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AIR TRANSPORT: SENSIBLE AND SAFE

SAFETY: EMERGENCY IN FLIGHT

SHOW REPORT: AERO INDIA 2013

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AIR TRANSPORT / SAFETY

△ P26 **EMERGENCY IN FLIGHT**

Incapacitation of the pilot in command of an airliner is definitely alarming to the passengers, the regulatory authority and, of course, the medical system.

AIR TRANSPORT / TRAINING

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CRM is a concept that recognises the critical role of human factors in determining the effectiveness of technically proficient crew in both normal and non-normal situations and provides practical options which can bring about attitudinal/behavioural change.



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With its path-breaking technology and maintenance cost advantage combined with higher efficiency and more than 3,000 firm orders, the GTF engine is likely to be a game changer, a winner and an engine of choice for the decades ahead.

INTERVIEW / INDUSTRY

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Filippo Bagnato, Chief Executive Officer, ATR, speaks to Vasuki Prasad of *SP's AirBuz* on products from ATR and the Indian market.



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△ P29 **BRAZILIAN BIRDS SIGHTED IN BANGLADESH**

NOVOAIR is on course to showcase how regional jets can bring greater convenience for passengers and help airlines tap the expected growth in domestic air travel.



Cover:
CRM training is crucial for flight crew, aviation's last line of defence in preventing accidents.

Cover Image: Boeing

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SP's AIRBUZ

AN EXCLUSIVE MAGAZINE ON CIVIL AVIATION FROM INDIA

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T APPEARS THAT KINGFISHER Airlines, the “glamour boy” of the airline industry, is unlikely to take to the skies again. The near certain demise of the domestic carrier that had set new standards in the airline industry has not only been traumatic but indeed somewhat puzzling. It is difficult to explain how a showpiece of a global business empire that has enormous resources at its disposal was allowed to crumble. Tragically, it has left hundreds of highly qualified professionals in the lurch aggravating the situation in the already saturated job market. Even measures by the government in respect of foreign direct investment and import of aviation turbine fuel directly by airlines did not make any difference. The Kingfisher business model is a subject for research by professionals and students of aviation management or perhaps is a fit case for investigation into what could be a massive fraud in financial management of an airline.

The good news for the air traveller in India is that Tata-AirAsia joint venture now appears to be a reality. Hopefully, this venture patronised by two of the most reputed business entities in the Asia-Pacific region, will help restore dynamism in the industry. But for the other domestic carriers, there could be difficult times ahead as AirAsia is reported to be aggressively competitive something that would send a chill down their collective spine. But in all this, the travelling public would gain.

The civil aviation industry in India had high hopes that their wish-list would be addressed in the Union Budget 2013-14. Unfortunately, it largely remained ignored and what the industry has got is nothing more than the proverbial crumbs. Kuldeep Yadav has more to say on the subject in this issue. The Aero India air show held every two years at the IAF Base in Yelahanka, Bengaluru, which is primarily focused on military aviation, this year, had a sizeable representation by the civil aviation industry especially in the domain of business aviation. An account by R. Chandrakanth in this issue highlights the notable shift in favour of the global civil aviation industry. Dealing with problems in the cockpit, Captain J.P. Joshi a veteran in civil aviation, in Part I of his article, has analysed the complexities and nuances of crew resource management (CRM) for short. Dr Mani Sishta, a specialist in aviation medicine, talks about episodes, though mercifully rare, of incapacitation of the pilot while in flight.

It is now generally accepted that the maximum growth potential in the future is in the regime of regional aviation especially in Asia. With this in view, Embraer has successfully forayed into Bangladesh with its regional jets thus opening up fresh opportunities. In an interview conducted by Vasuki Prasad of *SP's AirBuz*, Filippo Bagnato, CEO ATR, explains how the ATR family of regional turboprop aircraft and especially the most recently certified ATR72-600, are best suited for regional operations across India. Writing from Goa, Joseph Noronha examines the safety issues relevant to regional aviation in India and the prevailing state with regard to this critical aspect of the airline industry. In his article on aero engines, Shriniwas Mishra describes how Pratt & Whitney is forging ahead with the geared turbofan engines, a technology that has ushered in a revolution of sorts in the regime power plants for airliners.

All these apart from the regular features. Welcome aboard and happy landings!

B.K. Pandey
Editor



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✈ INDUSTRY NEWS

ORDERS FOR AIRBUS A320 FAMILY AIRCRAFT



Indonesian carrier Lion Air has placed a firm order worth \$24 billion with Airbus for 234 A320 family aircraft which includes 109 A 320neo, 65 A321neo and 60 A320ceo airliners. The Lion Air order comes soon after Airbus received major orders for its A320 family aircraft, including an \$11.2 billion order from Lufthansa for 100 aircraft and a \$9.3 billion order from Turkish Airlines for 117 planes. So far this year, Airbus has already received orders equal to 50 per cent of the total orders in 2012 which was 305 of A320s and 478 of A320neo. The latest order is the first from Lion Air, as the carrier looks to enhance fleet size to expand operations in the Asia-Pacific region, a market where air travel is expected to grow at over 6.4 per cent annually over the next two decades. "The fuel-efficient A320 family will enable Lion Air to achieve the lowest possible operating costs and offer competitive fares," said Rusdi Kirana, CEO of Lion Air Group.

ORDER FOR ATR 72-600 AIRCRAFT



Malaysia Airlines has placed a firm order for 20 ATR 72-600 aircraft with options for 16 more, the total valued at over \$840 million. The airline first signed a memorandum of understanding in December 2012 for the order. The new planes will be operated by Firefly and MASwings, regional subsidiaries of Malaysia Airlines. "We have been partnering with ATR for the last five years, and we are really satisfied with the outstanding per-

Acquisition of Civil Aircraft Liberalised

In a major decision taken by Ajit Singh, Minister of Civil Aviation, the government has done away with control over acquisition of aircraft by scheduled and non-scheduled operators, private operators and flying training institutes. Permission for actual induction of aircraft will no longer be required from Ministry of Civil Aviation (MoCA). Henceforth, only initial no objection certificate (NOC) for operating scheduled air transport services and non-scheduled air transport services including regional air transport services and in-principle approval for acquisition of aircraft by scheduled operators, will be required from the MoCA. This is a requirement under Rules 134 and 134A of the Aircraft Rules and the RBI guidelines to facilitate acquisition of aircraft.

The Minister has also abolished the Aircraft Acquisition Committee as it is no longer relevant. The matter relating to initial NOC and in-principle approval for acquisition of aircraft by scheduled operators will now be processed by concerned division of the Ministry. At pres-

ent, MoCA's approval is required for issuing initial NOC in cases of scheduled airlines, non-scheduled operators, flying institutes and private category. Besides this, MoCA's approval is also required for acquisition of aircraft by scheduled and non-scheduled operators, flying training institutes and for private use and also for replacement of aircraft. After implementation of this decision, no approval from MoCA will be required by anybody for actual import or replacement of aircraft and all such cases will be dealt with by the Director General of Civil Aviation for completion of necessary formalities.

This decision is another major step towards liberalisation in the civil aviation sector after approval of foreign direct investment of 49 per cent in Indian carriers. This will remove duplication and also reduce delays in seeking approval and will do away with the cumbersome procedure which airlines have to follow before acquisition of aircraft. The decision will help airlines to plan better for future inductions and also maintain timelines for acquisition. •

formance and the commercial results that our ATR 72 aircraft provide to our growing community networks. The ATR aircraft are clearly playing an important role in the development of Malaysia Airlines as they connect regional destinations and enable us feed larger aircraft at our main hubs," said Ahmad Jauhari, CEO of Malaysia Airlines. Deliveries of the new ATR72-600 aircraft would begin later this year.

MARKET OUTLOOK FOR AIRLINE INDUSTRY

As per industry forecast for 2013 by the International Air Transport Association (IATA), airlines are expected to post a net income of \$10.6 billion, an increase over earnings in 2012 by 40 per cent. Post-tax profit margin is expected to rise to 1.6 per cent, up from 1.3 per cent estimated earlier for 2013. Airlines in the Asia-Pacific region are expected to lead with \$4.2 billion in profit, followed by North American airlines at \$3.6 billion. The forecast also predicts improvements for carriers in Europe and Africa. IATA expects European carriers to post net profits of \$800 million and African carriers to net \$100 million. Cargo demand is expected to grow by 2.7 per cent, an improvement from IATA's previous forecast of a

1.5 per cent decline in cargo traffic for 2013. The forecast also predicts passenger demand to grow globally by 5.4 per cent, versus the previously forecast 4.5 per cent. "Against a backdrop of improved optimism for global economic prospects passenger demand has been strong and cargo markets are starting to grow again. The economic optimism is also pushing fuel prices higher," said Tony Tyler, Director General and CEO of IATA.

ORDER FOR BOEING 777-300ER

Swiss International Airlines (SWISS), a subsidiary of the Lufthansa Group, has recently announced a commitment for the purchase of six Boeing 777-300ER airliners at a cost of \$1.9 billion as per the current list prices. Harry Hohmeister, Chief Executive Officer, SWISS, said that the carrier has selected the 777-300ER to compete with airlines operating aircraft with more than 300 seats on similar routes. This order will for the first time introduce a first Boeing aircraft into the SWISS fleet. The Swiss carrier currently operates Airbus and Avro RJ 100 aircraft.

DOMESTIC PASSENGER TRAFFIC

According to a recent economic survey for 2012-13, domestic passenger traffic at

Indian airports during the period under review declined by 1.8 per cent and stood at 106 million passengers down from 108 million during the corresponding period of 2011-12. Domestic passenger traffic handled at airports had increased by 19.4 per cent to 108.1 million during January to November 2011 increasing from 90.5 million in the corresponding period of 2010-11. Weakening economic activity and high air fares coupled with increasing interest rates and fuel cost has led to a major decline in traffic. The survey report which was tabled in the Parliament by Finance Minister a day ahead of the national budget for 2013-14, shows an increase 1.6 per cent in international passenger traffic handled at the Indian airports. The survey data indicated that international cargo throughput at Indian airports reflected a decline as well.

CHINA EASTERN AIRLINES & OKAY AIRWAYS SELECT ROCKWELL COLLINS' HGS

Rockwell Collins' head-up guidance system (HGS) has been selected by China Eastern Airlines for 58 new Boeing Next-Generation 737 aircraft. Deliveries are expected to begin in 2013. Rockwell Collins' HGS displays critical flight information in the pilot's forward field-of-view, eliminating the need for the pilot to repeatedly transition to the head-down instruments. As a result, pilots can keep their attention focused on the outside world, enhancing overall situational awareness and safety.

Rockwell Collins' HGS has also been selected by Okay Airways for 10 new Boeing Next-Generation 737 aircraft. Deliveries are expected to begin in 2014. "We commend Okay Airways for adopting HGS in China," said T.C. Chan, Vice President and Managing Director, Asia Pacific for Rockwell Collins. "The operational benefits of this technology are significant, including access to lower landing minima at approved airports throughout the country, which will help assure timely arrival to these high-traffic destinations." Currently there are seven airports throughout China approved for lower landing minima by the Civil Aviation Administration of China (CAAC) for aircraft equipped with authorised head-up displays (HUDs) such as Rockwell Collins' HGS, including Beijing, Shanghai Pudong, Guangzhou, Chengdu, Xi'an, Qingdao and Jinan. There are 58 additional airports scheduled to be approved for lower landing minima in the next two years. Rockwell Collins was the first company to certify a HUD for this operation.

✈ BUSINESS AVIATION

EASA CERTIFICATION FOR DASSAULT FALCON 2000S & 2000LXS



Dassault's two newest business jet variants, the 2000S and 2000LXS, have received EASA type certification. The super mid-size 2000S has a range of 3,350 nm and features upgraded EASy II avionics. Deliveries of the new business jets are expected to begin in the second quarter of this year. The 2000LXS is an upgraded variant of the 2000LX, with longer range capabilities and standard EASy II avionics. Deliveries of the 2000LXS are expected to begin towards the end of 2013. Dassault expects to gain Federal Aviation Administration certification for the two jets later this year.

DASSAULT FALCON 2000 COMPLETES 20 YEARS



The first flight of the ground breaking Dassault Falcon 2000 business jet took place in March 1993 in Bordeaux-Mérignac (France). Since its certification, Dassault has delivered nearly 500 Falcon 2000 jets worldwide and the global fleet has achieved close to two million flying hours, making it one of the world's most popular and widely used business jets in operation. Dassault marked the aircraft's 20th anniversary at the Abu Dhabi Air Expo 2013, where the company presented its range of business jets including the next generation Falcon 2000LXS. The original Falcon 2000 was the first business jet in the world to be designed using

APPOINTMENTS

EUROCOPTER

EADS has appointed Guillaume Faury as CEO of Eurocopter.

AIRBUS

Airbus has appointed Yann Barbaux as Chief Innovation Officer Agility and Entrepreneurship.

ROCKWELL COLLINS

Rockwell Collins has appointed Colin Mahoney to lead International and Service Solutions

GULFSTREAM

Effective April 1, Gulfstream Aerospace Corporation has appointed Dan Nale to the position of Senior Vice President, Programs, Engineering and Test,

ROLLS-ROYCE

Rolls-Royce has appointed Ian Davis as Chairman of the company.

THE ENGINE ALLIANCE

Dean Athans has been named President of The Engine Alliance, joint venture of GE Aviation and Pratt & Whitney.

a fully digital mock-up, with the Dassault design team responding to Falcon operator needs of the time which helped define the aircraft's initial performance, the ideal range and operating costs. Since the original design, there have been six versions of the Falcon 2000, including the 2000LXS introduced last October. "The Falcon 2000 family of business jets has been a long-lasting success because of its cabin amenities, superior fuel efficiency and high retained value," said John Rosanvallon, President and CEO of Dassault Falcon. The 4,000 nm Falcon 2000LXS will be the newest aircraft in the Falcon 2000 family and inherits the same qualities as its siblings, outstanding performance and efficiency, cutting-edge technology and exceptional flexibility. The Falcon 2000LXS is built on the proven and capable Falcon 2000 platform. It will offer inboard slats, an enhanced and proven engine, new cockpit aesthetics, next-generation EASy II flight deck and Falcon Cabin HD plus, the most advanced cabin management system in business aviation. No other aircraft in the 4,000 nm range segment can offer the same combination of airport performance, cabin size and efficiency.

EVENTS CALENDAR

AIRCRAFT INTERIORS EXPO 2013

9-11 April

Congress Centre Hamburg, Germany
www.aircraftinteriorsexpo.com

SUN 'N FUN FLY IN

9-14 April

Lakeland-Linder Regional Airport,
Florida, USA
<http://www.sun-n-fun.org>

BUSINESS AVIATION SAFETY SEMINAR 2013

10-11 April

Fairmont Queen Elizabeth Hotel,
Montreal, Canada
<http://lightsafety.org/BASS2013>

ASIAN BUSINESS AVIATION CONFERENCE & EXHIBITION

16-18 April

Shanghai Hongqiao Airport,
Shanghai, China
www.abace.aero/2013

AERO FRIEDRICHSHAFEN

24-27 April

Friedrichshafen, Germany
www.aero-expo.com

EUROPEAN HELICOPTER SHOW

9-11 May

Hradec Králové LKHK, Czech Republic
www.eurohelishow.com

EUROPEAN BUSINESS AVIATION CONVENTION & EXHIBITION (EBACE2013)

21-23 May

Palexpo, Geneva, Switzerland
www.ebace.aero/2013

✈ TECHNOLOGY

PRELIMINARY DESIGN REVIEW BY HONEYWELL

Honeywell completed the preliminary design review for the hardware that will be used in Inmarsat's GX Aviation programme, including the terminals and antenna subsystems on the aircraft for in-flight connectivity to commercial and business aircraft. Honeywell's major programme milestones include the critical design review scheduled for late 2013, in time for the launch of the first satellite in Inmarsat's Global Xpress constellation. Inmarsat and Honeywell said they continue to track towards global service for commercial, business aviation and

government customers available in 2015. "We are making tremendous progress on the GX Aviation programme and are continuing towards our goal of bringing a new level of high-speed, in-flight connectivity to consumers, OEMs and airlines around the world. In addition to the successful preliminary design review, we are actively working with several aircraft OEMs to provide GX Aviation services, giving crews and passengers access to higher performing in-flight connectivity around the world for less," said Jack Jacobs, Vice President, Marketing, Honeywell Safety and Information Systems.

BOEING, GE PARTNER FOR 777X

Boeing announced its selection of GE as the engine partner on development study improvements for the 777X, its next-generation variant of the 777 expected to enter service in 2020. As per Boeing, the 777X will provide better fuel efficiency, improvements in cabin and enhanced range. The ongoing development study on improvements for the future aircraft includes current 777 customers worldwide, in addition to GE. "This decision to work with GE going forward reflects the best match to the development programme, schedule and airplane performance," said Bob Friedman, General Manager of 777X development at Boeing. The two companies did not disclose the financial details of the partnership, and a name for the 777X engine.

SPICEJET WEIGHS SWITCH TO AIRBUS

The Indian low-cost carrier SpiceJet currently operates an all-Boeing fleet which includes 37 Boeing 737 aircraft and plans to add seven more of the planes by the end of 2013. However, as per the Chief Executive Officer Neil Mills, the airline may consider a full switch to Airbus family of airliners as it is looking at options to upgrade to new generation aircraft. Such a decision by SpiceJet would further tilt the budget airline fleet market share in India in favour of Airbus, whose planes are used by IndiGo, India's biggest domestic carrier by market share, and GoAir. The move could hurt Boeing as it works to implement safety upgrades to its Dreamliner to end a two-month grounding of the fleet after a smoking battery forced an emergency landing in January this year.

SECOND GENERATION E-JETS

As per Embraer, United Technologies Corp (UTC) Aerospace Systems has been selected to provide the electric power generation and distribution system for the second genera-

tion of E-Jets, scheduled to enter service in 2018. The UTC subsidiary has also been selected to provide the wheels and carbon brakes for the new E-Jets. "Selection of these systems is another important milestone in the programme that is expected to be launched later this year," Embraer said in a statement. In February this year, Embraer selected Honeywell to supply its Primus Epic integrated avionics system for the next generation of E-Jets, a month after Pratt & Whitney's geared turbofan engines were selected to power the aircraft.

CSERIES OFFERS 160-SEAT VERSION



Bombardier plans to fly the first CSeries passenger airliner by the end of June this year. Initially envisioned with 130 seats and then with 150, the CSeries will also be available with 160 seats. Bombardier is also the launch customer for Pratt and Whitney's new geared turbofan engine, which is expected to be 20 per cent more efficient than existing engines. Bombardier has just 148 confirmed orders for the \$60 to \$70 million airliners, although airlines hold options on another 200. During the unveiling, Mike Arcamone, President of Commercial Aircraft Division of Bombardier said: "It is not a re-engineered aircraft to put in the market. It is totally a new aircraft." However, some analysts are of the view that potential customers may be waiting for the CSeries to prove itself before committing to orders. Mike Arcamone said the company wants 300 orders from 20 customers by the time first deliveries happen at the end of 2014.

✈ AIRLINE NEWS

PRESSURE ON BOEING OVER 787

Pressure on Boeing is growing to monetarily compensate airlines for disruption caused by the grounding of its 787 Dreamliner. All Nippon Airways, the leading 787 customer, wants cash refunds rather than discounts on future orders, for losses inflicted by

the worldwide grounding of the fleet of Dreamliners. Air India is also considering a similar demand. All 50 Dreamliners delivered worldwide were grounded after a series of problems with the plane's battery in the US and Japan. ANA operates 17 of those aircraft and is likely to have been hit hardest by having them out of service. The airline has cancelled more than 3,600 flights to the end of May. Air India has six of the \$200 million jetliners and has ordered 21 more. Persuading customers to accept discounts on future aircraft purchases would allow Boeing to spread any reimbursement costs over several years. Airlines, though, may see cash compensation as a quicker way to redeem losses. Boeing is yet to comment on this issue.

BOOSTING REGIONAL AIR CONNECTIVITY

The Ministry of Civil Aviation plans to replace the existing route dispersal guidelines with a new policy to incentivise airlines to fly to regional airports. The proposal mooted is a carbon credit-like system which will allow airlines to trade seat capacity as a part of its plan to promote regional routes. "It is an idea we are discussing it with airlines. If we mandate an airline to fly to the Northeast and it is unable to operate, it would be able to trade seats under this policy. It will be akin to carbon credits," Minister for Civil Aviation Ajit Singh said while speaking at the Routes Asia Conference in Mumbai recently. This carbon credit system is expected to generate greater financial viability for regional operators. At present, airlines are required to deploy 10 per cent of their total capacity to Northeast and Jammu & Kashmir as also one per cent of the capacity within the Northeast region. However, airlines find it unprofitable as they lack the right size of planes to operate on these routes.

FUNDS FOR AIR INDIA

In the Union Budget for this year, the Finance Minister proposed infusion of ₹5,000 crore into the perpetually ailing national carrier Air India as equity in the financial year 2013-14. In the budget last year, the then Finance Minister Pranab Mukherjee had allocated ₹4,000 crore for the flag carrier which has received substantial support from the government for revival and turnaround through a financial restructuring plan approved by the Union Cabinet last year. The national carrier is expected to start generating profits from normal operations by the end of the current fiscal on March 31, according to the Economic Survey 2012-13 tabled in the Parliament.

✈ INFRASTRUCTURE

MUMBAI AIRPORT'S NEW TERMINAL

The GVK Group is upgrading Mumbai International Airport at an estimated cost of Rs 12,380 crore. With an area of 439,000 square metres, the four-level new terminal at Sahar which will start international operations from October 2013, will handle 40 million passengers as against the capacity of 34-million at terminal T3 at Delhi airport. Pre-launch trials are expected to begin in May. Though problems such as airside congestion and lack of adequate night-parking bays that have dogged the growth of the Mumbai airport will remain, the new terminal will enable the airport to handle many more flights and offer far better passenger convenience as also spacious areas for check-in, security hold and baggage delivery.

AIRPORTS IN THE MIDDLE EAST

The Middle East is investing heavily for developing new and existing airports at a cost of over \$119 billion. Meanwhile, passenger traffic in the GCC has grown at a CAGR of 10 per cent between 2002 and 2010, significantly higher than the global average of between one and three per cent. His Highness Sheikh Ahmed Bin Saeed Al Maktoum, President of the Dubai Civil Aviation Authority, Chairman of Dubai Airports and Chairman and Chief Executive of Emirates Airline & Group, said, aviation is now established as a vital contributor to the UAE's economy, contributing more than \$39.47 billion or 14.7 per cent to the national GDP. Middle East Airports are expected to handle over 400 million passengers by 2020.

AVIATION FUEL INFRASTRUCTURE

In a meeting between the Ministries of Civil Aviation and Petroleum, in-principle decision was taken to permit state-run oil marketing companies to share their storage facilities with private companies for a fee subject to excess capacity being available. This decision would pave the way for Reliance Industries Ltd (RIL), Shell and Essar who are interested in ATF retail business at Delhi airport. RIL has operations across 26 terminals in India and wanted entry into Terminal 3 of the Indira Gandhi International Airport to feed Asia's largest terminal. Of the total, 52 per cent of the ATF is consumed in Delhi and Mumbai airports, with 15 per cent of it supplied by private players. ATF constitutes 45 to 50 per cent of operating cost of airlines. This latest decision is a step forward as it will introduce competi-

tion which will help lower cost of ATF. A formal directive in this regard is awaited.

HONEYWELL'S SMARTPATH AT CHENNAI AIRPORT

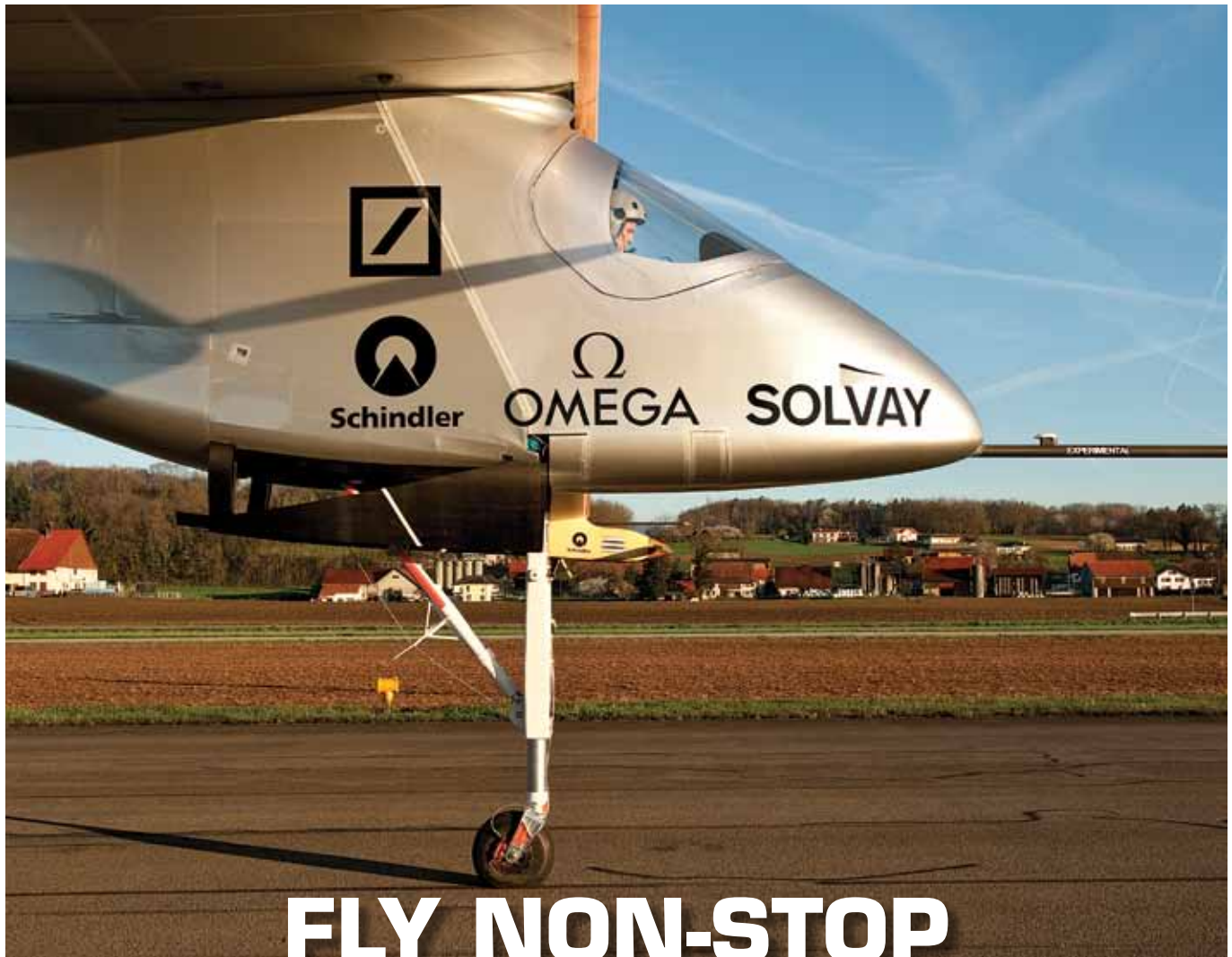


The Airports Authority of India (AAI) has selected Honeywell's SmartPath ground-based augmentation system as part of a pilot project to launch satellite-based approaches and landings at Chennai International Airport. As per Honeywell, the pilot project is part of the US-India Aviation Cooperation Program partially funded by the US Trade and Development Agency. Passenger demand at Chennai is expected to grow to 540 million annually over the next 12 years and AAI is to use the SmartPath system to meet the future demand. SmartPath will enable Chennai to support up to 26 separate approaches across four runways simultaneously, compared to traditional Instrument Landing Systems that usually support one approach at one end of a single runway.

✈ REGULATORY

OVERSIGHT BY DGCA

Subsequent to a rap on the knuckles by the International Civil Aviation Organisation (ICAO), the Indian Directorate General of Civil Aviation (DGCA) has put in place a plan to streamline the licensing procedure for corporate jets and charter aircraft as also to keep a check on their maintenance and modifications. In a recent safety audit, ICAO had raised serious concerns about oversight functions exercised by the DGCA and had clubbed India with some African nations over poor aviation safety record. The international organisation's concerns were mainly related to the fact the DGCA did not have a fool-proof process for issue and renewal of permits to non-scheduled operators. In 2006 too, the ICAO had red-flagged India over safety issues pointing out that there was acute shortage of personnel to carry out regulatory and oversight functions. **SP**



FLY NON-STOP

Solar Impulse, the solar-powered airplane is now ready to fly across America soon

BERTRAND PICCARD AND ANDRÉ Borschberg, the Swiss pilots and founders of Solar Impulse, have announced that their solar-powered airplane will attempt a coast-to-coast crossing of the United States soon without using a single drop of fuel.

It will be the first time that an airplane, capable of flying 24 hours non-stop day and night powered exclusively by solar energy, will fly across America. Solar Impulse will leave in early May from San Francisco (Moffett Airfield) and stop in four US cities including Phoenix, Dallas Fort Worth and Washington D.C. before reaching New York's JFK airport, its final destination in early July.

Following in the footsteps of the American founding fathers of aviation, Solar Impulse's pioneering endeavour across the United States will be a highly significant. It is the last mission before attempting a zero-fuel round-the-world flight in 2015.

Solar Impulse wants to inspire and motivate as many people as possible throughout its journey across America. "We want to show that with clean technologies, a passionate team and a far-reaching pioneering vision one can achieve the impossible," said Bertrand Piccard, Solar Impulse initiator, Chairman and pilot. He further added: "If we all challenged certitudes by driving change and being pioneers in our everyday lives, we can create innovative solutions for society's biggest challenges."

With the wingspan of a jumbo jet (63.4 metres/208 ft) and the weight of a small car (1,600 kg/3,527 lb), this revolutionary airplane is being hailed by experts as a technological wonder. "A flying laboratory for clean technologies, this prototype is the result of seven years of intense work in the fields of materials science, energy management and man-machine interface. Many of these technologies can also be applied to sectors beyond aviation," said André Borschberg, Solar Impulse co-founder, CEO and pilot. **SP**

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HOPE AMID DESPAIR

The wish-list from the industry for Union Budget 2013-14 was undoubtedly long.

With the expectations of the aviation industry fulfilled only partially, it appears that the year ahead will be challenging.

However, despite the adversities, the aviation industry is hoping for a turnaround.

BY KULDEEP YADAV

INDIA HAS HUGE POTENTIAL for growth in the civil aviation industry. Entry of private players progressively into every sector of the industry heralds the emergence of an open, liberal and investment-friendly environment. However, the main pillars of the aviation industry, namely the scheduled airlines and non-scheduled operators continue to be non-profitable; some in fact, are struggling to survive. Airport infrastructure in the country remains inadequate, aircraft manufacturing facilities in the civil sector are non-existent as also maintenance, repair and overhaul (MRO) facilities are grossly underdeveloped. Yet globally, India currently ranks ninth and as per the Ministry of Civil Aviation, it aims to be among the top three by 2020. With its contribution to GDP at a mere one per cent, the aviation industry in India is still a fledgling sector and requires strong government support for it to grow.

UNION BUDGET 2012-13. The Union Budget 2012-13 and the concurrent policy changes had delivered several incentives to an ailing aviation industry ushering in a ray of hope. The major proposals were firstly, permission for external commercial borrowings (ECB) as working capital of the airline for one year limited to \$1 billion (Rs 5,500 crore). As per the Ministry of Finance, this was to address the immediate concerns of the civil aviation sector in financial crisis. Secondly, to reduce the cost of aviation turbine fuel (ATF), which largely contributes to the high operating cost of the civil aviation sector, the government permitted import of ATF by Indian carriers. Thirdly, a proposal to allow 49 per cent equity participation through foreign direct investment (FDI) by foreign airlines was under consideration.

However, despite these measures, under the pressure of mounting losses and increasing debt burden, Kingfisher Airlines could not survive. Some airlines have evinced interest in FDI but no deal has yet been finalised. Instead of investing in the existing carriers, AirAsia is entering the fray jointly with the Tatas. Investors are hesitant owing to high taxes, poor infrastructure and unfriendly regulations that render conducting business in



India difficult. Sectors such as maintenance repair and overhaul (MRO), aircraft manufacturing, general aviation and cargo, where the potential is high enough to make India shine in aviation, are neglected by the government.

EXPECTATION FROM BUDGET 2013-14. The civil aviation industry had expectations from the budget this year that would facilitate higher growth rate and a more business-friendly environment. On top of the wish-list was relief for the highly competitive MRO sector languishing under the crushing burden of high tax structure. Expectations included exemption of customs duty, service tax and countervailing duty on aircraft test equipment, tyres and spares as also exemption from airport royalties for start-up companies for a specified period. With the right incentives, the MRO sector can grow rapidly, provide greater employment opportunities and contribute to GDP.

Another issue was the price of ATF which is much too high even after direct import and continues to constitute nearly 50 per cent of operating cost for the domestic airlines vis-à-vis 25 per cent globally. Direct import of ATF by Indian carriers did not prove viable due to lack of their own storage and transportation facilities as these belong to the oil companies. Individual states need to reduce sales taxes which are as high as 30 per cent in some states. Another demand has been to notify ATF as "declared goods" and for it to be brought under GST.

There is a need to reduce service tax on air tickets to at least 10 per cent from the current 12 per cent in order to reduce the tax burden on passengers thereby helping the ailing aviation industry. Also, the removal of fringe benefit tax on stay of airline crew in hotels and free tickets could bring relief to the airlines.

To encourage foreign carriers to invest, there is a need to increase the FDI limit to 74 per cent. Funds need to be allocated to promote regional connectivity, a segment that holds the greatest promise for the industry. Also, the airline industry needs to be given infrastructure status for it to be eligible for tax relief as well as attract investment. As part of the air ticket, the airline collects "passenger service

fee” which has facilitation and security components. The facilitation component is revenue for the airport operator. The security component is held by the airport operator in fiduciary capacity in an escrow account on behalf of the Central Government and does not form part of the airport operator's revenue. However, the surplus amount in the escrow account is regarded as income for airport operators and taxed accordingly—an anomaly that needs to be removed.

As per the Income Tax Act, airlines have to incur additional costs arising out of withholding tax on maintenance related payments towards labour charges and fees for technical services and royalties. These provisions need to be withdrawn and such payments allowed without deduction of tax at source.

Infrastructure development is a pre-requisite for the growth and development of any country. This involves creation of new infrastructure or upgradation including capacity enhancement of existing infrastructure. Both entail huge investment and as such, amendment is warranted in the Act such that upgrade of existing infrastructure is eligible for the benefit of Section 80-IA of the Act.

Airport infrastructure requires ancillary and support services such as fuel farms, vehicle parking areas and cargo handling facility. In the absence of a clear definition of an ‘Airport’ under the present section 80-IA of the Act, there is ambiguity as to whether or not these services enjoy the benefits thereunder. There is a requirement to extend the benefits under section 80-IA of the Act to the ancillary and support services as well. As per the current provisions, deduction is available to an enterprise if it has entered into an agreement with the Central or state government or other authorities prescribed in the section. It needs to be stipulated that the agreement between the subcontractor and the main concessionaire for carrying out ancillary activities be deemed as an agreement between the subcontractor and the government. Infrastructure for general aviation, including helicopter operations should be given special attention to promote charter services and medical/emergency services.

The investment-friendly move by the Indian Government to privatise airports has been quite successful. Apart from better infrastructure, it has enhanced revenues substantially, has helped airlines to grow, has created employment opportunities and contributed to GDP. Further privatisation will make the industry more competitive, raising standards and lowering prices. Private airport operators should also be permitted to issue tax-free infrastructure bonds to raise funds.

Specialised equipment for airport security as also a wide range of other high technology equipment required for installation at airports, are not imported by the respective government agencies but by the airport operators, who under the existing regulations, are not entitled to duty concession even though imports are financed from public funds. Regulations in this regard need to be amended to provide duty concession for import of specialised equipment by respective airport operators. The government should consider privatising air traffic control (ATC) to improve efficiency.

Duty on aircraft imported for non-scheduled operations is 2.5 per cent whereas it is 18.5 per cent for aircraft imported for pri-

vate use. Aircraft imported for scheduled operations and for government use are exempted from import duty. The duty structure needs to be rationalised and reduced to promote business and general aviation and obviate malpractices.

It is also desirable that Section 72A of the Income Tax Act with “provisions relating to carry forward and set-off of accumulated loss and unabsorbed depreciation allowance in amalgamation or demerger” be amended to extend the benefits therein to the entire airline industry and not only to public sector companies with a view to providing the private airlines operators a level playing field as well as sustaining the current growth of the civil aviation sector. A special mechanism is required for easing cash flows arising from delayed receivables from government entities such as Air India. There is an immediate need to set up an Aviation Finance Corporation (AFC), a special purpose vehicle to provide dedicated capital with lower interest rates and longer maturity period of loans.

DOES BUDGET 2013-14 MEET INDUSTRY EXPECTATIONS? The wish-list from the industry for Budget 2013-14 was undoubtedly long. Some of the expectations have been considered but many did not find a place in the budget. Some provisions of the budget that directly impact the aviation sector are as follows:

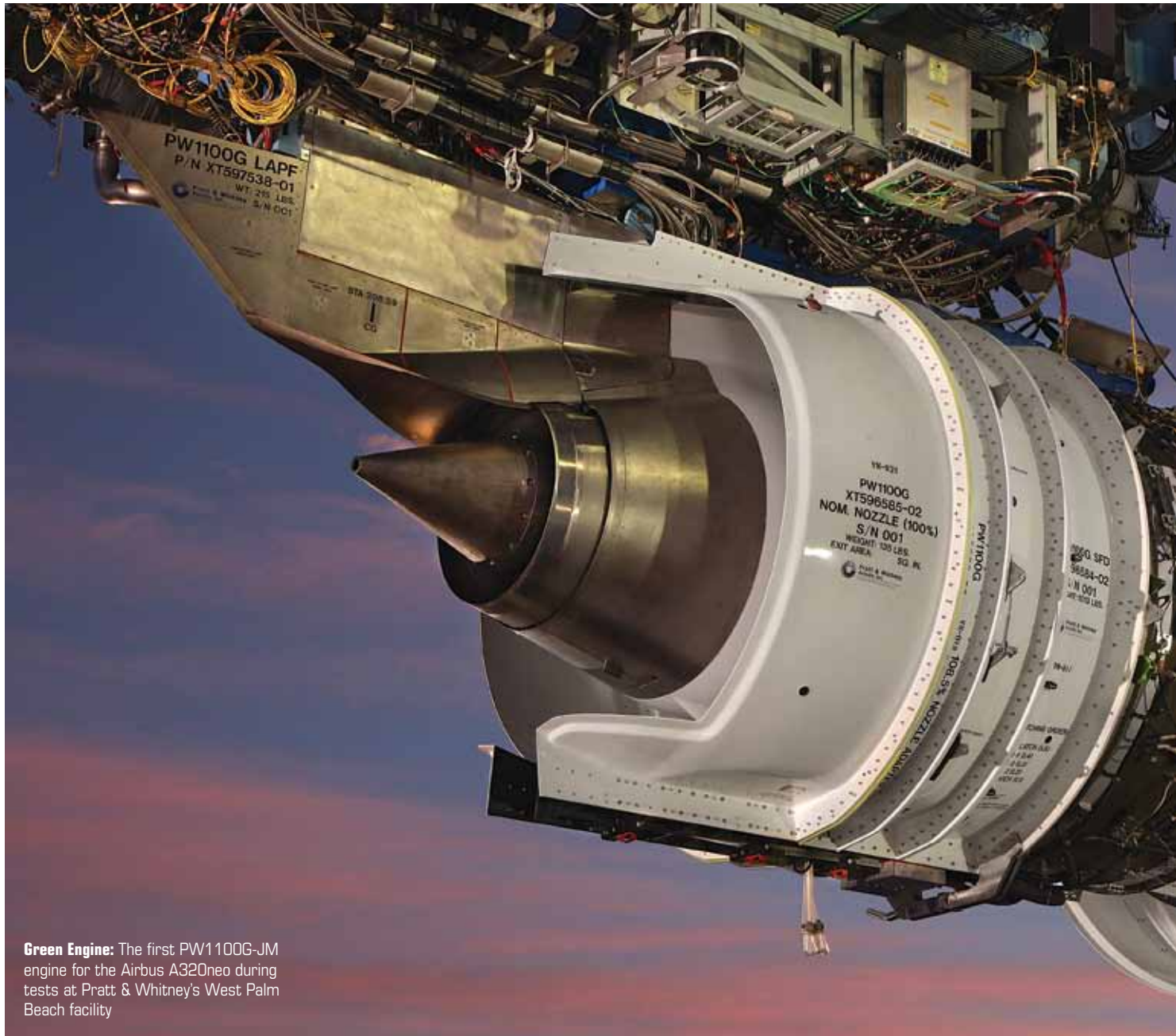
One important item on the wish-list that has been given some space is maintenance repair and overhaul (MRO). As the Finance Minister said, “The MRO industry is at a nascent stage. Encouraging the MRO sector will generate employment besides other benefits. Hence, I propose to provide certain concessions to the MRO industry.” This gesture by the government will benefit Air India and GMR infrastructure operators of MRO facilities at Mumbai, Delhi and Hyderabad. Currently, the basic customs duty exemption is available to spares and test equipment imported for MRO. The time period for consumption/installation of spares and test equipment imported for MRO is being extended from three months to one year.

Corporate tax surcharge has been increased from five to ten per cent for domestic companies whose annual taxable income exceeds ₹10 crore. In the case of foreign companies that pay a higher rate of corporate tax, the surcharge will increase from two to five per cent. The aviation sector is relatively young and no airline has earned profit during the last seven years. This provision thus is irrelevant for the aviation sector.

Section 29 of the Customs Act 1962 is being amended to permit landing of aircraft at any place other than customs airports. International passengers are to benefit from amendments to rules pertaining to baggage. In case of a male passenger who has been residing abroad for over a year or is on transfer of residence to India, the raise in duty-free allowance on jewelry is from ₹10,000 to ₹50,000 and for a lady passenger, it is from ₹20,000 to ₹1,00,000. Also, the duty free allowance for crew members has been raised from ₹600 to ₹1,500. Unfortunately, the budget has failed to address the major issues related to the aviation industry.

In particular, there was no mention of hoped-for-fiscal support for India's struggling airline industry in the budget document. The aviation sector in India needs special attention in respect of fiscal provisions and assistance. With the expectations of the aviation industry fulfilled only partially, it appears that the year ahead will be challenging. However, despite the adversities, the aviation industry is hoping for a turnaround. Undoubtedly, the government needs to do much more for the revival of the industry. SP

CORPORATE TAX SURCHARGE HAS BEEN INCREASED FROM FIVE TO TEN PER CENT FOR DOMESTIC COMPANIES



Green Engine: The first PW1100G-JM engine for the Airbus A320neo during tests at Pratt & Whitney's West Palm Beach facility

FORGING AHEAD

With its path-breaking technology and maintenance cost advantage combined with higher efficiency and more than 3,000 firm orders, the GTF engine is likely to be a game changer, a winner and an engine of choice for the decades ahead

BY SHRINIWAS MISHRA



THE PUREPOWER PW1000G GTF ENGINE PROVIDES 16 PER CENT IMPROVEMENT IN FUEL BURN AND CARBON EMISSIONS OVER CONVENTIONAL ENGINES

taken on this challenge with the PurePower geared turbofan (GTF) engines that claim not only higher fuel efficiency, better fuel burn and environmental benefits but also lower life-cycle costs.

Around 1998, Pratt & Whitney upgraded its PW6000 to PW8000 by replacing the fan section with a gear system and new single-stage fan. However, PW8000 was discontinued in favour of using the PW6000 turbo machinery with a new gearbox and a single-stage fan. This further evolved into the geared turbofan programme. Subsequently, in July 2008, the GTF was renamed as PW1000G. This engine was tested on the Boeing 747SP with the second phase of flight testing on Airbus A340-600. While the testing of the PW1524G variant began in October 2010, the PW1500G was type certified in February 2013 by Transport Canada.

Till about three years ago, no one was giving any credence to Pratt & Whitney's GTF engines, with industry analysts describing the technology as unworkable. But with Bombardier and Mitsubishi reposing faith in the technology which lowers fuel burn and operating cost, perspectives across the industry have changed radically. PurePower has now been selected as an exclusive engine for the Bombardier CSeries, Mitsubishi Regional Jet, Embraer's second generation E-Jets as well as an option on the Irkut MS-21 and Airbus A320neo.

As per the company, the PurePower PW1000G GTF engine provides 16 per cent improvement in fuel burn and carbon emissions over conventional engines. Also, along with reduced maintenance costs, the noise level of the PW1000G GTF engine compared to other engines of comparable performance is lower by 50 per cent. As the phrase "geared turbofan" suggests, the promised efficiency is made possible by a combination of a large quiet fan, and a fast and efficient turbine. PurePower PW1100G engine boasts of advanced aerodynamics, light-weight materials along with technological improvements in the high-pressure spool, low pressure turbine, combustors, controls, as well as in engine health monitoring. The company's PurePower PW 1100G-JM, which it classifies as its 'greenest engine', has been scheduled for introduction by Airbus in 2015 on its "neo" series of short- to medium-range, narrow-body aircraft.

PurePower engines have a number of variants with the numbering scheme for each PW1000G engine model based on the historical Pratt & Whitney pattern. Whereas the first number represents the generation (1 or 1,000), the second number denotes the customer (1- Airbus, 2- Mitsubishi, 4- Irkut and 5- Bombardier). While the last two numbers indicate the thrust class (24 for 24,000 pounds of thrust), "G" stands for a geared turbofan. (See Table for a snapshot of the PW1000G engines along with their characteristics and aircraft model.)

THE PW1100G-JM (AIRBUS). This engine has been selected by Airbus for the A320neo aircraft. With superior operating efficiency along with higher fuel efficiency, noise reduction and lower CO₂ and NO_x emissions, this engine is expected

AIRLINES ALL OVER THE world have been facing unprecedented economic challenges with the rising cost of aviation turbine fuel (ATF) constituting more than 40 per cent of their operating expenses. Also, there has been tremendous pressure to induct the technologies that would effectively reduce the environmental impact of emission and noise. Therefore, in addition to operational strategies by the airlines to address these challenges, there have been industry initiatives in developing lighter, quieter, more fuel-efficient and environment-friendly aircraft engines. Pratt & Whitney has

to be a boon for Airbus. Since the engine has fewer stages, fewer parts and consequently the requirement for fewer component replacements, maintenance and operating costs will be lower. As brought out earlier, this engine offers 15 per cent lower fuel burn and reduction in CO₂ emissions. With 50 per cent margin to CAEP/6 and 35 per cent margin to CAEP/8 meeting NO_x emissions requirements, there is significant noise reduction due to 15dB margin to Stage IV noise requirements. Engine certification is scheduled in the fourth quarter of 2014 and the entry into service with A320neo is scheduled a year later. While PW1124G would power A319neo, the PW1127G and PW1133G engines would power the A320neo and A321neo respectively.

PUREPOWER PW1200G (MRJ). PW1200G with advanced 3D aerodynamics incorporates light-weight materials such as a composite fan case with technologically superior compressor, combustor and turbine including engine health monitoring system. It has now entered the validation and certification phase of the programme. With the first flight of the MRJ planned later this year, its entry into service is scheduled in the third quarter of 2015. While PW1215G engine shall power the MRJ70STD, MRJ70ER and MRJ70LR, power plants for the MRJ90STD, MRJ90ER and MRJ90LR would be the PW1217G.

PW1400G (IRKUT MC-21). The PW1400G engine selected for the Irkut MC-21 aircraft is scheduled to enter into service in 2017. This engine is also expected to deliver excellent fuel efficiency with 50 per cent noise reduction along with reduced CO₂ and NO_x emissions. The PW1400G engine will also have reduced engine operating costs and maintenance due to fewer stages and parts.

PW1200G WITH ADVANCED 3D AERODYNAMICS INCORPORATES LIGHT-WEIGHT MATERIALS

While PW1428G engine will power the MC-21-200, the PW1431G engine is scheduled to be the power plant for the MC-21-300.

PUREPOWER PW1500G (BOMBARDIER). The Bombardier CSeries is being powered by PW1500G engine, with planned entry into service in the fourth quarter of 2013. Pratt & Whitney claims that this engine would be exceptionally beneficial providing 20 per cent less fuel burn. While geared turbofan engine architecture reduces the number of stages and parts, there is a significant improvement in engine efficiency. With 20dB margin to Chapter IV noise together with high-efficiency components and advanced combustor technologies to reduce CO₂ and NO_x emissions, the engine is environmentally beneficial. While PW1519G, PW1521G & PW1524G engines would power CS100, the PW1521G & PW1524G would power the CS300.

A GAME CHANGER. Although the main focus is on the gear, there are a number of innovative technologies which are going to contribute to the success of the PurePower engines. Pratt & Whitney has incorporated new technology throughout the core in providing this game changing engine. *Time* magazine categorised GTF as among the 50 best inventions of 2011 calling it, "the most important development in aviation". The engine has a gear system which separates the engine fan from the low pressure compressor and turbine. The fan rotates slowly while the low pressure compressor and turbine operate at high speed. This being a major innovation over direct drive architecture, geared turbofan has proved to be a game changer wherein not only the fuel burn is less, but there is also more power, reduced emission and lower noise generation. Due to enhanced engine efficiency, there are fewer engine stages and parts with reduced weight, and thereby less maintenance costs.

PW1000G with a remarkably higher bypass ratio of 12:1 surpasses the fuel efficiency parameters of existing engines on narrow body airliners. As per the manufacturer, there would be further refinement of the PurePower engine after its entry into service leading to higher efficiency and fuel burn lower by as much as 30 per cent in comparison to its competitors. With fewer low pressure turbine stages, the maintenance cost would be significantly lower than the competitors as it would have fewer life limited parts (blades) to be replaced. It is projected that the maintenance cost would be around 20 per cent lower than the existing engines. This would be a tremendous advantage to the airlines as the engines account for almost half of the maintenance cost. Also, since the gearbox is light-weight and contains only seven moving parts along with advanced lubrication system, the resultant ease of servicing would not only reduce time but also enhance reliability. The best part of the design system and technology is its robustness to handle higher thrust levels and scalability to suit both narrow as well as wide-body airliners.

With its path-breaking technology and maintenance cost advantage combined with higher efficiency and more than 3,000 firm orders, the GTF engine is likely to be a game changer, a winner and an engine of choice for the decades ahead. **SP**

PUREPOWER PW1000G ENGINE FAMILY

Engine Type	Geared Turbofan (GTF) engine with scaled engine core			
Engine Series	PW 1100G-JM	PW 1200G	PW 1400G	PW 1500G
Aircraft Family	Airbus A320neo	Mitsubishi Regional Jet	Irkut MC-21	Bombardier CSeries
Aircraft Models	A319neo A320neo A321neo	MRJ70 MRJ90	MC-21-200 MC-21-300	CS100 CS300
Passenger Capacity	124-220	70-96	130-230	100-145
Engine Models (thrust in lbs)	PW1124G 24,000 lbs PW1127G 27,000 lbs PW1133G 33,000 lbs	PW1215G 15,000 lbs PW1217G 17,000 lbs	PW1428G 28,000 lbs PW1431G 31,000 lbs	PW1519G 19,000 lbs PW1521G 21,000 lbs PW1524G 23,300 lbs
Architecture	1-G-3-8-2-3	1-G-2-8-2-3	1-G-3-8-2-3	1-G-3-8-2-3
Bypass Ratio (BPR)	12:1	9:1	12:1	12:1
Fan Diameter	81 Inches	56 Inches	81 Inches	73 Inches
Service Entry	2015	2015	2017	2013

Source: Pratt and Whitney (www.purepowerengine.com)



HUGE POTENTIAL

The ninth edition of Aero India 2013, held from February 6 to 10, at Air Force Station, Yelahanka in Bengaluru, attracted several companies including biggies such as Boeing Commercial, Embraer and Bombardier

BY R. CHANDRAKANTH

THE FIRST EVER INTERNATIONAL air show was held in 1909 at Le Bourget airfield in Paris while the Farnborough air show has its origins in the annual Royal air Force air show at Hendon from 1920 to 1937. These two air shows with both civilian and military segments, are iconic events. Compared to these, Aero India, the biennial event in Bengaluru, India, which was held for the first time in 1996, is a toddler and India Aviation, Hyderabad, is a newborn, having been initiated as recently as in 2008. Despite their late entry, both the events are fast gaining international importance. Aero India is organised by the Ministry of Defence while India Aviation is by the Ministry of Civil Aviation.

Aero India, which is predominantly a military aviation event, has a civil aviation component that has been increasing with

every show. The ninth edition of Aero India 2013, held from February 6 to 10, at Air Force Station, Yelahanka in Bengaluru, attracted several companies including biggies such as Boeing Commercial, Embraer and Bombardier. Making use of the platform, the Civil Aviation Minister Ajit Singh talked about the synergies that could be built into the aerospace sector, considering the enormous potential there is and the opportunities ahead.

"India," he said, "is among the top three civil aviation markets in the world in the next couple of years as passenger growth, air cargo and airport infrastructure was growing at break-neck speed. Having initiated several policy measures, the government is creating an ecosystem which is expected to start yielding results soon and the airline industry hopefully will witness a quick revival. General aviation business is slated to emerge as a key driver of regional connectivity and economic development."



Embraer's ultra-large Lineage 1000 on display



Dassault had on display Falcon 2000LX, Falcon 7X and Falcon 900LX

The Civil Aviation Minister said that India envisaged an investment of \$12.1 billion (₹66,550 crore) during the Twelfth Five Year Plan Period of which \$9.3 billion (₹51,150 crore) is expected to come from the private sector. Currently, India is the ninth largest aviation market in the world handling 120 million domestic and 40 million international passengers annually.

BOEING'S STRONG PRESENCE. Aircraft major Boeing is gung-ho about the civil aviation prospects in India and Dinesh Keskar, Senior Vice-President of Asia Pacific and India Sales for Boeing Commercial Airplanes, said that while traffic is dropping due to reduced capacity, yields are improving and fuel prices are stabilising in the market. "These are all positive signs for the airlines in India. There is now a balance between supply and demand, help-

ing airlines get reasonable yields to make a profit." Over the next 20 years, the Boeing Market Outlook projects that the airlines in India will need 1,450 new airplanes worth \$175 billion (₹9,62,500 crore).

EMBRAER LEADS WITH FAMILY OF JETS. Embraer promoted its full portfolio of Commercial Aviation, Executive Aviation and Defence and Security products. The portfolio included the leading family of commercial jets up to 120 seats in the global market (E170, E175, E190 and E195), the most modern and complete product line of business jets, from the entry-level Phenom 100 to the ultra-large Lineage 1000, and a broad range of integrated solutions for defence and security that combine a high technological level and operational efficiency at competitive acquisition and operating costs. Three of the Embraer Executive

AIR CHARTERS - NEED FOR NURTURING: K-AIR

The increasing number of commercial and general aviation companies present at Aero India 2013 is testimony to the fact that there is a lot of traction, leading to aviation business growth. Understanding such dynamics, K-Air, an aviation company headquartered in Kochi, Kerala, made its presence felt at the show, showcasing its varied activities—aircraft purchase and sale, leasing, charters and management.

Speaking to *SP's AirBuz*, Robin Cherian, Director, K-Air, said that as players entering the air charter business in increasing numbers, it had become important to be part of such events. There are reportedly over 120 air charter operators with 350 aircraft in India and the competition is increasing. "Air charter business is still in its nascent stages in India. The market has to mature and we need to develop it. But there are too many challenges," said Cherian. Despite the stumbling blocks such as poor infrastructure and hostile regulatory framework, K-Air is enthused about the market in India as there is a growing realisation that air charters offer a number of advantages, better utilisation of time being one. Corporates and individuals have

started utilising air charter service. "We have to continuously nurture the market," said Cherian.

K-Air is known for its vast network, guaranteeing availability of charter service 365 days a year with a response time of less than six hours. It offers aircraft to meet various flying needs such as passenger charters for VIPs, corporates and celebrities, film shooting, aerial photography, cargo, air ambulance, electioneering and aerial survey. It provides the customers access to multiple aircraft, accurate and reliable time slots for optimal aircraft utilisation. Cherian mentions that even while air charter business is developing slowly, there is new-found interest in pre-owned aircraft and is coming from Tier-II and Tier-III cities. "As most of them invest in the aircraft, we do take care of aircraft management."

The price of a new business jet, he mentions, could be in the range of ₹20 crore to ₹100 crore depending on the size and features. "It is possible to get a pre-owned jet with almost 30 to 50 per cent lower acquisition cost," K-Air, he avers, has placed over 60 aircraft through acquisition, management and lease of fixed-wing and rotary-wing platforms across the world. •



Hawker Beechcraft's best-selling aircraft King Air 350i



Single-engine turboprop Pilatus PC-12 NG

Jets aircraft were on static display—the entry-level Phenom 100, the long-range Legacy 650 and the ultra-large Lineage 1000.

Embraer has a strong presence in the Indian market and counts the national government, private organisations and individuals as customers and operators. The country is home to more than a third of Embraer's Executive Jets in the region with at least one type each of the Phenom, Legacy and Lineage jets in service today. Embraer Executive Jets is the only business jet manufacturer to produce a full range of aircraft solutions and its aircraft have received over a dozen international design and innovation awards from top luxury and aviation publications for setting a new standard for business aircraft.

BOMBARDIER. Bombardier Aerospace showcased two of its class-defining jets at this year's air show with its Challenger 605 and Global 6000 business jets. "India represents huge potential for business aviation," said Nilesh Pattanayak, Regional Vice-President, Sales, Asia-Pacific. "As the economy grows and the need for global and regional corporate travel increases in the region, the value of a business jet is now well established. Our Global aircraft family is the market leader in India and we look forward to having the opportunity to showcase a Global 6000 jet, our class-leading Challenger 605 jet and presenting our overall product portfolio."

"It is an exciting time for business aviation in India and we are playing our part in connecting India's business leaders with the rest of the world by providing the ultimate tools to improve their efficiency," added Pattanayak, "2012 was a great year for Bombardier Business Aircraft as we captured 60 per cent of business aircraft orders worldwide and we are continuing to build upon that success in 2013."

HAL KEEN ON EXPANDING CIVIL MARKET. Trying to cash in on the humungous potential, Indian aerospace behemoth Hindustan Aeronautics Limited (HAL) announced at the show that it would go aggressive in its forays into the civil aviation sector. Leveraging its military expertise, HAL is entering into civil aerospace. "By 2020, the projections are that India will be the third largest civil aviation market. In recent meetings with competent

authorities, it was decided in principle that HAL should lead the programme of national civil aircraft which has to be developed in collaboration with the private sector. The expert committee has pegged the investments for such a programme at ₹7,500 crore," said HAL Chairman R.K. Tyagi.

Making its foray in civil aviation and MRO business, Tyagi mentioned that it had received the civil certification for Ozar airport near Mumbai from the Directorate General of Civil Aviation and hoped that it would 'decongest' Mumbai International Airport while it would lead to substantial savings in aviation turbine fuel. Tyagi said efforts were on to reopen HAL Airport, Bengaluru, to supplement the Bengaluru International Airport Limited and that the Civil Aviation Secretary had endorsed the same. "When BIAL was envisaged, it had planned for a capacity of ten million passengers per annum and now, it has crossed 12 million already and was preparing to handle 17 million passengers." "HAL could supplement air connectivity by handling short haul flights," he said and mentioned that nowhere in the world an operational airport had been closed down to accommodate a new airport.

BEECHCRAFT DISPLAYS 'SPECIAL MISSION' AIRCRAFT. During Aero India 2013, Hawker Beechcraft was in its final phase of restructuring of the company and Beechcraft honchos were present to make a case for its best-selling aircraft King Air 350i. The executives were on a mission, so to say, selling the special mission capabilities of the aircraft which numbers 94 in India, a good figure and growing further.

DASSAULT RIDES HIGH ON MMRCA WIN. Dassault Aviation, which is riding high with its fighter aircraft Rafale after winning the medium multi-role combat aircraft competition, was present in good strength. Dassault had on display Falcon 2000LX, Falcon 900LX and Falcon 7X. The French manufacturer has shown big ambitions in India. The Falcon 900LX and 2000 LX feature the new FalconCabin HD plus cabin management system. Till date, Dassault has about 20 Falcons based in India and last fall, it opened a new Falcon liaison office in New Delhi. **SP**

SENSIBLE AND SAFE

Aviation regulators, pilots and airlines now have a proactive approach to safety, meticulously compiling and sharing information about flying hazards with the goal of anticipating and preventing accidents rather than merely adopting a reactive approach

BY JOSEPH NORONHA



PHOTOGRAPHS: SP Guide Photos

S COMMERICAL AVIATION BECOMING safer? The gratifying answer is yes. According to Aviation Safety Network, a reputed accident research agency, last year was the safest since 1945. Globally, year 2012 saw just 23 fatal accidents and 475 deaths against 42 fatal crashes and 1,147 deaths in 2000. Some of the reasons for this dramatically improved performance are evident. Commercial aircraft are becoming more reliable with each passing year and their engines are far less likely to quit. Advancements in the cockpit and trustworthy avionics mean that the load on the flight crew is minimised while sophisticated warning and navigation devices ensure that the once-common causes of accidents such as mid-air collisions, landing accidents in bad weather and controlled flight into terrain (CFIT), have been drastically reduced. There are also less

obvious reasons why accident rates are plummeting, especially in the advanced countries. Aviation regulators, pilots and airlines now have a proactive approach to safety, meticulously compiling and sharing information about flying hazards with the goal of anticipating and preventing accidents rather than merely adopting a reactive approach. Indeed, the flying environment has never been safer and that is something to celebrate.

CONTINENTAL CHASM. But in the flight safety arena, something always remains to be done. For instance, while North America is the safest continent with a very low accident rate, Africa accounts for 22 per cent of all fatal airliner accidents even though it hosts just three per cent of global departures. Even in the US, the safety record in respect of regional aviation is hardly inspiring. Regional airlines have been involved in five of the seven fatal accidents that struck scheduled airline flights in the past decade. In four of these accidents, pilot error was cited as a cause. So what does that say about training and “safety first” culture? The most recent of these deadly mishaps, the one involving Flight 3407 of Colgan Air, was attributable to inadequate training and insufficient regulation. Flight 3407 was operated by regional carrier Colgan Air for Continental Airlines under the brand name Continental Express. In February 2009, it crashed near Buffalo, New York, killing all 49 aboard. The cause was an incorrect response by the Captain to two key stall warning devices on the 74-seat Bombardier Q400 turboprop, one of the safest regional aircraft flying today. After the crash, it emerged that regional carriers in the US routinely hired younger pilots with as little as 250 hours of flight experience, worked them to the bone, yet paid them far lower wages than the major airlines—all quite legal under the US Federal Aviation Administration (FAA) rules.

In many countries, including India, there is no reduction in the crew experience requirement for regional airlines. This is eminently sensible. However, it happens everywhere that the major carriers grab the best and brightest talent, leaving the smaller regional enterprises to fight over the left overs. In this country too, a regional airline is seen as a mere stepping stone to a more lucrative job with a prestigious airline. And India's regional airlines are still in the doldrums. Since the Ministry of Civil Aviation introduced its policy on scheduled regional air transport operations in August 2007, just one regional carrier, MDLR Airlines, operated on a small scale and soon folded up. Now there is only Air Mantra with two small planes on very limited routes in the northern region. But it has recently temporarily suspended operations. However, on the brighter side, major airlines such as SpiceJet and Jet Airways are keeping the regional aviation flag flying by connecting several Tier-II and Tier-III cities to the nearest metro or major city with the help of Bombardier Q400 NextGen, ATR 72-500 and ATR 72-600 turboprop aircraft.

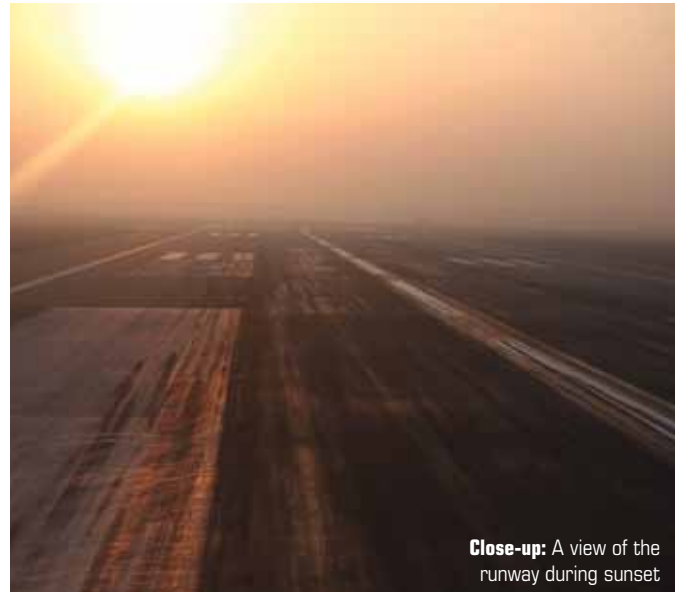
REGIONAL MISGIVINGS. Why do regional airlines, usually small setups that fly planes with fewer than 100 seats, have a worse safety record when compared with the major carriers? One reason, especially in the US, is that the regional carriers, which meet their performance goals defined by the number of completed flights, often earn more money than those that fail to meet such targets. This may be an incentive to take “small” chances instead of delaying or cancelling a doubtful flight. In order to survive in a dog-eat-dog world, regional airlines also need to be very aggressive in controlling costs. This often results in poor pay and working conditions. Although regional opera-



Indian Carriers: An Air India and Jet Airways flight on display during India Aviation



Abundant Caution:
An airplane being refuelled



Close-up: A view of the
runway during sunset

tions are usually viable only if they feature low-cost flights to low-cost airports, the industry's cost-cutting race to the bottom can have disastrous consequences.

There was a time when regional aircraft were not half as sophisticated as the larger airliners. But nowadays, a regional jet or modern turboprop costs tens of millions of dollars, and has many of the same high-tech avionics and cockpit advancements as a standard narrow-body airliner such as the Airbus 320 or the Boeing 737. However, an aircraft is only as safe as its crew. In many parts of the world the training standards and experience levels of regional aviation pilots are generally lower than those of pilots flying in the major airlines. As such, regional aviation pilots are more prone to committing errors. The inherent characteristics of regional aviation, short hops between under-equipped airports, make it more challenging and fatiguing and consequently less safe than tranquil intercontinental flights between ultra-modern international airports.

Overall, a typical regional aviation scene is not comforting. Young, inadequately trained pilots are made to fly several trips in a long work cycle, in a low-paid, highly-stressful job, rendering the situation ripe for trouble. Even when a major carrier operates a mix of large and small aircraft as SpiceJet and Jet Airways do, the more experienced pilots usually get to fly the bigger and better airliners on the longest routes, performing just three to four take-offs and landing in a day. On the other hand, the fledgling pilots, who have to begin somewhere, will always be on small planes on short-haul regional flights involving perhaps six or eight takeoffs and landings daily. It is a statistical fact that most crashes occur in two phases of flight: during the take-off and climb or during approach and landing.

Maintenance is another area of concern. Regional carriers often outsource their line maintenance requirements, especially at smaller airports. And such maintenance may not always be adequately supervised. Shoddy, outsourced maintenance was blamed for at least two regional aviation crashes in the US.

In India, although regional aviation is yet to take-off, other factors come into play. Much of the predicted increase of the coun-

try's air traffic will be from remote, up-and-coming destinations. But the country is facing a severe financial crunch plus a shortage of air traffic management staff, a situation that could continue. When resources are scarce, the lion's share of funds and the best and brightest people are inevitably committed to the busiest airports, so small regional airports could be neglected and their facilities may not be up to the mark.

PREDICTIVE SAFETY. Earlier, aviation safety used to be mainly a matter of reacting to the last accident. Now it is more proactive, doing whatever it takes to prevent an accident. An example of this new cautious approach is the grounding of the global Boeing 787 Dreamliner fleet earlier this year because of just two incidents of overheated batteries. In contrast, the last time a civilian fleet was grounded was in 1979, when a McDonnell Douglas DC-10 crashed killing 273 onboard.

In future, flying should be even safer, when safety goes predictive, allowing hazards to be identified long before a hint that an accident might occur. Global flight safety data is proposed to be gathered, compiled and added to a single worldwide database being set up through the International Civil Aviation Organisation. Within a few years, it will be possible for a pilot anywhere in the world to check out the hazards of any airport of interest based on the experiences of the flight crew who have previously operated from there.

India's airline industry is expected to grow at around eight per cent over the next 20 years, taking aviation services to many remote regions. Any period of rapid growth calls for extra care. Regional operators especially, will be venturing into uncharted territory without much information available for guidance. They will need to be alert to the unique safety challenges that regional aviation throws up. Neglect or complacency could be fatal. And with many more regional airlines likely to get off the ground, the need for plenty of sensible preparation, abundant caution and close supervision cannot be overemphasised. If hazards are identified much before they can possibly trigger accidents, the next decade could be even safer than the last. **SP**

Technical Proficiency:
CRM training has undergone
generational change



HUMAN FACTORS VITAL

CRM is a concept that recognises the critical role of human factors in determining the effectiveness of technically proficient crew in both normal and non-normal situations and provides practical options which can bring about attitudinal/behavioural change so that competent individuals can come together to form an effective team

BY CAPTAIN J.P. JOSHI

FORMAL TRAINING FOR CREW resource management (CRM) was adopted by airlines from the early 1970s. KLM was one of the first to introduce a human factors training programme based on the Edwards SHEL model and the concept of trans-cockpit authority gradient. Accidents involving fully airworthy aircraft were perplexing to the aviation community, the most notable being the collision in 1977 between two B-747 airliners while on the runway at Tenerife. Such accidents were not due to the lack of technical proficiency of the cockpit crew but were suggestive of breakdown of coordination and com-

munication between them. It was finally at the NASA workshop of 1979, where the relevance of human factors in aviation accidents came into focus. Participants at this conference concluded that formal training in crew coordination was required to reduce human error accidents. The origin of CRM training is now universally traced to this NASA workshop of 1979.

With advancements in knowledge and better understanding of the subject, CRM training has undergone generational change from the first to the present-day sixth which is also called "Threat and Error Management". CRM training is crucial for flight crew, aviation's last of line of defence in preventing accidents. How-

KLM WAS ONE OF THE FIRST TO INTRODUCE A HUMAN FACTORS TRAINING PROGRAMME BASED ON THE EDWARDS SHEL MODEL

ever, it is equally important for others who provide support to aviation activities.

PILOT-IN-COMMAND. Amongst the flight crew, the final authority and responsibility with regard to safety of the aircraft and its occupants rests with the Commander of the aircraft from assumption of command until completion of the flight. This is elaborated in Rule 141 of the Aircraft Rules which states that “the Pilot-in-Command (PIC) shall have final authority as to the disposition of the aircraft while he is in command. The PIC shall supervise and direct other members of the crew in the proper discharge of their duties in flight operations.” It further clarifies that “In addition to being responsible for the operation and safety of the aircraft during flight, the PIC shall be responsible for the safety of passengers and cargo, maintenance of flight discipline and safety of the crew.” An onerous and challenging task indeed!

The PIC is highly capable but also has human limitations. Human attributes and behaviour have been studied by experts and well-documented. A pilot aspiring for flying licence is required to be knowledgeable in this regard. Human factors’ is the term coined by the International Civil Aviation Organization (ICAO) for this important area of study by pilots, and lately by others too such as air traffic controllers and maintenance personnel. Most of the earlier generation pilots, for whom knowledge of human factors was not mandatory for licensing, by virtue of their seniority, are today flying as commanders, check pilots, instructors and examiners. However, with generally an accident-free record, they are not convinced of the efficacy of CRM training. This article explains ‘why’ CRM is important for the commander and his crew. Understanding the ‘why’ would help motivate the crew to learn the ‘what’ and ‘how’, which is the main purpose of CRM training.

IMPORTANCE OF CRM TRAINING. CRM training is important for all crew members, especially so for the commander because it is he who, by law, is ultimately responsible for safe flight. While every commander understands its importance, yet this concept needs to be internalised if accidents, such as the one at Mangalore and others around the world involving fully serviceable aircraft flown by technically proficient crew are to be prevented.

HUMAN ERROR. With the new generation airliners offering high levels of technical reliability, human error has increasingly become the leading cause of accidents. Investigation into accidents have revealed that the underlying cause is not only human error on the part of the Commander and his crew but also attributable to errors or failures at various stages in the life-cycle of the aircraft viz. the design, manufacturing, loading and maintenance. Failure on the part of the regulator, management, air traffic control (ATC), dispatch and the meteorologist have been contributory factors. In some cases, the PIC or a well-trained crew could have prevented the accident, but failed

to do so. This brings us to the larger question as to why human beings are prone to err.

HUMAN INFORMATION PROCESSING SYSTEM. Research into the functioning of the human brain has revealed its limitations. The following are some of the significant memory-related problems that human beings, including pilots, are inclined to suffer from:

- Absent mindedness – forgetfulness attributable to lack of attention.
- Blocking – temporary loss of memory manifest in a query, “Did he clear us to land?”
- Transience – forgetting information with time evident in a question “What is the approach frequency?”
- Mis-attribution – forgetting the source of the information.
- Suggestibility – developing a false memory because of new information received during retrieval.
- Bias – unconscious reshaping of memory due to personal beliefs or mood.
- Persistence – negative distortion of memory of a traumatic event.
- Memory changes – memory changes from person to person and also within the same person due to reasons like physical and emotional health, stress, quality and duration of sleep, diet and age.
- In-attention blindness—things to which attention is not directed are not perceived. In-attention blindness is affected by the following factors:
 - ❑ Lack of conspicuousness – all warnings in the cockpit are designed to be conspicuous so as to attract attention
 - ❑ Mental workload and task interference. Low workload and the effects of automation, low arousal and low performance.
- Fixation is a cause factor in many aviation accidents. Fixing of attention on something leading to inadequate availability of attention resources to maintain situational awareness.
- Limited processing capability of the brain vis-à-vis massive inputs from the five senses. In aviation, the eyes and ears including vestibular apparatus and seat of the pants are the most effective sense organs. As an example, in the human visual system, the amount of information coming down the optic nerve is estimated to be around ten million bits per second. This far exceeds the capacity of the brain to process and assimilate, which is under 40 bits per second. Limitations of the working memory of the brain are akin to the RAM in a computer.

SITUATIONAL AWARENESS. Limitations of the human information processing mechanism impinge on the efforts by aviators at developing and sustaining situational awareness. This already difficult situation becomes even worse when information is to be processed rapidly as during in-flight emergency and in non-normal situations. Being aware at all times is extremely

POOR SITUATIONAL AWARENESS INVARIABLY LEADS TO BAD DECISIONS



Last line of defence:
Commercial pilots need to be convinced of CRM techniques

important in enabling the crew to take the right decisions. Poor situational awareness invariably leads to bad decisions. This is detrimental to air safety and impinges on the primary responsibility of the PIC. How does one ensure that the crew maintain or quickly regain situational awareness, if lost? This requires the application of CRM which entails, “the effective use of all available resources: human, hardware and information.” The PIC is by law the final decision-maker in the air, but knowing his/her limitations, he/she should be the one to use all available resources to become aware and thereafter go on to make the right decision. This sounds simple and logical but investigation into accidents/incidents indicate that this is not so. The reasons are many and some attributable to one's formative years in life, where individual accomplishments are celebrated.

Commercial pilots for whom the aim of safe and efficient flying is paramount need to be convinced about using CRM techniques, if the record of aviation accidents has to be improved. In the context of the rapid growth in aviation, positive action is necessary to bring down accident rates. The most significant contribution to reducing human error accidents can come from

internalisation of CRM techniques by the pilot and his crew, aviation's last line of defence.

COMMUNICATIONS. For situational awareness in terms of location, spatial orientation, environment, aircraft systems, time and fuel, the PIC requires a variety of inputs. Accidents are known to have occurred in the hands of a situationally unaware PIC even while other crew members were situationally aware. Apparently, this was the case at Mangalore. This implies that the whole crew should be on the same page and there should be no unresolved issues in the cockpit. It is not only the PIC who is responsible for the accident, but the entire crew. Accidents due to human errors occur because either the PIC does not ask for or does not consciously or unconsciously permit free flow of relevant information amongst the crew. Sometimes, the crew does not share critical information due to human failure. Emotions are an integral part of being human. The aircraft responds to control inputs exactly the same way each and every time, but humans may not. Emotions always matter to human beings. Other reasons could be: one may feel that the other is aware; knows everything; or the other does not need to be told as he is so experienced; or a plain ‘I am not ok, you are ok’ situation; or ‘why should I tell him’, he is responsible for his actions. These may be false assumptions, as has been brought out in a number of accident investigations. In Mangalore, the co-pilot had attempted to advise the PIC, but was not assertive enough. SP

(To be continued)

CRM TRAINING IS IMPORTANT FOR ALL CREW MEMBERS, ESPECIALLY SO FOR THE COMMANDER



‘ATR IS A WELL-KNOWN AND COMPETITIVE AIRPLANE IN INDIA’

When compared with jetliners, the turboprop airliners offer better fuel efficiency. The potential of regional aviation in India is also high. The existing low-cost carriers and the new regional airlines emerging on the civil aviation scene are expected to invite bids from turboprop manufacturers to either commence operations or replace the existing fleet of regional aircraft. Indeed, the turboprop market is booming and ATR is definitely in the lead. **Filippo Bagnato**, Chief Executive Officer, ATR, speaks to **Vasuki Prasad** of **SP's AirBuz** on products from ATR and the Indian market.

SP's AirBuz (SP's): How do you see the prospects for ATR in the Indian market?

Filippo Bagnato (Bagnato): India is growing and there is still untapped potential for further introduction of commercial aircraft. The number of airplanes in India is still limited with some 400 commercial aircraft, including some 50 regional planes. This is not much when compared to over 1,300 regional aircraft in North America, which has a lesser population. In India's regional market, ATR is already well positioned with a market share of some 66 per cent of all regional aircraft. The connectivity between small and medium-sized communities is still to be deployed. ATR is a well known and competitive airplane in India. The operating environment in the region is very challenging with high operating costs and low average yields.

SP's: What are the prospects for the year 2013 in India for the ATR 72-600 aircraft?

Bagnato: We are currently introducing the very first ATR 72-600 in India with Jet Konnect and we are in discussion with other airlines in order to further expand the presence of our aircraft in the region.

SP's: How would you compare the ATR 72-600 with its competitors in the turboprop segment?

Bagnato: We propose the regional aircraft which feature the most advanced technologies, passenger comfort standards and the least operating costs. The ATR 72-600 features up to 40 per cent less fuel consumption when compared to other 70-seat turboprops, which is a substantial advantage when fuel represents some 50 per cent of the operating costs in India. The ATR 72-600 is the most recently certified regional aircraft in the market. Its flight deck features leading-edge technologies inspired from that of Airbus' A380, the world's largest commercial airliner. Special care was devoted to the new Armonia cabin offering lighter and more comfortable seats, wide overhead bins, mood lighting and a new cabin management system. These technological improvements lead to an increased operational flexibility, easier crew handling, higher comfort level and reduced maintenance costs.

SP's: Of the 74 firm sales plus 41 options with 11 customers in 2012, how many of these are to leasing companies?



Environment Friendly:
ATR 72-600 features up to
40 per cent less fuel consumption

Bagnato : About 15 to 20 per cent of the orders are from leasing companies and the rest are for direct sales.

SP's : With a production backlog of over 221 aircraft, how would you be able to cater to a start-up airline that needs the ATR 72-600 to commence operations immediately?

Bagnato: We have three years of production ahead. This said, we keep some production and delivery rate flexibility and we strongly cooperate with leasing firms to offer optimal solutions to airlines for a better match of all their needs and expectations.

SP's: What was the rate of production in 2012 and what is it expected to be in 2013?

Bagnato: 2012 was the best year in the history of ATR with 64 deliveries. This means 20 per cent more deliveries than in 2011 with 54 aircraft. In 2013, we plan to deliver over 80 aircraft and increase our rate of production up to 90 aircraft next year.

SP's: How well do you think the ATR aircraft fit into the Indian market?

Bagnato: As proven over the years, ATRs perfectly match the needs of regional operations in India. With low operational costs, maximum passenger comfort and low break-even load factors, this aircraft is best suited for regional operations across India.

SP's: Typically, what is the break-even load factor for the ATR 72-600?

Bagnato: Typically, the break-even load factor for an ATR 72-600 is below 50 per cent. This equals to 35 passengers, which is six to ten less passengers when compared to other 70-seat turboprops.

SP's: What about the 90-seat next generation turboprop?

Bagnato: ATR is strongly considering a 90-seat turboprop variant

and we have presented a business plan to our shareholders EADS and Alenia Aermacchi. This would be a totally new aircraft, further developing the key advantages of the ATR aircraft family i.e. economics, comfort, simplicity and high operational performance.

SP's: There is confusion as to which aircraft is better suited for India—the performance and route flexibility offered by your direct competitor and the operating economics of ATR 72-600? What are your views?

Bagnato: In India, with jet fuel prices today among the highest in the world and ATR turboprops burning around 30 per cent less fuel than that of a direct turboprop competitor, the economics of ATRs are pressing on shorter sectors typical in India's regional airline route networks today. It is important to notice that the average length of a typical regional route in India is around 250 nautical miles.

On the routes below 400 nm, the maximum payload of an ATR 72-600 and the competitor's 70-seat turboprops are very similar and do not bring any significant operating advantage to an airline (no supplementary turn around cycle for an airline due to saved time). In terms of flexibility, the ATR aircraft can deserve a lot more destinations in India and the region. Due to their ability to operate in environments with a wide range of short unpaved airstrips, many of the airstrips are not able to accommodate the large jets of competitor airliners. By the way, the shortest scheduled air route in the world flown by an ATR is just 18 km. There are quite a few regional routes in India that are not much longer than this distance where only an ATR can take off and land.

To sum up, there are not real advantages in India for our competitor aircraft, both in terms of speed or payload. The advantages of the ATR are proved by its long-standing presence in India and the fact that we have traditionally been the preferred solution for regional operations by most of the Indian carriers. **SP**



EMERGENCY IN FLIGHT

Incapacitation of the pilot in command of an airliner is definitely alarming to the passengers, the regulatory authority and of course, the medical system that in the first place, cleared the pilot to fly

BY DR MANI SISHTA

ALTHOUGH A RARE OCCURRENCE, one does sometimes hear of a pilot of an airliner succumbing to a heart attack mid-air. Occasionally, the co-pilot takes over controls when the Captain of the aircraft was, for some reason, physically incapacitated and had to be taken out of the cockpit for emergency medical care. In fact, last November, when the co-pilot of a Boeing 747 on a transcontinental flight suffered a debilitating migraine attack, an off-duty

pilot travelling as a passenger replaced the missing crew and the flight continued to its destination. While the demise of a pilot in flight is shocking, the consequences of mere incapacitation can be no less catastrophic.

Thanks to a fairly rigid and universal system of initial and periodic medical evaluation of aircrew, incidents of in-flight incapacitation are not too frequent and may not seem alarming. But incapacitation of the pilot in command of an airliner is definitely alarming to the passengers, the regulatory authority

and of course, the medical system that in the first place, cleared the pilot to fly.

In-flight incapacitation is clearly a problem that lies in the domain of aviation-medicine as well as that of flight training, the former being concerned with prevention and the latter, with the management of its occurrence. One of the main objectives of aviation medicine has been to completely eliminate the possibility of such an episode while in flight. Similarly, evolution of cockpit design, Standard Operating Procedures, the concept of crew resource management (CRM) and air traffic control procedures and aircraft maintenance practices, involve agencies such as the original equipment manufacturers, the regulatory authority and the airlines. All these agencies are concerned along with the problem of incapacitation of the pilot in flight, apart from other contingencies.

NATURE OF INCAPACITATION. The International Civil Aviation Organization (ICAO)'s medical definition for incapacitation is: "any reduction in medical fitness to a degree or of a nature that is likely to jeopardise flight safety." An operational definition would be: "any physiological or psychological state or situation that adversely affects performance."

Incapacitation has been described as "sudden" and "subtle". There is quite a variation in the degree of incapacitation, from "total" to "uncertain" and both these types can challenge the acknowledgement by the other healthy cockpit crew member. A particular category of incapacitation has been identified as "cognitive". The problem created by such incapacitation is difficulty in dealing with a pilot who is disoriented or mentally incapacitated or is obstinate while being physically able and vocally responsive. These cognitive incapacitations may seem psychologically based, but in some cases, the underlying cause can be pathological as with brain tumours, metabolic or frank psychiatric disorders leading to erratic performance. Retrospectively, there often seems to have been ample warning of an impending problem. In most cases, the pilot may have demonstrated inappropriate behaviour involving action or inaction as well as failure to comprehend, perceive and pass judgement.

Incapacitation can take place in any phase of flight, though an occurrence during take-off or landing and can have devastating impact on flight safety. All cockpit crew training procedures, especially CRM training to handle such an occurrence, is intended to confirm its presence and then taking over of controls and duties by the healthy member. At altitudes above 20,000 feet, explosive or slow decompression, pressurisation failure, fire, toxic smoke and the presence of carbon monoxide can result in hypoxia that is the most sinister of incapacitating hazards. This is sinister because the symptoms of hypoxia can vary from "normal" behaviour initially at least, to outright loss of consciousness, all within a matter of seconds. The possibility of feeling a "high" can be most distractingly devious. Procedures related to donning of oxygen masks are of primary importance here. Dur-

IN-FLIGHT INCAPACITATION IS CLEARLY A PROBLEM THAT LIES IN THE DOMAIN OF AVIATION-MEDICINE AND FLIGHT TRAINING

ing the remedial descent processes, decompression sickness can take its toll, especially where there is a pre-existing illness.

Medical conditions that can cause serious incapacitation include uncontrolled diabetes mellitus, high blood pressure, unexpected side-effects of self medication, various forms of epilepsy, and cardiovascular diseases. This is not to suggest that members of the aircrew are declared fit to fly with incomplete medical evaluation or observations. But they do have a penchant to either disregard or seek medical advice outside the aviation medicine domain. It is worth mentioning a positive facet of medical disposals here. After recovering from cancer, a heart attack or cardiac surgery, medical clearances attempt to follow the "one per cent rule". Here is a magnificent bit of statistical foreplay which aims to balance flight safety risks with financial considerations for the pilot and the operator. The rule accepts that if a hundred pilots with similar medical condition are flying, only one of them will suffer from recurrences/complications, necessitating further grounding.

STATISTICAL ANALYSIS. To quote the ICAO document, during the last decade of the 20th century, a number of contracting states were approaching a fatal accident rate of one in ten million flying hours. Some of these states, therefore, set as their target, for *all cause* maximum fatal accident rate, a figure of one in ten million flying hours with human failure risk constituting one tenth of the risk and human failure caused by medical incapacitation comprising one-tenth of the human failure risk, or one-hundredth of the total risk. The rationale gets even more complex but results in the acceptance of a medical-cause-accident-rate of no more than one in ten billion flight hours. Given the well-worn cliché that medicine is not an exact science, this is the best possible compromise, though some states even advocate the "two per cent rule". The important point here is that states should work towards defining objective fitness criteria to encourage consistency in decision-making.

According to a study carried out in 1991 by ICAO, gastrointestinal conditions constitute about 75 per cent of self-limiting incapacitations. Uncontrollable bowel action constituted 21 per cent of these, with colicky pain, nausea and vomiting causing the remaining.

While these may represent a little more than varying degrees of discomfort and inconvenience, they can also be completely incapacitating. Fortunately, time for a planned handover is possible in most instances. Herein lies a lesson. Airlines attempt to provide cockpit crew with food from different sources. Fair enough. But what about the lack of discipline when a crew member has a meal prior to flight from an unhygienic restaurant or consumes foods he/she is known to be allergic to? Other potentially incapacitating conditions include earache (eight per cent), fainting/weakness (seven per cent), headaches/migraines (six per cent) and vertigo/disorientation or the lack of situational awareness (four per cent). There is no reference to fatigue-induced "sleep attacks", drowsi-

INCIDENTS OF IN-FLIGHT INCAPACITATION ARE NOT TOO FREQUENT AND MAY NOT SEEM ALARMING



Alarming Situations: Incapacitation can take place in any phase of flight, though an occurrence during take-off or landing and can have devastating impact on flight safety

ness due to medication or epileptic conditions in this report and there is plenty of reason to accept that the incidence of these conditions are higher than what one would like to believe.

THE WAY FORWARD. What can be done by the aviation medicine domain to get to terms with the problem? For one, the doctors admitted to this specialty must possess a high level of general knowledge of the aviation environment. Familiarity with the social and professional behaviour of aircrew can be attained with close and constant observation as well as interaction, bereft of the fear of reprisal from the pilot community. This is certainly the situation amongst military aviators where the squadron doctor is trained to be a friend, philosopher and guide. Within an airline hierarchy, the senior doctor should be able to

fulfil this role admirably. Simply being able to collect reliable data on incapacitations will be half the battle won. The other half of the battle would entail a rational analysis of the circumstances surrounding the incapacitation, to screen out medical pathology and training issues.

Thereafter, it is the regulatory agency that will have to lay down suitable guidelines for prevention. Sadly, this is far from reality. The ICAO now mandates a safety management system within the Regulatory Medical Department. The role of this “aviation smart” doctor would essentially be data collection from the three main sources as follows:

- In-flight medical events.
- Medical events that occur between flights but which would have been important had they occurred in flight.
- Medical conditions discovered by medical examiners during a routine medical evaluation.

Surely, there will be many new challenges in managing the medical safety management system, but show me a naysayer and I will show you a flight safety risk. It is never too late to start. **SP**

Acknowledgement by the Author - Information used here has been obtained from the 2012 ICAO document 8984.

**INCAPACITATION OF THE PILOT IN
COMMAND IS DEFINITELY ALARMING
TO THE MEDICAL SYSTEM THAT
CLEARED THE PILOT TO FLY**



Faiz Khan, NOVIAIR Chairman and Muhammad Faruk Khan, Bangladesh's Minister of Civil Aviation & Tourism during the inaugural flight ceremony in January

BRAZILIAN BIRDS SIGHTED IN BANGLADESH

REGIONAL JETS MAKE THEIR DEBUT IN DHAKA

NOVOAIR is on course to showcase how regional jets can bring greater convenience for passengers and help airlines tap the expected growth in domestic air travel

BY SP'S CORRESPONDENT

IT IS RARE TO see regional jets parked at the Hazrat Shahjala International Airport but NOVIAIR co-founder and Managing Director Mofizur Rahman is hoping his fleet of Embraer E145s will soon be a familiar sight at Dhaka and at airports across Bangladesh. The new Bangladeshi airline commenced domestic operations on January 9 this year after receiving two E145s on November 30 and December 6 last year. The aircraft are configured with 49 seats in single class and are owned by the airline. The acquisition is noteworthy; not only are these the first regional Jets registered in the country but they are also operated by a new scheduled airline.

Mofizur Rahman's vision for jet aircraft at NOVIAIR can be traced back to his days as a pilot in the Bangladesh Air Force.

Early in his flying career, he had flown missions in Africa and met several other pilots from the Brazilian Air Force. Interactions with fellow military pilots got him interested in Embraer – a Brazilian aircraft manufacturer making both military and commercial aircraft. That led eventually to a trip to Embraer's factory in São José dos Campos in Brazil. The visit made a lasting impression that would turn out to influence the choice of an aircraft for his new airline.

EVALUATING OPTIONS. The founders of NOVIAIR considered adopting a business model that utilised 50-seat turbo-props yet they felt a need to introduce a differentiated product. Another option focused on regional jets to capture premium fare,

FOR NOVOAIR, THE NEW, LOW OWNERSHIP COST OF THE E145S WAS INSTRUMENTAL IN THE DECISION TO ACQUIRE JETS

time-sensitive travellers who value speed and a business-oriented flight schedule. Regional jets would also allow for growth in the longer term and a more diverse NOVOAIR network, including international destinations. The attractiveness of building the airline by opening new routes to foreign cities was a key driver in the decision to acquire regional Jets.

According to Mofizur Rahman, "We are pleased to offer an all-jet domestic service which will appeal to the business traveller in Bangladesh. In the future, we aim to connect our key cities with other top destinations in the region." Airlines registered in Bangladesh are required to demonstrate their operating competency in the domestic market for one year before they can apply to fly internationally. If NOVOAIR is successful in complying with that stipulation, it sees an opportunity to add a third E145 within one year to expand operations to Kolkata, Bengaluru, Kathmandu, Yangon, Kunming and Chiang Mai. As of now, the E145s link five domestic cities – Dhaka, Jessore, Chittagong, Sylhet and Cox's Bazar.

CAN REGIONAL JETS WORK? NOVOAIR is counting on continued strong growth in passenger movement to make its new venture viable. In 2011, Bangladesh recorded 6,27,000 domestic enplanements, nearly 20 per cent more than the previous year. Strong annual traffic growth is predicted through to 2020. But a sound regional business model relies on more than a just steady stream of passengers to generate healthy load factors. There is an operating formula that successful airlines follow to ensure positive returns.

When regional jets first came on the market in the early 1990s, their higher speed generated more available seat kilometres per day than slower turboprops. It was good news for airlines and even better news for passengers who could make same day return trips and avoid inconvenient and costly overnight hotel stays. Consistently-scheduled peak morning and evening departures are essential in attracting business travellers who value their time and are willing to pay premium ticket prices.

A high-frequency schedule also creates high daily aircraft utilisation which, in turn, lowers the hourly operating cost. North American airlines flying undepreciated, factory-new regional jets in the 1990s had to maximise daily utilisation to offset the high ownership costs. Those days are long gone as those carriers migrate to larger-capacity aircraft and pare down their 50-seat jet fleets. High fuel prices and declining fares have put downward pressure on regional jet operating economics in the United States, the world's largest domestic market. The surplus of regional jets has resulted in a plentiful inventory of pre-owned aircraft with bargain lease rates and attractive purchase prices. For NOVOAIR, the new, low ownership cost of the E145s was instrumental in the decision to acquire jets.

THE FORMULA FOR SUCCESS. Air Namibia in southern Africa is adhering to the regional jets operating formula with tremendous success. It flies each of its 37-seat Embraer E135 jets



in excess of 3,000 annual block hours. It deploys its pre-owned regional jets on prime-time round-trip morning flights to short-haul domestic cities from its Windhoek hub, sends the aircraft to medium-haul destinations at noon and returns them in time to operate the peak evening round-trips to pick up the same-day business travellers from earlier that morning.

While Bangladesh is hardly Namibia, the principles of the regional jet business model apply to both countries. A well-timed flight schedule and high daily utilisation are fundamental to earning the loyalty of premium-fare passengers and generating maximum revenue. Speed on the ground is just as important as speed in the air and smaller capacity regional jets have very short turnaround time between flights.

NOVOAIR has designed its flight schedules and in-flight service to appeal to business travellers



NOVOAIR is on course to showcase how regional Jets can bring greater convenience to passengers and help airlines tap the expected growth in domestic air travel. The airline has recruited an impressive team of flight operations professionals that includes a roster of pilots from scheduled airlines and the military who have accumulated in excess of 1,00,000 command hours. Moreover, many of these were Qualified Flight Instructors on Boeing 767 and Lockheed L-1011. That experience seems to be paying off. After the first 30 days of scheduled service, 99.5 per cent of NOVOAIR's E145 flights departed on time, according to Lutfur Rahman, Head of Operations.

SMALL CAN BE BEAUTIFUL AND PROFITABLE. The regional jet revolution that swept North America and Europe in

the 1990s with their massive, well-developed markets, deregulated environments, easy access to aircraft financing and high airfares, never reached the Indian subcontinent. Consequently, there is limited knowledge of how regional jets can work in parts of the world where large fleets of smaller-capacity aircraft are non-existent. After the shake-out in India's domestic industry that has seen bankruptcies, bailouts and restructuring, pre-owned regional jets, with their low acquisition costs and the new-generation of larger regional jets may be welcome alternatives. Bigger may not necessarily be better. NOVOAIR may yet prove that domestic airlines can prosper in the new environment pursuing a strategy of controlled growth and flying a fleet of right-sized airplanes. **SP**

ENCOURAGING CHANGES

The most progressive step of the government has been to abolish the Aircraft Acquisition Committee of the Ministry of Civil Aviation, eliminating a major bureaucratic hurdle and facilitating speedy procurement of new aeroplanes by airlines

THE FIRST COMMERCIAL FLIGHT in India took place on February 18, 1911, by a French aviator Monseigneur Piguet when he undertook a ten-minute trip from Allahabad to Naini, covering a distance of just 10 km. However, the origin of the airline industry in India is traced to the year 1932 when the legendary J.R.D. Tata flew a De Havilland Puss Moth from Karachi to Bombay as part of the first Tata Sons Ltd flight to deliver mail carried by British Imperial Airways. In 1948, the Government of India acquired 49 per cent stake in Tata Airlines which was designated as Air India International and was operating on international routes as the flag carrier for the nation. In 1953, the government nationalised the air transport industry in the country, acquired majority stake in Air India International and at the same time, set up a domestic carrier called Indian Airlines through merger of eight privately-operated domestic carriers that had sprung up in a relatively short span of time. The flag carrier entered the jet age in 1960 with the induction of the first Boeing 707 and in two years later, was renamed as Air India. Indian Airlines becomes one of the first airlines to induct into its fleet the Airbus A320 in 1989.

After the nationalisation of the airline industry, Air India faced stiff competition in the international segment and built up a commendable reputation in the years that followed, the domestic carrier Indian Airlines (later renamed as Indian) enjoyed complete monopoly of the skies. There was no competition in the domestic sector and the airline was not restrained in any way in the crafting of fare structures. Consequently, air fares remained high and air travel was perceived to be the privilege of the elite, the affluent, those travelling at company expense and senior functionaries of the government. There was no pressure on the state-owned carrier to strive for better performance financially, in respect of on-time performance or quality of service. Unfortunately, with passage of time, performance of Air India too began to degenerate and very soon came to be on par with the domestic carrier Indian. Both airlines were never real commercial ventures and functioned more like departments of the Central Government under rigid bureaucratic control and afflicted with the associated ills such as low productivity, overstaffing, labour dispute and mediocrity. Excellence in performance or profitability was never of any concern. The travelling public meekly reconciled to the state of affairs as it neither had other options nor had seen anything better or different.

In the wake of economic reforms, in the early 1990s, the government took the rather bold and progressive step to liberalise the civil aviation sector paving the way for the emergence of private airlines. A number of airlines emerged on the scene, all operating as full service carriers as the low-cost concept was unknown in India. The first on the scene was East West Airlines followed by Jet Airways, Air Sahara, Damania Airways and a host of others. However, most of these were unable to survive the hostile and competitive business environment aggravated by stifling and unimaginative regulatory framework, high fuel prices, and exorbitant airport levies as also deep-seated systemic corruption. Barring Jet Airways and Air Sahara who had deep pockets, all the other airlines were consigned to the civil aviation archives well before the end of the decade.

There was a revival of the airline industry in the private sector in 2003 with the establishment of Air Deccan by Captain G.R. Gopinath based on the low-cost concept. Inspired by the Air Deccan experience, a number of private carriers mushroomed with the total number of private airlines operating in the Indian skies going up to nine. However, despite the novel concept of no-frills service, profitability still remained a distant dream for most of the new players. Once again, the doddering business models were unable to survive the adverse operating environment and what followed was consolidation in the industry more out of desperation than any business strategy. Two airlines merged and by 2012, three others completely shut down operations leaving just four private carriers in the market. The government appeared to remain insensitive to the plight of the industry.

But now there are signs of change as evident in the decisions in the recent past. The government has permitted import of aviation turbine fuel by airlines which should lower cost; has permitted sharing of fuel infrastructure available with the state-owned oil marketing companies; and use of airspace under control of defence. This was followed by approval of foreign direct investment up to 49 per cent by foreign carriers into airlines in India, a facility not so far available. But perhaps the most progressive step has been to abolish the Aircraft Acquisition Committee of the Ministry of Civil Aviation, eliminating a major bureaucratic hurdle and facilitating speedy procurement of new aeroplanes by airlines.

Finally, the tide seems to be turning in favour of the airline industry in India. **SP**

—B.K. PANDEY



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