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MILITARY

Disruptive Technologies
in MRO

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IAF
Modernisation
Damper

CIVIL

Impact of
Budget on
UDAN

RCS:
Air
Deccan's
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BUSINESS AVIATION

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LAST WORD

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Squandered

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THE AIR COMBAT FORCE LEVELS AND CAPABILITY ENHANCEMENT IS
A WORK IN PROGRESS FOR IAF AND WILL CONTINUE IN 2018 ALSO

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The air combat force levels and capability enhancement is a work in progress for IAF and will continue in 2018 also. It will assertively push for its acceptance with the final decision makers to meet the existent or perceived threats to the national security.

COVER ILLUSTRATION BY

Anoop Kamath



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NEXT ISSUE: *New Technologies*



Our valuable readers will notice that we have redesigned *SP's Aviation*. We do believe that the new appearance of the magazine will appear to be much smarter, more readable and compact, and therefore interestingly informative

PERHAPS THE MOST IMPORTANT EVENT FOR THE NATION in the recent past has been the unveiling of the Union Budget for the financial year 2018-19. This is an event of national concern since it affects every section of the society in the country including the Indian armed forces. The most notable impact of the budgetary allocation for defence would be on the ongoing process of its modernisation. In a write up in this issue of *SP's Aviation* on the budget, Air Marshal Sukhchain Singh (Retd) has analysed its impact on the modernisation of the Indian Air Force (IAF). The author is of the view that given the marginal increment in the allocation for acquisition projects and the colossal backlog, there is little possibility of the modernisation process picking up any momentum. In fact the author sees the budgetary allocation for defence for the year 2018-19 as a “damper” for the process of modernisation of the IAF.

The Air Marshal has also analysed the state of Maintenance, Repair and Overall (MRO) and the new technologies such as 3D printing, Artificial Intelligence and E Maintenance Management Systems that are being developed to enable the MRO services to keep pace with the escalating demand from the field. The author is of the view that enhancing capabilities of the MRO segment of military aviation will go a long way towards improving the flight-line availability of military aviation platforms.

In this issue of the magazine, Rohit Srivastava has catalogued some of the major events during the year gone by, related to the regime of military aviation both in India and the world. However, as for military aviation in India, there is considerable backlog and much is still left to be done. We will look forward for a more promising year ahead! Rohit Srivastava also looks at the case for fitting the Jaguar fleet of the IAF with a more powerful engine as the fleet is still left with considerable airframe life. Unfortunately, the case appears to have got bogged down on account of the complexities of the Defence Procurement Procedure.

In the regime of civil aviation, John Slattery, President & CEO, Embraer Commercial Aviation, highlights a problem faced by the global civil aviation industry, that of shortage of pilots. The author is of the view that with the robust growth in air travel likely in the next two decades, the problem is likely to become more acute. Fortunately, the global airline industry is seized with this problem and has begun initiating measures to mitigate the gravity of the situation.

Writing about Regional Aviation in India, Arpita Kala looks at Captain Gopinath's airline endeavour with the 19-seater Beechcraft 1900D to exploit opportunities in the Regional Connectivity Scheme as also the challenges that lie ahead for him. In the second article, Arpita Kala speaks of the positive impact on the Indian civil aviation industry of the Union Budget unveiled recently by the Minister of Finance Arun Jaitley. The author is of the view that while the prospects for Indian civil aviation are bright, the extremely slow progress in the new international airport project at Navi Mumbai is a matter of serious concern for the industry.

All this and more in this issue of *SP's Aviation*. Welcome aboard and happy landing!

Jai Hind!

A handwritten signature in blue ink, appearing to read 'Jayant Baranwal', with a large, stylized flourish.

JAYANT BARANWAL
PUBLISHER & EDITOR-IN-CHIEF



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NEWS

ITALIAN COURT ON AGUSTAWESTLAND CASE

On Monday, January 8, 2018, the Italian Court of Appeal of Milan has acquitted Giuseppe Orsi, former President of Italian defence and aerospace major Finmeccanica and Bruno Spagnolin, former CEO of its subsidiary AgustaWestland, of corruption charges involving a multi-crore deal with India for VVIP helicopters. The decision of the Court was based on lack of evidence on account of which the charges against the two executives could not be substantiated. The development came more than a year after a court sentenced Orsi to 4.5 years and Spagnolini to four years in jail on corruption charges related to a ₹3,600 crore contract to supply a dozen helicopters to New Delhi. The case against Orsi and Spagnolini was a result of an investigation launched in 2012.



VIEWS

IN FEBRUARY 2010, THE MINISTRY OF DEFENCE (MOD) UNDER the UPA II Government had concluded a ₹3,600 crore contract with AgustaWestland, the British subsidiary of the Italian aerospace major Finmeccanica, to purchase 12 AW101 helicopters for Air Headquarters Communication Squadron based at Palam, New Delhi. These helicopters were required urgently to replace the obsolescent fleet of Mi-8 helicopters that had been modified for travel of the President and the Prime Minister of India as also other VVIPs from abroad visiting India as the guest of the Indian government.

On February 12, 2013, allegations of wrong-doing by top executives of Finmeccanica by way of bribery and corruption in the AW101 helicopter deal with the Indian MoD came to light when the Italian authorities arrested Giuseppe Orsi, the CEO of the parent company of AgustaWestland. Reacting to this development, the then Minister of Defence A.K. Antony immediately ordered investigations into the contract to ascertain whether the government functionaries as well as others on the Indian side were also involved in the wrong doings that had been alleged by the Italian authorities. Thus in effect, there were investigations into the alleged scam running in parallel in Italy and India.

On February 25, 2013, the Indian Central Bureau of Investigation (CBI) registered a Preliminary Enquiry against former Chief of the Air Staff, Air Chief Marshal S.P. Tyagi as well as a number of others and finally registered an FIR against them. Speaking on the issue on March 25, 2013, Defence Minister A.K. Antony stated, "Yes, corruption has taken place in the helicopter deal and bribes have been taken. The CBI is pursuing the case very vigorously". However, it is not clear till date the basis on which such a categorical statement was made by a person in high office especially when the inquiry was yet incomplete and the reputation of a high ranking officer from the Indian Air Force (IAF) was at stake. Even though three helicopters had been received by the IAF by this time, the contract was cancelled by the MoD in January 2014 on grounds of breach of the Pre-Contract Integrity Pact and the payments made in advance, were fully recovered. The IAF however, has been left literally "holding the baby" as it is still in possession of the three AW101 VVIP helicopters that it cannot use.

On April 8, 2016, the Milan Court of Appeal overturned a lower court verdict and convicted Giuseppe Orsi to four years' imprisonment for paying a hefty bribe to senior functionaries in India that included politicians, bureaucrats and officers of the IAF. However, on December 16, 2016, the Italian Supreme Court cancelled the conviction of April 8, 2016, by the Milan Court of Appeal and ordered a retrial. Meanwhile, on December 9, 2016, the CBI arrested Air Chief Marshal S.P. Tyagi along with a few others and remanded him to judicial custody till December 30, 2017. Finally, in September 2017, the CBI filed a charge sheet against him and nine others. In his defence, Air Chief Marshal S.P. Tyagi's counsel had told the court that he was "a decorated war hero of the nation" and that "CBI, which was termed as a caged parrot by the Supreme Court, is trying to tarnish his image". Also, that the decision to procure helicopters from AgustaWestland for travel by VVIPs, was a collective one and Prime Minister's Office was also involved in the decision-making process.

On January 8, 2018, the third Court of Appeals of Milan finally acquitted the defendants on all charges. The reaction from the CBI is that this judgement will not impact their investigations as laws in this country are different from those in Italy and the probe here is independent of that in Italy. The CBI also claims that the investigators have succeeded in establishing a substantial part of the money trail. However, the counsel for the defendants in the case in India regard the judgement by the Italian Court as "a big slap on premier investigating agencies". The counsel regards the whole process of investigation in India as "classic example of abuse of process of law for political motives".

One tragic aspect of the sordid episode is that the IAF has been dragged needlessly into this ugly controversy as these helicopters were not meant for the armed forces, but for travel by VVIPs. As such, this exercise ought to have been undertaken by other agencies and not by the IAF. Tragically, this episode has damaged the institution of the Chief of the Air Staff and dented the morale of the IAF. Hopefully the latest developments in Italy will help reverse the damage and restore the prestige of the IAF. **SP**

—BY AIR MARSHAL B.K. PANDEY (RETD)



DISRUPTIVE TECHNOLOGIES IN MILITARY MRO

Identifying emerging disruptive trends in technology affecting MRO well in advance, will ensure that military MRO will be able to provide the required combat availability of the war fighter

By AIR MARSHAL SUKHCHAIN SINGH (RETD)

THE AIRCRAFT MAINTENANCE, REPAIR AND OVERHAUL (MRO) business is poised for stunning growth in the near term, but the aerospace companies that provide those services must navigate a rocky and often unpredictable landscape in order to thrive. Aircraft manufacturers and suppliers, meanwhile, are building more efficient, reliable and advanced commercial and military aircraft, engines and components. This new technology puts added pressure on MRO providers to be versatile and to cultivate new skills. As aircraft become more and more reliable, there is a diminishing need for technicians. But reliability is also diminishing the hands-on experience of dealing with problems. Aviation is progressing linearly, but the world is progressing exponentially. Are we accessing only the new information

technologies in small chunks and trying to force-fit those pieces that mesh with our traditional framework while missing opportunities to jump to whole new levels?

Identifying emerging disruptive trends in technology affecting MRO well in advance, boldly and regardless of accepted wisdom, will ensure that military MRO will be able to provide the required combat availability of the war fighter. The following disruptive technologies need serious thought and foresight in planning on its implementation within the defence services.

ADDITIVE MANUFACTURING OR 3D PRINTING

Most manufacturers in the airline industry utilise a method known as Conventional Manufacturing, which is regarded to

be extremely inefficient. This method leaves large quantities of unused and unnecessary raw materials resulting in considerable wastage. 3D printing methods however, use raw materials needed only for the desired aircraft parts which save on raw materials and minimise weight of the parts. The aviation industry uses 3D printing technology because it has the capability of reducing aircraft weight, while increasing customisation and overall construction efficiency. Direct Metal Laser Sintering (DMLS) is the most common means of producing metal prints. The use of lasers to combine alloys, allows manufacturers to create functional metallic parts of high strength and durability. We may see an enduring presence of DMLS in the coming years as part of any industry that requires high durability metal parts. Traditional 3D printing (Fused Filament Fabrication (FFF), Digital Light Processing (DLP)) is not being used in the aerospace industry. The core problem that companies run into with these types, is scale. 3D printers will have to be much bigger to be able to produce every part of an airplane. So far, companies are making do with smaller components. For this reason, DMLS is more suitable than others as all it requires is a laser and platform and these can be easily adjusted for size.

A key factor for success throughout the aerospace industry is weight reduction and therefore a key indicator for products is the “buy-to-fly” ratio, the weight ratio between the raw material used for a component and the weight of the component itself. 3D printing cannot only produce lighter parts, but also significantly compress the buy-to-fly ratio as much as ten or even 15-fold, reduce material wastage (on high cost materials such as titanium) providing huge cost saving opportunities.

3D printing reduces the capital required to achieve economies of scale with enhanced flexibility and reduces the capital required to achieve scope. Considerations of minimum efficient scale, shapes the supply chain. It has the potential to reduce the capital required to reach minimum efficient scale for production, thus lowering the barriers to entry to manufacturing for a given location. Economies of scope influence how and what products can be made. The flexibility of 3D printing facilitates an increase in the variety of products a unit of capital can produce, reducing the costs associated with production changeovers and customisation and/or the overall capital required. Changing the capital-versus-scale relationship, has the potential to impact the way supply chains are configured, while changing the capital-versus-scope relationship has the potential to impact product designs.

During the lifetime of an aircraft, parts may be replaced. In order to meet the demand for replacement parts, aircraft manufacturers keep an inventory of parts on hand. A client requests parts from the aircraft manufacturer when a replacement part is desired. However, receiving requested parts from the aircraft manufacturer, may take an undesirably long time for a client. Some clients may keep an inventory of parts on hand to avoid waiting for a long time. However, storing an inventory of extra parts either at an aircraft manufacturer or with a client, requires enhanced resources. There is quantifiable return on investment ROI to achieve from 3D printing by reducing material costs, decreasing labour content and increasing availability of parts at the point of use – all having a dramatic impact on the supply chain. While 3D printing is rightly being welcomed in civil aviation, it will also require key changes in ERP systems to control every element of manufacturing, maintenance and support chain

processes to manage the possibility of counterfeit parts entering the support chain. Companies must take a close look at what tools and technologies are needed to better manage the supply chain, increasing control and also monitoring counterfeiting risks to take the right actions to stop them in time.

Certified materials and printers to make qualified metal parts don't exist in today's military MRO establishments. The unique benefits of rapid build time and unique microstructural control to avoid counterfeiting in the 3D printing processes, cannot be fully realised with the existing long airworthiness certification times. Accelerated Certification of Additively Manufactured Metals initiative must be undertaken by CEMILAC now. The goal is to develop predictive models that cover all time and length scales relevant to additive manufacturing for metal parts. Success with these efforts may well become the tipping point in the adoption of 3D printing technologies for MRO in military aviation and general aviation.

BLOCKCHAINING TECHNOLOGY

Blockchain is best defined as a data structure that has the ability to establish a digital archive or to record blocks of data or transactions that can be shared and easily accessed by users across networks of different computers. Blockchain can be used as a digital ledger shared by airlines, MRO teams and OEMs to record flight events, operational conditions and scheduled aircraft maintenance checks. While the technology and its applicable use is relatively new in the aviation industry, Blockchain has already grown in popularity in the financial sector and is also well known for its association with providing a way of recording bitcoin transactions. Lufthansa Industry Solutions has launched an initiative known as Blockchain for Aviation (BC4A) to evaluate how technology can be employed to increase transparency in flight maintenance which includes software developers, aircraft manufacturers, MRO service providers, logistics providers, lessors and even civil aviation regulators.

With Blockchain, information is stored in blocks, each of which contains its own history. Because every block is verified and sealed, the information contained in it cannot be changed and is saved in such a way that it is visible to all. This transparency makes it extremely difficult to corrupt and manipulate the information and is of particular benefit if different companies are working together and therefore using the same data as in aircraft maintenance. In the future, components will be registered in a Blockchain after they are manufactured together with all relevant data – for example serial codes. If a component is installed in an airplane, this information can be saved again in another Blockchain. If the part then malfunctions, maintenance technicians can use the information stored to review the exact number of flight hours and to decide whether to replace or repair the part. If it is repaired, this information can then be saved in a separate Blockchain for the component in question. This is an incredible advancement, as it means that the entire maintenance cycle of a single component can be reviewed in its entirety. It reduces the risk for MRO service providers in particular, as they can now use Blockchain technology to provide verifiable documentation at any time, about the parts they have installed. Other Blockchain application scenarios in aviation include the secure management of certification from aviation authorities and technicians' job cards.

“Do not let yourself
be forced into doing
anything before you
are ready”
—Wilbur Wright



BLOCKCHAIN CAN BE USED AS A DIGITAL LEDGER SHARED BY AIRLINES, MRO TEAMS AND OEMS TO RECORD FLIGHT EVENTS, OPERATIONAL CONDITIONS AND SCHEDULED AIRCRAFT MAINTENANCE CHECKS.

Even though the above use cases are promising, their implementation is still in its infancy. Several challenges need to be addressed, including the development of multiple security layers and scalability challenges in supporting millions of devices and billions of transactions. Another challenge is the design and implementation of the consensus mechanisms that are necessary to validate the various transactions in the decentralised infrastructure. More importantly, there is still a significant knowledge gap in Blockchain technologies, which makes it difficult for innovators to use it in novel ways. The potential benefits could include improved data quality, single traceable record of serial numbers, better and more accurate maintenance history, increased trust between service providers, suppliers and operators, cheaper compliance increasing airworthiness. This leads to a lighter administration, lower costs and higher system utilisation. Blockchain has quite the disruptive potential for MRO in aviation and the defence MRO establishments need to start viewing it with

PHOTOGRAPH: INDIAN AIR FORCE

interest for indoctrinating the air warriors of its possibilities and plan for its disruptive acceptance for implementation.

ARTIFICIAL INTELLIGENCE (AI) IN E-MAINTENANCE MANAGEMENT SYSTEMS (E-MMS)

The new era of Big Data and sophisticated analytics for predictive maintenance has drawn the interest of MRO because aircraft are so reliable, it is almost impossible to obtain data samples for every type of fault. The most useful approach is to learn from the mass of healthy data in order to detect abnormalities or departures from healthy patterns can be detected. The key is to offer early warning of any impending problems. The best way to do that is to quantify aircraft health, so small changes can immediately be flagged. Traditional OEM analytic tools are decades old, not designed for massive data analysis and often not flexible enough to incorporate machine learning. These are ending “slowly.”

Inventory optimisation tools will be highly useful. The solution brings a new perspective to planning, stocking and optimising inventory. It provides a new intelligent layer, wrapped around existing rules and policies, that continuously evaluates hundreds of parameters before making recommendations. And Innovative inventory tools are tightly integrated with its predictive maintenance platform. As the global fleet transitions from previous-generation to next generation aircraft, the volume and predictive power of this big data will enable operators and providers of maintenance to better forecast, plan and deploy aircraft assets. The application of AI in maintenance extends widely from the intelligent maintenance optimisation models to the more practical applications such as cost budgeting of maintenance projects and selecting optimal repair methods. How big data can be implemented for the E-MMS systems, has disrupted the traditional thought process of maintenance management. We will see newer models of the implementation which will be predictive decisions rather than historical analysis based decisions. MRO services will increasingly be based on such AI models which will reduce the downtime of aircraft and enhance the availability of the platforms and systems.

The biggest reward for investments in Big Data analytics is realised when granular events are studied and improved. This is a regulatory requirement for all aircraft operators as part of a Continuing Analysis and Surveillance Systems (CASS) plan. Detecting trends in failures, part usages, non-routine and life limits using Big Data tools, allow operators and regulators to continually refine maintenance planning operations that support cost reductions and safety of flight operations. By combining these key elements of data management, MRO operations can be greatly economised. From an operator’s perspective, access to more intelligent information means that more time is spent completing tasks than finding or processing paperwork. From a business point of view, more efficient operations translate into reduced aircraft downtime, driving higher margins.

The existing E-MMS which is being implemented in the IAF needs to be viewed in this context and plans need to be formulated for big data analytics for the huge quantities of data that it will generate. The integration of IMMOLS with E-MMS is part of the IAF project which will capture each other’s touch points in a seamless application for pan IAF weapon platforms. This integrated application needs to be continued for its full implementation; but a brainstorming be undertaken on how to tailor and use it in a big data analytical disruptive mode. Wipro, IBM, Ramco, Infosys etc are software giants who can exploit this disruptive technology to better the military MRO in improving the combat potential of our war-fighting platforms. **SP**



DEFENCE BUDGET 2018: IAF MODERNISATION DAMPER

The defence five-year plans are formulated in consonance with existing threat perceptions, the “Raksha Mantri’s operational directives” and the 15-year Long-Term Integrated Perspective Plan (LTIPP)

By AIR MARSHAL SUKHCHAIN SINGH (RETD)

UNION BUDGET FOR THE FINANCIAL YEAR 2018-19, PRESENTED by the Finance Minister Arun Jaitley envisaged a total outlay of ₹24,42,213 crore. Out of this, ₹2,95,511.41 crore has been earmarked for Defence. This accounts for 12.10 per cent of the total Central Government expenditure for the year 2018-19. The allocation of ₹2,95,511.41 crore represents a growth of 7.81 per cent over budget Estimates (₹2,74,114.12 crore) and 5.91 per cent over Revised Estimates (₹2,79,003.85 crore), respectively for the financial year 2017-18. Out of ₹2,95,511.41 crore allocated for the financial year 2018-19, ₹1,95,947.55 crore has been allocated for Revenue (Net) expenditure and ₹99,563.86 crore for Capital expenditure for the Defence Services and the Organisations/Departments under the Ministry of Defence (MOD). ₹99,563.86 crore, allocated for Capital expenditure, includes modernisation-related expenditure. The Capital allocation for Ministry of Defence under BE 2018-19 is 33.1 per cent of the total Central Government Expenditure on Capital Account, which is ₹3,00,441 crore. For Defence Pension, which is over and above the outlay mentioned above, an amount of ₹1,08,853.30 crore has been provided in BE 2018-19. This is 26.6 per cent above

the BE 2017-18 of ₹85,740 crore and 14.26 per cent over RE 2017-18 of ₹95,000 crore.

IMPLICATIONS

India’s defence budget hiked by 7.81 per cent to ₹2,95,511 crore from ₹2,74,114 crore from 2017, has once again dashed hopes of any major jump in military modernisation this year despite heightened tensions with both Pakistan and China. The armed forces, incidentally, had sought an allocation of ₹26.84 lakh crore+ over the next five years to ensure requisite military modernisation and maintenance. The annual defence budgets have shown a trend of declining modernisation outlays for new projects, with almost 80 per cent of the outlays earmarked for “committed liabilities” (instalments for arms deals inked in earlier years) and a skewed revenue to capital expenditure ratio. This has meant that the Army, Navy and the Indian Air Force (IAF) continue to manage with critical operational gaps on several fronts ranging from fighters, helicopters and submarines to howitzers and modern infantry weapons. India’s defence budget for 2018-19 will largely account for only inflation and currency fluctuations, despite the armed forces coveting the latest and the best hardware.

ILLUSTRATION: ANOOP KAMATH

The stress on defence budget built up over the last two years has got compounded. If the allocation of last two years was insufficient and there are carried forward liabilities to be discharged, mere 7.81 per cent increase over last year is grossly insufficient because of the following:

- The impact of the custom duty on direct imports will be realised at the time of deliveries that begin 2018-19. The impact of this could be 18.5 to 29.74 per cent of the price.
- Similarly, the delivery of major platforms, which used material imported by DPSUs, OFB and domestic industry from 2015-16, will begin to attract custom duty from the year 2018.
- Petrol, diesel and aviation turbine fuel (ATF) are major consumption items and the world crude prices trend would add to the burden.
- The decline in the modernisation budget is a source of great concern, especially given the limited budgetary scope available for signing new contracts.

MODERNISATION

The defence five-year plans are formulated in consonance with existing threat perceptions, the “Raksha Mantri’s operational directives” and the 15-year Long-Term Integrated Perspective Plan (LTIPP). But they have not received much attention from successive governments, with the 10th (2002-07), 11th (2007-12) and 12th (2012-17) Plans failing to get approval from the finance ministry. As per the 13th Defence Plan, ₹12,88,654 crore has been projected for the capital outlay, while ₹13,95,271 crore for revenue expenditure. With an eye firmly on China, there is also a separate section in the plan on the “capability development” of the strategically-located tri-service Andaman and Nicobar Command, which was set up in October 2001, but has suffered from relative neglect, lack of infrastructure and turf wars.

Modernisation is a continuous ongoing process. Old and vintage platforms become a drain on the maintenance and need to be replaced both to upgrade capability, technology and to keep abreast with the potential threats. Defence acquisition is a complex long drawn process and the time gap between the Acceptance of Necessity (AoN) and the contract signing could be over 15 years. The methodology in the media is to assess the state of modernisation with reference to allocation and utilisation of the ‘capital acquisition budget’, a term used synonymously with the term ‘modernisation budget’. Not all expenditure incurred from this notional segment of the capital outlay goes into procurement and other activities aimed at ‘modernising’ the armed forces. Conversely, some expenditure that could arguably be viewed as being related to ‘modernisation’ gets incurred from the revenue budget also. Thus, it is erroneous to consider higher levels of expenditure from the capital acquisition budget as an indicator of greater modernisation of the armed forces and vice versa.

The MoD has utilised 90 per cent of the capital outlay and 82.6 per cent of the 2017-18 revenue budget. Nearly ₹1.42 lakh crore out of the total of ₹1.72 lakh crore of the revenue budget, has been spent which continues to rise on account of One Rank One Pension scheme. Also, ₹78,000 crore of 86,000 crore of the capital outlay has been utilised with the IAF fully utilising its entire acquisition budget. The IAF modernisation contracts which are likely to roll over to next financial year due to short-

fall in new schemes cash outgo are most probably any of these. The figures in brackets below are the amount for the first year of contract and not the total cost of the project:

- Six flight refuelling aircraft (₹1,292.24 crore)
- Jaguar re-engine project (₹580.00 crore)
- Avionics UPG for IL-76/78/AWACS (₹612.17 crore)
- 38xPC & MK-II (₹264.90 crore)
- D-26EW system for MIG-29 (₹365.45 crore)
- 48 X MLH (₹1005.76 crore)
- 20X additional Hawk (₹549.99 crore)
- 56 x AVRO replacement (₹1,789.40 crore)
- 65 x Ka 226-T RSH (₹268 crore)
- LR SAM

It needs to be appreciated that the capital acquisition proposals are based on the Services Capital Acquisition Plan (SCAP) which is culled out from the FYPs and, according to successive editions of the DPP, these plans are required to be approved only by the DAC, which has been happening regularly. In the past, even CCPA/CCS approvals did not imply approval of all procurement programmes included in the plan or assurance of funds for those programmes. It is often said that the allocation for defence is grossly inadequate and that for ensuring credible defence preparedness, based upon modernisation of the armed forces in a compressed time frame, it is necessary to allocate

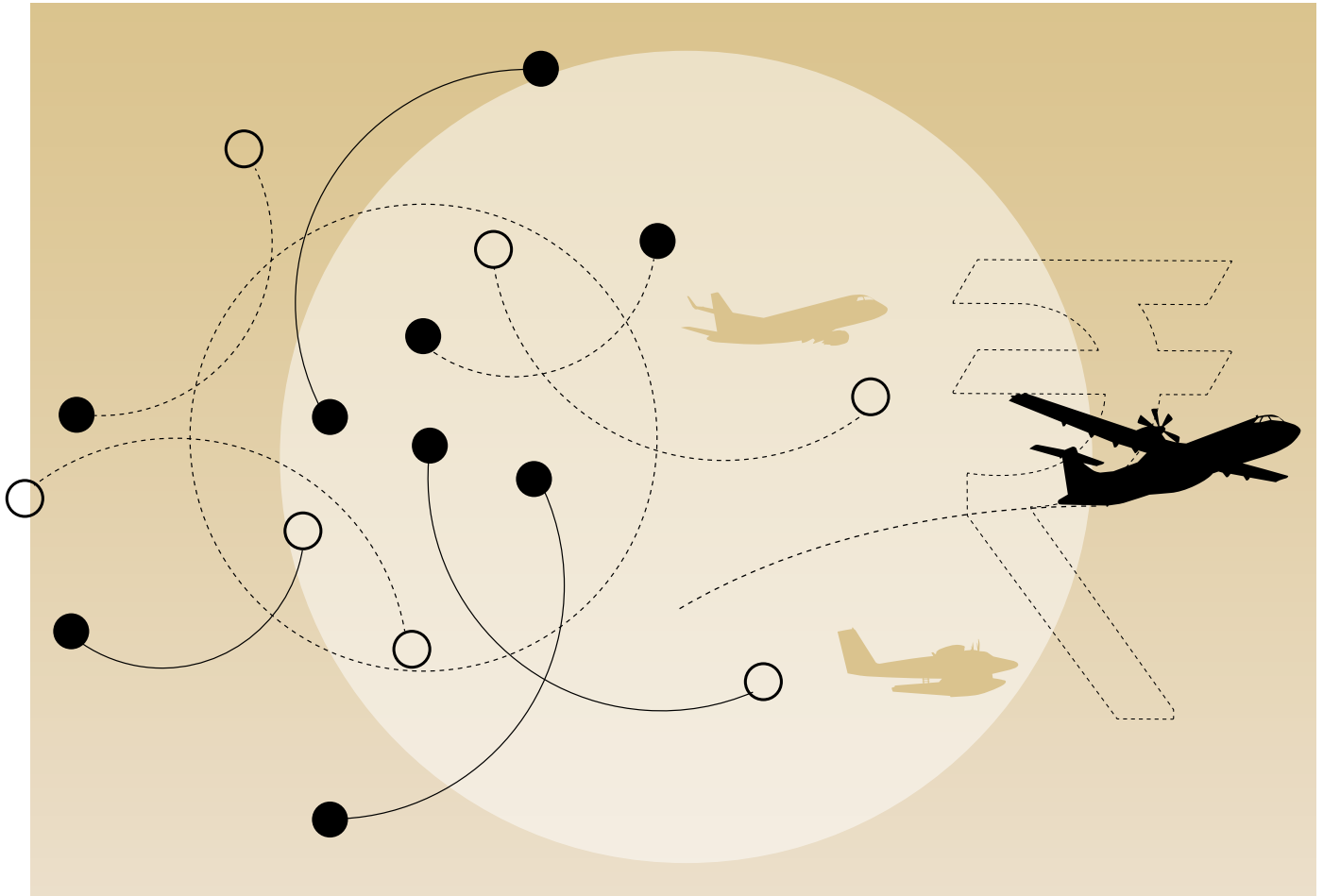
three per cent of the gross domestic product (GDP) for defence consistently for the next 10 to 15 years. Even the LTIPP 2012-27 is based on the assumption that three per cent of the GDP will be earmarked for defence over the entire 15-year period.

It is true that most of the capital acquisition budget is getting utilized for meeting committed liabilities arising from the already signed contracts, but it does not imply that this leaves no money for the new procurements. In fact, most of the underutilisation is on account of the new procurements not going through. One also has to take into account the possibility that if the allocations were

to be increased to three per cent of GDP, a large proportion of that would get diverted to the revenue segment. In fact, this is an area which requires greater attention, because some of the revenue expenditure is related to serviceability of the equipment and weapon systems, stocks of ammunition, etc, which in turn, has a bearing on the operational readiness of the armed forces.

One of the most widely held views about the slow pace of modernisation is that the procurement procedure is complex and archaic and to make matters worse, the civilian bureaucracy in the MoD keeps stonewalling procurement proposals. According to the DPP, there are at least 11 stages through which every procurement proposal must pass before it culminates in the award of a contract. While this creates the impression of the procedure being complex, no one has made out a convincing case for doing away with even one of these stages. There is possibly a lot of scope for improvement in the processes concerned. These processes are not very clearly defined, leaving room for indecision and even corruption. This is one of the several areas that need to be focussed upon and concrete suggestions made for improvement. Those handling public funds cannot be faulted for being cautious or even over cautious, while dealing with cases involving thousands of crore of public money. The public discourse is simply not focussed on this aspect. SP

One of the most widely held views about the slow pace of modernisation is that the procurement procedure is complex and archaic



IMPACT OF BUDGET ON UDAN

From hawaii chappals and hawaii jahaaz to flight operations affected by smog, Minister of Finance Arun Jaitley has big plans for Indian aviation

By ARPITA KALA

ILLUSTRATION: ANOOP KAMATH

WHILE THE MINISTER OF STATE FOR CIVIL AVIATION JAYANT SINHA had declared the Union Budget 2018-19 as a 'political document', some of the plans mentioned in the fiscal budget may bode well for Indian aviation especially for the UDAN (*Ude Desh ka Aam Nagrik*) scheme. From improving flight operations in poor visibility during smog in winter months to expanding airports and prepping for VVIP take-offs, many grand plans were unveiled.

HAWA HAWAI?

The Minister of Finance, Arun Jaitley said while presenting the budget, "The Airport Authority of India (AAI) has 124 airports, we propose to expand airport capacity to one billion trips a year. With this step, hawaii chappal wearing citizens will be able to take the hawaii jahaaz." He also stated that 56 un-served airports and 31 helipads will also be connected and operations at 16 such

airports have already begun. An allocation of ₹1,014.09 crore for the upcoming financial year was announced for reviving 50 airports and viability gap funding in the North Eastern states under the flagship regional connectivity scheme.

With the Centre for Asia Pacific Aviation (CAPA) predicting 125 million domestic fliers in 2017-18 alone, Jaitley's ambitious plan to increase airport capacity by up to five times to handle the billion trips under the new initiative, NABH Nirman, seems poised to boost the UDAN. Founder & CEO of BIS Research, Faisal Ahmad, approves of the new changes saying, "As India looks towards democratising air travel and making flying accessible and affordable for the middle class, emerging technologies such as vertical takeoff landing (VTOL) can save millions of dollars on investment on airport expansion and flight acquisition in the coming years. Leading aircraft company Boeing, has already filed a patent in June 2015 for VTOL aircraft with seating capacity of 100 passengers. Similarly, Airbus is expected to pilot test its electric and autonomous personal aircraft, Vahana, in the first quarter of 2018. The aircraft will takeoff and land vertically, much like a helicopter and then once it is in flight, the rotors can be switched to horizontal so it can be flown like a normal airplane. This will result in saving on the complex and expensive infrastructure of an airport required for operation of fixed-wing aircraft. With India becoming the fastest growing domestic aviation market globally in terms of number of domestic tickets sold, this could be a potential avenue for the Indian government to look at in terms of saving cost and fighting traffic congestion. Not just aircraft, even flying cars could be the future of transport." With Sinha also rooting for the rickshaw drones, flying cars does not seem that far-fetched.

A SHOT FOR SEAPLANES

The Minister of Finance also mentioned the need for a "necessary framework for higher investment in seaplane operations". He, however, did not elaborate about it in his speech. With SpiceJet sharing plans to buy about 100 seaplanes from Japan's Setouchi Holdings and Union Minister for Transport, Nitin Gadhari, urging the firm to manufacture seaplanes in the country following the successful trial runs, looks like a new way of flying is in the offing. Meanwhile, SpiceJet has expressed possibility of manufacturing seaplanes in West Bengal and the work on building the infrastructure has already begun. A joint team comprising officials from the Ministry of Civil Aviation, the Airports Authority of India (AAI) and the Directorate General of Civil Aviation (DGCA), will conduct a "preliminary feasibility study" to build water aerodromes for operating seaplanes. There is also a possibility of fine-tuning of the Indian aviation rules for such carriers, after the study. The Chief Minister of Andhra Pradesh, Chandrababu Naidu has also encouraged the move and asked the Minister of Civil Aviation, P. Ashok Gajapathi Raju and the SpiceJet CMD Ajay Singh to make at least five seaplanes operational within the next two months.

Not only expanding the infrastructure, improving flight schedules also seems to be the goal with the Minister of Finance announcing a special scheme to help the states in North India affected with air pollution. The union government will assist the state govern-



THE MINISTER OF STATE FOR CIVIL AVIATION, JAYANT SINHA ADDRESSING THE POST-BUDGET PRESS CONFERENCE IN NEW DELHI ON FEBRUARY 2, 2018.

ments to set up in-situ machinery for disposing of crop residue in a manner that does not adversely affect the environment. The recent smog in North India affected flight operations in a big way and this development may just get a sigh of relief for the aviation industry.

MUMBAI PLAYS SPOILSPORT

However, there are some unaddressed issues in the budget. Amitabh Khosla, Country Director, India, International Air Transport Association (IATA) says, "We welcome the focus on airport infrastructure capacity announced in the budget. In our 20-year passenger forecast, IATA anticipates India will become the third largest aviation market by 2024. But this is by no means guaranteed. To make this a reality, airport capacity in India needs to be augmented and expanded quickly. IATA has earlier recommended and is supportive of leveraging AAI's balance sheet for infrastructure creation and expansion. But the big question mark on capacity and a critical area of concern for IATA, continues to be the Mumbai airport. The new international airport at Navi Mumbai airport is still a distant dream. In the meantime, Mumbai continues to fall behind in aviation activity and the state of Maharashtra is unable to fully exploit the economic potential that can be delivered by the aviation industry. We urge the government to urgently look at innovative approaches to bridge the infrastructure shortfall." SP

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HOPES FROM 2018 – GULFSTREAM PERSPECTIVE



PHOTOGRAPHS: GULFSTREAM AEROSPACE

Another initiative for 2018 is to continue our focus on providing customers the most advanced technology from start to finish

By **JASON AKOVENKO**,
Regional Vice President (Asia-Pacific), Gulfstream Aerospace



FORGING AHEAD:
REVOLUTIONARY AIRCRAFT
FAMILY OF GULFSTREAM

GULFSTREAM ENDS A BUSY YEAR OF FIRST FLIGHTS, milestones and flight testing in 2017, we can't help but look to 2018 with excitement and enthusiasm. Any year with an aircraft in development is a busy one, and we happen to be developing two — the all-new Gulfstream G500 and G600. The aircraft, powered by two Rolls-Royce's Adour Mk 811 turbofan engines, is underpowered and hence to improve its flight envelop which could allow it to operate in high operating environment such as in the mountains, a more powerful engine is required.

Since 2015, our priority has been in-flight validation, and every year since has been in rigorous pursuit of that goal. In fact, 40 per cent of the new aircraft family's first flights took place last year alone. With first flights in the rearview mirror and an impressive 10 test articles now in the sky, the focus for is about continuing to perfect two aircraft that have shown both promise and performance.

Over the course of the G500 and G600's rigorous flight test programme, the aircraft demonstrated performance beyond original projections. As we announced at the 2017 NBAA-BACE, the G500 can fly 5,200 nautical miles/9,630 kilometres at its long-range cruise speed of Mach 0.85, which is 600 nm/1,111 km more than initial expectations. This increased range provides customers the ability to connect cities like Bangalore and London in 9 hours and 44 minutes at Mach 0.87.

Its sister ship, the G600, will now deliver 6,500 nm/12,038 km at the same speed of Mach 0.85. These increases will allow customers unparalleled mission flexibility and the ability to link even more destinations like Delhi and Melbourne in 11 hours and 23 minutes at Mach 0.87.

The five G500 aircraft in the test fleet have achieved more than 1,130 flights and have completed more than 4,100 hours of testing. The fully outfitted production G500 demonstrated its increased range when it flew its longest flight to date from London to Las Vegas in 10 hours and 19 minutes, setting a record in the process.

As certification draws closer, future G500 and G600 pilots are training on the groundbreaking Gulfstream Symmetry Flight Deck™ — a flight deck truly designed by pilots for pilots that will change the way business jets are flown. Considerable feedback from pilot demos reflects that these are truly "pilots' aircraft" thanks to the smooth, intuitive handling and easy adoption of electronically linked active control sidesticks.

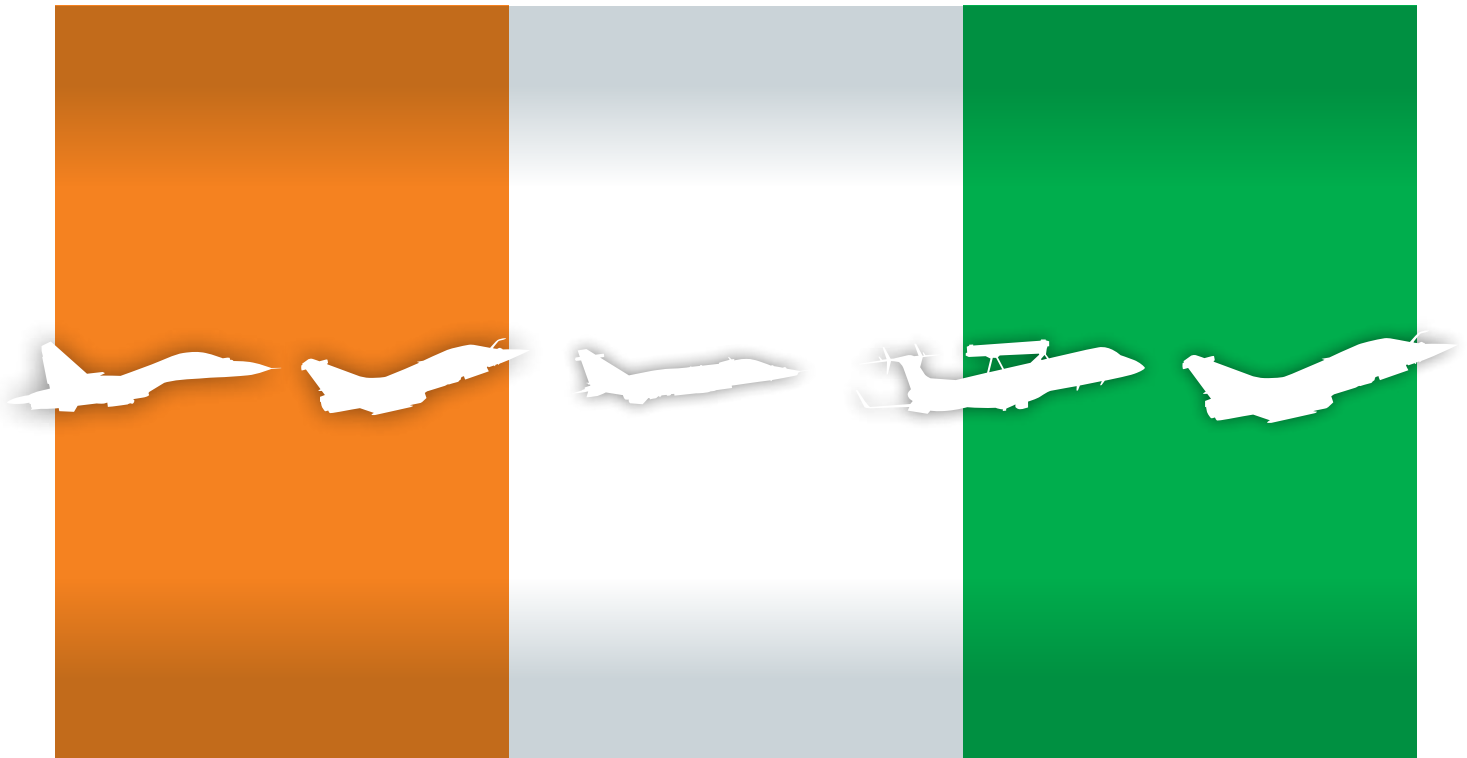
Although the two flight test programmes are operating separately, commonalities between each aircraft's flight deck and avionics enabled us to apply much of what we're learning on the G500 to the G600 programme.

Customers will save hours of flight time thanks to PW800-series engines, resulting in greater fuel efficiency, performance and speed, as well as longer durations between scheduled maintenance.

Another initiative for 2018 is to continue our focus on providing customers the most advanced technology from start to finish — and that includes the design process. As we showcased at NBAA-BACE, customers have the option to select and experience countless interior design options when using Gulfstream's immersive reality tools. The ability to easily view myriad cabin configurations and customizable design options is just another way we aim to exceed expectations.

Ushering in a new aircraft family involves every single pair of hands at Gulfstream, from engineers and technicians, to designers and upholsterers. Each one of us looks forward to a year like 2018 when we get to witness the culmination of our years of effort — delivering the G500 and G600 to customers. A revolutionary aircraft family is not simply an exciting achievement for Gulfstream, but will shape and redefine business aviation, setting the standard for years to come. **SP**

A revolutionary aircraft family is not simply an exciting achievement for Gulfstream, but will shape and redefine business aviation, setting the standard for years to come



HOPES FROM 2018: CRUCIAL ASPECTS FOR IAF

Capital procurements for the Indian Air Force are anchored on a long-term perspective plan based on the threats and the geopolitical environment

By AIR MARSHAL SUKHCHAIN SINGH (RETD)

THE AIR COMBAT FORCE LEVELS AND CAPABILITY ENHANCEMENT is a work in progress for the Indian Air Force (IAF) and will continue in 2018 also. It will assertively push for its acceptance with the final decision makers to meet the existent or perceived threats to the national security. The IAF's capital procurements are anchored on a long-term perspective plan based on the threats and geopolitical environment. The weapon platforms capable today will be sub optimal in future wars and hence need to be continuously revisited both in numbers and capability. The IAF need to induct no fewer than 12 combat squadrons to meet its targeted strength by 2027-32 has been discussed at length in the media. It has also

been argued that with the present combat aircraft capabilities being multi fold as compared to the legacy aircraft, the IAF needs to tone down its numerical numbers projection. With an assertive adversary in the northern borders and the western border always on the tenterhooks the numbers are as important as capability enhancement, if not more. What are the hopes of IAF from the country in the year 2018 which will allow it to meet its tasks in fulfilling the aspirations of the resurgent India in the years to come? To my mind IAF will look forward to concrete decisions on various projects/platforms by the politico-bureaucracy that will affect its war fighting potential.

ILLUSTRATION: ANOOP KAMATH

FORCE LEVELS

As of now three Su-30MKI and two Dassault Rafale squadrons are already contracted, with two squadrons of Tejas MK.1 fighters to be built by HAL. This will add seven squadrons to the IAF. However, six squadrons of MiG-21Bison and the two MiG-27UPG will be phased out by 2025. If no new aircraft are ordered, the IAF would be left with 30 combat squadrons by 2025 resulting in an overall shortfall of 12 squadrons against its desired strength. One Jaguar squadron is also due to be phased out by 2027 resulting in a deficiency of 13 squadrons by 2027. Making up this shortfall by the year 2027 poses significant challenges. It had earlier planned to acquire an additional five squadrons of Rafale and undoubtedly would still like to do so if permitted. To compensate for this shortfall and to cater for future replacements for aircraft such as the Jaguar and eventually the MiG-29 and Mirage 2000, India has two active plans to bolster force levels. One of these involves the procurement of new single and twin-engine fighters, with the latter taking priority. The other involves the procurement of four squadrons of the Tejas Mk.1A variant.

TEJAS

HAL slow progress in establishing adequate production facilities for Tejas has not been able to meet the target of eight aircraft per year, much less an enhanced production target of 16 aircraft per year, despite establishing a second production line using the BAE Hawk production facility. Even in the IOC configuration, the Tejas Mk.1 offers considerable capability, however, the full capability is obtainable with the FOC version only. The Tejas, especially its Mk.1A variant, offers an opportunity for the IAF to close its squadron strength shortfall. Unlike the proposed single and twin-engine procurement projects, this is a viable, relatively low-cost, replacement for the MiG-21 available to the Indian Air Force. If HAL were to complete the FOC of the basic Mk.1 without further delays and shifting priorities, then there is a possibility of two Tejas Mk.1 and four Tejas Mk.1A squadrons being in service by 2025, filling the gap left by the retirement of the six MiG-21Bison squadrons. IAF would like to see HAL speed up work exponentially by focusing on integrating large assemblies that are built and supplied by private aerospace companies and managing the Outsourcing private defence firms to achieving HAL's production targets. Greater accountability of ADA is important in achieving the FOC and should be aggressively questioned in the high-powered committee monitoring the Tejas project.

TWIN-ENGINE FIGHTER

The selection of a new twin-engine fighter under a 'Make in India' initiative should be shelved. The selection of the Rafale should stand and, subject to the price and technology transfer package being satisfactory, the induction of additional Rafale aircraft beyond the existing 36 should be considered as a priority. A separate twin-engine project, unless there are severe problems with the Rafale, is a time-consuming luxury with little benefit to India.

SINGLE-ENGINE FIGHTER

The IAF will be interested that the Government of India through the Ministry of Defence (MoD) take steps towards initiating the procurement of a single-engine type through the Strategic Partnership route on a fast track basis. More than a year has passed since the project was announced by the then Defence Minister on January 3, 2017, without any tangible progress being made. The process has to be started and completed in

a time-bound manner so that the IAF can reap the benefits of this programme. Despite the claims of various companies likely to be in the race of single-engine type, establishing production lines and delivering aircraft will invariably take some time and hence making quick availability of aircraft into the IAF inventory is unlikely. Distractors of the single engine type program have been bidding for the Tejas to fill in the void for the IAF. It needs to be clarified that the Tejas is at best a replacement of the Mig-21 in the op role even though it has enhanced capability. The single-engine type being sought is to replace the MiG-23-MF/-BN and MiG-27ML aircraft in service, while the Tejas has been earmarked to replace the MiG-21. Therefore, IAF will hope that there is visible traction during 2018 in the Strategic Partnership to make the single-engine type in India.

AVRO REPLACEMENT

IAF has been finding it increasingly difficult to maintain the Avro fleet. Serviceability is low and technical snags are frequent. The aircraft are effectively obsolete. It was proposed to buy a replacement from the global market since HAL the only possibility was not considered feasible as an indigenous manufacturer due to its heavy commitment towards a large number of vital programmes. When the RFP was floated only one vendor emerged on October 22, 2014, with Airbus Defence & Space and Tata Advanced Systems Limited (TASL), offering the Airbus C295. According to the bid, Airbus, will supply 16 C295s in flyaway condition and TASL will manufacture/assemble the remaining 40 in India. This is stuck even as negotiations for the \$1.8 billion purchase are in the final stages. With the defence programme between India and Russia to manufacture a new military transport aircraft for the Indian and Russian air forces having effectively been shelved this contract needs to be finally inked in the interest of IAF. If the Avro were replaced by the more versatile aircraft like the C295, it would surely be a valuable addition to the IAF's. The Avro replacement project will enable the IAF to make a timely transition to a new and better transport aircraft. Once the An-32RE retires from service by 2030 a transport aircraft in the five to ten tonne class would be needed which can be filled by the CN295. More importantly, it is a vital first step towards the meaningful participation of the private sector in defence aerospace, a move that will immediately boost "Make in India". It must be grabbed ASAP.

FORCE MULTIPLIERS

AWACS

IAF has only three AWACS, with Israeli Phalcon radar systems mounted on Russian IL-76 heavy-lift aircraft. These were inducted in 2009-11 under a \$1.1 billion deal inked in 2004. Indigenous AEW&C (Airborne Early-Warning and Control system) christened 'Netra' was also inducted in Feb 2017, about seven years behind schedule. The first Netra is undergoing operational test-runs at the Bhatinda airbase after initial operational clearance, while the second is awaiting final operational clearance. The third will be retained by the DRDO for R&D work.

The case for two more 'follow-on' Phalcon AWACS, in the tripartite deal with Russia and Israel, remains stuck due to steep hike in price of the surveillance platforms. The government is ready to pay only about \$800 million for the two Phalcon AWACS, and not \$1.3 billion demanded by the OEM. On the indigenous front, the two aircraft under the AWACS-India project will be ready only by 2024-25 at the earliest. Though the defence ministry approved the ₹5,113 crore project in March 2015, under which 360-degree coverage indigenous AESA (active electroni-



CONSOLIDATING INDIGENOUS MANUFACTURING: GENERAL DAVID L GOLDFEIN, CHIEF OF STAFF OF THE USAF, RECENTLY FLEW A SORTIE IN 'MADE IN INDIA' LCA TEJAS AIRCRAFT AT AIR FORCE STATION, JODHPUR

cally scanned array) radars are to be mounted on Airbus A330 wide-body jets, the contract is yet to be inked and it will take approx. 80 months to operationalise the two AWACS once the contract is inked. This induction of two Phalcon AWACS merits serious attention of the MoD since the indigenous programme is still to be born with its attendant delays. With the two live borders in the west and north/east, three AWACS are woefully short of the requirement. IAF will hope that a final decision is taken in 2018 on these inductions.

Air-to Air-Refuelling Aircraft

The IAF operates six IL-78 planes bought in 2003-04 at ₹132 crore a piece to expand the strategic reach of its fighter jets. The desired serviceability of the IL-78 fleet should be 70 per cent but has been about 50 per cent during the last seven years. Simply put, barely half of the planes were available for missions at any given time.

The government is expected to float a new tender for six mid-air refuellers which will be the third one in the last 10 years, with the previous two failing to end up as contracts due to price complications. IAF's mid-air refuelling capabilities will take a hit from 2018-19 onwards when IL-78 tankers go for overhaul, leaving the air force with little option as two attempts to buy new tankers have failed. The need to procure six mid-air refuellers to stay prepared to counter our adversary in the eastern sector and a mitigation plan for the overhaul of the IL-78 aircraft will be IAF's testing times. Israel Aerospace Industries' Bedek Aviation Group are expected to be new entrants in the tanker competition with their offering of used Boeing 767 converted to the tanker role at a much cheaper price tag. Building military strength doesn't come cheap. Tankers are an essential requirement and the government needs to prioritise the purchase.

FORCE SUSTAINABILITY

The combat platforms availability is an important metric which decides how the force projection and missions will be executed in any conflict. It is these numbers which have to be ensured by the maintainers and logisticians of the IAF. With the new inductions not keeping pace with the retiring fleet it is imperative that the combat effectiveness is sustained within the existing combat forces. The reported IAF average serviceability of its aircraft fleet is approximately 60 per cent. Having 40 per cent of IAF fleet on the ground is hard to accept. Even a 10 to 15 per

cent improvement in serviceability will bring in approximately three squadron aircraft numbers for operations.

Su-30MKI

Su-30MKI fleet of approximately 270 ac is the largest fleet of the IAF. With 60 per cent serviceability, there are approximately 100 aircraft are therefore not available for operations. There is adequate manpower and skill to maintain these aircraft but the non-availability of spares and assemblies is the single factor adversely affecting the recovery of aircraft. HAL has negotiated a long-term spares agreement with the Russians in March 2017 for sustained supply of airframe and engine spares in its commitment to ensure the desired availability of this fleet. IAF will be looking forward to the successful implementation of the agreement and continuous supply of spares to its op units to achieve 75 per cent serviceability of the Su-30 fleet.

Jaguar

The Jaguar spares supply is drying out and HAL/IAF is struggling to sustain the 65 per cent serviceability of this important fleet. With the likely re-engining of Jaguar with the Honeywell F125IN engine, this fleet has to be sustained well after 2027. HAL/IAF has initiated steps to source spares from various third party global vendors. IAF will hope that these endeavours are aggressively pursued in 2018 to sustain the Jaguar fleet.

Spares Procurement in Revenue Budget

Are we being penny wise and pound foolish when it comes to spares procurement in the revenue budget. The major spares procurement cases are beyond the delegated powers of Air Headquarters and have to be progressed with the MoD. Long decision times to convert the cases to contracts needs to be seriously addressed by the officials as this is resulting into reduced numbers of available aircraft. The L1 mode of procurements needs to be questioned in view of single or limited vendors in military aviation. What is the serviceability loss versus the procurement gain in revenue spending needs a careful examination and faster conversion to contract is what IAF hopes for in 2018.

The IAF hopes for 2018 will be that a sense of urgency on the part of all the parties concerned to ensure that existing projects are closely monitored for their completion timelines and that new procurement endeavours are dealt with in an expeditious manner. **SP**

PHOTOGRAPHS: IAF / TWITTER



SCALING NEW HEIGHTS: LCA TEJAS IN FLIGHT

2017: EVENTFUL FOR MILITARY AVIATION

While the Indian government has initiated steps to address issues related to strengthening the capabilities of the Indian armed forces, much still remains to be done

By ROHIT SRIVASTAVA

PHOTOGRAPH: KARTHIK KUMAR / SP GUIDE PUBLNS

THE YEAR GONE BY HAS BEEN EVENTFUL FOR MILITARY aviation not only across the globe, but for India as well. With the escalating confrontation between the United States and North Korea and the aggressive moves by China to dominate the South China Sea, the level of tension globally and the possibility of a wider conflict breaking out has been increasing. Closer home, the stand-off between India and China at Doklam and the perpetually burning fire in Jammu and Kashmir, the deteriorating security scenario in the region has also been a matter of concern. While the Indian government has initiated steps to address issues related to strengthening the capabilities

of the Indian armed forces, much still remains to be done. Some of the developments in this regard during the year 2017, have been catalogued in the succeeding paragraphs.

RFP FOR 83 LCA 'TEJAS'

In December 2017, Indian defence public sector major the Hindustan Aeronautics Limited (HAL) received a Request for Proposal (RFP) for 83 LCA Tejas aircraft from Indian Air Force (IAF). The new proposal will populate four fighter squadrons of the IAF and the production will begin after from 2019-20 after completion of the Final Operational Clearance (FOC). The

Defence Acquisition Council (DAC), the apex body of the Ministry of Defence (MoD) for defence acquisitions, cleared proposal for purchase of 83 LCA Mark 1A including ten twin-seat trainer version. The proposal is expected to cost over ₹50,000 crore.

Till date, the IAF has signed two contracts with HAL for procurement of 40 Tejas aircraft to populate two squadrons. The first contract was signed on March 31, 2006, to procure 20 Initial Operational Clearance (IOC) standard aircraft. HAL was required to finish delivery by December 2011. In the second contract signed on December 23, 2010, for 20 Final Operational Clearance (FOC) standard aircraft to be completed by December 2016.

BRAHMOS ON SU-30MKI

Indo-Russian BrahMos supersonic cruise missile, was successfully test-fired on November 22 for the first time from the IAF's frontline fighter aircraft Sukhoi-30 against a sea-based target in the Bay of Bengal. The missile was gravity dropped from the fuselage of the Su-30 and the two stage missile's engine fired up and propelled the BrahMos towards the target.

The successful maiden test-firing of BrahMos Air Launched Cruise Missile (ALCM) from Su-30 is expected to significantly bolster the IAF's air combat operations capability from stand-off ranges. BrahMos ALCM weighing 2.5 tonnes is the heaviest weapon to be deployed on India's Su-30 fighter aircraft modified by HAL to carry the weapon.

RFI FOR INDIAN NAVY'S CARRIER-BASED FIGHTERS

The Indian Navy has floated a Request for Information for 57 carrier-based aircraft to arm its next aircraft carrier. The tender was issued in January 2017 after the naval version of the under-development LCA Tejas was rejected by the Indian Navy. The fresh tender was issued to explore the market for a foreign make aircraft. The Request for Proposal for the programme is expected sometime this year. Dassault's Rafale-M and Boeing's F-18 are the main contenders.

RFP FOR LIGHT COMBAT HELICOPTERS

In an encouraging development for the Indian defence manufacturers, defence aerospace major, the Hindustan Aeronautics Limited, on December 22, received a Request for Proposal (RFP) for 15 Light Combat Helicopters (LCH) from the Indian armed forces. The proposal for the procurement of 15 helicopters was cleared by the Defence Acquisition Council (DAC), the apex body for defence procurement in the Ministry of Defence (MoD), in November 2016 for around ₹3,000 crore under IDDM category of the Defence Procurement Procedure (DPP). Ten helicopters are expected to go to the IAF and the rest to the Indian Army.

MAIDEN FLIGHT OF BOEING KC-46A TANKER

The first Boeing KC-46A tanker that will be delivered to the US Air Force next year, successfully completed its first flight and airborne tests, taking off from Paine Field and landing after more than three hours later. The KC-46A, derived from Boeing's commercial 767 airframe, is built in the company's Everett facility. Boeing is currently on contract for the first 34 of an expected 179 tankers for the US air Force.

CHINA DEVELOPS MISSILE INTERCEPTOR

China Aerospace Science and Industry Corporation has stated that they have made a "new-generation aerospace defence missile" that incorporates top space technologies and which it describes as one of the cornerstones of a world power's strategic prowess. It is claimed that the ultrafast anti-missile interceptor is capable of knocking down incoming projectiles that is



FAST & FURIOUS:
(TOP) BRAHMOS AIR LAUNCHED CRUISE MISSILE (ALCM) WAS SUCCESSFULLY TEST FIRED FROM SU-30; (MIDDLE & ABOVE) BOEING'S F/A-18 AND DASSAULT'S RAFALE-M ARE THE MAIN CONTENDERS FOR INDIAN NAVY'S CARRIER-BASED FIGHTERS.

PHOTOGRAPHS: SP GUIDE PUBNS, US NAVY



MAKING A MARK:

(TOP) BOEING KC-46A TANKER SUCCESSFULLY COMPLETED ITS FIRST FLIGHT AND AIRBORNE TESTS IN 2017; (MIDDLE) A MOCK UP OF INDIAN MULTI-ROLE HELICOPTER FROM HAL; (ABOVE) HAL ROLLED OUT THE FIRST INDIGENOUSLY UPGRADED HAWK MK 132 AJT IN RECORD TIME IN JANUARY 2017.

PHOTOGRAPHS: BOEING, KARTHIK KUMAR / SP GUIDE PUBNS, HAL

flying ten times faster than a bullet. Only US and Russia have this technology.

THALES DEVELOPS ACTIVE ARRAY RADAR FOR HAL

Thales has developed an active array radar that meets the specific needs of Hindustan Aeronautics Limited (HAL), to equip the LCA Tejas Mk-1A, the multirole Light Combat Aircraft operated by the IAF. Thales radar is an advanced Fire Control Radar designed for air superiority and strike missions, based on fully solid-state Active Electronically Scanning Array technology, enabling the radar to achieve long detection ranges, high mission reliability and multi-target tracking capabilities. The radar has successfully completed initial flight test designed to measure its performance level.

CHINESE J-20 ENTERS SERVICE

The much awaited Chinese stealth fighter Chengdu J-20, in September last year, entered service of the People's Liberation Army Air Force. The aircraft has gone into serial production at the Chengdu Aerospace Corporation. According to the Chinese media, the fighter J-20 is China's fourth-generation medium and long-range fighter jet. It made its maiden flight in January, 2011 and was first shown to the public at the 11th Airshow China in Zhuhai, Guangdong Province, in November 2016. The armaments bay configuration of the J-20, similar to F-22, has two lateral bays for small air-to-air missiles and another bay under the fuselage for long range weapons.

RFI FOR NAVAL UTILITY HELICOPTERS

The Indian Navy, in August 2017, sent out a global Request for Information for 111 Naval Utility Helicopters. The selected helicopters will be manufactured in India through strategic partnership model and will replace the aging HAL's Chetaks (Alouette III) helicopters. The first 16 of them will be bought off the shelf rest will be manufactured in India. The helicopters will be used in the search and rescues and logistic roles.

RFI FOR NAVAL MULTI-ROLE HELICOPTERS

In August 2017, the Indian Navy issued the global Request for Information for 123 naval multi-role helicopters (NMRH). The Indian Navy wants to deploy one helicopter on each of its warships. Earlier tenders to acquire small number of NMRH did not fructify and this time, the government wants to manufacture these helicopters in India to replace the Kamov and Sea King anti submarine warfare helicopters currently with the Indian Navy and is expected to have anti-surface and logistic capabilities also.

EUROPE'S SIXTH GENERATION COMBAT JET

The European government and the industry are gearing up for the development of a new sixth-generation combat jet which could involve a combination of manned and unmanned systems. Despite being complicated by the UK's planned exit from the EU, European leaders have gained fresh impetus to commence the programme as relations with US President Donald Trump remain uneasy due to his attacks on some NATO member's lower-than-expected defence spending commitments. The project is likely to cost far more than Euros 10 billion.

THAAD SYSTEM CLEARED FOR SAUDI ARABIA

The US State Department's Defence Security Cooperation Agency (DSCA) has cleared the sale of Terminal High Altitude Area Defence (THAAD) systems to Saudi Arabia. Valued at an estimated \$15 billion, the package includes the provision of 44 THAAD launchers, 360 THAAD Interceptor Missiles, 16 THAAD



UNMANNED POWER: (LEFT) PREDATOR B SEA GUARDIAN UAV; (RIGHT) UNMANNED X-37B SPACE PLANE FROM USAF.

Fire Control and Communication System and seven THAAD radars. Lockheed Martin Space System and Raytheon will act as lead contractors in the deal.

INDIA SIGNS \$2 BILLION CONTRACT FOR MR-SAM

In April 2017, India signed a contract worth \$2 billion with the state-owned Israel Aerospace Industries (IAI) for supplying advanced medium-range surface-to-air missile systems (MRSAM). Out of the two billion, \$1.6 billion will go to the IAI and rest will go to Rafael for component and systems. The MR-SAM has been jointly developed by the DRDO and IAI and can engage enemy aircraft, UAVs and other aerial platforms at range up to 70km.

SEA GUARDIAN FOR INDIA

Giving a major filip to Indo-US defence cooperation, India has begun the process to procure remotely piloted Predator ‘B’ Sea Guardian unmanned aerial vehicles from the United States (US). During Prime Minister Narendra Modi’s visit to the US in June 2017, an offer to sell Predator B was made to India. Minister of State for Defence Subhash Bhamre, on December 20, 2017, in response to a question in Lok Sabha, stated, “Request for Information for Predator ‘B’ Sea Guardian was issued to the US Office of Defence Cooperation on November 14, 2017 and response is awaited.” Procurement of Sea Guardian is “progressed under Buy (Global) category and no transfer of technology is envisaged.”

UTC BUYS ROCKWELL COLLINS FOR \$30 BILLION

On September 04, 2017, United Technologies Corporation (UTC) struck a \$30 billion deal to buy avionics and interior maker Rockwell Collins, thus making them one of the world’s largest makers of civilian and military aircraft components. The Rockwell Collins and UTC’s aerospace systems segment will be combined to create a new business unit named Collins Aerospace Systems.

SAAB AND ADANI ANNOUNCES COLLABORATION PLAN FOR AEROSPACE AND DEFENCE IN INDIA

Defence and security company Saab and Indian infrastructure conglomerate Adani Group, in September last year, announced a collaboration plan for aerospace and defence sector in India. The intended collaboration would encompass design, development and production of Gripen for India and high-tech products

of national importance for India and also the creation of joint venture in India in line with and in support of the Make in India policy. The Gripen is a modern multi-role fighter aircraft featuring state-of-the-art technology, including advanced data links and sensor plus a unique extensive electronic warfare suite.

INDIGENEOUS HAWK

In January last year, the Indian aerospace major Hindustan Aeronautics Limited (HAL) rolled out the first indigenously upgraded Hawk Mk 132 advanced jet trainer (AJT) in record time. The aircraft which was rolled out on the eve of the Republic Day, was also showcased at the Aero India 2017. This fulfils the commitment made jointly by the BAE System and HAL at the Aero India, 2015 to explore possibilities for the Hawk aircraft for India and export markets.

US AIR FORCE’S SECRET SPACE PLANE

The US Air Force’s unmanned X-37B space plane that has been zipping around the Earth for nearly two years on a classified mission, landed successfully on May 7, 2017. The aircraft that resembles a miniature space shuttle, landed at NASA’s Kennedy Space Centre. The space plane, also known as Orbital Test Vehicle, made history by landing after 718 days of orbit endurance. This was the fourth mission of the aircraft.

RFI FOR ENGINE FOR MRH-HAL

After unveiling the full-scale model of the Indian multi-role helicopter, the state-owned Hindustan Aeronautics Limited (HAL), in June 2017, issued a Request for Information for turboshaft engine for 10 to 12.5 tonne AUV class twin-engine helicopter. The preferred total engine weight with all accessories and harness is to be within 250 kg. The chopper is expected to fly in six-seven years.

F/A-18 UPGRADE

Boeing is planning future upgrades for the F/A-18 Super Hornet that will keep the fighter flying into the 2040s. If approved, the plan will see continued development of the aircraft after the current Block 3 enhancement planned for the E/F variants of the Super Hornet which enters production in 2020. Speaking on the plan, Larry Burt, Director of Global Sales and Marketing for the Global Strike division, said that there “could well be lots of new capabilities added after Block 3.” [SP](#)

PHOTOGRAPHS: GA-ASI, USAF



JAGUAR UPGRADE NOW OR NEVER

Any further delay in the upgrade, especially re-engining of Jaguars will lose its purpose as the aircraft has 15-20 years of residual life

By ROHIT SRIVASTAVA

THE ANGLO-FRENCH FLEET OF THE SEPECAT JAGUAR DEEP penetration strike aircraft of the Indian Air Force (IAF) is one of its primary strike aircraft in the combat fleet. Out of the fleet of 140 aircraft acquired initially, currently around 125 remain in service. Inducted into the IAF some four decades back, it has undergone multiple upgrades in its avionics and weapons, keeping it relevant in its role for the IAF. However, the most important component of the aircraft, its engine, is yet to undergo upgradation.

The aircraft, powered by two Rolls-Royce's Adour Mk 811 turbofan engines, is underpowered and hence to improve its flight envelop which could allow it to operate in high operating environment such as in the mountains, a more powerful engine is required.

Since, its induction into the IAF, the aircraft has seen upgradation of its avionics, radar systems and integration of laser

guided and other modern weapons systems; but the need for new and significantly more powerful engines has remained unfulfilled.

The Jaguar fleet has completed more than 30 years of service with the IAF. It has no specified airframe calendar life and is only based on Fatigue Index. Based on the individual aircraft operational exploitation the fleet, it is believed that it has an approximate residual 15-20 years of airframe life. Modernization will add additional operational life to the aircraft for another 20 years. The decision to replace the engines must be made immediately. Any further delay in purchasing the engines will be useless.

The IAF is losing its fleet strength rapidly, but it has not been able to acquire replacement aircraft, except for the Russian Su-30 MKI which has been joining its fleets regularly. Had it not been for the Su-30 MKI, the IAF would have lost its fleet strength

as well as superior strike capability vis-à-vis its adversary. In the last two decades, instead of acquiring new combat aircraft, thanks to cumbersome acquisition process and budgetary shortages, the IAF has been forced to upgrade its legacy aircrafts including the Jaguar fleet.

UPGRADE BY HAL

HAL-built Jaguar's are fitted with the more advanced Display Attack and Ranging Inertial Navigation (DARIN) avionics suites. These include Head-UP Display, a GEC-Ferranti Combined Map & Electronic Display (COMED) 2045, a SAGEM ULISS 82 Inertial Navigation System and a Laser Ranger and Marked Target Seeker. The system also includes a locally-designed Identification Friend/Foe, Automatic Direction Finder, radar altimeter, U/VHF R/T sets and HF/SSB equipment. The maritime-attack Jaguar IM initially sported nose mounted Agave radar with display facility in either the Head-UP Display or the COMED. Capable of air-to-air operations as well, the Agave was optimised for maritime air-to-surface operations. Original Agave radar on 20 maritime strike role Jaguar's has been replaced by multirole ELTA EL/M-2032 (Not AESA) radar about 10 years back.

Currently, HAL is integrating the Jaguar's with DARIN III systems. The upgrade incorporates new state-of-the-art avionics architecture including the Open System Architecture Mission Computer (OSAMC), Engine & Flight Instrument System (EFIS), Fire Control Radar, State-of-the-Art Inertial Navigation System with GPS and Geodetic height correction, Solid State Digital Video Recording System (SSDVRS), Solid State Flight Data Recorder (SSFDR), Smart Multi-Function Display (SMD), Radio Altimeter with 20000 ft range, Autopilot with Alt Select & HNAV and Identification of Friend or Foe (IFF).

HAL is also integrating the Active Electronically Scanned Array (AESA) radar from Israel into the DARIN III aircraft. India has ordered 58 of these radars from ELTA, Israel. The first flight of the Jaguar with EL/M-2052 AESA radar was conducted in August, last year. These aircraft will also have smart CBU-105 Sensor Fuzed weapons.

RE-ENGINEING

On November 26, 2010, Ministry of Defence (MoD) issued a Request for Proposal (RFP) to two of the leading engine manufacturers, Rolls-Royce the original power plant provider and to the American engine manufacturer Honeywell for its F125IN. In response to the tender, Rolls-Royce initially offered the Adour Mk 821, an upgraded version of the existing engine Adour Mk 811, which delivers higher thrust. But this is not actually a new engine, but offered certain advantages such as proven technology and commonality with existing engine and also with the Adour Mk 871 turbofan fitted on the IAF's advanced jet trainer Hawk Mk132.

As reported earlier by SP's Aviation,



HONEYWELL F125N ENGINE

when compared with the engine currently fitted on the Jaguar, the F125IN turbofan from Honeywell delivers 30 percent higher thrust. Honeywell claims that the F125IN would offer a 9850lbf (43.8kN) thrust engine that will deliver high performance, "improved pilot safety, lower maintenance costs and outstanding reliability". Honeywell also claimed that the modular construction of the F125IN and its integral dual full authority digital engine control (FADEC) system would provide substantial savings to the operator in life-cycle costs. The engine is projected to save the Indian Air Force more than ₹7,000 crore in life-cycle costs compared to other upgrade options being considered. The F125IN permits the Jaguar to perform missions never before possible with the current engine.

It is however not clear whether or to what extent an ageing airframe will be able to fully and gainfully exploit the significantly higher level of thrust the two F125IN engines are capable of delivering. The improved thrust to weight ratio and maneuverability will surely increase the fatigue index counters.

The F125IN fitted on a Jaguar was successfully demonstrated to the IAF in 2007. Honeywell has moved forward since then acquiring its own Jaguar airframe and has completed design of its standard engines for production and is now ready for flight demonstration. Rolls-Royce opted to withdraw from the contest rather than be eliminated, resulting in a "single vendor situation". Now, as dictated by the provisions of the Defence Procurement Procedure (DPP), the MoD has been compelled to withdraw the RFP.

The 120 twin-engine Jaguar's will get new engines supplied by Honeywell, for an estimated \$3 billion. Each Honeywell F125N engine delivers 43.8 KiloNewtons (kN) of thrust, significantly higher than the 32.5 kN of the Jaguar's current Rolls-Royce engine. If this proposal of the Honeywell gets government approval, then the aircraft's range will go beyond 400 km and will also enable it to fly across the mountains with a higher rate of climb.

In the meantime, HAL, which has been upgrading the aircraft, reportedly, is also interested in doing the re-engining. They proposed to integrate the F125IN engines into the fighters with Honeywell as a consultant to the project. The F125IN Engine, based on off-the-shelf, in-service F125 engine, is expected to reduce the take-off distance of the Jaguar by over

30 percent and enhance mission capability above 30,000 feet. This engine is also expected to reduce the life cycle cost of the aircraft. In line with the 'Make in India' programme, Honeywell has planned to get 25 per cent of the engine components manufactured in India. They also intend to do all airframe modification, testing and certification in India.

In the meantime, as the spares production lines are getting closed, India is procuring 31 decommissioned Jaguar's from France for spares to keep the existing fleet flying. **SP**

The Jaguar have completed more than 30 years of service with IAF and most of the fleet does not have more than 15 years of airframe life

PHOTOGRAPH: SP GUIDE PUBS

A CONCRETE STEP TO ADDRESS PILOT SHORTAGE



The airline industry offers tremendous opportunity and job security for pilots, especially with such robust growth in air travel projected over the next twenty years

By **JOHN SLATTERY**
President & CEO, Embraer Commercial Aviation



ILLUSTRATION: ANOOP KAMATH

A SHORTAGE OF PILOTS IS A REAL THREAT TO THE AIRLINE industry, but the Air Carrier Training Rulemaking Committee (ACT ARC) of the Federal Aviation Agency (FAA) is finally proposing concrete steps to address the issue. Read more in my latest blog post. Last month, the FAA's ACT ARC issued its recommendations to provide an alternative pathway to the famous "1,500-hour rule." This does not solve the entire pilot shortage issue, but it is the biggest development in many years that goes a long way to help the situation.

A shortage of pilots is a real threat to the airline industry and it is already an issue in some world regions. Despite the US carriers being the most vocal, Chinese, European and Asian airlines are also working hard to staff their cockpits.

The International Civil Aviation Organisation (ICAO) predicts a need for around 5,00,000 new pilots in the next 15 years. That is roughly 20 per cent more than the current capacity to train them. On top of that, an ever-shrinking number of students are willing to take classes to become a pilot. According to the FAA of the United States (US) FAA, the number of pilot certificates issued to students shrunk an average of 2.7 per cent annually over the last five decades.

The shortage has already caused airlines to cancel hundreds of flights this year. Some communities lost air services completely which forced passengers to travel further just to get to a functioning airport. The Committee's proposed modification would allow new hires to obtain a certificate with restricted privileges after completing an Enhanced Qualifica-

tion Programme (EQP). With a predefined curriculum, the programme would be executed mostly by regional airlines with help from the FAA.

In short, this new way of thinking equates hours in classrooms and simulators with experience operating an aircraft by accumulating 'credits' to reduce the total number of required flight hours.

Two credit accounting methods were proposed:

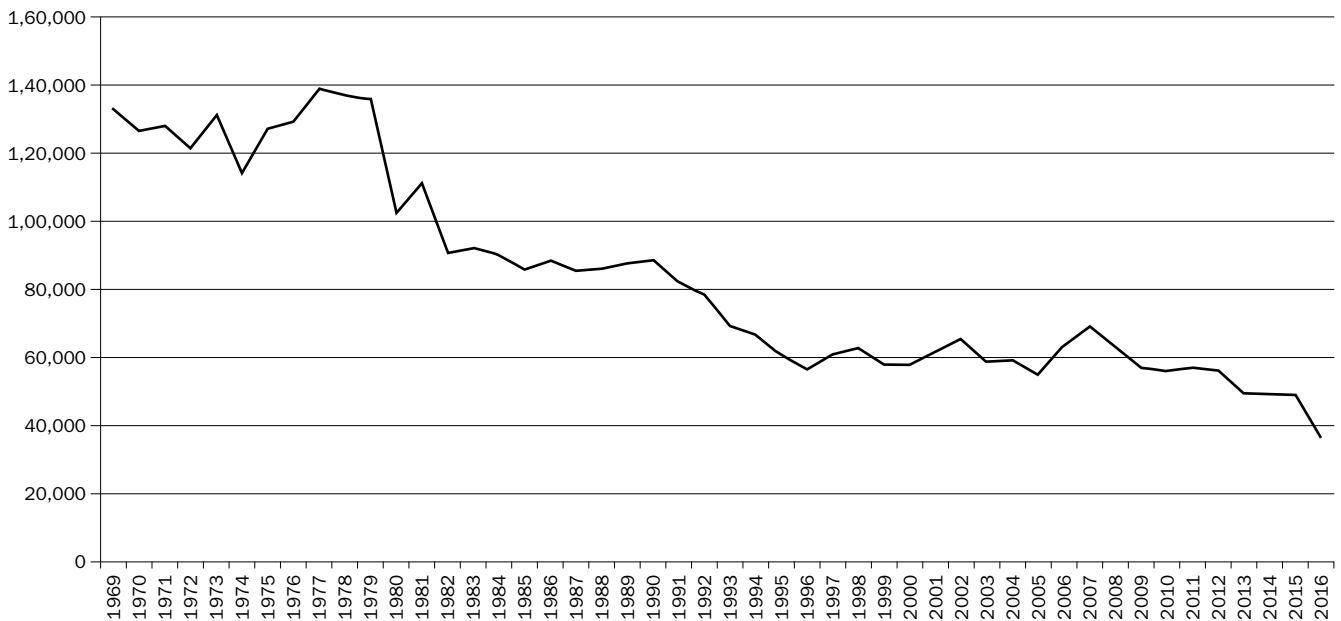
- 250 academic hours credited for every candidate that completes the EQP, effectively reducing the required flight hours by the same amount.
- 750 academic hours credited to candidates that complete the EQP, effectively reducing the required flight hours by 250 for candidates with military background, 500 flight hours for candidates with a four-year bachelor degree and 750 flight hours for candidates with two-year bachelor degree.

Airlines are also developing other alternatives to mitigate the problem. Some are working to attract new pilots at a much earlier age, even as early as high school. JetBlue Airways for example, has set up its own programme by offering internships for aspiring commercial pilots while students are at the university. United Airlines is linking up with flight training schools and developing career path programmes so that students have a job upon graduation.

Carriers are also offering generous signing bonuses, raising pay scales and improving benefits. One way to attract more pilots is to shorten the time to progress through training and to accu-

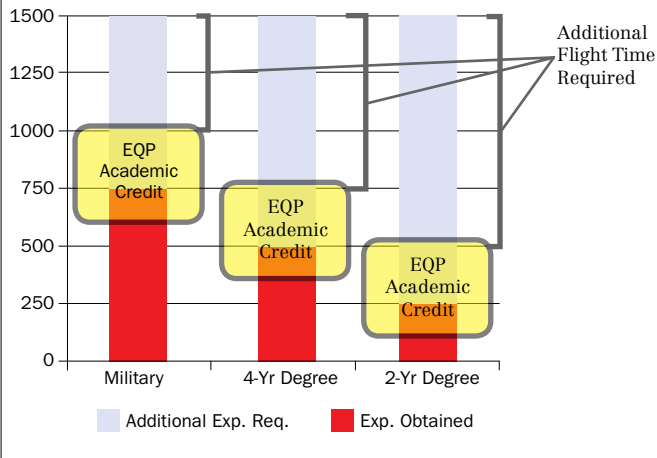
One way to attract more pilots is to shorten the time to progress through training and to accumulate qualifying hours

US STUDENT CERTIFICATES ISSUED

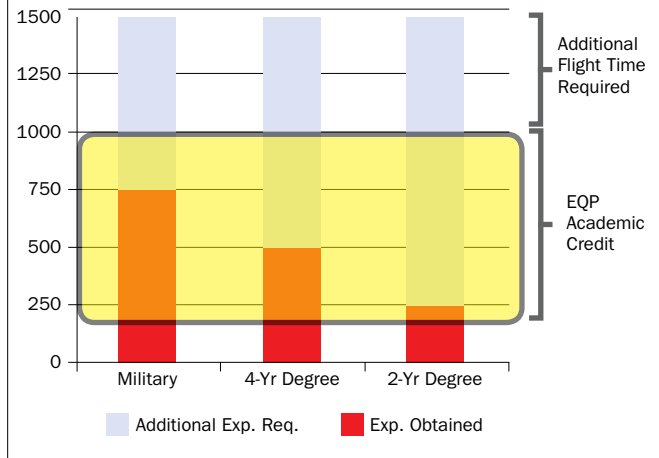


SOURCE: US CIVIL AIRMEN STATISTICS - FAA

EQP AERONAUTICAL EXPERIENCE CREDIT (METHOD 1)



EQP AERONAUTICAL EXPERIENCE CREDIT (METHOD 2)



multate qualifying hours. That time savings translates into cost savings for a new recruit and up to two years more time earning a career salary. That is a significant incentive.

There are encouraging signs that these initiatives are working, particularly in the USA. Airlines there are getting back on track to meet their future staff levels. I am optimistic that we, as

an industry, will find new ways to bring a whole new generation of pilots into the cockpits of our airplanes.

Flying is a fantastic career. If you are considering a future in the skies, the airline industry offers tremendous opportunity and job security for pilots, especially with such robust growth in air travel projected over the next twenty years. [SP](#)



PHOTOGRAPH: EMBRAER



◀ CAPTAIN G.R. GOPINATH, FOUNDER OF AIR DECCAN

AIR DECCAN'S G.R. GOPINATH: MAD SCIENTIST OR A BRILLIANT VISIONARY?

After revolutionising commercial aviation sector with ₹1 tickets and e-tickets, the pioneer of affordable flights may have bitten off more than he can chew with Air Deccan 2.0

By ARPITA KALA

THE FATHER OF LOW-COST CARRIERS (LCC) IN INDIA, CAPTAIN G.R. Gopinath, sure knows how to make a grand entry. The pioneer, who has been missing in action from the aviation scene for almost three years, has returned with Air Deccan and headline-making ₹1 fare. Though not in the forefront, the 66 year old had been operating charter services Deccan Charters from Bengaluru for over a decade after Air Deccan went under and is now poised to steal the limelight once again with his radical schemes.

FLIGHTS OF FANCY

Gopinath's comeback has also resulted in him being the poster boy for the government's UDAN (*Ude Desh Ka Aam Nagrik*) initiative that allows more people to use flying as a viable mode of travel. As the Minister of Finance Arun Jaitley aptly said, "The Airports Authority of India (AAI) has 124 airports, we propose to expand airport capacity to one billion trips a year. With this step, *hawai chappal* wearing citizens will be able to take the *hawai jahaaz*."

Air Deccan is one of the five carriers chosen under the initiative to utilise about 43 under-used airports in the Indian continent. Not only that, the scheme offers perks such as subsidy for 50 per cent of the seats on these routes, exclusive route monopoly for three years and other concessions at the landing airport.

Industry experts seem to be getting good vibes from UDAN with Faisal Ahmad, Founder and CEO of BIS Research saying, "As India look towards democratising air travel and making flying accessible and affordable for middle class, emerging technologies such as vertical take of landing (VTOL) can save millions of dollars on investment on airport expansion and flight acquisition in the coming years. Leading aircraft company Boeing, has already filed a patent in June 2015 for VTOL aircraft with seating capacity of 100 passengers. Similarly, Airbus is expected to pilot test its electric and autonomous personal aircraft, Vahana in the first quarter of 2018. With India becoming the fastest growing domestic aviation market globally in terms of number of domestic tickets sold, this could be a potential avenue for the Indian government to look at in terms of saving cost and fighting traffic congestion. Not just aircraft, even flying cars could be the future of transport."

GETTING REAL

Air Deccan undertook its first flight on the Mumbai-Jalgaon route on December 22, 2017, almost two months later than the September 2017 deadline set by the Ministry of Civil Aviation and that was not the only delay. The maiden flight took off an hour and half later than its scheduled 1.20 p.m. departure. While a



AIR DECCAN PLANS TO RESUME OPERATIONS WITH THE 19-SEATER BEECHCRAFT 1900D

few lucky travelers may have snagged the Re one fare, for the Jalgaon flight, fares were pegged at ₹2,250 for 50 per cent of the seats. The ticket price for the remaining will be ₹4,500 per seat. Typically, the airlines reserve three to five per cent of their seats for such flash sales and since the passenger load factor is never 100 per cent, this helps in filling up empty seats.

However, it should be noted that the fare-related gimmicks were touted as a major reason for the financial strain that forced Gopinath to sell Deccan to Kingfisher's Vijay Mallya, which in hindsight, was not a good move at all. Moreover, the airline is still in the process of negotiating with the Delhi and Mumbai airports for landing and parking slots. This is crucial since without connectivity with metro airports, it is economically unviable to operate on regional routes. Even Amitabh Khosla, Country Director, India, International Air Transport Association (IATA), has expressed doubts over the airport infrastructure. He says, "In our 20-year passenger forecasts, IATA anticipates India will become the third largest aviation market by 2024. But this is by no means guaranteed. To make this a reality, airport capacity in India needs to be augmented and expanded quickly. IATA has earlier recommended and is supportive of leveraging AAI's balance sheet for infrastructure creation and expansion. But the big question mark on capacity and a critical area of concern for IATA, continues to be the Mumbai airport. The new international airport at Navi Mumbai is still a distant dream. In the meantime, Mumbai continues to fall behind in aviation activity and the state of Maharashtra is unable to fully exploit the economic potential that can be delivered by the aviation

industry. We urge the government to urgently look at innovative approaches to bridge the infrastructure shortfall."

STRIKE TWO FOR CAPTAIN

For its fresh aviation stint, Air Deccan plans to resume operations with the 19-seater Beechcraft 1900D, a turboprop aircraft that was abandoned by the firm in 2007 in favour of the newer and more cost-efficient ATR 72 series. Also, unlike the previous fleet of 43 aircraft, the firm seems to be treading cautiously with plans to have a four-aircraft strong fleet with one kept on standby.

Gopinath's target audience remains skeptical on the social media sites such as Twitter, egging him on to have an airline service that should focus on sectors which require more than an overnight journey by train and that there should be daily flights between these city pairs. He, however remains unfazed and may we say undeterred as he quotes American theoretical physicist Richard Feynman on his social media handles, calling his lectures 'need of the hour for the country.' A week after Air Deccan's maiden stint, he entered the New Year with these wise words to his followers, "Feynman says 'doubt and discussion are essential to progress and comes out of a satisfactory philosophy of ignorance.'"

While his tweets may be worse than his bite, it remains yet to be seen if Air Deccan 2.0 lives up to its hype after the first flight. A retired army officer, Gopinath, has a lot riding on this deal since he has publically announced plans to hang up his flying boots after this stint. With the fiscal budget allocating ₹1,014.09 crore for UDAN, all eyes are stuck on Gopinath's second innings. **SP**

Unlike the previous fleet of 43 aircraft, Air Deccan seems to be treading cautiously with plans to have a four-aircraft strong fleet with one kept on standby



KELLY JOHNSON (1910-1990)

Johnson’s method was to assemble an exceedingly small team of elite engineers in close proximity in an environment where innovation, creativity and productivity could flourish

IN JUNE 1943, WITH WORLD WAR II IN FULL SWING, IN BURBANK, California, representatives of the United States Army Air Force (USAAF) approached Lockheed Aircraft Corporation with an urgent request for a new jet fighter. One month later, Lockheed’s young engineer Clarence “Kelly” Johnson and his team were ready with their proposed design. However, four months of military-bureaucratic hemming and hawing followed. When the contract finally came, the schedule was tight – 150 days. Lockheed already had its hands full, churning out aircraft by the thousands for the war. However, despite the busy schedule, Johnson’s hand-picked team of designers and engineers produced the Lockheed P-80 Shooting Star, the first operational jet fighter of the USAAF, in 143 days.

Kelly Johnson was born in Michigan on February 27, 1910. His first brush with aviation came at age 13, when he won a prize for his aircraft design. That is when he decided he wanted nothing better than to make aircraft. However, when he applied to Lockheed for a job in 1932, it was turned down. He returned a year later armed with a Master’s Degree in Aeronautical Engineering and was hired as a tool designer. His first major success came in the late 1930s when he developed the P-38 Lightning which became one of the more significant fighters of World War II. Johnson worked for over four decades in Lockheed’s Skunk Works and played a major part in the design of about 40 famous aircraft, with more than half being of his original designs. Two aircraft bagged the US National Aeronautic Association’s prestigious Collier Trophy.

But the crowning glory of Johnson’s Skunk Works was the SR-71 Blackbird. This long-range, Mach 3+ strategic reconnaissance aircraft built for the USAF was packed with innovations. It was specifically meant to fly so high and so fast that it could not be shot down. One major problem the talented design team had to face was that of aerodynamic heating which would soften and wrinkle an ordinary aluminium airframe. The other challenge was to build a jet engine capable of operating in the rarefied atmosphere at 80,000 feet. The Blackbird was one of the first aircraft to incorporate a low radar cross-section so as to ensure that hostile radars would have little or no time to acquire and track it and to launch a missile against it. Indeed, if a surface-to-air missile launch was detected, the pilot had to simply accelerate and outrun the weapon. Although over half a century has passed

since the SR-71’s first test flight in December 1964, it still holds the record for the fastest air-breathing manned aircraft ever.

Lockheed’s Skunk Works came up with some of the most iconic military aircraft of the times including the Lockheed U-2 Dragon Lady, an ultra-high altitude reconnaissance aircraft which was the world’s first dedicated spy plane. It was built in eight months and some variants are still in service. Skunk Works began as an informal company, but later became a trademarked designation. It originated due to the stench from a nearby plastic factory that filled the air. Nowadays a ‘skunk works project’ refers to a radical or innovative project secretly researched and developed by a small group of people.

Johnson’s method was to assemble an exceedingly small team of elite engineers in close proximity in an environment where innovation, creativity and productivity could flourish and shroud the project in complete secrecy till the finished product emerged. This was firstly to prevent rivals from getting wind of the project and secondly to preclude customers interfering with the design or attempting to modify it. Benjamin Rich, who succeeded Kelly at Skunk Works, put it thus: “We became the most successful advanced projects company in the world by hiring talented people, paying them well and motivating them into believing that they could produce a Mach-3 airplane like the Blackbird a generation or two ahead of anybody else.”

Kelly Johnson was arguably the most gifted, effective and respected aircraft design engineer in the history of aviation. He loathed committees, bureaucrats and minutely detailed specifications, preferring to give his team a free hand to come up with the best. To this end, he ran Skunk Works by “Kelly’s 14 Rules” one of which was “There must be a minimum number of reports required, but important work must be recorded thoroughly.” His management style was summed up by his motto, “Be quick, be quiet and be on time.” In 1958 he became Vice President of Lockheed’s Advanced Development Programmes. Later, he was offered the position of company President thrice, but he preferred to continue overseeing Skunk Works, where he could do what he loved – organising and extracting the best out of his aircraft design teams. Kelly Johnson died on December 21, 1990, after prolonged illness. SP

— JOSEPH NORONHA



MILITARY

ASIA PACIFIC

RUSSIAN PGMS FOR INDIA

Raksha Mantri Nirmala Sitharaman has cleared the procurement of 240 bombs, at a cost of ₹1254 crore from M/s JSC Rosonboron Exports, Russia. These bombs, which fall under the category of Precision Guided Munitions, will be used by Indian Air Force (IAF). This procurement will address the deficiency of Precision Guided Munitions in the IAF arsenal, besides enhancing its offensive capabilities.

INDIA'S MOST LETHAL MISSILE AGNI-V SUCCESSFULLY TEST-FIRED



On January 18, 2018, India has successfully test-fired its most lethal, indigenously-designed and built 5000km range intercontinental, surface-to-surface, nuclear-capable ballistic missile Agni-V. The Agni-V missile was test-fired from the Abdul Kalam Island defence test facility off the Odisha coast. This test was Agni-V missile's first user trial which would eventually pave the way for its induction into the Strategic Forces Command (SFC) and also conducted by them. Agni-V was successfully test-fired last time on December 26, 2016. This missile has been tested four times so far. Two of the tests have been conducted from a canister on a road mobile launcher. All the four missions have been successful.

BRAHMOS SUPERSONIC CRUISE MISSILE

India plans to test an extended-range variant of its BrahMos supersonic cruise missile by the end of this year. New Delhi has already tested a 400km variant of the missile, but since joining the Missile Technology Control Regime in June 2016, has been working on producing a variant with a range of 800km. Coming in land, naval and air-launched variants, India successfully tested the missile from a configured Su-30 fighter for the first time against a target in the Bay of Bengal in November 2017.

RUSSIA RELEASES INFOGRAPHIC ON SUKHOI SU-57 FIGHTER

The PAK FA Programme involves the design, production and delivery of a fifth-generation fighter aircraft to the Russian Air Force which will increase its combat potential. This will also bring aircraft production and related industries to a new level of production and technology.

ADDITIONAL CONTRACT FOR F-35

Amid fresh UN-imposed sanctions on North Korea and further bellicose threats made by Pyongyang, Japanese and South Korean media have reported that their respective governments are considering additional F-35 Joint Strike Fighter orders. South Korea has established a process for procuring 20 additional F-35A fighters, adding to the 40 already ordered in 2014. Meanwhile, Tokyo may order the Short Takeoff and Vertical Landing variant of the next-generation fighter, the F-35B, which would allow the Japan Air Self-Defence Force to operate the aircraft from shorter runways as well as on board its Izumo-class helicopter destroyers, which could be retrofitted with ski-jumps and upgraded aviation fuel storage facilities to allow the aircraft operate off its deck.

ASTRA BEYOND VISUAL RANGE AIR TO AIR MISSILE (BVRAAM) FOR UAE

The UAE has expressed interest in purchasing India's indigenous Astra BVRAAM to arm its fleet of Mirage 2000-9 fighter aircraft. India has already integrated the missile on its fleet of Su-30MKI aircraft and work will now take place on integrating the Astra on IAF's Mirage 2000 fighters. The prospective sale is one of several defence deals New Delhi is chasing in the region, with ongoing effort to manufacture arms and equipment in a joint venture with Saudi Arabia and Jordan who are also looking Indian-developed defence equipment.

RFP FOR TEJAS

Hindustan Aeronautics Ltd (HAL) has received a RFP from the IAF for 83 Tejas Mk-1A light combat aircraft (LCA). The RFP comes following the November 2016 clearance for funds for the programme by India's Defence Acquisition Council, with production orders expected to be placed in late 2018. The Mk-1A variant is a significantly modified version of the initial Tejas Mk-1 LCA and will come equipped with the Israeli Elta 2052 AESA radar, podded Electronic Warfare suite and Cobham in-flight refuelling probe. Also in the mix are the addition

QUICK ROUNDUP

AIRBUS

Airbus' Commercial Aircraft deliveries in 2017 were up for the 15th year in a row, reaching a new record of 718 aircraft delivered to 85 customers. Deliveries were more than four percent higher than the previous record of 688 set in 2016. Airbus achieved 1,109 net orders from 44 customers. At the end of 2017 Airbus' overall backlog stood at 7,265 aircraft valued at \$1.059 trillion at list prices.

Airbus made its first A400M Atlas transport aircraft delivery of 2018 with the number of deliveries of the Atlas made by the firm now standing at 56. The aircraft was delivered to the German Air Force, bringing to 15 the total number now operated by Berlin out of a total order of 53 units ordered.

Following an MoU signed at Le Bourget Paris Airshow in June 2017, Viva Air, the Latin America low cost carrier group owned by Irelandia Aviation, has signed a purchase agreement with Airbus for 50 A320 Family aircraft. The 35 A320neo and 15 A320ceo will be operated by the group's airlines Viva Colombia and Viva Air Peru.

Airbus has announced that it had finalised agreements with Indigo Partners and its four portfolio airlines for the purchase of 430 additional A320neo Family aircraft for ultra-low-cost airlines Frontier Airlines (US), JetSMART (Chile), Volaris (Mexico) and Wizz Air (Hungary). The signed purchase agreement follows a MoU among the parties announced at the Dubai Air Show in November 2017.

BOEING

Boeing has unveiled its Mach 5 hypersonic demonstrator concept, dubbed the 'Son of Blackbird', the aircraft features a delta-wing and builds on the two decades of hypersonic demonstrator experience Boeing gained from the X-43 and X-51A projects, as well as the XB-70 bomber programme. The design is aimed at also providing a hypersonic successor to the long-retired SR-71 Blackbird reconnaissance aircraft, aimed for the late 2020s.

Boeing has unfurled a new unmanned electric vertical takeoff and landing (eVTOL) cargo air vehicle prototype. Powered by an environmentally-friendly electric propulsion system with eight counter rotating blades allowing for vertical flight, the vehicle is designed to transport a payload up to 500 pounds and will aid in future cargo and logistic applications. The eVTOL will be used as a flying test-bed to mature the building blocks of autonomous technology for future applications.

Boeing and flydubai have finalised the purchase of 175 Boeing 737 MAX airplanes in the largest single-aisle jet order in Middle East history. The deal which includes options for an additional 50 jets, is valued at \$27 billion at current list prices. This was announced as a commitment at the 2017 Dubai Airshow.

The Boeing Company and Brazil's Embraer have confirmed that the two companies are engaged in discussions regarding a potential combination, the basis of which remains under discussion. There is no guarantee a transaction will result from these discussions.

QUICKROUNDUP

EMBRAER

Embraer has delivered a total of 210 jets in 2017, of which 101 were commercial aircraft and 109 were executive jets (72 light and 37 large). The deliveries were within the anticipated figures for the year. As of December 31, 2017, the firm order backlog totaled \$18.3 billion.

GENERAL ELECTRIC

General Electric will provide its services in support of F/A-18 E-F Super Hornet and EA-18G Growler aircraft. The \$74 million contract has been awarded by the Naval Supply Systems Command Weapon Systems Support. The six month agreement, scheduled to be finished in June, tasks GE with the supply of 773 F414 engine components used on the Boeing-made aircraft, with work to be carried out at various GE supplier locations.

JAPAN

Work is to begin on producing Japan's first KC-46 tanker aircraft, following the \$289 million USAF firm-fixed-price contract awarded to Boeing to deliver one unit to Tokyo. The contract provides for non-recurring engineering, integrated logistics support and one KC-46A aircraft and is a 100 percent FMS to the Japanese government. Work is to be completed by February 28, 2021.

LOCKHEED MARTIN

Lockheed Martin has been awarded a \$7 billion contract to provide F-22 Raptor sustainment services. The agreement has a five-year base ordering period calling for comprehensive F-22 air vehicle sustainment to be completed by December 31 2027. The deal follows the recent \$6.7 billion award to United Technologies for sustainment activities on the Raptor's Pratt and Whitney F-119 engine.

NORTHROP GRUMMAN

Northrop Grumman, California, has been awarded a \$172,669,763 cost-plus-fixed-fee contract for Battlefield Airborne Communications Node (BACN). This contract provides BACN payload operation and support for payload equipment and services. Work is expected to be completed by January 23, 2019.

RAYTHEON

Raytheon Missile Company, Arizona, has been awarded a \$634,204,347 fixed-price-incentive-firm-target contract for Advanced Medium-Range Air-to-Air Missile (AMRAAM) production Lot 31. The contract is for the production of the AMRAAM missile and other AMRAAM system items. Work is expected to be completed by January 31, 2020. This contract involves FMS to Japan, Korea, Morocco, Poland, Indonesia, Romania, Spain, Turkey, Bahrain and Qatar.

RUSSIA

Russian daily Kommersant reports that the Russian Defence Ministry has reached an agreement with Myanmar for the sale of six Su-30SME fighter aircraft. While many details

of new air-to-air missiles and precision munitions, in addition to the R-73 and Rafael Derby BVRAAM, already integrated on Tejas Mk-1.

DRDO SUCCESSFULLY CONDUCTS INTERCEPTOR MISSILE TEST

Ballistic Missile Defence (BMD) System of DRDO has successfully scored a direct hit on incoming missile on December 28, 2017 from Dr Abdul Kalam Island off the coast of Odisha. The interceptor directly hit the target at an altitude of about 15 kilometres and destroyed it. Today's direct interception is fourth in a row, where the missiles have scored a perfect hit on the incoming missile. It was witnessed by Vice Chief of Air Staff Air Marshal Sirish Deo and other senior officials of the armed forces. Directors of DRDO laboratories namely RCI, ASL, LRDE and ITR reviewed the entire launch operations.

Raksha Mantri Nirmala Sitharaman congratulated DRDO for elevating the country to few select nations having such BMD capability.

CHINA'S WING LOONG II RECONNAISSANCE-CUM-ARMED UAV

A recent flight by the Aviation Industry Corporation of China's Wing Loong II has set a new record with the UAV hitting five successive targets with five separate types of missiles. With its first flight taking place in February last year, the newly-developed reconnaissance-strike-integrated UAV has conducted firing tests with eight types of missiles and dozens of bombs, with a hit rate of 100 percent, according to the Xinhua news agency. Since this maiden flight, the drone has been hyped as potential best seller on the export market, offering a cheaper alternative to its rival, the General Atomics MQ-9 Reaper.

APPOINTMENTS

AIRBUS CHINA

Eric Chen, previously President of Airbus Commercial Aircraft China, succeeds Laurence Barron as Chairman of Airbus China.

George Xu has been appointed CEO of Airbus China.

ATR

Frédéric Torrea, 53, has been appointed Corporate Secretary and General Counsel of ATR in addition to his duties as General Counsel of ATR since 2009 and Chief Compliance Officer since 2015.

COUNCIL OF FRENCH DEFENCE INDUSTRIES

Éric Trappier, Chairman and CEO of Dassault Aviation, President and Chairman of the Board of ASD and President of GIFAS, was appointed Chairman of Council of French Defence Industries.

DASSAULT AIRCRAFT SERVICES

Remy St-Martin has been promoted to the post of Senior Vice President/Chief Operating Officer of Dassault Aircraft Services, Dassault's company-owned service centre network for the Americas.

HARRIS CORPORATION

Harris Corporation has named retired

US Army Major General Jeff Smith Vice President of Business Development, supporting the company's strategic relationships with the US Army, US Special Operations Command and other key industry partners.

ISRO

The appointments Committee of the Cabinet has appointed Dr Sivan K as Secretary, Department of Space and Chairman Space Commission Commission vice Dr A.S. Kiran Kumar with a tenure of three years from the date of assumption of charge of the post.

LOCKHEED MARTIN

Lockheed Martin's Board of Directors has approved the appointment of Richard Edwards as Executive Vice President, Lockheed Martin International and Frank St John as Executive Vice President, Missiles and Fire Control.

SAFRAN TRANSMISSION SYSTEMS

Hélène Moreau-Leroy has been named Director of the Zodiac Integration Project.

Franck Saudo has been named CEO of Safran Transmission Systems, taking over for Hélène Moreau-Leroy.

RFP FOR INDIGENOUS LIGHT COMBAT HELICOPTER

HAL has received a RFP from the IAF and the Indian Army for 15 Light Combat Helicopters (LCH). The LCH is a 5.5-tonne class, combat helicopter designed and developed by HAL. It is powered by two Shakti engines and inherits several technical features of the Advanced Light Helicopter. The features that are unique to LCH are sleek and narrow fuselage, tri-cycle crashworthy landing gear, crashworthy and self-sealing fuel tanks, armour protection and low visibility features which makes the LCH lethal, agile and survivable. Presently, four technology demonstrators are under flight testing. LCH has the distinction of being the first attack helicopter to land at Forward Bases in Siachen, 5400m above sea level.

AMERICAS

ROYAL SAUDI AIR FORCE (RSAF) CONTRACT FOR BOEING

Boeing is to carry out repair and support services for the RSAF following the award of a US Air Force \$480.4 million fixed-price-incentive-firm contract which comes as a 100 percent FMS to the Gulf kingdom and includes a 24-month base period, with five 12-month option and one six-month option period to continue repair services and support between Boeing and the RSAF. The deal includes the logistical in-Kingdom repair and return of parts for F-15C/D/S/SA fleets and repair of aerospace ground equipment, hush house/open air test cell equipment for the RSAF F-15 programme. Work is expected to be completed by June 25, 2025.

SHOW CALENDAR

6–11 February
SINGAPORE AIRSHOW
Changi Exhibition Centre, Singapore
www.singaporeairshow.com

26 February–1 March
HAI HELI-EXPO
Las Vegas Convention Centre, Las Vegas, NV, USA
<http://heliexpo.rotor.org>

8–11 March
WINGS INDIA 2018
Begumpet Airport, Hyderabad, India
www.wings-india.in

BOEING CONTRACT FOR QATAR

Boeing has been awarded a \$6.1 billion USAF contract as part of Qatar's F-15 programme. The deal provides for the FMS requirement to procure 36 new F-15QA aircraft for the Qatar Emiri Air Force as is part of a sole-source acquisition. Deliveries will be completed by December 30, 2022. The announcement covers half of Qatar's order for 72 F-15QAs and follows a \$1.1 billion award last month for F-15QA support services, as well as an \$8 billion agreement with the UK for 24 Eurofighter Typhoon jets. The contracts come as Qatar finds itself under blockade by Saudi Arabia and its neighboring countries, who accuse Doha for supporting and financing terrorism, stemming from its support for the Muslim Brotherhood.

INDUSTRY

AMERICAS

MISSILE DEFENCE AGENCY (MDA) ORDERS THAAD

MDA has almost tripled its production orders for Terminal High Altitude Area Defence (THAAD) interceptors from the system's manufacturer, Lockheed Martin. Valued at \$553.1 million, the modification has increased the total value of the contract from \$273.4 million to \$826.6 million and calls for the production and delivery of Lot 9 and Lot 10 interceptors, one-shot devices and provide associated production support efforts under fixed-price-incentive-firm target contract line item numbers. Work is expected to be completed by December 24, 2020.

SPACE

ASIA PACIFIC

ISRO LAUNCHES 100TH SATELLITE

The Indian Space Research Organisation (ISRO) successfully placed into orbit its 100th satellite "Cartosat 2" on January 12, 2018. The Cartosat 2 satellite was the main payload of ISRO Polar Satellite Launch Vehicle (PSLV) which carried India's 100th satellite along with 30 others. The surveillance satellite from the "Cartosat 2" series for earth observation will keep an eye on India's neighbours. The Cartosat is expected to help monitor and boost data services for coasts, road networks, water distribution, and land-use mapping. The PSLV also carried satellites from Canada, Finland, France, Republic of Korea, UK and the US. The total weight of all the 31 satellites carried on-board PSLV-C40 was about 1,323kg. ●

QUICK ROUNDUP

of the sale including a financial package to help cover the purchase, have yet to be decided, the order is valued at \$400 million with deliveries to commence in 2019.

SIKORSKY

Sikorsky, a Lockheed Martin Company, Connecticut, was awarded a \$193,850,000 firm-fixed-price FNS (Saudi Arabia) contract for eight Saudi Arabian National Guard and nine Royal Saudi Land Forces Airborne Special Security Forces unique UH-60M aircraft. Estimated completion date is December 31, 2022.

SOUTH KOREA MARINE CORPS

South Korea's Marine Corps has received delivery of its first two MUH-1 multi-role utility helicopters. Based on KAI's KUH-1 Surion, the new variant features an external fuel tank, specialized radio equipment, flotation devices etc. 32 units have been ordered and deliveries are expected to continue to until 2023, at least.

USAF

The US Air Force has awarded General Atomics a \$328.8 million contract for MQ-1 Predator and MQ-9 Reaper remotely piloted aircraft support and services. Work is expected to be completed by December 2018.

The USAF has awarded Boeing with a \$17.5 million contract modification to provide engineering sustainment support onboard C/KC-135 Stratotanker aerial refueling aircraft; which includes airframe components, mechanical and electrical systems, as well as subsystems and their components. Completion date is September 13, 2019.

US DOD

Egypt's AH-64 Apache helicopter fleet will be fitted with Modernised Target Acquisition Designation Sight/Pilot Night Vision Sensor System (M-TADS/PNVS) kits, following the award of a FMS contract modification by the US Department of Defence (DoD) to Lockheed Martin for \$25 million. Work is expected to be completed by April 30, 2020.

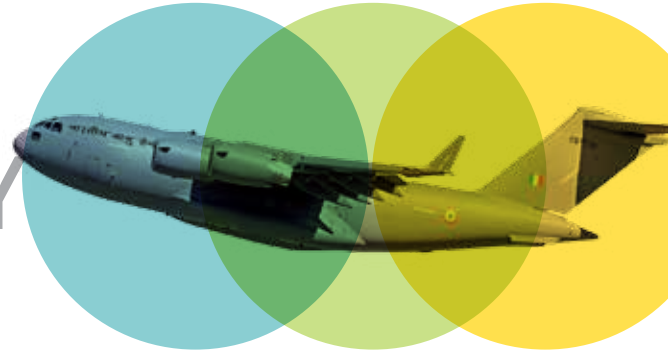
US NAVY

US Navy and Australian government P-8A Poseidon maritime patrol aircraft (MPA) will have integrated logistics services and site activation support provided by the aircraft's manufacturer Boeing, following the award of a \$115.2 million contract modification issued by the Naval Air Systems Command. Scheduled completion is set for September 2021.

US MARINE CORPS

Surplus AH-1W Super Cobra attack helicopters previously used by the US Marine Corps are being offered for sale by the US government, either through a FMS or Direct Commercial Sale. Prior to any sale, the helicopters will be fitted with a new 'glass' cockpit and pilot/maintainer training will be provided to prospective customers.

AN OPPORTUNITY SQUANDERED



Delays in taking decisions in the procurement of military hardware has adverse effect on the modernisation process of the Indian armed forces which in turn has implications for national security

By AIR MARSHAL B.K. PANDEY (RETD)

IN THE MIDDLE OF 2016, THE DEFENCE ACQUISITION COUNCIL (DAC) under the Chairmanship of Manohar Parrikar, the then Minister of Defence, cleared the proposal put forward by the Indian Air Force (IAF) to purchase one C-17 Globemaster III strategic airlift aircraft. This will enhance the strength of the existing fleet of the C-17 with the IAF to 11. In June 2017, the US Department of State approved the potential sale of one C-17 to India for \$366 million under the FMS programme. The approval covered supply of spare parts and product support as was the case with the contract for the initial 10 aircraft.

BACKGROUND

In June 2009, the IAF had put forward a proposal to the Ministry of Defence (MoD) to procure ten C-17 Globemaster III heavy-lift aircraft along with associated equipment, from Boeing, the aerospace giant of the United States (US). This induction was planned as a part of the modernisation drive that the IAF had embarked upon to upgrade its strategic airlift capability as also to replace the ageing fleet of IL-76 strategic airlift aircraft acquired from the then Soviet Union in the mid 1980s. The government accorded approval to the proposal in June 2011. This procurement at the cost of \$4.1 billion, was effected through the Foreign Military Sales (FMS) programme of the US government thus obviating the need for a tendering process under the Defence Procurement Procedure (DPP) that is tedious and invariably long-drawn. Also, the contract had an in-built provision for a follow-on order for six more platforms. The first of the ten aircraft contracted for arrived in India on June 18, 2013 and the delivery of all ten was completed by early 2015. A new Squadron designated as 81 Skyloids under Western Air Command of the IAF, was raised at Air Force Station, Hindon, to operate the newly inducted platforms.

THE PLATFORM

The C-17 Globemaster III is a four-engine large military transport aircraft with a payload capacity of 77.5 tonnes. It has a cruise speed of 0.74 Mach or 829 kmph, can climb to an altitude of 45,000 feet above mean sea level and has a range of over 10,000 km. This aircraft was developed for the United States Air Force (USAF) in the early 1990s by the then McDonnell Douglas and was designed to replace the ageing fleets of two other large size military transport aircraft in the USAF namely the C-141 Starlifter and the C-5 Galaxy. After the merger of the major competitor Boeing with McDonnell Douglas in 1997, the for-

mer took on the task of further development and manufacture of the C-17 which, apart from the USAF, was supplied to the United Kingdom, Australia, Canada, Qatar, United Arab Emirates, NATO Heavy Airlift Wing, Kuwait and India. The last C-17 that was manufactured at the plant in Long Beach, California, rolled out in November 2015. In all the plant had manufactured over 250 C-17s.

For India, the aircraft provides global reach and is indeed a “game changer” as described by the former Chief of the Air Staff Air Chief Marshal N.A.K. Browne. Since the arrival of the first aircraft in 2013, the IAF has been undertaking tasks globally related to disaster management and has also been participating in joint air exercises with other major air forces of the world. If the planned induction of 16 C-17 Globemaster III aircraft into the IAF had gone through successfully, India would have been one of the largest operators of this platform outside the US. Unfortunately, it was not to be so.

IAF’S QUEST FOR MORE C-17S

In 2012, the IAF had finalised plans to buy six more C-17 Globemaster III aircraft during the 13th five year plan period 2017-22. However, on November 29, 2015, Boeing made public its intention to shut down the plant in California producing the C-17s after the last aircraft on the assembly line was rolled out. This decision was taken by Boeing primarily on account of lack of orders for the platform. At the time of closure of the plant in 2015, Boeing was left with 10 aircraft that were available for sale. Being aware of India’s intention to buy another six C-17 aircraft, the US aerospace major communicated its plans to discontinue production and advised the MoD to decide quickly and take appropriate follow up action without undue delay to process the case for procurement of six C-17 aircraft. Unfortunately, as has often been the case, the MoD failed to provide a timely response to the evolving situation leading to delayed decision-making. Meanwhile other customers picked up nine out of the ten platforms available leaving just one for the IAF. Qatar was the last nation to pick up four. For the IAF it was clearly a case of an opportunity lost.

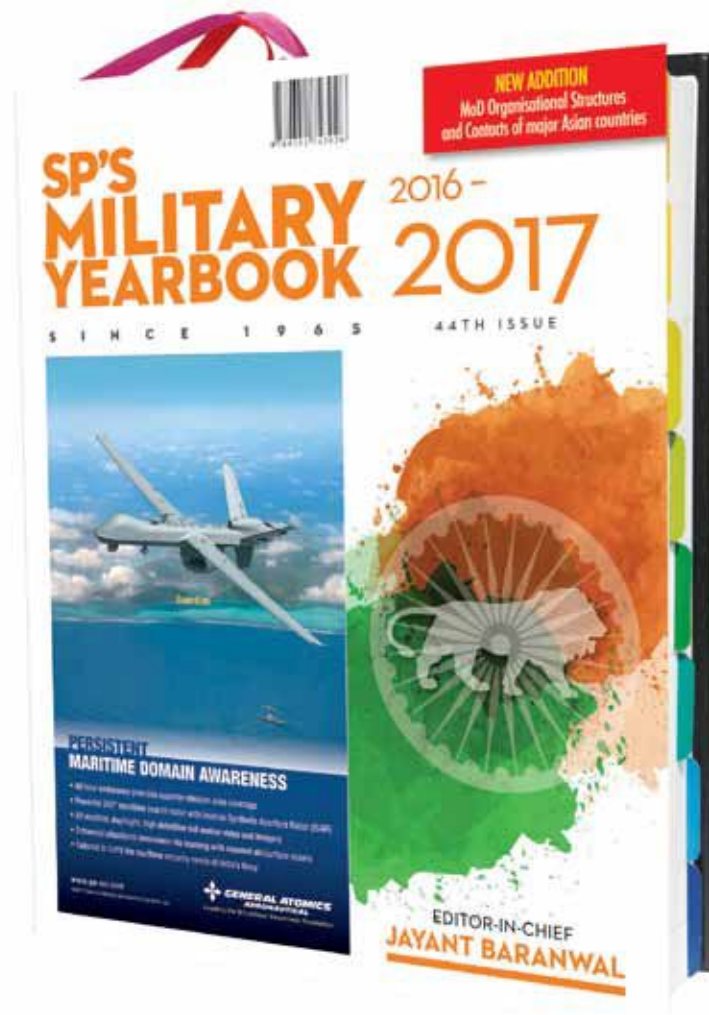
The experience of the IAF with the project to enhance the size of the C-17 Globemaster III fleet, clearly highlights the need for speed in decision-making. Delays in taking decisions in the procurement of military hardware has adverse effect on the modernisation process of the Indian armed forces which in turn has implications for national security. ^{SP}



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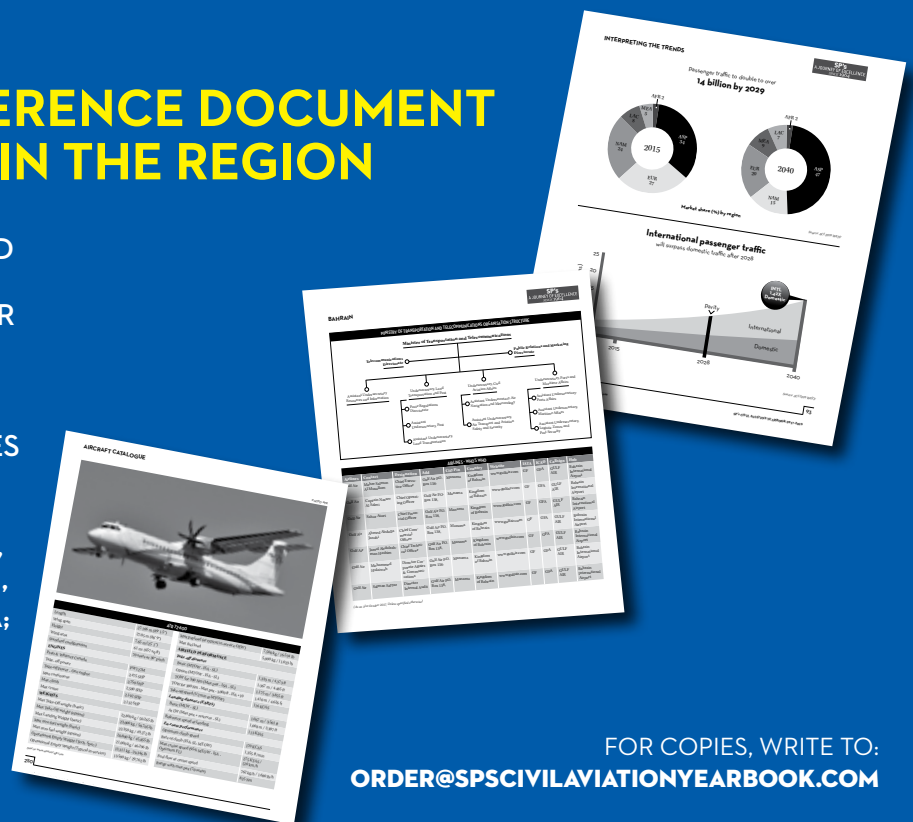
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