of tasks will use these parameters for their threshold and repeat interval criteria. This can be referred to as four C checks per cycle. In this format, the calendar backstop is the planned threshold rather than the FH threshold. *(see table – base check guide- this page).*

For both aircraft types the basic structural or 'SC' check parameters frequencies of 3,000FC/18MO,

6,000FC/36MO, 9,000FC/54MO, and 12000FC/72 MO are used to complete one base check cycle over a 6YE period. The oldest aircraft of both fleets will now have been through their sixth check cycle after 35-36 years of operation.

Tasks with intervals that fall between the base checks are planned into what is still known commonly as 'A' checks. Using the largest grouping of 'A' check tasks for both types would be at 750FH. Based on utilisation of 8FH per day this check will fall due every three months.

For subsequent 6YE cycles, additional large groupings of tasks fall at 24,000FH/108MO (systems threshold to include 10YE tasks) and 24,000FC/144MO, followed by 30,000FC/180MO, and 36,000FC/216MO. These check groupings will include reduced repeat interval inspections from the previous check cycle. This is controlled by a task card status report commonly referred to as the last done next due (LDND), or last done next performed (LDNP).

"The LDND is what every operator or continuing airworthiness management organisation (CAMO) must control so that they know for every scheduled maintenance item when the task was 'last done', and when it is 'next due'," explains Cooper. "They may use an Excel spread sheet or a larger automated IT system which is fed the threshold and repeat intervals per task. As each task is completed, its 'last done' date is entered, and the system will recalculate the 'next due'. Any changes or escalations to the MPD tasks via a customer's own AMP will be captured.

"As the aircraft ages, and accumulates FH and FC, planners have additional groups of tasks to watch for on the LDND," continues Cooper "The planner's experience is needed to interpret the information. For the 757 and 767 this applies for tasks like those that are FLS, where the threshold depends on aircraft utilisation, or where repeat intervals only apply to a percentage of the fleet."

Ageing maintenance

For the 757 and 767, 50,000FC, and 40,000FC (for the 767-400ER, -300F and for specific converted freighters based on FC at time of conversion), are the major thresholds for introducing large groups of fatigue-based SSIP tasks, including FLS tasks. Although Boeing uses the FC as the primary focus for structural task thresholds, high FH utilisation can trigger some inspections early.

FLS tasks require an aircraft's current FH and FC utilisation to determine any deviation from the initial threshold of 50,000FC (or 40,000FC) for the required inspection. This is carried out by using an FLS threshold graph referenced in the MPDs. The individual aircraft's current FC are plotted on a vertical scale, while the current FH are plotted on a horizontal scale. By the FC/FH threshold that the two utilisations meet within a diagonal shaded block, the tasks must have been performed, so an aircraft of high FH will reach the shaded area at a lower FC limit. The 757 and 767 use this process in both MPDs. The 757's MPD has 43 FLS tasks and the 767's has 24.

Other SSIP tasks are grouped differently between the two types. For the 757 MPD non-FLS supplemental inspection tasks are shown with an initial threshold falling due at 50,000FC, with varying repeat intervals of 3,000FC to 12,000FC *(see table – base check guide-page 24)*. This is a grouping of 301 tasks.

To put the 50,000FC threshold into perspective against the current active 757 fleet, there are 41 active and 10 stored aircraft ranging from 35,000FC to the highest cumulative figure of 45,653FC, so the initial threshold of 50,000FC has yet to be met by any aircraft in the fleet. For the highest FC aircraft at a utilisation of 3FC per day, this group of tasks will be due within the next four years.

For the 767, non-FLS supplemental inspections tasks are listed with 'NOTE' in the threshold or interval column of the MPD task listing to indicate that a note explanation is included under the task's description.This must be examined to determine its initial threshold. The larger mix of variants in the 767 MPD means there can be tasks with varying initial thresholds, as well as repeat intervals. As with the 757, many of the 767's task thresholds are 50,000FC (40,000FC for -400ER/-300F and specific BCF). In total, with all other 'NOTED' threshold airframe fatigue inspections that go as low as 16,000FC, there are 424 tasks. *(see table, page 24)*.

To put the 50,000FC (and 40,000FC per specific variants) threshold into perspective against the current 767 fleet, there are 35 active and six stored aircraft ranging from 35,000FC to the highest cumulative figure of 50,147FC. The inspections are beginning to fall due for the 767 fleet. This includes the FLS tasks, where the high FH utilisation will reduce the initial FC threshold.

"We are just getting into the 50,000FC range for our fleet," says Jim Savastano, general manager at Airborne Maintenance & Engineering Services in Wilmington, Ohio. "It is exciting to see what becomes of it, and what challenges are before us. The 767 is a strong aircraft and we find mostly corrosion rather than fatigue issues. We have done many failsafe trim outs and failsafe strap replacements due to fatigue, but now are finding corrosion issues are driving us to perform replacements."

757 MPD task overview

SSIP tasks account for a large proportion of the MPD Structures Section 2. With all other inspection types, the current revision (January 2018) of the 757 MPD has 1,566 listed tasks: Systems and Powerplant with 655; Structures with 728; and Zonal with 183 tasks.

The tasks quantities against the FH, FC and calendar threshold of the standard 18MO check cycle are shown *(see table, page 24)*. Not all tasks, however, will apply to all aircraft.

With a base check cycle of four checks at 18MO intervals over a six-year period, the oldest aircraft of the fleets at just over 35 years old will now be completing their sixth base check cycle.

757 Systems tasks

Of the 655 Section 1 Systems tasks, 417 apply to all variants, 83 to the Rolls-Royce (RR) engine, 56 to the Pratt and Whitney (PW) engine, 16 to the -200PF, seven to the -200, nine to the -300, and 67 to the passenger aircraft/combi.

For maintenance planning purposes there are 56 different threshold and interval groupings, all but one of which have the same repeat interval as the initial threshold. 33 of these groupings fall due in FH/FC and calendar parameters at less than 18MO, and form the bulk of the A check work packages between C checks.

Large groupings, as expected, fall into guide C check parameters (18MO intervals) with the larger access requirements lining up with the 72MO and 144MO structural thresholds. These include:

24,000FH/72MO with 87 tasks in total. 63 tasks apply to all aircraft and 24 to specific aircraft or engine options. These tasks would form a large part of a standard fourth C check package every 6YE. Main tasks include EZAP and EWIS inspections, including on-engine wiring and areas above the wing centre section. There are also 'off-aircraft' checks for components, such as fuses.

48,000FH/144MO with 15 tasks in total. 13 tasks apply to all aircraft variants and two to specific aircraft or engine options. These tasks at 144MO include bonding checks (resistance measurements) for in-tank tubing, wire harnesses and fuel pump ground straps, due to SFAR 88 requirements (Special Federal Aviation Regulation 88) focusing on fuel-tank ignition source prevention.

Other large groupings of tasks include the 10YE interval which has eight tasks, including detailed inspection of the wire bundles over the centre tank. These will require internal cabin equipment removal, and so need to be scheduled with a C check package *(see table, page 24)*.

In all MPD sections where the threshold and repeat interval is 'at opportunity' of the component change, the tasks will have 'ENG CNG', 'APU CNG', or 'IDG CNG' listed as the threshold requirement. 'note', 'LIF LIM' (life limit), 'SHP VST' (shop visit), and 'VEN REC' (vendor recommendation), can be listed where thresholds and repeat intervals will be detailed in the task description. These can be high FC and man-hour (MH) requirements for tasks, such as internal engine part replacements and component restorations. In the 757 systems and powerplant section, there are 63 such task listings to monitor.

Systems tasks that are high FC relate to MPD entries to discard the gears. This includes a 103,000FC threshold for the MLG and NLG. The general call for the restoration of the gears is 18000FC/10YR under a 'noted' threshold.

757 Structural tasks

Of the 728 structures section 2 tasks, 423 are applicable to all variants, 49 to the RR, 50 to the PW, 24 to the PF, 88 to the -200, 55 to the -300, and 39 to the passenger aircraft/combi. It is in this set of tasks that the SSIP tasks will be found.

There are 22 different threshold and interval groupings. Notably only six of these groupings have the same initial threshold as the repeat interval. The shorter repeat interval of most tasks causes the number of base inspection tasks to escalate as the aircraft goes through the checks after passing the initial thresholds.

Two large groupings of tasks where this is the case are:

24,000FC/144MO initial threshold, 12,000FC/72MO repeat interval. 20 tasks apply to all aircraft in this group. This requires the 12YE task grouping to be repeated at a 6YE interval, assuming the FC intervals are not reached first. These include GVI and DET wing inspections, and internal passenger cabin inspections with equipment removed.

36,000FC/216MO initial threshold, 12,000FC/72MO repeat interval. There are 29 tasks applicable to all aircraft in this group. These 18YE tasks are to be repeated at 6YE intervals. These include GVI upper lobe inspections with specific floor panel removals, and lower lobe inspections including bilges.

The 36,000FC/216MO initial threshold and 36,000FC/216MO repeat interval inspections have a high threshold, but comprise a small number of tasks. These require engines and pylons to be removed, and fall due at the end of the third base check cycle at 18 years of age, and again at the end of the sixth base check cycle at 36 years of age.

Other large groupings as expected fall into guide C check parameters as mentioned under the systems tasks observations with the same threshold and repeat intervals. This includes the 12,000FC/72MO with 100 tasks, 89 of which apply to all aircraft variants, and 11 to specific aircraft or engine options. This large grouping requires heavy access requirements to cover GVI of airframe structure, and NDT inspections of items, such as flight controls.

There are no 24,000FC/144MO repeat intervals for the 757 structures section. All initial 144MO tasks have a reduced repeat interval.

The largest grouping of tasks in the structures section is the 50,000FC initial threshold supplemental inspections as previously mentioned. These are 301 tasks, across a mix of airframe and engine variants, with a repeat interval varying from 3,000FC to 12,000FC. The repeat interval in some cases applies to a varied mix of 20% to 90% of the operator's fleet. The tasks, mostly SDI (often NDT), cover fuselage, wings, flight controls and nacelles. Boeing estimates that more than 830 inspection MH are needed. Not all tasks apply to all aircraft,

767-200/-300/-400 MPD STRUCTURAL PROG INSPECTION TASKS OF HIGH FC THRESHOLD, WITH FLIGHT LENGTH SENSITIVE (FLS) AND DAMAGE TOLERANCE RATING (DTR) REFERENCE

Thresholds listed in the 'task description' per MPD task entry	Repeat intervals listed	Qty across a/frame & Eng variants	NOTES
50,000FC, MOD date sensitive for some types (-300BCF) 40,000FC for -300F and -400ER when applicable	Varies from 3,000FC to 12,000FC	125	Det (often NDT) insp or fslge, wings, flt ctrls & nacelles. Rpt insp apply to % of fleet. 78 tasks for all aircraft. Many tasks deep access.
50,000FC or 70,000FH	Varies from 980FC or 1,400FH wcf, to 12,000FC or 17,000FH wcf.	16	GVI & special detailed insp of lwr wing & rear spar surfaces, wing dry bays and ctr aux fuel tanks. Only for SF and BC fleet.
50,000FC or 70,000FH (or 8,000FH after conversion to BCF)	Varies from 3,600FC or 50,000FH, to 12,000FC or 16,800FH	7	Wing NDT insp apply to BCF.
50,000FH	2,400FC to 12,000FC	104	Det insp for fslge, wings, flt ctrls & nacelles. Rpt insp apply to % of fleet. Only 13 tasks for all aircraft. Deep access for many tasks.
50,000FC	2,000FC	1	Only task with 50,000FC threshold. Applies to SF aircraft only, & for H/stabilizer upper surface insp.
48,300FC	3,000FC	1	Service panel cutout insp 48,000FC for (200SF), mod date sensitive (300BCF).
40,000FC	6,000FC to 12,000FC	28	Det insp of fwd/aft bulk cargo door, wing ctr stringers and skin, cargo door latch cam, fslge skin splice, stab actuator assy, svce doors, flap structure.
40,000FC or 90,000FH	750FC or 3,000FC, up to 12,000FC, depend stg length and task	24	Det insp for -400ER nacelle fittings, spar chords link fittings & engine mount bulkheads
37,500FC or 30,000FC	12,000FC	2	Fwd large cargo door latch frame. NDT insp.
37,500FC	3,000FC	1	NDT insp crown skin section 43 for -SF.
30,700FC	No repeat	1	NDT insp skin splices crown & upper lobe. (applies to SF and BCF).
30,000FC or 44,900FC (type specific)	3,000FC to 12,000FC	4	Main deck cargo door inspections (mainly NDT) of latch frame inner chords & outer skin
30,000FC	12,000FC	3	Aft cargo door latch frame & skin NDT insp (300F), crown skin doubler NDT (SF).
27,900FC	6,000FC	1	NDT insp skin lap splices for -SF and -BCF.
25,000FC	3,000FC to 25,000FC	47	Det tasks for fslge, wings, flt ctrls & nacelles. 28 of the 47 tasks apply to all aircraft.
25,000FC or 70,000FH	4,000FC or 12,000FC, depend stg length (less 8FH)	1	Wing rear spar ctr section det insp (-400ER).
25,000FC or 80, 000FH intervals	Varies from 3,000FC to 12,000FC. Rpt interval on some tasks affected by stage length	26	Det insp ctr fuel tank, wing stringers, rear spar web & chords, trunnion det insp. Rpt apply to % of fleet.
FLS tasks document - figure 01 needed to determine threshold	Different repeat intervals determined by average stage length. This can be as low as 3,000FC or 4,300FH	24	Det insp of wings. Tasks only apply to some variants.
16,000FC or 70,000FH	Varies from 4,000FC to 80,000FC or 16,000FC, depending stage length (less or more than 8FH)	3	Eng mount special det insp (-400ER)
SB or mod related	Per instruction of SB or Mod date	2	Det insp wing spar upper surface, skin lap splices
OPP	At opportunity	1	Det insp fwd door cutout.
Combined threshold Pax FC before Boeing conv considered for threshold	12,000FC	3	Det insp crown skin dblrs & stringers, longit lap splices. DTR check ref with threshold

757-200/-300 MPD STRUCTURAL PROG INSPECTION TASKS OF HIGH THRESHOLD, WITH FLIGHT LENGTH SENSITIVE (FLS) AND DAMAGE TOLERANCE RATING (DTR) REFERENCE

Initial threshold	Repeat intervals listed in notes of task entry & Sect 9 MPD	Qty across a/frame & Eng variants	Guide example of Insp areas Some insp areas not applic to all types or L/N
50,000FC	3,000FC	18	NDT insp: fslge skin lap fasteners,horiz stab reap spar support, cargo door, eng mount bulkhead, torque check eng mounts
50,000FC	6,000FC	26	NDT det insp: outboard flap skin, BS1720 bulkhead beam, BS 263 bulkhead chord, fwd eng mount (RR Eng), Cargo door beams, flap tracks, main deck cargo door skin & frames
50,000FC	9,000FC	12	Various bulkhead insp, incl BS1720 beam, fwd eng mount (PW), nacelle spar, fslge skin splices, cargo door cutouts (low L/N).
50,000FC	12,000FC	245	Special det tasks for fslge, wings, flt ctrls & nacelles. Rpt insp only applic to % of fleet. 99 tasks apply to all fleet. Deep access for many tasks.
Listed as 'NOTE' ref to FLS task sect 9 graph for FC insp threshold	6,000FC to 12,000FC	44	FLS tasks for 757-200/-300. Sect 9 of MPD to determine threshold & rpt intervals, range from 6,000FC to 12,000FC. NDT various insp at fwd & aft spar chord, overwing frames, MLG trunnion support, dry bays, body rib lwr chords.

and access to the inspection areas is additional *(see further breakdown, this page)*.

As the fleet ages, some 50,000FC threshold 3,000FC repeat tasks will no longer apply as they are effective to low L/N aircraft only. An example is task 53-450-00 number 2 cargo door cut out BS 1440 chord NDT inspection on 757-200s L/Ns 1 to 57, to be repeated for 70% of aircraft in this L/N group, in each operator's fleet. This task applies to six remaining aircraft in service.

Structures tasks with the threshold 'NOTE' contain the 44 FLS tasks, 23 of which apply to all 757 type variants, 12 to just the 757-200 and nine to the 757-300 only. Repeat intervals range from 6,000FC to 12,000FC *(see table, this page)*.

All but seven of the 44 FLS tasks are NDT inspections, with most being wing structure inspections. Task 57-540-00, for example, is an NDT specific structural inspection to be carried out on the 757-200 lower rear spar chord at Wing Station177.5. The task requires use of the FLS threshold graph in section 9 of the MPD for the initial threshold in relation to its current FC and FH. The repeat interval is 12,000FC, applicable to 50% of aircraft. The DTR check form is listed for alternative repeat inspections if required and if damage is found.

757 Zonal tasks

The Zonal Section 3 of the MPD comprises the smallest number of inspections with 183 tasks. 123 tasks apply to all 757s, 17 to the RR, 19 to the PW, six to the PF, and 18 to the passenger aircraft/combi.

173 of the tasks fall into five groupings, all with the same repeat interval as the initial threshold. 750FH, 6,000FH/18MO, 12,000FH/36MO, 12,000FC/72MO and 24,000FH/72MO. The 750 FH tasks would be slotted into an A check or carried out during line service checks. All the calendar backstops fall neatly into a 18MO cycle. The 10 remaining tasks of the 183 are ENG CNG, APU CNG and T/REV CNG related GV inspections of the zones to be carried out at component change.

In the 757 Zonal section, the 24,000FH/72MO threshold and repeat interval is the highest check package. This includes 40 tasks, with 25 that apply to all aircraft variants and 15 to specific aircraft or engine options. The 72MO tasks contain extensive EZAP inspections on areas exposed by heavier inspection and access requirements of the Structures 72MO inspections. These areas include fuel tanks, horizontal stabiliser and internal cabin.

A small group, but with large access requirements, is the 12000FC/72MO group of seven tasks. These contain wing centre section and bulk cargo CPCP basic task requirements along with forward and aft cargo EZAP inspections.

767 MPD task overview

The current revision (December 2017) of the 767 MPD contains 1,805 active tasks in total in the three main sections. These tasks are grouped into Systems and Powerplant (885), Structures (728), and Zonal (192). As with the 757 MPD, the SSIP tasks account for a large proportion of the MPD Structures Section 2.

The tasks quantities against the FH, FC and/or calendar threshold of the standard 18MO check cycle are shown *(see table, page 24)* beside the 757 figures. Not all tasks apply to all aircraft.

767 Systems tasks

Of the 885 Systems and Powerplant Section 1 tasks, 360 apply to all variants, 50 to the RR engine; 67 to the GE CF6-80 engine; 41 to the PW JT9D-7R4 engine; 70 to the PW4000-94 engine; 11 to a mix of engine options; 31 to freighter variants; 76 to passenger aircraft; and 99 to either the -200, -300, or -400 series.

There are 72 different threshold and interval groupings with the same repeat interval as initial threshold.

Large groupings as expected fall into guide C check parameters with the same threshold and repeat intervals being the same as the 757. These include:

24,000FH/72MO with 113 tasks. 62 tasks apply to all aircraft variants and 51 to specific aircraft or engine options. These contain extensive EZAP restoration (cleaning) requirements across the fuselage and wings, system operational and functional checks.

The 48,000FH/144MO group has 22 tasks. 19 tasks apply to all variants, and three to specific aircraft or engine options. Of note required are SFAR 88 fuel tank inspections, internal and external, including a functional check of the bonding between the overwing fill ports and the structure.

There are 80 tasks that are not listed with an FH or FC threshold and interval. 38 of the 80 are listed as 'LIF LIM' and mainly include the listing to discard engine parts (turbine disks and shafts) which requires a shop visit triggering all 'at engine removal' inspection tasks. Six are listed as APU CNG/ENG CNG/IDG CNG tasks, 13 are 'NOTE' tasks, six are SHP VST tasks, and 17 VEN REC tasks.

Tasks listed of interest, with high FC intervals, are the MPD entries to discard the gears. This includes 50,000FC (MLG

Initial thresholds for supplemental structural inspections can be Flight Length Sensitive. This uses the individual aircraft's total accumulated FC versus FH to determine when the task will fall due.

-300 and 400E), 70,000FC (MLG -200), 80,000FC NLG all types. The general call for the restoration of the gears is 18,000FC/10YE.

767 Structural tasks

Of the 728 Structures Section 2 tasks listed with thresholds and intervals, 239 apply to all variants; nine to the RR engine; a further 14 to a mix of engine options; 21 to the freighter variants; five to the passenger aircraft; and nine are specific to either the -200, -300 or -400 series. The CF6, JT9D, and PW4000 have their tasks listed under 'NOTE'.

There are 424 tasks with 'NOTE' listed as the initial threshold, of which 154 apply to all aircraft; 91 are specific to either the -200, -300 or -400 series; 113 apply to the freighters; and 66 to specific engine types. It is in this group of tasks that the SSIP will be found.

There are 17 different threshold and interval groupings. Five of these groupings have reduced repeat intervals to the initial threshold reducing the repeat inspection time by 50% on average.

Two large groupings of tasks where a reduced repeat interval is the case are:

24,000FC/144MO initial threshold, 12,000FC/72MO repeat interval. There are 46 tasks, 39 of which apply to all types. This requires the 12YE tasks to be a repeat at 6YE. This includes fuselage interior lower lobe structural inspections and upper lobe inspections, galleys and lavatory removal, leading edge slat and aileron interior structure inspections.

36,000FC/216MO initial threshold, 12,000 FC/72MO repeat interval. There are seven tasks in this group, and six apply to all types. This requires the 18YE tasks to be a 6YE repeat. These include interval GVI inspections of the upper lobe lap joints and circumferential joints.

Like the 757, the 36,000FC/216MO initial threshold and 36,000FC/216MO repeat interval inspections require the engines and pylons to be removed.

Other large groupings as expected fall into guide C check parameters with the same threshold and repeat intervals. These are:

12000FC/72MO: this has 70 tasks, 57 applying to all aircraft and 13 to other aircraft or engine options. These include DET inspections of pressurised and unpressurised structure and wing tanks.

As highlighted in this article, the 767 MPD structures section differs greatly to the 757 in the way the high FC and FH fatigue tasks thresholds are listed. In the 767 MPD these tasks are 'NOTED' thresholds requiring exact details of thresholds and repeat intervals to be determined by reading the task description. This applies to all higher FC tasks, apart from one repeat inspection on the 767-200SF horizontal stabiliser upper surface due at 50,000FC with a repeat at 2,000FC. These tasks' initial thresholds, repeat interval, FLS requirement, and task details are shown *(see table, page 28)*.

The 767 SSIP tasks also differ from the 757 in that they cover a range of initial thresholds. 125 use the 50,000FC (or 40,000FC for 300F and 400ER) for the initial threshold, and another 129 use 50,000FC with other determining parameters including high FH. Another 170 tasks relate to fatigue-based structural inspections with a threshold as low as 25,000FC for airframe inspections, and 16,000FC for engine inspections. No guide MH are provided for these tasks, so operators have to determine the planning requirements.

The 24 FLS tasks listed as 'note' consist of internal and external SDI in the area of the wing's centre-section lower surface, wing's centre-section fuel tank, and wing's rear and front spars. In the same procedure as the 757, the individual aircraft's FC versus FH utilisation is used to obtain the initial threshold.

For the 767-300BCF, supplemental inspections can require thresholds to be determined by using a combined life threshold curve to plot time as a passenger aircraft, then as a freighter. This would be indicated in the task description of the MPD task entry. Additionally, there is a modification date sensitive curve for the same purpose.

Additional complexities to enter in the LDND for the higher FC aircraft include varied repeat intervals, depending on the aircraft's FC length (FH per FC). A task may have a threshold of 25,000FC or 70,000FH, but the repeat interval will depend on the FC length flown. A stage length of less than 8FH, for example, equates to a repeat interval at 12,000FC. A stage length equal to, or more than, 8FH, has a repeat interval of 4,000FC.

767 Zonal tasks

Like the 757, the 767 Zonal Section 3 of the MPD comprises the smallest number of inspections with 192 tasks. 101 tasks apply to all variants, 14 to the RR engine, 15 to the CF6 engine, 15 to the JT9D engine, 13 to the PW4000 engine, 14 to freighter variants, and 11 to the passenger aircraft. Nine are specific to either the -200, -300 or -400 series.

188 of the tasks fall into 11 groupings, all with the same repeat interval as the initial threshold: 750FH, 400FC, 1,500FH, 3,000FH, 3,000FC/18MO, 6,000FH/18MO, 6,000FC/36MO, 12,000FH/36MO, 12,000FC/72MO, 24,000FH/72MO and 24,000FC/144MO. This is more groupings than on 757.

The heavier inspection grouping is 24,000FH/72MO: 43 tasks. 26 tasks apply to all variants, and 17 to specific aircraft or engine options. These cover cargo compartment, centre auxiliary and main fuel tank inspections (CPCP and EZAP), and cabin zonal inspections.

The 767 Zonal section has tasks listed as 144MO unlike the 757. The

50,000FC and 40,000FC are the initial thresholds for a large number of fatigue based supplemental structural inspections time for surface preparation will have to be considered.

12000FC/144MO tasks (x3) are GVIs of the vertical stabilizer, including the removal of the removable leading edge.

New release ADs & SBs

New airworthiness directives (ADs) affecting the ageing fleet are a result of differing factors, including the effect of long-term service on construction materials requiring new work against previous AD corrective actions.

One such example on the 757 is AD2017-22-12, which covers slats disbonding on aircraft on which the terminating action of AD2005-07-08 had previously been performed.

The AD affects the 757-200 series aircraft and is a result of reports of slats continuing to be found disbonded. The AD requires determining type of trailing edge slat wedges of the leading-edge slats, repetitive inspections for disbonding, and corrective actions if necessary. This AD provides an optional terminating action for the repetitive inspections by replacing a type A wedge with a type B wedge.

Costs are estimated to be up to 24MH per inspection cycle plus repair costs. The AD has a guide wedge replacement (per wedge) labour cost of 43MH, and up to nearly $85,000 in parts cost. There are 10 wedge assemblies per aircraft. Compliance times are referenced as 3,000 trailing edge FC or 24MO for the initial threshold. This will also cover slat wedges on control surfaces returning to service from storage.

As well as corrective actions on previous terminating actions of ADs, a change in required inspection technique can also lead to new ADs superseding previous releases entering work packs.

An example is AD 2016-22-09, which supersedes AD 2006-20-11 and is also specific to the 757-200. AD 2006-20-11 required initial and repetitive detailed or high frequency eddy current (HFEC) inspections for cracks around specific rivets of the fuselage skin. The new AD only allows a repetitive HFEC inspection. This AD was prompted by an evaluation that the fuselage skin lap splice is subject to widespread fatigue damage (WFD).

The AD estimates up to 20MH per inspection cycle. Repair MH would have to cover removal and refit of the aircraft interior in the area affected for access, repair materials required, and surface reprotection.

Compliance time is determined by the inspection method previously used: before 37,500FC, or within 3,000FC if the previous inspection was a detailed inspection only, or 12,000FC after accomplishing the most recent HFEC inspection, whichever occurs later.

A recent AD of note with high MH and a short compliance time affecting both fleets is AD 2016-25-01. This has a compliance of 24MO from the end of January 2017, and therefore will have to be performed at the closest C check.

"AD 2016-25-01 requires installation of an 'on-ground' stabilizer auto trim inhibit system, relays and related wiring, to open and close the flight control computer (FCC) analogue output that controls the stabilizer trim adjustment," explains David Peretz, aircraft MRO programme manager at IAI, Bedek Aviation. "It also requires installation of a momentary action ground test switch along with new operational programme software (OPS) for the FCC. The installation consumes about 400MH."

767 aft bulkhead change

Over the last 24MO there have been several AD releases for monitoring WFD on 767 aircraft, introducing new repeat inspections on airframe structural components. WFD monitoring can lead to terminating actions being required to large sections of the structure. AD 2016-25-07, for model 767-200 and -300 series, is one such AD that requires replacement of the aft pressure bulkhead (APB) with a new improved version.

Boeing alert SB 767-53A0267 referenced by the AD describes procedures for replacing the APB at body station (BS) 1582 of Section 48 of the fuselage barrel. The AD estimates this task to consume about 1,541MH.

"I think the industry realises the AD and SB estimated MH are in general very light. In the case of the APB replacement, the MH dramatically change depending on if it is a stand-alone task, or combined with a heavy check," explains Savastano. "The level of check, the operator's maintenance programme, and if there are any other modifications, such as the stabilizer inhibit AD to be performed, all have to be factored in the planning and manpower loading. The replacement takes about 30 days."

"Kits can only be bought through Boeing, and costs vary depending on if you are buying 10 kits or one," continues Savastano. "They have an 18-month lead time, so you need to plan ahead. The tooling is very specific, and Airborne Maintenance & Engineering Services is currently the only MRO that has it."

The AD's compliance time is before the accumulation of 60,000FC, or within 36 months of the effective date of the AD (February 7th, 2017), whichever occurs later, but not earlier than 37,500FC. Although the fleet leaders in terms of FC are well below this threshold figure, operators are carrying out the modification early.

"We have completed four APB replacements and have the fifth under way. We have three more planned for this year and four in 2019. The main reason for the replacement is to extend the life of the aircraft," adds Savastano.

SIP programme

The 757-200 SIP is continuing. The earlier AD 2004-12-17 for aircraft with RB211 engines has been superseded by 2014-05-13. For the PW-powered

High FC inspection thresholds for 767 freighter aircraft can vary depending on FC accumulated as a passenger aircraft.

aircraft, the earlier AD 2003-18-05 has been superseded by 2013-10-02. The newer ADs refer in part to the original modification, new concurrent modification requirements, and repeat inspection details. Aircraft affected are L/Ns 1 to 735.

The SIP programme is well known, and requires the modification of the nacelle strut and wing structure to prevent fatigue cracking.

"There are still some 757s that have not completed pylon modification. AD 2014-05-13 extended the compliance to lower FH/FC aircraft. Final compliance date is April 2022 if the FC requirement is not reached," explains Jorsey.

Brian McCarthy, vice president of sales at Precision Aircraft Solutions, adds: "We are starting to see many pylons being modified during passenger-to-freighter conversion, and lead time for the SB kits must be monitored. Most operators are carrying out elective SBs and inspections to the pylon area at the same time to ensure future reliability. This includes inspections for migrating bushings, chaffing clamps and hoses, as well as replacement of parts such as brittle wire, cables and corroded connectors.

"A SIP task can take 25-30 days, and would pace the downtime of a lessor check," continues McCarthy. "Including all the part kits, manpower costs, tooling rental and Boeing tooling refurbishment fees, the SIP will cost $750,000 or more. At the end of the day when calculating future maintenance costs, you have to consider the bigger ticket ADs, especially those with structural integrity requirements."

The 767 SIP is also continuing. AD 2004-16-12 requires modification of the nacelle strut and wing structure of the aircraft and is similar in scale to the 757-programme, requiring about 2,700MH to complete. This AD affects PW- and GE-powered 767-200, -300, and -300F series airplanes L/N 1 through to 663.

Compliance is before a total time of 37,500FC, or within 20 years of the date of manufacture, whichever occurs first. Under specific conditions an optional threshold formula provided in the applicable SB to type is an acceptable alternative to the 20-year threshold.

Routine

Boeing lists MH for many of the inspections tasks in the MPD. The standard clause that they are for skilled personnel carrying out the inspections grouped together with others of the same zone and of same frequency is applied. For this reason, it is industry standard to multiply the Boeing figures by a 'reality' factor to determine actual MH requirements. Industry feedback at present puts this figure for the types at 2.0-2.5 for lesser checks, and 3.5-4.0 for higher checks.

Time to undertake tasks with zero MH would have to be determined by each operator. This affects the 767 more, with 332 of the 728 Structures tasks, and 43 of the Systems tasks listed with '0' in the MH column. The 757 for comparison has only 18 of the Systems tasks listed.

Boeing guide access MH against aircraft panels are listed in the MPD Appendix A. Like the routine figures, access figures will be put through a formula to match the efficiency the MRO can achieve.

For the SSIP tasks, surface preparation before the inspection will need to be considered. Production sealant and corrosion protection finishes may need to be removed based on each task's individual DTR check form instructions.

Another area of note for routine higher maintenance tasks is the use of GVI. This may be thought of as a minor inspection, but as the aircraft progress through the higher maintenance tasks GVIs can also require deep access in areas not usually disturbed. The MPD will list panel removals required to perform the listed inspections, although additional access requirements can be listed in the task description.

"We have had two S12C inputs through recently, which have included 216MO interval GVIs of the pylons," explains Adam Gilvear, base maintenance manager at 2Excel Engineering. "This requires the engines and struts to be removed before the GVI is to take place on the strut to wing fittings. These big jobs are coming around because of the age of the aircraft."

Non-Routine

Progressive check cycles and ageing airframes normally relate to an escalating routine to non-routine (NR) ratio figure for manpower planning. This can be a result of time between inspections, larger access requirements, and in general more cosmetic discrepancies.

Guide figures supplied for a structural 4C check have this ratio in the region of 1.1:1, and up to 1.3:1 NR hours to routine inspection hours. Advance the cycle to an 8C, and this ratio ranges from 1.4:1 to 1.5:1, and at the 12C check ranges from 1.6:1 to 1.8:1. A guide NR ratio for the SSIP will require more aircraft to begin the inspections.

The resultant NR tasks from scheduled maintenance inspections also vary, depending on the attention the operators have previously invested in preventative measures. This especially applies to corrosion prevention.

The upper and lower deck floor beams and cargo bay bilges are especially susceptible to corrosion because of water ingress. Although this issue is not unique to the 757/767 aircraft types, it does affect the high number of older freighter-converted aircraft in the two fleets.

"There have been a lot of corrosion

Investment on corrosion preventative measures during cargo conversion and heavy maintenance inputs will assist the aircraft reduction in future non-routine maintenance costs leading up to the higher FC threshold inspections.

and floor beam issues in the original ST Aero converted aircraft," adds McCarthy. "Due to the hostile environment the aircraft exists in, and the constant introduction of water from the loaded freight, over time the metal clips to secure the floor panels to the floor beams have caused areas of blend outs that are beyond allowable limits. This has led to floor beam replacements or significant repairs."

"Precision is now converting the next generation of 757s for DHL's network, replacing the original 34 ST Aero converted fleet. We are currently converting the airline's 25th aircraft. DHL intends to keep these aircraft in their fleet for no fewer than 15 years and because of that, their attention to reliability improvements and corrosion prevention and protection is significant."

"We are replacing the metal clips with an OEM composite 'Torlon' clip. Each ship set costs $50,000, but the product eliminates costly dissimilar metal corrosion floor beam damage down the road. We are also installing a gel tape to the lower side of the floor panels to create a continuous seal to prevent water intrusion from the floor panel fasteners."

Other areas of corrosion are not so easily preventable. "Pylon corrosion is common on all 757 aircraft now. It used to just be with the RB211-535C engine, but all the aircraft now seem to have it on their pylon skins. This commonly leads to engines being removed for repairs to be carried out," says Gilvear.

"C ducts are also an area to watch for corrosion on the older fleet. Total turnaround time (TAT) for off-base repairs have impacted recent checks where the loaning of four C duct units was considered by the operator to return the aircraft to service. This then required the aircraft to return to maintenance for the original components to be swapped back. On this occasion the decision was made to wait," explains Gilvear.

NR resulting from recent AD releases have been creating parts shortages. This includes AD 2014-22-09 for the 767 that was issued to detect and correct flap rotary actuator gear disengagement from its mating reaction ring. "This disengagement with flaps extended could cause an uncommanded roll due to flap blowback, overload, or flap departure from the aircraft," explains Peretz. "250MH are needed for the inspection, but most of the rotary actuator requires replacement. It is very difficult to find these units in the market."

For a guide breakdown of C check costs, see previous ageing 757 and 767 articles *(see Assessing the 757's Ageing Maintenance Requirements, Aircraft Commerce, February/March 2012, page 34 and Assessing the 767's ageing maintenance, Aircraft Commerce, April/May 2012, page 38).*

Freighter conversions

As of first quarter 2018, there are 210 passenger-to-freighter conversion 757-200SFs, 79 757-200PFs, 127 converted 767-200/-300s, and 133 767-300Fs in active service.

Converted freighter aircraft will incorporate any inspections designated by the approved modification into their own AMP along with the required Boeing MPD tasks, including the SSIP inspections. Although many of the oldest aircraft by age are the converted freighter aircraft, their lower-than-average annual utilisation rate is holding off the higher fatigue SSIP maintenance requirements.

What is having a more immediate impact on some of the fleet is the push to extend the LUMP from an 18MO cycle to a 24MO cycle.

"We see the 757 freighter operators moving towards a 24MO programme to avoid the seasonal swing of an 18MO programme that will have the aircraft trapped in maintenance during peak cargo traffic periods," adds McCarthy.

"The 24MO LUMP is a good programme for the freighter. When the aircraft move to a 24MO programme some of our conversion-related tasks (that is, the main cargo door lube) cannot wait until 24MO, but can easily be dropped into lesser weekend checks along the way," explains McCarthy

Summary

While maintenance costs will rise for the ageing fleet simply because additional compliance tasks are approaching 50,000FC and 40,000FC for specific types, there seems to be no immediate concern over the approaching threshold.

Due to the different formats and utilisation of the current fleets, the 767 is hitting the higher maintenance 50,000FC or 40,000FC threshold tasks first. Most of the 757 fleet still has some room to go.

"The 757 is standing the test of time. Many of the 757 fleet leaders that are flying unusually high FC are showing no signs of needing additional maintenance, which would impact the rest of the fleet. I think operators will easily reach 50,000FC, which is part of the type's popularity. We are putting our 100th conversion aircraft in to work shortly, and we still have 60 more conversions anticipated, with a remaining feed stock of perhaps 196 aircraft available."

Whether the inspections will become a watershed figure for specific variants is yet to be seen. Of the 243 retired 757s, only 19 were in the 40,000FC to 50,000FC range. For the 767 this figure is five of the 241 retired aircraft. For the operators that push through the SSIP thresholds, the effect of the tasks' reduced repeat intervals on their fleets will then need to be predicted. AC