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777 Comes of age

Company Profile
Pentagon 2000 Software, Inc.

MRO News
from around the world

People on the Move
latest appointments



777 reaches maturity

The oldest Boeing 777s are now over 20 years old and the twin-engine widebody continues to be a marvel of aero engineering. The 777 first entered commercial service with United Airlines in June 1995 and the programme has gone on to sell more than 1,360 aircraft across the different versions. The 777X series is planned to enter service by 2020.

Clearly, the 777 has been a top seller for Boeing and in this edition we are looking closer at 777 maintenance programmes and trends from MRO providers AF KLM E&M, AAR Corp and HAECO.

The large numbers of 777s in service mean that these aircraft are set to dominate wide body MRO spending. We ask the experts what the cost implications are, particularly for the early -200 models. The oldest 777-200ER at Air France for instance are not showing any major recurrent defect that would cause unscheduled extra time to visit or extra cost. There are obviously some occurrences, but they are limited and not systematic. However, these factors vary according to the airline, specifics of the aircraft and the operational environment.

Airworthiness directives are commonplace. In

most cases, airlines are told to look for and correct any faults during maintenance. Looking at past incidents involving 777s we also find out if MROs have made any changes or modifications to 777 inspections over the years.

The 777-300ER will also receive further improvements in 2016 designed to reduce fuel use by another two percent.

Happy Reading!

Keith Mwanalushi
Editor



The Boeing 777-8 and 9 will be less of a drastic departure.

Photo: Boeing

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Messier-Bugatti-Dowty's new Malaysian plant delivers first brake heat sink to AirAsia

Photo: Safran

Messier-Bugatti-Dowty's new Malaysian plant delivers first brake heat sink to AirAsia

A year after its official inauguration, Messier-Bugatti-Dowty's new plant in Sendayan, Malaysia delivered its first heat sink to AirAsia, for use on the Airbus A320. The heat sink is a stack of carbon disks comprising the airplane's brake. Messier-Bugatti-Dowty chose Malaysia to set up its new carbon disk production and refurbishment plant in this region, which has a fast-growing fleet of commercial airplanes. The plant is specialized in the supply of carbon disks for commercial airplane brakes. It spans some 10,000 m² (108,000 ft²) and has 80 employees, with plans to expand to 150 by 2018. Sendayan is an ideal complement to Messier-Bugatti-Dowty's existing carbon disk facilities, both in France (Villeurbanne and Molsheim) and in the United States (Walton, Kentucky). Messier-Bugatti-Dowty now supplies 18 operators in Malaysia, with a total of 200 aircraft already in service and another 400 on order. More than 2,000 airplanes in Asia already use Messier-Bugatti-Dowty carbon brakes.

Aircelle leads Europe's NIPSE research project on next-generation powerplant systems

The challenges of equipment integration on future aircraft powerplants – particularly next-

generation Ultra-High Bypass Ratio (UHBR) powerplants – is the focus of a three-year European Union-funded technology project now underway with 10 companies and organisations, and led by Aircelle (Safran) as industrial coordinator. The NIPSE project seeks to find better placement options for equipment, using locations in the engine, the nacelle and the aircraft itself. NIPSE also addresses the need to improve thermal management of integrated powerplant systems (IPPS). Called NIPSE (Novel Integration of powerplant System Equipment), this programme addresses installation limitations expected in such future powerplant systems, including the thinner nacelles and larger fan modules; along with architectures that require more functionality and provide extra thermal constraints through lower ventilation capability and reduced volume availability. NIPSE is targeting a 15% reduction of equipment volume for the UHBR powerplant, along with weight savings and improved thermal management on the more integrated powerplant systems, enabling UHBR solutions to achieve their potential powerplant fuel savings of up to 2-3%. Additionally, a reduction of development time for the installation of powerplant systems is anticipated. Established within the European Commission's Horizon 2020 research and innovation framework programme, NIPSE is funded at €6.2m and has a three-year duration. NIPSE is managed by INEA (Innovation and Networks Executive Agency).

Rolls-Royce launches new SelectCare Service

Rolls-Royce has launched a new engine service, SelectCare, continuing its reputation for service innovation and expanding the customers' choice of competitive, capable and flexible services across the engine lifecycle. SelectCare fits between Rolls-Royce's fully comprehensive TotalCare service, which maximises engine time on wing in addition to giving long-term cost certainty on a dollar-per-flying-hour basis, and MRO Services, where customers contract for shop visit support on an individual time and materials basis. SelectCare allows customers to tailor the services they require across an agreed number of engine shop visits to match their service needs and budget. The new service launches with American Airlines as its first customer. American chose SelectCare for all RB211-535 engines that power its Boeing 757 fleet. These aircraft were previously supported by separate TotalCare and MRO Services agreements.

Singapore Airlines extends TotalCare with Rolls-Royce

Singapore Airlines has extended its TotalCare service agreement with Rolls-Royce for Trent 800 engines that power its Boeing 777 aircraft. TotalCare enables the business models of the aircraft owner and Rolls-Royce to be fully aligned to improve engine reliability, increase time on wing, and maximise the engine services contribution to customer business performance.

Alcoa signs long-term contract with GE Aviation

Alcoa, a global leader in lightweight metals technology, engineering and manufacturing, has signed a long-term contract with GE Aviation for jet engine components in an agreement valued at more than US\$1.5bn over the contract life. Under the deal, Alcoa will supply advanced nickel-based superalloy, titanium and aluminum components for a broad range of GE Aviation engine programs. Alcoa will employ advanced manufacturing capabilities to produce the parts across several facilities including LaPorte, Indiana; Whitehall, Michigan; Hampton, Virginia; Dover, New Jersey; Wichita Falls, Texas; Winsted, Connecticut; Dives, France; and Laval, Canada. A global leader in lightweight metals technology, engineering and manufacturing.

Liebherr-Aerospace signs letter of intent with Hafei-Harbin

Liebherr-Aerospace has recently signed a letter of intent with the Chinese manufacturer Hafei-Harbin (AVIC Group) in Harbin to equip the helicopters AC312C and AC312E with air management systems. Liebherr-Aerospace will supply the air management systems for the versions C and E of the modernized helicopter AC312 program. The systems will be designed, manufactured and serviced by Liebherr-Aerospace Toulouse SAS, Toulouse (France), Liebherr's center of excellence for air management systems. They will feature highly-reliable, light-weight components based on technologies that build upon Liebherr's unmatched experience in air management systems for helicopter cabins and cockpit. Hafei-Harbin, located in the North of China, has manufactured helicopters since 1952, partly in partnership with Airbus and Airbus Helicopters since the mid-1980s. Hafei-Harbin expects a good market prospect for the AC312C and AC312E in China and to consolidate its position on the growing Chinese helicopter market.

Flying Colours achieves STC for ADS-B OUT on Bombardier Challenger 300

Flying Colours Corp., the North American MRO, completions and refurbishment company, has successfully secured a Supplemental Type Certificate for ADS-B OUT for Bombardier Challenger 300 airframes, from the US-based FAA. The first Bombardier Challenger 300 was out-fitted with the soon-to-be mandatory tracking system in November 2015, at its St. Louis facility. The STC will be submitted for validation by both Transport Canada and Europe's EASA this year. The STC follows on from Flying Colours Corp. achieving an

STC for Bombardier Challenger 604/605 aircraft types in October 2015, and expands the range of services it can offer to aircraft owners and operators. The awarding of the STC follows significant training and technology investment from Flying Colours Corp. over the last twelve months.

Primera Air signs multi-year power-by-the-hour contract with AJW Aviation

Primera Air, the Danish leisure airline, has chosen AJW Aviation to provide full power-by-the-hour (PBH) services for eight Boeing 737NG aircraft. AJW will also place exclusive and non-exclusive spares stock at Primera's operational headquarters in Copenhagen. The exclusive stock is being provided by AJW Leasing. A key factor in this new PBH support agreement is that Primera will have access to AJW's extensive stock of Boeing 737NG spares already conveniently sited across their hub network and this benefits Primera's numerous bases across Scandinavia, the Canary Islands and throughout the Mediterranean. It is AJW's policy to ring the globe with strategic hubs of commercial Airbus and Boeing spares in support of specific PBH contracts, and to sustain the Company's award-winning 24/7/365 AOG service.

PART completes EMB-145 tail section replacement

Pacific Aerospace Resources & Technologies (PART) has completed its first Embraer 145 Aft Fuselage and Tail Section replacement at John F. Kennedy Airport, New York. The Chautauqua Airlines Aircraft N572RP was involved in a ground incursion when it was struck by another aircraft.

The aircraft test flew with zero defects on the test flight. PART's team members gained valuable experience in 2013 when they participated in the first tail section replacement outside the factory at Newark Liberty Airport. In addition, PART's team members have extensive experience with the Embraer platform as they have performed 4 Embraer 145 Nose Section Replacements, 3 Embraer 145 Series Wing Changes, a dual fuselage change on an ERJ-170, and an aircraft recovery of a Legacy 600 that was involved in a midair collision.

Aircraft Propeller Service demonstrates ingenuity and commitment to lengthening component lifespans

Aircraft Propeller Service have recently developed an innovative brush-plating repair solution for a damaged, Cad-plated steel torque plate on propeller hubs. The repair not only saves the part from being scrapped, but it also represents a viable solution for damaged Cad-plated steel plates that can now be repaired at one-third the previous costs. According to APS Vice President of Sales and Marketing, Dennis Santare, "I have to hand it to our technical team for their commitment to our customers. They developed a process that not only increases the lifespan of a critical component, but also delivers significant savings directly to our customers' maintenance budgets. These efforts make APS and our customers more competitive." Unlike new torque plates, which are un-plated, the older plates are Cad-plated. Once the Cad plating is damaged, there is no other approved way to re-use the part. In presenting its solution to this costly problem, APS was able to secure OEM approval through a supplemental engineering action which will save customers' money for every future hub repaired at an APS facility.



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Magnetic MRO will launch its second painting hangar at Tallinn Airport in 2017

Photo: Magnetic MRO

Magnetic MRO to launch new dedicated painting hangar at Tallinn Airport

Magnetic MRO, a total technical care provider headquartered in Tallinn, Estonia is to launch its second painting hangar in 2017. The new dedicated painting hangar will be built in co-operation with Tallinn Airport, in response to growing demand for painting services from Magnetic MRO customers. A Letter of Intent has been signed and preparations have started to build the 2000 m² hangar with further expansion possibilities. The new hangar will be capable of housing aircraft in size up to Boeing 737MAX9 and Airbus 321neo, as well as regional aircraft. Equipped with an overhead crane for lifting aircraft engines, the hangar will be suitable for both painting and ad-hoc maintenance activities. Much like the existing painting facility, the new hangar will have a Spraybooth Technology Limited (STL) system. To ensure the highest level of service quality, painting equipment will include Sherwin-Williams, AkzoNobel, PPG and Mankiewicz systems. Scaffolding solutions are designed by Lahyer and are equipped with lighting to enable the best painting conditions possible. According to the agreement, the hangar is planned to be finalized and ready for use by June 1st, 2017.

Delta TechOps and Rolls-Royce deepen relationship with BR715 MRO agreement

Delta TechOps, Delta Air Lines' maintenance division, has signed an agreement on December 21st with Rolls-Royce for the establishment of BR715

overhaul capability in Delta TechOps, during 2016. Delta Air Lines began operating BR715-powered Boeing 717s in 2013 and is the largest operator of this aircraft type with 91 entering into service. This agreement is part of the ongoing strategic plan for Rolls-Royce to develop a competitive and capable network to meet customers' needs. Earlier this year Delta TechOps joined the Rolls-Royce Trent Service Network as an Approved Maintenance Centre and will provide engine overhaul services for the Trent XWB and Trent 7000 engines for Delta Air Lines and other customers.

SWISS contracts Lufthansa Technik to provide component support for future Boeing 777 long-haul fleet

Swiss International Air Lines (SWISS) has contracted Lufthansa Technik to provide component support for its future Boeing 777 long-haul fleet. The corresponding Total Component Support (TCS) contract will run for a period of ten years and includes nine aircraft. Lufthansa Technik is working intensively on preparations for supplying components for SWISS. This includes the basic stocking with spare parts at the airline's base airport in Zurich. The start date for supply is 1st January 2016. Lufthansa Technik has wide-ranging expertise in the area of technical support for the Boeing 777. Apart from comprehensive material supply, the support also covers maintenance and overhaul of the different 777 versions, for example by Lufthansa Technik Maintenance International (LTMI) in Frankfurt. The maintenance specialists at Lufthansa Technik have also contribut-

ed in no small way to the smooth entry into service of the 777 freighter for Lufthansa Cargo.

AFI KLM E&M and Boeing renew and extend Component Services Program 737 partnership

AFI KLM E&M and Boeing have inked the long-term renewal of their joint efforts to implement their 737 Component Services Program (CSP) program. At the same time, the two parties agreed to extend the program to the future Boeing 737 MAX, first deliveries of which are scheduled for 2017. Stanley A. Deal, Senior Vice President Commercial Aviation Services, Boeing Commercial Airplanes said: "We are delighted to continue to grow this successful 737 program and expand our partnership through the addition of the 737 MAX. This proven program has demonstrated its reliability and excellent technical quality, providing a significant competitive advantage for 737 customers."

Lufthansa Technik delivers second VVIP Boeing 747-8

Lufthansa Technik's Completion Center has finished the VVIP cabin conversion of the second Boeing 747-8 in Hamburg. The aircraft has now been delivered to an undisclosed customer. Another aircraft of this type is currently undergoing completion. Lufthansa Technik AG has, at times, equipped three 747-8s in parallel.

Sabena technics wins its first B777 cabin modification

French MRO provider, Sabena technics, has welcomed its first Boeing 777 for airframe modifications since obtaining its rating approval. According to the agreement, Sabena technics will perform cabin & systems modifications on two Boeing 777 aircraft from Air France in their dedicated maintenance facilities in Bordeaux (France). Modifications will include the integration of the latest Air France "BEST" cabin as well as the installation of a brand new In-Flight Entertainment system.



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MTU Maintenance Canada looks back at successful accessory repair ramp-up
Photo: MTU Maintenance

MTU Maintenance Canada looks back at successful accessory repair ramp-up

Three years after the opening of the Accessory Repair Center (A.R.C.), MTU Maintenance Canada is satisfied with the development of its business for accessory repair and Line Replaceable Unit (LRU) management. The company, an affiliate of one of the leading engine maintenance providers, has managed to increase revenues by 48% to US\$40m since 2012 and has won a number of new customers. In 2015 alone, MTU Maintenance Canada signed several long-term contracts at a total value of US\$26m. Accessories and LRUs include parts that do not directly form part of the core engine, but are necessary to sustain its operation. As a one-stop shop provider, they are becoming increasingly important in MTU Maintenance Canada's services portfolio. The A.R.C. was founded in a move to offer customers a broader range of MRO services under MTU's Total Engine Care (TEC) concept. With the aim of lowering the operating costs of its customers, the facility, co-located with MTU Maintenance's engine MRO location at the Vancouver International Airport, offers a wide range of internal accessory repair capabilities that can be accessed directly.

Floreat Group enters aviation finance and leasing sector

Global Fixed Income Fund I has financed the US\$26m junior tranche of a 12-year finance lease for two Boeing Aircraft operated by Norwegian Air Shuttle. The senior lender is Norddeutsche Landesbank Girozentrale (Nord/LB) with a loan volume of US\$68m. Doric GmbH is responsible for the asset management of the aircraft. Floreat Group is a privately-held, London-based independent financial group, with investments in debt, real estate and public and private equities.

IAI and Formula Systems agree to acquire TSG for US\$50m

Israel Aerospace Industries (IAI) and Formula Systems have entered into a definitive agreement for the purchase of TSG – a subsidiary and the military arm of Ness Technologies, engaged in the fields of command and control systems, intelligence, homeland security and Cyber security. The total purchase price in the transaction will be US\$50m in cash (subject to cer-

tain adjustments), with each of IAI and Formula acquiring 50% of TSG for US\$25m. The consummation of the transaction is subject to, among other things, obtaining certain regulatory approvals. TSG is a leading provider of core command and control systems to Israel's defense organization, including the Israeli Defense Forces and the Israeli Police, and its activity is well suited for both parties. The acquisition represents the parties' strategic decisions to expand their scope of activities, and to preserve leading positions in the markets where they operate, through M&A activity. The parties will focus on turning TSG into a leader in its field in Israel, by maximizing the synergies between TSG, IAI and Formula and pursuing its expansion, among other ways, through mergers and acquisitions of companies that operate in complementary areas.

Bohai Leasing completes acquisition of Avolon

Bohai Leasing has completed the acquisition of 100% of Avolon. Bravia Capital Partners originated and structured the transaction with a total enterprise value of approximately US\$7bn, bringing Bohai's investment in commercial aircraft and new orders to over 500 which, based on this fleet, makes Bohai the fourth largest aircraft leasing company in the world. Bravia's initial step was to be the lead equity participant with HNA Group, Bohai's parent, in 2010 in acquiring the Allco Aviation fleet of 68 widely-leased aircraft in an acquisition with a total enterprise value of approximately US\$3 billion. The acquired portfolio was subsequently re-branded Hong Kong Aviation Capital ("HKAC"). HKAC was then acquired by Bohai in 2012. Since then Bohai has worked with Bravia, eventually acquiring Avolon, further enhancing its strategic position. Bohai has been building presence and scale across transportation finance sectors and Bravia has been at the center of its acquisition activity having both originated and co-invested in aircraft leasing and marine container leasing, representing US\$15bn total enterprise value of acquisitions over the last 6 years.

HEICO Corporation completes Robertson acquisition

HEICO Corporation's Electronic Technologies Group has completed the acquisition of Robertson Fuel Systems. On December 21st, 2015, HEICO announced it had entered into an agreement, subject to regulatory approval which was subsequently received, to acquire Robertson from affiliates of American Securities for US\$255m in cash to be paid at closing, to be adjusted for typical post-closing adjustments. Tempe, AZ-based Robertson is a leader in the design and production of mission-extending, crashworthy and ballistically self-sealing auxiliary fuel systems for military rotorcraft.

Woodward and GE Aviation initiate large engine fuel systems joint venture

Woodward and GE Aviation have announced the formal creation of the large engine fuel systems joint venture announced on May 20th, 2015. Under terms of the agreements related to the joint venture, Woodward received US\$250m from GE Aviation on January 5th, in exchange for GE Aviation's acquisition of its equity interest in the joint venture. GE Aviation and Woodward will participate equally in the operating results of the joint venture programs and the future cash flows from the joint venture. The joint venture will design, develop, source, supply and service fuel sys-

tem components from the inlet up to the fuel nozzle for the GE90, GENx, GE9X and all future large commercial engines developed by GE Aviation. Woodward will be the preferred supplier to the joint venture. As a result, Woodward content on the GE9X engine will increase significantly when compared to the GE90 engine. As previously announced, Woodward has completed US\$125m in share repurchases through an accelerated stock repurchase program in the second half of fiscal year 2015. This was part of a previously announced US\$25m share repurchase initiative, and Woodward intends to complete the remaining US\$125m in share repurchases during the first half of fiscal year 2016.

Constant Aviation and Lone Star AOG announce merger

Constant Aviation, a Directional Aviation Capital Company offering full-service maintenance, repair, and overhaul with a nationwide network, announced the merger with Lone Star AOG. The combined companies will operate under Constant Aviation and the full transition will take 30 days. "The AOG business at Constant Aviation has been growing consistently the last year. Our 2016 goal will continue to focus on providing our customers AOG support anytime, anywhere. The merger between Constant and Lone Star AOG creates a nationwide AOG support system. Our technicians will now dispatch out of eight cities - Cleveland, Birmingham, Orlando, Las Vegas, San Francisco, Los Angeles, Dallas and Pittsburgh. We will continue to grow our AOG business, adding teams to cities where a need exists. We understand the importance of immediate response when it comes to any AOG situation, and our Support Center is available 24/7/365 at 844.261.7119," said Stephen Maiden, President/CEO Constant Aviation.

Gemcor joins Ascent Aerospace's assembly line integration portfolio

Ascent Aerospace, a leading integrator of aircraft assembly line solutions, has bolstered its automated assembly capabilities with the addition of Gemcor. Gemcor is a global leader in developing and manufacturing automated fastening systems that are used by virtually every airframe manufacturer throughout the world. Gemcor systems are used in the

sub-assembly of aircraft wings, fuselages and nacelles, with the company having produced more than 2,200 automated fastening systems throughout its 78-year history. The joining together of Ascent and Gemcor further strengthens Ascent's ability to provide a total turn-key factory solution for almost any aircraft assembly, anywhere in the world. The transaction is expected to close during the first quarter of 2016.

HEICO signs agreement to buy Robertson Fuel Systems

HEICO Corporation has announced that its Electronic Technologies Group has entered into an agreement to acquire Robertson Fuel Systems from affiliates of American Securities for US\$255m in cash, to be paid at closing, subject to typical post-closing adjustments. The transaction is subject to clearance under the Hart-Scott-Rodino Antitrust Improvements Act and other customary closing conditions. The parties anticipate the acquisition will be completed within 60 days. Tempe, AZ-based Robertson is the world leader in the design and production of mission-extending, crashworthy and ballistically self-sealing auxiliary fuel systems for military rotorcraft. Robertson's products include approximately 65 different fuel systems serving over 50 different platforms across military and civil aircraft and ground vehicles.

Minsheng Financial Leasing closes seven-aircraft portfolio financing aircraft with DVB as arranger

Minsheng Financial Leasing has announced the closing of a seven-aircraft financing facility led by DVB. The aircraft portfolio consists of three A320-200s and four 737-800s on long-term operating leases to airlines from Turkey, Spain, China and Indonesia. DVB is the Arranger, Security Trustee and Facility Agent and also the Original Lender alongside Helaba (Landesbank Hessen-Thüringen Girozentrale), ICBC (Asia) and Korea Development Bank. Berwin Leighton Paisner was the Borrower's counsel for this transaction while Norton Rose Fulbright acted for the Lenders. This deal refinanced five aircraft solely underwritten by DVB on a bridging loan and also marks Minsheng Financial Leasing's largest offshore portfolio financing across various lessees and jurisdictions.

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The triple threat

The popular 777 twin-jet made its first commercial flight 21 years ago. **Keith Mwanalushi** looks at how 777 maintenance procedures are shaping as the jet reaches maturity and finds that even the oldest 777s are still going strong.

According to Boeing, in the early days of aviation, maintenance programmes were developed by mechanics. The programmes were simple and without analytical basis. The formation of airlines created the need for new regulations and broader regulatory involvement in maintenance requirements.

With the entry of large jet airplanes into the commercial market in the 1950s, the airplane manufacturer became the source of maintenance programme development. The underlying concept was to overhaul every component at a given time.

Over the decades, Boeing has worked closely with the aviation industry to develop robust processes that ensure scheduled maintenance programmes adhere to the highest safety and operational reliability levels.

HAECO Group as a whole supports some of the largest Boeing 777 fleets in the world, they include Cathay Pacific which has a 60-strong 777 fleet with more on order, as well as several other major 777 operators in North America.

Heavy maintenance (C check or above) and other modifications and airframe work including cabin retrofit, installation of GCS and NGS systems, as well as crew rest area modification, are offered at the Group's Hong Kong and Xiamen facilities. HAECO Americas, on the other hand, focuses on cabin solutions and it has recently completed an extensive cabin project for a major North American operator.

The HAECO Group also offers various component services for the Boeing 777 in China including thrust reversers, cowlings, nacelles and control surfaces through HAECO Spirit Aero-Systems; in-house overhaul for body and nose gears through HAECO Landing Gear Services; TEXL, a joint venture with GE Aviation, specialises in the repair, overhaul and testing of GE90-110/115B engines; and HAESL, a joint venture with Rolls-Royce, offers full MRO service for the Trent 800 engines found on legacy 777s. HAECO inventory technical management manages a component pool that is currently supporting some 70 Boeing 777 aircraft.

"The HAECO Group has introduced various improvement programmes for different aircraft



777s are dominating widebody MRO spending.

Photo: BA Engineering

types over the years to enhance productivity, which turned into savings for airline customers in terms of ground time and maintenance costs," declares James Barrington, Group Director Airframe Services, HAECO Group.

These programmes according to Barrington include the introduction of electronic and wireless AMM by maintenance staff, "as well as remote maintenance tasks sign-off for engineers, lean processes for a streamlined production flow from procurement to redelivery, dedicated air-bridge to enhance productivity of cabin projects, and much more."

AFI KLM E&M is another long standing player on 777 capability. The first aircraft of that type entered the Group fleet back in 1997. And to date, Air France KLM operates a fleet of 91 Boeing 777s. "These two aspects explain why AFI KLM E&M offers a very complete range of products for the Boeing 777, which have been optimised over the 18 years since the first EIS," comments Jacques-Olivier Guichard, AFI KLM E&M Marketing Director.

AFI KLM E&M work on the full scope of 777 MRO from engines, components, airframe, modifications and aerostructures. The 777 is a commercial success at AFI KLM E&M, with 200+ contract-

ed, largely due to the partnership with Boeing. One area of cooperation is the Component Support Programme (CSP). "CSP has become the reference on the market for 777. It was created in 2003, and renewed in 2015 for a period of 10 years. It is to be noted that CSP is the leading support product on the market," Guichard states.

Air France-KLM just recently signed a several hundred million US dollar component maintenance agreement for Etihad Airways Boeing 777 fleet. The 10-year deal, effective February 2016, provides Etihad and its equity partners with access to an extensive global pool of components offered by AFI KLM E&M for the wide-body aircraft, through the 777 CSP jointly operated with Boeing. Etihad Airways currently operates a fleet of 33 long-range and extended-range passenger and cargo Boeing 777 variants.

The maintenance agreement is the latest phase of a partnership struck between the two airlines in October 2012. Both carriers have a commercial alliance involving code sharing on flights across their networks over hubs in Abu Dhabi, Paris and Amsterdam.

AFI KLM E&M has reviewed its 777 maintenance programme some 30 times since 1997 which has led to a number of improvements to the



Air France KLM operates a fleet of 91 Boeing 777s.

Photo: Boeing

programme. “New intervals have been granted, based on approval received for items escalations, allowing us to reduce the HMO by over 35% since EIS, and as a consequence to improve aircraft availability.”

Guichard reports that feedback from the company’s own operational experience also allows the possibility to change some perimeters of the checks, for even more aircraft availability.

AAR Corp only recently started supporting the 777. AAR supports the 777 at its Lake Charles, Louisiana, and Indianapolis, Indiana, MRO facilities, and soon at the Rockford, Illinois, facility opening later this year. “We support both heavy maintenance and modifications, and engineering services including engineering integration and programme management,” says Troy Jonas, VP – Repair and Engineering for AAR’s 1MRO Network.

The large numbers of 777s mean that these aircraft are set to dominate wide body MRO spending. “Like any airplane, the 777s require more maintenance as they get older. And these airplanes have been in service now for over 20 years,” Jonas points out.

Clearly, older aircraft require more maintenance. However, these factors vary according to the airline, specifics of the aircraft and the operational environment. “But being that it is 20 years old,

we do see some steady retirements of the airplane as time goes on. For instance, we see significant requirements for interior modifications and IFE upgrades for the B777,” Jonas continues.

With the Boeing 747 and 767, as well as the Airbus A340 getting closer to the end of their lifecycles for commercial use, the 777 and the Airbus A330 are both dominating wide body aircraft types that HAECO services most.

“New intervals have been granted, based on approval received for items escalations, allowing us to reduce the HMO by over 35% since EIS, and as a consequence to improve aircraft availability.”

Jacques-Olivier Guichard, AFI KLM E&M Marketing Director

“The 777 definitely offers some savings in cost to our airline customers compared to the older wide body models, including the A340 and the 747,” says Barrington. He attributes those savings to both a better designed aircraft by the manufacturer, wider use of titanium and composite materials for better corrosion resistance, as well as the extensive knowledge and experience gained throughout the 777’s 20 years production span.

“HAECO engineers have found the Boeing 777 to be a very well designed aircraft. There have been no major maintenance issues even on the earlier Boeing 777 models, other than some common

AD rectification works such as the (BS) 246 floor beam issue,” Barrington reveals.

Guichard feels costs will keep going down, but to a lesser extent as most of the intervals improvements have been done, and operational knowledge is already high. “There is little margin for improvements in that respect,” he says.

Guichard further reports that the oldest 777-200ER from Air France does not show any specific or major recurrent defects that would cause unscheduled extra time to visit or extra cost. “There are obviously some occurrences, but they are limited and not systematic.”

Next generation wide bodies will require less maintenance man hours and therefore fewer technicians. Seemingly, processes will change in preparation for the likes of the new 777X.

“There are several kinds of challenges around the new generation of aircraft, but the impact on activities is going to come slowly,” Guichard predicts. As an example, he says, in 2017 and for the first time, the deliveries of new generation aircraft will be higher than deliveries of the former generation aircraft. “The number of man hours will not be the unique driver to consider to assess the number of technicians that will be needed,” he stresses.

While newer airplanes or next-generation airplanes require less maintenance, Jonas from AAR sees the overall MRO market experiencing healthy growth worldwide, while the North American market will see modest growth over the next five years or so. “In fact, some of the 777 work we are doing in our U.S. network is from Latin America and South-east Asia,” he adds.

Two major trends observed by HAECO with new generation aircraft are longer maintenance intervals and more composite materials being used. “From a business perspective, longer maintenance intervals means less revenue, MROs would tackle this challenge by offering to airlines more value-added services that improves passenger experience, such as the connectivity (e.g. installation of GCS systems) offerings, more space-saving new seats, galleys, crew rest and lavatory relocation, etc.

“The latter trend can be seen as both a challenge and an opportunity, HAECO Group companies such as HAECO Component Services and HAECO Spirit AeroSystems have started to develop capabilities and services to leverage on the growing

demand for composite components, repair and overhaul,” Barrington explains.

In comparison to other all new aircraft types, Barrington feels the Boeing 777X is less of a drastic departure from the legacy Boeing 777, in terms of the design and structure of the airframe and engine. “Thanks to the large number of 777 aircraft we have handled, the Group has over the years evolved into a renowned 777 one-stop shop, gaining the confidence of operators worldwide. Therefore, we are confident when entering into the 777X era, while we continue to acquire new capabilities to satisfy the emerging needs.”

The 777 has an impeccable safety record but airworthiness directives are commonplace. In most cases, airlines are told to look for and correct any faults during maintenance. Looking at the few incidents involving 777s, assumingly there are changes or modifications to 777 inspections.

Barrington says that depends on the operating environment and frequency of the aircraft, as well as work package specified by individual operators. “In general, most of the aircraft types we worked on aged quite well, corrosion and major structural issues were minimal. Nevertheless, we tend to pay special attention to freighters and aircraft that were operated in humid climates to ensure the airframes are in good shape; our extensive experiences servicing aircraft from Asia Pacific and those from North America have



Demand for cabin modifications on older 777s is increasing.

Photo: American

shown us that humidity and proximity to the oceans in the Pacific region take their tolls on some Boeing 777 airframes in the form of corrosion on wings. For example, while corrosion was not found on aircraft of the same type operated in less humid regions such as North America. We have been in regular communication with Boeing on identifying recurrent minor issues on the Boeing 777, such as chafmarks found on different parts of the fuselage,” Barrington explains.

Guichard reckons the amount of airworthiness directives on the 777 programme is within regular activity for aging aircraft type. “No airworthiness directive has created major down time or fleet immobilisation so far.”

So it seems, the 777 meets expectations on many fronts.



North America provides a huge market for 777 MRO customers.

Photo: Fraport

Pentagon 2000 Software, Inc.

PENTAGON 2000 Software, Inc. is a vendor of enterprise software systems used in the aerospace, electronics, defence, power systems, metals trading and related high technology industries.

The company's software provides fully integrated control and visibility within and across an enterprise, enabling significant improvements in efficiency, productivity and financial performance. Since 1986 Pentagon 2000 Software, Inc. has focused on creating software that fully supports the day-to-day operational requirements and strategic vision of hundreds of companies worldwide.

Pentagon 2000 Software, Inc. introduced its flagship software system in 1986. For 30 years, customer requirements and market-leading technologies have provided key inputs for ongoing development and enhancements to the platform. The system is licensed globally to customers on every continent. Industry-specific functionality is available for operators, MRO's, FBO's, manufacturers, distributors and parts traders. The software is fully-integrated to enable rapid deployment and provide a low cost of ownership. Customers utilise the system to improve efficiency, control quality, ensure regulatory compliance, increase service and satisfaction, and manage their overall financial performance.

From a functional perspective, the system has capabilities to support fleet management, flight operations, aircraft recordkeeping, maintenance, manufacturing, component repairs, materials management, sourcing, and accounting/financials. Support for quality system management, regulatory compliance, tooling/calibration, technical publications management, employee training, skills management and other functions round out the offering. Built-in support for web based e-commerce and EDI are provided. Industry-specific partner interfaces are available for interoperability with commercial networks and sourcing services such as ILS, Aviall, SPEC2000, Aeroxchange, IHS Haystack, Fipart, Locatory and others.

From a technology perspective, Pentagon 2000SQL™ is implemented using the latest enterprise technologies from Microsoft, Apple and others. The system can be deployed on a customer premise or through the many cloud-based offerings that are growing in acceptance.



Pentagon 2000 software is used over a wide spectrum of sectors.

Photo: Pentagon 2000

User access is supported on mobile devices, web browsers and by a rich-client personal computer interface. The system architecture allows scalability from small work groups to enterprise class data centre operations.

Customers have always provided the key requirements for system development and enhancements, and there are many ways for customers to participate in this ongoing process. Pentagon 2000 maintains an open dialogue with customers in each region and market sector, and feedback is consolidated as requirements and input for use on an aggregate basis to steer the direction of product development. Pentagon 2000 is a member of a many trade associations and the team exhibits at a wide range of industry conferences each year. New system enhancements are continuously added based on customer requirements, and customer advisory council user groups are in place to ensure a direct and continuous closed-loop process to guide product development investments.

Setting up the software, converting data from legacy systems and training customers takes a specialised set of skills. A team of training consultants and implementation specialists work

on-site and on-line with new customers to help ensure a smooth transition onto the platform.

The company offers a full in-house customer support capability to provide software installation, defect support, online help, and telephone help-desk assistance. The company support staff has a strong technical background and deep knowledge of the system and related technologies. Standard support hours and extended all year round coverage is available to suit each customer's needs.

Pentagon 2000 Software maintains a long history of delivering market-leading solutions for its customers. The system enjoys wide acceptance in the market, and customers will continue to drive development requirements for the system far into the future. While the current platform employs leading technologies from Microsoft and Apple, new developments are continuously underway to allow customers to take advantage of new devices and increasing system functionality. Recent expanded company investments in the Pentagon 2000SQL system will result in improved capabilities for clients to manage their operations, service their customers, and deliver value to their shareholders.

In the hot seat.....

Keith Mwanalushi speaks to Mr Franck Turner, EVP Air France KLM Engineering & Maintenance.

AviTrader MRO: What attracted you to this business?

Turner: I've always been passionate for aircraft and technology. I must say that my expectations were more than fulfilled until now. When you are lucky enough to work on amazing machines such as Concorde, it is more than an honour, and it is a privilege! Aviation is a very exciting business with a world-wide perspective.

AviTrader MRO: What does a typical day's work entail in your job?

Turner: There is no typical day, every day is different being in contact with business partners, clients, providers, employees etc. Technology and business are always changing, but to work with high skilled people who are passionate about their work is something that lasts. And since we are a global company, I travel a lot and I meet many different people from all over the world.

AviTrader MRO: What is the most challenging part of your job?

Turner: I see it as a challenge but also as a privilege to lead the integration of so many elements and interests of all stakeholders, i.e. Our customers, our people, our company ambitions, the changing market demands, the Innovation and new technology we develop for our products and service, the implementation and execution, resulting in a healthy and profitable growth.

AviTrader MRO: In your opinion what has been the greatest benefit from the integration between Air France and KLM from a maintenance and engineering perspective?

Turner: We've developed lots of synergies and knowledge sharing, while respecting each other's culture. We used our strengths and skills in order to increase our market shares, product portfolios, and global customer base. This multi-cultural approach, which is part of what we call adaptiveness, helps us to adapt to our customer needs by carefully listening to them. As we are not only based in Europe but all over the world we have the advantage to be inside many different cultures and to learn from them.

AviTrader MRO: AF KLM E&M have placed a lot of emphasis on component support services. How do you plan to develop this sector further?

Turner: First, I would say that we are a global multiproduct MRO, with strong expertise in all maintenance segments: component, engines, airframe, and training. On the component business, we are well positioned on current generation component support and we have put a strong focus on new generation aircraft. We recently made a step with the extension of our Component Services Programme with Boeing to 737 MAX. We already signed A320NEO support contract and we are leading 787 component MRO. Being the only MRO part of an airline group having ordered A380, 787 and A350, we are well positioned on the latest technologies. A good example is the recent opening of Helios, our cutting edge aerostructures and composite shop which is designed to handle the new generation composite technologies. AF KLM E&M proposes a wide range of component support concepts, from T&M to pooling solutions and asset management. Furthermore, we are continuous-



Franck Turner, EVP Air France KLM Engineering & Maintenance

ly extending our MRO network to increase our global presence and proximity, and provide the necessary logistics support.

AviTrader MRO: AF KLM E&M enjoys a global customer base but there is growing interest in the emerging markets in general by the MRO industry. How are you responding to demand from these regions?

Turner: As part of our adaptive and our flexible approach, we are ready to fulfil the specific needs of rapidly growing markets and airlines. Our clients enjoy our expertise to help them locally and via our logistic network so that we are able to provide them with quick maintenance solutions. We rely on the global Air France KLM reach and we are building a worldwide MRO network, with shops, line maintenance teams and logistic centres.

AviTrader MRO: What can the industry expect to see from AF KLM E&M in 2016?

Turner: With our Perform 2020 programme, our goal is to improve our competitive position and to increase customer satisfaction. In 2016, we can expect that we will extend our client base, including with A350 and GENx customers. We will continue to develop our capabilities with new industrial facilities and new partnerships. And a major focus is innovation, research and development, through our MRO Lab programme. Our co-innovation centre in Singapore will open soon and, together with all our innovation initiatives, the MRO Lab will provide new tools and knowledge to make simpler, easier and faster maintenance solutions for our clients.



AF and KLM have developed several synergies.

Photo: Patrick Delapierre



Constanze Hufenbecher

Change in Executive Board of Lufthansa Technik AG in Hamburg: The company's Supervisory Board has appointed **Constanze Hufenbecher** to the Executive Board with responsibility for Finance for three years beginning February 1st, 2016. She succeeds **Dr. Peter Jansen**, who stepped down as a member of the Executive Board of Lufthansa Technik on December 31st, 2015.

GE Capital Aviation Services (GECAS), the commercial aircraft leasing and financing arm of GE, has appointed **Rich Greener** to Senior Vice President, Cargo Programs. In this role, Greener will have global responsibility for building and execut-

ing on GECAS' cargo aircraft strategy. Previously, he was Senior Vice President of Specialty Markets, which included regional aircraft. Greener joined GECAS in 2001 from BAe Systems Airbus and has over 25 years of aerospace experience.

International Aircraft Associates, appointed **David Holbert** as Vice President, Engine Product Lines effective immediately. In this new position, Mr. Holbert will be an integral part of IAA's strategic growth plan. His expertise coupled with a vast aviation background will fortify IAA's business operations and growth. International Aircraft Associates is an aftermarket Engine Material and Technical Support Services company established in 1978, IAA supports MRO's, Airlines and Lease/Finance organizations worldwide.

PEMCO Aviation Maintenance has named **Douglas Ragsdale**, Director of Quality. He will be based out of the company's corporate headquarters at Tampa International Airport and will report to **Ernie Kiss**, PEMCO's Vice President Quality and Engineering.

Alessandro Amendola has been appointed as



Alessandro Amendola

new Senior Vice-President Engineering of ATR. He will be responsible for all the engineering activities related to the fields of certification and airworthiness, customization, systems and propulsion, structures, flight tests, flight technologies, support, and quality, processes and methods. He will also closely work with the Programs directorate, providing engineering support and solutions in the definition of new aircraft developments. He will report to ATR's Chief Executive Officer **Patrick de Castelbajac**, and will sit on the Executive Committee. He replaces **Carmine Orsi**, which mandate expired at the end of 2015.

Other News

Singapore Airlines (SIA) will upgrade its fleet of Boeing 777 airplanes with **Astronautics'** Block Point 4 (BP4) Electronic Flight Bag (EFB). "The newer EFB will enable the storage of more information including detailed charts, maps, documents and databases, allowing operators to enhance airplane performance and improve operational efficiency," said Larry Levine, Vice-President, Business Development, Airlines and OEMs. "With the expanded performance of the Central Processing Unit, operators can continue to add new applications as they are developed. Additionally, the enhancements made to the BP4 EFB have provided a significant improvement to the mean time between failures (MTBF) making it one of the most reliable avionics systems fielded today, reducing total operating costs by over 50% for an airline." The EFB is a form-fit-function replacement for the existing Astronautics BP3 EFBs on SIA's Boeing 777 and can

be installed overnight.

Air France Industries will upgrade four Airbus A330 aircraft with **Rockwell Collins'** PAVES Passenger Services System (PSS) for one of its customers. The standalone, cost-effective reading light and cabin crew call system with USB charging port brings several benefits, including a significant reduction in aircraft weight. Depending on the system it replaces, PAVES PSS can bring weight savings that exceed 1,000 pounds, producing millions of dollars saved annually from a significant reduction in fuel costs. Rockwell Collins teamed with Air France Industries on this cabin solution. Air France Industries designed the installation and continues to develop innovative solutions generated by Rockwell Collins' new products. Deliveries of PAVES PSS to Air France Industries will begin in January.

Information Technology

Avio-Diepen continues to provide solutions to optimize the supply chain in aerospace industry and now offers a new services in finding real-time pricing and inventory levels information for aircraft parts through PartsBase. "Quick response times and reliable information are critical for aircraft parts buyers," says Ben Nieuwland, Corporate Marketing Manager at Avio-Diepen. "This new real-time connection between PartsBase and Avio-Diepen will provide PartsBase users with the actual inventory levels of aircraft parts stocked in any of our worldwide locations. An additional benefit for Avio-Diepen customers is that with one click, they can receive real-time price quotes for the parts that we list on Partsbase." PartsBase is the largest and most comprehensive aviation marketplace and community, offering listing,

search, government data, market intelligence, advertising and SEM services. PartsBase has grown into a community of over 7,500 companies with 30,000 end users utilizing services in 162 countries.

AerData, the provider of lease management, records management and engine fleet planning software, reported that **Standard Chartered Aviation Finance**, a division of **Standard Chartered**, has chosen AerData's STREAM Records Management System to support their fleet of over 100 aircraft. STREAM (Secure Technical Records for Electronic Asset Management) is the industry's foremost web-based solution used by some of the world's largest airlines, lessors and MROs to manage aircraft and engine records.