

CFM56-7B technical support providers

There are about 5,100 CFM56-7Bs in operation. A global survey of six major levels of support identifies major global support providers.

This survey summarises the major aftermarket and technical support providers for the CFM56-7B family of turbofan engines. It is grouped into six sections covering the categories of technical support offered by each of the providers:

- Line maintenance and in-service operational support (see first table, page 30).
- Engine management (see second table, page 30).
- Engine provisioning (see third table, page 30).
- Engine components (see first table, page 31).
- Shop visit maintenance (see second table, page 31).
- Specialist repairs (see third table, page 31).

CFM56-7B overhaul market

In terms of total CFM56-7B engine overhauls, by far the largest number of contracts are awarded to shops managed by CFMI's aftermarket affiliates GE Engine Services (GEES) and Snecma Services, accounting for more than 43% of 6,458 engine overhaul contracts logged by FlightGlobal's ACAS maintenance database. GEES's proportion of the world total is almost 30% (1,928 logged contracts), while Snecma Services' is 13.5% (874 logged contracts).

GEES's CFM56-7B overhauls are undertaken at: Dallas, TX; Strother Field, KS; Cardiff, Wales; Prestwick, Scotland; and Selangor, Malaysia. Snecma Services' -7B overhauls take place at Villaroche, France; Brussels, Belgium; Casablanca, Morocco; and Sichuan, China.

The next most active -7B overhaulers are: Lufthansa Technik (634 contracts and 9.81% market share); MTU Maintenance (530 contracts, 8.2% market share and shops in Hannover, Canada and Zhuhai in China); Delta TechOps (472 contracts and 7.3% market share); and Pratt & Whitney Engine Services' Norway facility (260 contracts and 4% market share). Other -7B overhaul providers are: SR Technics; Turkish Technic, Jet Turbine Services (a division of Qantas); KLM E&M; ST Aerospace Engines; Iberia; TAP M&E;

United Services, IHI Corporation, Bedek Aviation, Aerothrust and American Airlines.

Aftermarket outlook

"CFM56-7Bs are staying on-wing longer, but the shops are beginning to fill. Fleet demographics suggest there is a wave coming, so capacity will tighten a bit over the next three years, but not to the extent of there being a shortage. Capacity will be 'well balanced', but it will have to be ramped up," observes David Stewart, principal at AeroStrategy. "There is enough capacity either in place, or about to be put in place, to manage demand through to 2010. However, by 2016-2017 there will be a need for even more capacity.

"We expect 15% annual growth from 2007 to 2017," notes Stewart. "That's huge, but it is also a function of the engines' reliability. Relatively few are coming through the shops now, but all deliveries made from 1998 to 2007 will be generating shop visits over the coming decade. A 15% annual growth rate translates into a quadrupling of the number of events over the next decade."

The test cell capacity of CFM56-7B providers is a good indicator of the balance between capacity and demand. Test cell capacity in 2007 was sufficient for 500 annual engine shop visits. Any further capacity requirement for managing short-term peaks can be accommodated with extra shifts or overtime, but this will be manageable in 2007, according to Stewart.

Stewart notes that the additional capacity being planned over the next few years will double engine-shop capacity over the next three years. Pratt & Whitney's engine-shop ventures with both Turkish Technic and China Eastern in Shanghai will soon come on line. Other players reported to be adding CFM56-7B capacity include Iberia, TAP, ST Aerospace's Chinese venture (STATCO), Lufthansa Technik's expanded Hamburg engine facility, Aerothrust, and IAI-Bedek. Jet Turbine Services in Australia is also gearing up for CFM56-7B shop visits. Lufthansa Technik recently bought a 50% share in this facility which has

capacity to service 600 GE and CFM56-7B engines for customers in the region, including Qantas's. Snecma Services was also reported to be setting up CFM56-7B capability in India, but according to AeroStrategy this is now on hold.

Overall, AeroStrategy reports an overall spend in 2007 of \$864.3 million for -7B maintenance, repair and overhaul (MRO). The largest portion, \$401.1 million, was spent in North America, followed by Western Europe (\$212.8 million), Latin America (\$72.8 million), China (\$66.5 million), Africa (\$38.5 million), Asia Pacific (\$28 million), Middle East (\$26.2 million), and India (\$21 million). These figures correspond roughly to the geographical distribution and size of CFM56-7B fleets worldwide.

Industry perspectives

"We see pretty long on-wing times for first-run engines," says Thomas Böttger, director customer services and product sales at Lufthansa Technik (LHT). "It depends on where the engine is operating, but the demand is more than the industry was expecting, particularly with large fleets where engines were delivered close together. We therefore need a controlled and well planned approach for the first-run removal wave. We are now starting programmes to stagger engine removals, so as not to waste too much life limited parts (LLP) life and to avoid spending too much on spare engines. We will increase capacity at our Hamburg shop so we can be prepared for the demand. The first induction into the shop will probably be late this year or early next year."

LHT aims to develop its own repair solutions for the -7B and to supply parts manufacturer approval (PMA) parts. "We try to do whatever we can to keep the engine on-wing for as long as possible," says Böttger, "so we are educating operators on performing maintenance on-wing wherever feasible, and have on-wing support teams positioned globally.

Böttger says shop-visit drivers are generally not EGT-margin-related. LHT is seeing removals due to issues such as variable stator vanes (VSVs). "This part is becoming worn after 14,000-15,000 flying hours (FH), so we have developed a one-day, on-site repair to fix it because it cannot be replaced on-wing. This means not only that it is not necessary to bring the engine into the shop after only 14,000-17,000FH if the VSV needs work, but the engine could be good for another 8,000-10,000FH before the LLP life is reached," explains Böttger.

Katia Diebold-Widmer, head of marketing at MTU Maintenance Hannover, predicts about 650 shop visits worldwide in 2008, rising to 850-900 by 2010. "Although this is a sharp increase, I do not think there will be a shortage in

CFM56-7B LINE MAINTENANCE & IN-SERVICE OPERATIONAL SUPPORT

	On-wing maintenance	Line maintenance	Hospital repair/ Quick turn repairs	On-wing support	AOG/field services	Borescope inspection
American Airlines	Yes	Yes	Yes	Yes	Yes	Yes
China Airlines	Yes	Yes	Yes	Yes	Yes	Yes
Delta TechOps	Yes	Yes	Yes	Yes	Yes	Yes
GEES (various)	Yes	Yes	Yes	Yes	Yes	Yes
Iberia	Yes	Yes	Yes	Yes	Yes	Yes
Jet Turbine Services /Qantas	Yes	Yes	Yes	Yes	Yes	Yes
KLM Engineering & Maintenance	Yes	Yes	Yes	Yes	Yes	Yes
Lufthansa Technik	Yes	Yes	Yes	Yes	Yes	Yes
MTU Maintenance	Yes	Yes	Yes	Yes	Yes	Yes
Snecma Services	Yes	Yes	Yes	Yes	Yes	Yes
TAP Maintenance & Engineering	Yes	Yes	Yes	Yes	Yes	Yes
Turkish Technic	Yes	Yes	Yes	Yes	Yes	Yes
United Services	Yes	Yes	Yes	Yes	Yes	Yes

CFM56-7B ENGINE MANAGEMENT

	Maintenance management & check planning	ADs/SBs management	Documentation management	Health/condition monitoring
Aeroturbine	Yes	Yes	Yes	Yes
Delta TechOps	Yes	Yes	Yes	Yes
GA Telesis	Yes	Yes	Yes	Yes
GEES	Yes	Yes	Yes	Yes
IASG	Yes	Yes	Yes	Yes
KLM Engineering & Maintenance	Yes	Yes	Yes	Yes
Lufthansa Technik	Yes	Yes	Yes	Yes
MTU Maintenance	Yes	Yes	Yes	Yes
Pratt & Whitney Engine Services	Yes	Yes	Yes	Yes
Snecma Services	Yes	Yes	Yes	Yes
SR Technics	Yes	Yes	Yes	Yes
TAP Maintenance & Engineering	Yes	Yes	Yes	Yes
Turkish Technic	Yes	Yes	Yes	Yes
Total Engine Support (TES-UK)	Yes	Yes	Yes	Yes
United Services	Yes	Yes	Yes	Yes

CFM56-7B ENGINE PROVISIONING

	Short-term leasing	Medium- & long-term leasing	Engine pooling	Sale & leasebacks
Aeroturbine	Yes	Yes	Yes	Yes
AAR Engine Sales & Leasing	Yes	Yes	Yes	Yes
AerCap Engine Leasing	Yes	Yes	Yes	Yes
Engine Lease Finance	Yes	Yes	-	Yes
GA Telesis	Yes	Yes	-	Yes
Lufthansa Technik	Yes	Yes	Yes	Yes
Macquarie AirFinance	Yes	Yes	-	Yes
Magellan Group	Yes	Yes	-	Yes
Shannon Engine Support	Yes	Yes	Yes	Yes
Tradewinds	Yes	Yes	Yes	Yes
Willis Lease Finance	Yes	Yes	Yes	Yes

capacity, especially as many providers are adding capacity over the next few years.”

One important issue is that there are not as many spare -7 engines available as

there are for other engine types. “It will be critical for airlines without spares to first find an adequate source for them during their shop visits, either directly

with the MRO shop or from an engine lessor,” says Diebold-Widmer. Given the limited supply of spare engines, it will also be crucial for MRO providers to offer competitive turnaround times.

“We have two overhaul locations, in Hannover, and Zhuhai in China. We are also an original equipment manufacturer (OEM) licensed provider,” notes Diebold-Widmer. “With about 40% of the CFM56 aftermarket under contract to both GE and Snecma, and 13% in-house ‘airline captive’, there is not much room for other providers. This is important because at present the world market is overcrowded with third-party shops.”

Like other large engine MROs, MTU has been offering thrust-per-hour contracts for some years. “We are also targeting the largest ‘non-captive’ airlines. We offer everything up to our total engine care packages, which include standard engine MRO, fleet management, engine condition monitoring, and logistical services up to line replaceable unit (LRU) support,” says Diebold-Widmer.

Designated engineering representative (DER) repair development is an important activity for MTU. “One of the areas we are looking at is airfoil replacement technologies. We would be investing in the high value parts, typically high pressure turbine (HPT) airfoils, but we are not planning to develop PMA parts or LLP repairs,” continues Diebold-Widmer.

Both MTU’s facilities are already fully equipped, and large enough to absorb the expected CFM56-7B shop-visit increase. “We have a flow-line for inducting the engines in Hannover, which means we can induct any engine at any time, and it makes no difference whether we induct a -7B, or PW2000 or V2500. We have also invested in a new test cell which will be operational by end of August 2008.


“The -7B market is characterised by large fleets and a plethora of small operators. There are only big fishes left, and there are only a few of those. Everyone seems to think CFM56-7B MRO is a big market, but given what is already captive, and how many providers are offering their services, it actually is not.”

Dave Monasterio, CFM56 MRO programme manager at Pratt & Whitney Engine Services (PWES), notes: “We are very active on the CFM56-7B, as well as the overall CFM MRO business. We are competing in three to five campaigns a month with the rest of the MRO providers. We are very busy, especially at our engine centre in Norway, and expect to be as busy at our two engine centres in Shanghai and Turkey.”

PWES has seen an increase in -7B work over the past three years. “About 60% of our work is now on the -7B, up from 30%, and we expect it to reach

70%. Today most of the new business in Norway relates to -7Bs.

“The -7Bs first went into service 10 years ago, so the early engines will be due for LLP replacement, especially the lower-thrust models rated at 22,000lbs and 24,000lbs thrust. We expect a large uptake in shop visits for the -7B in the next three to four years,” continues Monasterio.

Shop visits will most likely be due to a combination of LLP expiry and EGT margin loss for engines rated at 26,000lbs or 27,000lbs, according to Monasterio. “A lot of the operators re-rate EGT-margin-limited engines, which extends their on-wing life until LLPs expire.” 

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CFM56-7B ENGINE COMPONENTS

	QEC repair	QEC build-up & engine dressing	LRU repair	LRU pooling & logistics
Aeroturbine/AerCap	Yes	Yes	Yes	Yes
AirLiance Materials	-	-	-	Yes
Delta TechOps	Yes	Yes	Yes	Yes
GEES	Yes	Yes	Yes	Yes
KLM Maintenance & Engineering	Yes	Yes	Yes	Yes
Lufthansa Technik	Yes	Yes	Yes	Yes
MTU Maintenance	Yes	Yes	Yes	Yes
Pratt & Whitney Engine Services	Yes	Yes	Yes	Yes
Snecma Services	Yes	Yes	Yes	Yes
Turkish Technic	Yes	Yes	Yes	-
Tradewinds	-	-	-	Yes
Unical	-	-	-	Yes

CFM56-7B SHOP VISIT MAINTENANCE

	Hot-section inspection	Module change	Module overhaul	Full overhaul	Disassembly/build-up
Aerothrust	Yes	Yes	Yes	Yes	Yes
American Airlines Maintenance	Yes	Yes	Yes	Yes	Yes
Bedek Aviation (IAI)	Yes	Yes	Yes	Yes	Yes
China Airlines	Yes	Yes	Yes	Yes	Yes
Delta TechOps	Yes	Yes	Yes	Yes	Yes
GEES Dallas	Yes	Yes	Yes	Yes	Yes
GEES Strother	Yes	Yes	Yes	Yes	Yes
GEES Wales	Yes	Yes	Yes	Yes	Yes
GEES Malaysia	Yes	Yes	Yes	Yes	Yes
Iberia	Yes	Yes	Yes	Yes	Yes
Jet Turbine Services	Yes	Yes	Yes	Yes	Yes
KLM Engineering & Maintenance	Yes	Yes	Yes	Yes	Yes
Lufthansa Technik	Yes	Yes	Yes	Yes	Yes
Lufthansa Technik - Airmotive Ireland	Yes	Yes	Yes	Yes	Yes
MTU Maintenance Hannover	Yes	Yes	Yes	Yes	Yes
MTU Zuhai	Yes	Yes	Yes	Yes	Yes
Pratt & Whitney Norway	Yes	Yes	Yes	Yes	Yes
Pratt & Whitney Shanghai	Yes	Yes	Yes	Yes	Yes
Snecma Morocco Engine Services	Yes	Yes	Yes	Yes	Yes
Snecma Services Villaroche	Yes	Yes	Yes	Yes	Yes
SR Technics	Yes	Yes	Yes	Yes	Yes
SSAMC (Sichuan Snecma Aero Engine Maintenance Company)	Yes	Yes	Yes	Yes	Yes
ST Aerospace Engines	Yes	Yes	Yes	Yes	Yes
ST Aerospace Engines (STATCO, Xiamen)	Yes	Yes	Yes	Yes	Yes
TAP Maintenance & Engineering	Yes	Yes	Yes	Yes	Yes
Turkish Technic	Yes	Yes	Yes	Yes	Yes
United Services	Yes	Yes	Yes	Yes	Yes

CFM56-7B SPECIALIST REPAIRS

	Fan blade repair	Vanes & stator repair	Compressor blade repair	Turbine blade repair	Combustor repair	Casing repair	Seals repair	On-site DER authority	PMA parts approved
Airfoil Technologies	Yes	Yes	Yes	-	-	Yes	-	Yes	-
Airfoil Services Malaysia	-	-	Yes	Yes	-	-	-	Yes	-
Chromalloy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
GEES	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
GKN-Chemtronics	Yes	-	Yes	-	-	Yes	-	Yes	-
MTU Maintenance	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
Lufthansa Technik	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pratt & Whitney Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Snecma Services	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-
ST Aerospace Engines	-	Yes	Yes	Yes	-	-	-	Yes	-