

Shared Horizons

U.S. - India Aviation Cooperation Program : " Uddein Saath Saath - Together We Fly"











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at Aero India 2019

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Message from the Co-chairs



Col Ashwini K Channan ACP Co-chair (Industry) & Senior Director, Government Relations Honeywell Aerospace India



Thomas M. Miller ACP Co-chair (Government) & FAA Senior Representative, South Asia

We are pleased to present to you the July - December 2018 issue of "Shared Horizons".

The highlights of the period were Boeing's grant signed for CNS/Airspace with AAI; grant signed for EDTP with RGNAU and Eminent speakers series with Hugo Yon, U.S. Department of State (DoS) & Kristen Davis, U.S. Department of Transportation (DoT).

On 2nd November, ACP's "Innovation in Aviation" workshop with MOCA allowed for open discussion on existing and proposed projects that will provide training and technical expertise in close cooperation with MOCA, DGCA, AAI and BCAS.

We are excited to welcome the companies that have joined the ACP within the last 6 months, including Aireon, Deloitte, United Airlines and Veoci.

In this 11th year of the US – India ACP, we seek to expand our efforts to rethink ACP's role in the modernization of India's aviation systems. You can be assured that we will continue to approach these efforts with determination, tenacity, innovation and passion.

On behalf of the entire ACP membership, we wish you great success in 2019.



(Thomas M. Miller)

PUBLICATION DATA

Edited & Published by Sandeep Bahl **Executive Program Director** Mobile: +91 97171-95197 Email: sandeep.bahl@us-indiaacp.com



Coordinated & Designed by Nidhish Jain

Program Assistant Tel.: +91-11-2660-2302 (D) Mobile: +91 98684-83500



Email: nidhish.jain@us-indiaacp.com nidhish@iaccindia.com

US-India Aviation Cooperation program (ACP)

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Ministry of Civil Aviation Government Of India







ACP Ongoing Projects

- Sustainability Master plan for Kolkata and Lucknow Airports X
- Executive Development Training Program (EDTP) with RGNAU ¥
- ✗ CNS/ATM Modernization Roadmap

ACP Past Successes

- Aviation Safety Technical Assistance Phase I ¥
- Technical, Management, and Operational ¥. Development Training (TMODT) Phase – I
- Total Airspace and Airport Modeler (TAAM)
- ✗ AAI Air Traffic Control Officers (ATCO) Manpower Assessment
- Helicopter Aviation Safety Technical Assistance ¥
- Technical Training for Aerospace Industry ¥
- Technical, Management, and Operational Development ¥ Training (TMODT) Phase - II
 - Mission

The U.S-India Aviation Cooperation Program (ACP) was established in 2007 as a public-private partnership

between the U.S. Federal Aviation Administration (FAA), the U.S. Trade and Development Agency (USTDA), other US Government agencies and U.S. Companies.

The ACP supports the growth of the Indian civil aerospace sector by working directly with the Government of India (GOI) to identify and execute projects that encourage collaborations between US and Indian stakeholders, in the area of aerospace technology and best practices.

Objective

- 🏋 🛛 Promote greater engagement between US and Indian Government agencies and industry to enhance civil aviation in India.
- 🛪 Undertake projects that advance Cooperation in domains such as aviation safety, security, regulatory oversight and management.
- Provide training and technical assistance to accelerate excellence in aviation operations.
- Within India, increase awareness of, and facilitate access to, US expertise, technology and best practices to X assist India's aviation growth.

- ✗ Airport Geographic Information System (AGIS) for Indian Airport
- ✗ Business Case for GAGAN Extension
- ✗ Aviation Safety Technical Assistance Phase − II
- ProVision Body Scanner System Pilot Project ¥
- Aviation Security Equipment Testing X & Evaluation Program (ASETEP)
- GBAS Pilot project at Chennai Airport ¥

Detecting threats

Validating technology

Training teams

Battelle has a lengthy history solving aviation security challenges thanks to technologies and services such as our ProDetect[™] 3D Security Screener Training, Verif-IQ[™] X-ray Image Quality Verification, detection system testing services (FAT, SAT, ISAT) and LS10[™] Liquid Bottle Scanner.



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ACP Milestones



2018

- ✤ Grant signing ceremony of CNS/Airspace with AAI
- ✤ Grant signing ceremony of AAAE/IAAE with IAA & GMRAA to provide Training, Accreditation Programs
- ✤ ACP's "Innovation in Aviation" workshop with Ministry of Civil Aviation at New Delhi
- ✗ Grant signing ceremony of EDTP with RGNAU
- ✤ RGNAU's Eminent Speaker Series with Mr. Mark Searle, University of California Berkeley at New Delhi
- ACP's Eminent speakers series with Hugo Yon, U.S.
 Department of State (DoS) & Kristen Davis, U.S.
 Department of Transportation (DoT)
- 🛪 2018 U.S. India Aviation Summit at Mumbai
- ✗ Wings India 2018 at Hyderabad

2017

- Eminent Speaker Series 2017 Blockchain Technology & its effect on the Aviation Industry
- ✗ Aero India 2017 at Bengaluru
- ✤ ACP & RGNAU partnership to bring the first Executive Development Program (EDP) for Aviation in India
- ✤ Creation of Sub-committee on Aviation and Aerospace Skills Development
- ✗ Celebration of ACP's "10 years Anniversary Partnership" at New Delhi
- ✤ Grant signing ceremony of Sustainability Master plan for Kolkata and Lucknow Airports
- ✤ ACP's "Innovation in Aviation" workshop with Ministry of Civil Aviation at New Delhi

2016

- ✗ Memorandum of Understanding Signing: ACP & Rajiv Gandhi National Aviation University (RGNAU)
- ✗ Grant Signing Ceremony: GAGAN Extension Business Case
- ✤ Memorandum of Cooperation (MOC) Signing: ACP & National Skill Development Corporation (NSDC)
- ↔ ACP project workshop with Ministry of Civil Aviation (MOCA)
- Memorandum of Cooperation (MOC) Signing: ACP & Bhogapuram International Airport Company Ltd., (BIACL)
- ✤ India Aviation 2016 at Hyderabad
- ✤ Grant agreement signed for Aviation Safety Technical Assistance Phase – II

2015

- ✤ Aero India 2015 at Bengaluru
- ✤ Grant agreement signed for ProVision Body Scanner System Pilot Project

2014

- ✤ India Aviation 2014 at Hyderabad
- ✤ Grant agreements signed for ASETEP & India Regulatory Oversight Assistance

2013

- ✤ Grant agreements signed for PBN, DGCA officers' training Phase-II and Airport GIS
- ✗ U.S. India Aviation Security Seminar
- ✗ U.S. India Aviation Summit, Washington D.C.

2012

- ✤ Grant agreement signed for Total Airspace and Airport Modeler (TAAM)
- ✗ India Aviation 2012 at Hyderabad

2011

- ✤ Grant agreements signed for DGCA officers' training Phase-I & launching GBAS at Chennai Airport
- ✗ U.S. India Aviation Summit, New Delhi

2010

- ✤ Grant agreement signed for Helicopter Safety Technical Assistance
- ✤ Automatic Dependent Surveillance Broadcast (ADS–B) & Ground Based Augmentation System (GBAS) Seminar
- ✗ India Aviation 2010 at Hyderabad
- ✤ Roundtable Discussion on Airport Regulatory & Financing Best Practices

2009

- ✤ Grant agreement signed for Aviation Standard Technical Training
- ✤ U.S. India Aviation Partnership Summit, Washington D.C.

2008

- ✤ FAA conducts Air Traffic Management Training Program (ATMTP)
- ✤ AAI Air Traffic Control Officers (ATCO) Manpower Assessment Study
- ✗ Air Traffic Flow Management (ATFM) Seminar

2007

- ✤ MoU between: U.S. Department of Transportation, U.S. Trade & Development Agency and Ministry of Civil Aviation
- ✗ U.S. India ACP Inaugural Session: ACP Formed
- ✗ U.S. India Aviation Partnership Summit, New Delhi







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The Commercial Section of the U.S. Embassy promotes U.S. exports, helps American companies do business overseas, and promotes foreign direct investment into the United States. As part of the U.S. Commercial Service's global network with seven offices across India, over 100 offices in the United States, and more than 80 other international offices, we have many trade and export promotion resources to help you develop your business.

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Single Company Promotion: The Single Company Promotion (SCP) provides U.S. companies with promotional services to help increase the awareness of their product or service. This promotional event can be customized and might include a seminar, press interaction, or reception, with a targeted e-mail or direct mail campaign to invite attendees.

Gold Key Service: The Gold Key Service (GKS) arranges pres c r e e n e d o n e - o n - o n e appointments with potential customers or business partners. The GKS services includes up to five appointments with pre-qualified customers, distribution channel firms, appropriate government officials, or other contacts, and possible escort by a U.S. Commercial Service staff member for meetings.

International Company Profile: An International Company Profile (ICP) is a due-diligence check that helps U.S. companies evaluate potential business partners. An ICP provides a detailed background report based on a variety of research sources, including an onsite visit by a Commercial Specialist, listing of the company's senior management, comments from company references, banking and financial information, and CS India insight on whether the prospective partner can meet your business needs.

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Customized Trade Counseling:

U.S. companies can benefit from customized trade counseling that can provide information on market opportunities, market entry recommendations, regulatory issues, and other relevant information.





The Aviation Industry is Entering a New Era with Global Air Traffic Surveillance

By Cyriel Kronenburg, Vice President, Aviation Services, Aireon

Ground-Based Air Traffic Surveillance and its Limitations

Air Traffic Controllers (ATC) around the world continue to experience the physical limitations of radar and groundbased antennas with considerable impact in the world's large oceanic and remote airspaces. Many international and domestic flights continue to fly large parts of their route without having Air Traffic Services (ATS) surveillance over oceans, deserts, inhospitable terrain and mountainous areas where Air Navigation Service Providers (ANSPs) currently do not have the ability to install radar or ground-based Automatic Dependent Surveillance-Broadcast (ADS-B) systems.

Due to the physical limitations of existing ATS surveillance technologies, large oceanic airspaces currently often operate with large longitudinal and lateral separation (spacing) between two aircraft. This results in aircraft operating at inefficient flight levels and allowing for only fixed and inflexible routes, to ensure safe aircraft separation where no ATS surveillance is available. This also limits the timely detection of aircraft that do not adhere to ATC instruction and visibility into traffic coming from neighboring airspace. airplane in the world can be seen in real-time by ATC, regardless of location.

Implementation of ATS surveillance (like radar and ADS-B in domestic airspace) will provide the required capability



Space-Based Surveillance and Benefits

The aviation industry is on the doorstep of a new era with the availability of global ATS surveillance from space. By early 2019, all 66 satellites of the Iridium NEXT low Earth orbit (LEO) satellite constellation with the ADS-B receivers of its partner, Aireon, will be operational in space. For the first time in history, every to accommodate rapidly growing airspace traffic volumes in oceanic and remote airspaces through reduced separation application, while at the same time, significantly increasing safety. Enabling aircraft to fly closer together, while maintaining stringent safety standards, allows for more routes and flexibility in using those routes. It will also provide pilots more options to





fly desired altitudes, take advantage of the upper wind conditions and fly optimal speeds, limiting unnecessary fuel burn and provide air traffic controllers with real time surveillance and situational awareness to safely guide pilots around adverse weather conditions.

Extending ATS surveillance Over Oceanic Airspace

Various studies carried out on the benefits of deploying spacebased ADS-B for ATS surveillance in North Atlantic airspace all showed significant fuel savings and time exceeding US\$300 million annually. Those studies also revealed a dramatic improvement in safety through the possibility to intervene in potential airspace conflicts, reducing risk by over 70 percent.

India - Aviation Growth and Challenges

Similar to the airspace in the North Atlantic, vast stretches of the Bay of Bengal, the Arabian Sea and the Indian Ocean are equally busy corridors connecting South/South East Asia and Gulf/European destinations, most of which are currently managed by India. Aircraft ADS-B equipage levels are already approaching 90 percent, and this will continue to grow as mandates take effect. With these high levels of



India has become the third largest aviation market in the world with a rate of sustained double-digit growth for the last 50 months. Forecasts suggest that this growth will continue, and Indian airspace is going to experience additional congestion. This will require extra capacity both in airspace and airports to meet the demand, including continued growth on overflights between South Asia, Middle East and Europe. equipage, an answer to capacity constraints is right around the corner through the recent deployment of space-based ADS-B. Space-based ADS-B is a logical and easily implemented solution to meet near-term and longer-term capacity needs in India. This will be done through reduced separation and route optimization in oceanic airspace, while adding an instant safety net to an airspace that currently largely has no ATS surveillance



available.

ICAO Initiatives for Reduced Separation Using Space-Based ADS-B

The International Civil Aviation Organization (ICAO), the world's international regulator for aviation, is well on its way to publishing new separation standards for airspace where communication using Very High Frequency (VHF) is not possible (such as oceanic or remote airspace). These standards will allow for much closer spacing between aircraft, similar to aircraft separation standards over terrestrial airspace. The recommendation is that this be achieved through a combination of ATS surveillance using spacebased ADS-B and Controller Pilot Datalink Communication (CPDLC).

Space-Based ADS-B – Growth Enabler for India

The deployment of space-based ADS-B for ATS surveillance will assist in creating and implementing efficient procedures on busy oceanic routes, enable harmonized separation standards and seamless transitions between domestic and international airspace. Full ATS surveillance will also facilitate more effective and safe handoffs to neighboring Flight Information Regions (FIRs) and quicker response time to emergency and distress situations with search and rescue.

India leads the way in the region with their adaptation of new technologies and has achieved many international awards for their robust contribution to the global aviation industry. Introduction of ADS-B through ground sensors in the domestic airspace, deploying satellite communication technologies, implementing surface technology like Advanced-Surface Movement Guidance and Control System (A-SMGCS), Ground-Based Augmentation System (GBAS) and airspace optimization through GPS-Aided **GEO** Augmented Navigation (GAGAN) and Central Air Traffic Flow Management are just a few recent notable program implementations.

Transforming Global ATM

As of the end of 2018, ANSPs in 29 countries are in the process of integrating space-based ADS-B data into their ATC system, with several ANSPs from Canada, the UK, Denmark, Ireland, Italy, Singapore, Western Africa and South Africa going operational with the data in the first half of 2019. Live operational trials in the North Atlantic will commence in the first quarter of 2019. Additionally, several additional ANSPs worldwide, including India, are in the procurement process to take part in this new era of global air traffic surveillance.



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Moving Aviation Security Forward in India

By Neal Owens, Senior Business and Program Management Representative, Battelle



With double-digit growth rates from 2010 through 2017, India is moving toward being the third largest aviation market in the world after the U.S. and China. But fast growth poses tremendous challenges—especially when it comes to aviation security. In response, many of India's airports are increasingly bypassing older X-ray screening technologies and installing cutting-edge screening equipment based on computed tomography (CT) technology. The challenge for India's aviation industry will be ensuring that security personnel are fully trained and ready to realize the full benefits of these newer security technologies.

Preparing Security Screeners for the Switch to CT Scanners

CT technology has the potential to both improve security and speed up screening for both hold and cabin baggage. CT scanners work by applying detection algorithms to high quality threedimensional (3D) X-ray images to automatically identify potential threats. Because the detection algorithms are not perfect, these systems can produce false alarms that can increase wait times for passengers. These potential threats must be resolved by trained screeners who use the 3D images and the various CT image controls to make a final threat determination.

The challenge to CT technology use is that 3D images are much harder to resolve than standard 2D images. Proper training for CT screeners is therefore essential to reaping the benefits of CT technology, including faster baggage processing and more effective threat detection.

Training simulators developed by CT scanner manufacturers are adaptations of the CT system itself, developed to complement CT machine sales. But these CT simulators have both cost and feature limitations. In response, Battelle has developed a computer-based training (CBT) system for CT screeners that represents the state of the art in CBT screener training. The training system is based on Battelle's extensive experience developing training and screening protocols for the U.S. Department of Homeland Security (DHS) and expertise in CT technology gained through testing and evaluation work for the U.S. Transportation Security Administration (TSA). Battelle's ProDetect[™] Security Screener Training system grew out of a research platform developed by Battelle for its DHS work. It includes a series of training modules built using principles of Human Factors (HF) to support higher levels of retention, deep understanding and transfer of skills to the real-world screening environment.

ProDetect software is the only CBT training platform currently available that is specifically designed for 3D CT systems. It can be incorporated into any screener training program as a standalone laptop trainer or as a networked solution.

ProDetect[™] Software: Preparing for the Future of Aviation Security in India





Battelle developed the ProDetect training platform to address the challenges of preparing security personnel to analyze and interpret complex 3D images from CT scanners. The interactive ProDetect training system is modular in design and provides information and practical applications to train screeners who are at different levels of background understanding and experience.

ProDetect software modules include:

 Security Screening Courseware: This module, currently oriented to cargo screening, provides background information about terrorism, threats to aviation, improvised explosive devices (IEDs) and Xray system fundamentals such as X-ray system basic technology, trace detection technology, screening operations and X-ray safety. This module, like all ProDetect software modules, is highly interactive and self-paced to adapt to the needs of the learner. The Security Screening Courseware module is most

appropriate for new screeners who are just being introduced to security screening.

• IED Builder: This module is offered in recognition of the fact that most screeners, novice or experienced, have never encountered an IED. The IED Builder module is also highly interactive and self-paced. Trainees can select from a large photo menu to create different IED configurations and see what each configuration would look like. Once selected, ProDetect virtually builds the IED and presents it both as a picture and as a 2D X-ray image. Trainees can then manipulate the images (pan and zoom) to examine them in detail.

• Image Interpretation Training (IIT): This module is the heart of the practical training for CT screeners. It provides 3D image search challenges with follow-up exercises to CT screeners based on a graphical user interface (GUI) that matches the systems they will actually use on the job. The IIT module is similar to the training provided by simulators created by CT manufacturers, but with much greater depth and flexibility. It has been demonstrated to deliver higher levels of training effectiveness at significantly less cost than manufacturerdeveloped simulators.

These three basic modules can be procured individually or in combination.

ProDetect training software is based on several basic HF concepts proven to increase training effectiveness, including interactivity, self-paced learning, immediate feedback and immersive training in key concepts. Here's what that looks like within the IIT module:

• Interactive: With the IIT module, trainees can use the same graphical user interface and software tools that they use with their CT scanners on the job to manipulate images and analyze security threats. Alarm images are presented on the screen, and screeners are allowed a programmable amount of time to resolve the alarm using the





available tools and controls. Screeners can rotate, zoom and pan images and activate other alarm resolution tools such as organic strip, density manipulation and other controls allowed by their CT machines. Multiple viewing panes provide bag view, slice view, alarm view and projection view, just as with their CT system.

Responsive: Unlike • simulators, ProDetect software gives participants immediate feedback on every bag image, allowing them to correct errors and learn from their mistakes in real time. All controls and viewing panes are available for this feedback mode so trainees can review their results and reinforce the correct selection. Significantly, ProDetect software records every action and mouse click during the entire training exercise to give trainers and administrators deep insight into trainee weaknesses and help them determine what trainees need to do to improve.

• Immersive: ProDetect software provides immersive

training about each alarm item directly following the immediate feedback step. ProDetect's immersive training is provided in four modules.

★ A Q&A exercise quizzes screeners on critical concepts arising from each example bag image.

★ The Standard Operating Procedure (SOP) module walks the trainee through a genericized example SOP or organizationspecific SOP to reinforce how the SOP can be used to assist in alarm resolution.

★ The "Find the Component" module, used for bags containing IEDs, instructs the trainee to input the location of specific IED components when they are present, using the same panes and controls used in the alarm resolution exercise. This ensures that trainees truly understand how threat components should appear in the various image panes available, and promotes the spatial skills necessary to effectively operate CT security systems. ★ Lastly, the PIES module (Power supply, Initiator, Explosive and Switch), also used for bags containing IEDs, gives trainees further details about each of the four components in the specific IED present in the bag. This module also provides photographs of the complete IED and the CTX-ray image.

Advanced CT screening systems require advanced screener training. Without specific and immersive training for security personnel, airports and government agencies will not exploit the full value of their CT systems in terms of screening efficiency and effectiveness. ProDetect software is a valuable investment that will ensure that airports and governments will maximize their returns on the substantial investments they have made in CT technology.





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Indian authorities must immediately implement Performance Based Navigation (PBN) with ADS-B for Helicopter Operation in India



By Suneel Talwar, President & CEO, TriEco LLC

PBN: The new kid on the Block

The National Civil Aviation Policy 2016 highlights that the Government has proposed to promote the growth of the Indian aviation sector in a significant manner and brings out that India has the potential to be among the top three countries globally in terms of domestic and international passengers carried. A new report by FICCI and KPMG suggests that India can reach the 3rd rank in terms of number of passengers carried by 2020.

 \bigstar The number of helicopters in India is presently dismally low at 300, however evolving Emergency Service requirements, offshore oil platform service, urban transport requirements will change the landscape in the future, and it now the time to start planning for it. For comparison, there are approximately 10,000 civil helicopters in the USA (2012 figures). The USA is also a leader in terms of number of WAAS enabled RNP/RNAV approaches

and is leading the change for better air traffic management through adoption of ADS-B.

★ Growth of Civil Aviation is a key priority of the India Govt. The Indian helicopter industry is stunted and it is assumed that infusion of US expertise and technology in improving safety and efficiency would be mutually beneficial.



PBN: Area navigation based on performance requirements described in navigation specifications

★ Helicopters have traditionally flown in visual conditions to heliports and landing areas where installation of conventional approach and landing systems, such as Instrument Landing System (ILS) is not feasible or affordable. To address this limitation, Performance Based Navigation (PBN) and Global Navigation Satellite System (GNSS) are key enablers to provide economical solutions for this problem.

★ PBN operations are supported by aircraft equipped with the GPS Avionics and Satellite Based Augmentation System (SBAS) avionics, which will enable operators to use the Indian Geo Augmented Navigation (GAGAN) signal in Indian airspace. SBAS/GAGAN improves the accuracy, availability, and integrity of the U.S. Global Positioning System (GPS) to provide a vertically guided instrument approach capability, equivalent to ILS, without the need to install any ground based navigation equipment at the airport. With SBAS, users may achieve meterlevel accuracy both vertically and horizontally. SBAS integrity provides a guarantee on accuracy which is vital for an aircraft's approach, called in the US Localizer Performance with Vertical Guidance (LPV), typically supporting a decision altitude (DA) at 200-250 feet above the landing area where the pilot has a much better chance to see the runway or





helipad and execute a safe landing. LPVs are PBN procedures that provide a reliable landing service at these remote locations to maximize worker productivity and minimize costly delays.

★ Many mining and oil and gas operations are normally conducted in remote locations or out over the sea like offshore flying in Mumbai high. SBAS precise positioning combined with PBN procedures enables the use of bi-directional routes to separate incoming and outgoing flight paths to specific locations. Fly In/Fly Out (FIFO) operations are used by mining and oil and gas entities to fly the workforce to and from remote airstrips and are critical to maintaining safe continuous operations at remote locations. In addition to schedule integrity and workforce availability, the improved reliability increases the safety, efficiency and capacity of the airport operations improving overall cost effectiveness of the operation. RNAV departures and low altitude enroute

structure support operations from helipads during low visibility conditions. Copter Point-in-Space RNAV Approach Procedure/LPV approaches to the heliports can be performed with visibilities as low as three quarters of a mile and with cloud ceilings as low as 300 feet.



★ The overall goal should be to develop or to create an infrastructure similar to the Gulf of Mexico deploying PBN and with initial objectives to channel helicopter traffic over the water along the shores, thus greatly reducing noise in residential neighbourhoods.

• Reduce instances of "scudrunning" or flying low under the cloud cover during overcast weather to maintain visual contact with surface landmarks.

• Segregate vertical flight VFR

and IFR routes, approaches, departures, and missed approach structures to facilitate vertical flight operations independent from commercial fixed wing operations

• Developed enabled RNAV intra-city/south shore low level IFR routes

• Leverage Gulf of Mexico experience knowledge and New York City shoreline heliports operations and offshore routes to establish coastal bases-to-oil platforms with PinS approaches, GPS routes and ATC tracking.

★ For the implementation it is important to carefully define requirements, specifications, scope and timelines to meet the customer's needs and to effectively capture the systems requirements for IFP design, validation and maintenance. This involves Flight Operations, Air Traffic Control, OEM's, Civil Aviation, Heliport Managers, and others. Depending on the current status of the respective facilities, obstacle and/or terrain





surveys may need to be performed that conform to FAA (or ICAO) specifications. This data is essential to design a safe, certifiable Instrument Flight Procedure. The Instrument Flight Procedures are developed collaboratively, and once it is approved by the stakeholders, it is charted and further developed, coded and installed in a test navigation database for Flight and Obstacle Validation.

★ The US Trade and Development Agency, India Chapter may take up a project, *if requested*, to promote the growth of helicopters especially a d o ption of Next Gen technologies such as PBN and A D S - B for helicopter community and other stakeholders in the Indian Aviation sector.

★ A USTDA study can provide the basis for the feasibility and implantation of PBN for helicopters. The study should include:

- Data Collection
- Fleet capabilities and



integrity • knowledge • imagination

Suneel Talwar, President & CEO TriEco, LLC 7710 Springvale Drive, Suite 201 Louisville, Kentucky 40241 USA Phone: 502-594-7070 Email: talwar@trieco.net Web: www.trieco.net

equipage

- PBN Implementation Plan
- Training requirements
- Cost-Benefit Analysis
- Financing plans

• Development impacts/spin off effect for India

★ However, full support from AAI and DGCA towards the project needs to be ensured.

Acknowledgement: The author acknowledges the use of some of the information as obtained from discussions and interaction with Mr. Dieter Guenter, Senior Vice President, Aerospace, Tetra Tech AMT





Harris Orthogon: Building the bridge for a full airside capacity optimization

By Sujoy Ghosh, Managing Director – FTI India, Harris Corporation

Harris Orthogon has been providing arrival and departure sequencing tools and queue management for over 30 years, solving Air Navigation Service Providers (ANSPs) problems on the most demanding airports in the world. Both arrival and departure management are main factors impacting Airport airside resource utilization. However corporative planning between these parties lack on valuable information that can contribute to optimized operations.

Airports today plan around fix airline schedules, ANSPs are not aware of the airport plan and airlines cannot fly to these schedules due to weather, irregular operations, departure delays at outstations, etc. Often resource consuming buffers are built into the AOP to account for these uncertainties.

Orthogon's ATC background and proven success were claimed by major airports to solve their airside constraints leading to the development and implementation of Orthogon's airside optimization suite, consolidating them as the ideal airport partner for bridging the gap between ANSPs and airports enabling the last ones to better predict and optimize airside capacity.

Receiving more accurate arrival (AMAN) and correct sequenced departure flight data (PDS/DMAN) supported by real time monitoring and updated variable taxi times (Airside Monitor) will enable the airport to more dynamically allocate stands and parking positions (Dynamic Stand Allocation). Airport situational awareness applications such the Airside Monitor go beyond variable taxi time updates, and can provide valuable monitoring of A-CDM milestones also in adverse weather conditions. Supported by international aviation initiatives and compliance to ICAO ASBU as well as EU PCP

objectives Harris Orthogon solves the most complicated airport constrains resulting on only benefits for all stakeholders.



Orthogon's airside optimization suite consolidates them as the ideal airport partner for bridging the gap between ANSPs and airports enabling the last ones to better predict and optimize airside capacity.

Airport Airside Optimization Suite

The Orthogon **Pre-Departure Sequencing (PDS)** provides all capabilities required for Airport-CDM implementations by optimizing the times which aircrafts are planned to depart from their stand and is ready to be synchronized with our more f unctional DMAN.





The Orthogon **Airside Monitor** is an airport surface movement monitoring, alerting and taxi time prediction tool. It uses realtime surveillance and inputs



from multiple airport and air traffic systems to improve collaboration between s t a k e h o l d e r s .

The Orthogon **Dynamic Stand Allocation** addresses stand management at high traffic volume airports that deviate frequently from planned schedules. The solution improves stand utilization resulting in better airport efficiency and increased capacity.

Providing leading innovations to SESAR and ICAO programs

for high performing airport operations and advanced ATC. Enabling intelligent arrivals and the world's first rolling predictive Airport Operations Planning tool to better manage a ir p or t o p e r a t i o n a l uncertainties proactively. Our **Demand Capacity Balancing** provides a solution for large capacity constrained airports managing peaks of arrival traffic.

Air Traffic Synchronization Solutions

Harris Orthogon's provides an integrated suite of arrival, departure and flow



management software for flexible resource utilization, reduced workload and queue management in today's c r o w d e d a i r t r a ffi c environment. Our solutions can optimize capacities for limited airside and airport resources like runways and airspace. In addition, offers efficiency and environmental benefits as it leads to a reduction of fuel c o n s u m p t i o n a n d consequently, greenhouse gas emissions.

Our Queue Management Tools were designed to adapt to increasing expectations for the efficiency of traffic flows and airport operations. The concept of this suite is to generate advisories used for decision support to air traffic controllers, helping to improve Air Traffic Control (ATC) and airport operations.

The Orthogon Arrival Manager (AMAN) helps air traffic controllers to efficiently manage incoming flights in order to make best use of available runway and airspace capacities. AMAN provides





decision support for all controllers managing arrival traffic, if required, in a multirunway configuration and multiairport environment.

The Orthogon **Departure Manager (DMAN)** provides optimized planning of outbound flights based on selectable planning and optimization strategies. DMAN maximizes runway capacity utilization, minimizes fuel burn and provides significant improvements of outbound traffic predictability.



Integrated Visualization tools

With the **ODS Toolbox™**, Harris Orthogon has acquired a worldwide reputation as a specialist for air traffic Controller Working Positions (CWP) development software. Since its market entry in 1994 the ODS Toolbox™ has been accepted by many large Air Navigation Service Providers (ANSPs) and system integrators as the tool of choice for graphical user interface d e v e l o p m e n t .

The ODS Toolbox[™] is a precursor and prepared the development and market entry of the newly developed **ODS[™] Open Platform,** which became the standard user interface software platform for all new

customer projects of Harris Orthogon since January 2013. The SWIM Master Class 2013 award in November 2013 in the "Applications" category had only become possible thanks to its versatility and improved development time and costs. The entirely new concept of ODS[™] Open Platform allows an open data and programming environment enabling collaborative development with multiple contributors.







VEOCI – the NEW SaaS for Airlines & Airports

By Maninder Singh Grewal, MD, iPrime – Sole Veoci Representative for India/ Africa/Asia



The Aviation industry has an enviable global record for innovation & safety. Keeping this record going requires a commitment to disciplined compliance along with innovation for performance, quality, cost and customer satisfaction.

Today, with the increasing traffic and customer demands, airline and aircraft incidents, small and large, throw the organizations into chaos and require heroic efforts and large expenditures to mitigate the damage and to bring the situation back to normal.

Consider the Thai Airways Boeing 777-2D7 that made an emergency landing at Dhaka (DAC) last July. The aircraft circled the airfield and touched down at 06:19 UTC (12:19 LT), on the right side of the centerline.

The outer rear wheel of the right main landing gear touched down first at 576 feet down the threshold of runway 14 followed by the inner rear wheel of the right main landing gear. At the time of touch down the aircraft presumably had a right bank with a heading of about 15 degrees right of the runway heading.

After touchdown, the aircraft rolled on the concrete surface for 768 feet. The aircraft maintained the same right offset heading with the runway heading until the outer wheels of the right main landing gear went into the grassy-mud followed by the inner wheels of the right main landing gear. After about 1536 feet the aircraft was back on the runway. In the process, the landing gear crushed nine concrete cable laying pits, covered with iron sheets. Wheel debris and brake assembly parts got detached from the wheel assembly and were found scattered along the path. The aircraft vacated the runway and stopped on a taxiway. It appeared the rearmost two tires on the righthand main landing gear had burst.

Such an incident requires an immediate response from a number of Teams and the personnel involved may exceed several hundred. The chains of command for the Airline and Airport need to spring into action. A serious incident will require many teams from the Airline to deliver the effort needed: legal, finance, airport operations, HQ staff, logistics, Ticketing and perhaps as many as twenty more functions. Then there is the Airport responsibility; a runway is closed and may remain closed for several hours, passengers have to be bussed in and made comfortable. Those that need medical attention need ambulance service or first aid. After a period of time, for those marooned at the airport, accommodations have to be provided and the emergency operations plan needs to kick





in. This may involve local hospitals and other services that need to be coordinated.

News and media has to be addressed appropriately and adding to the growing complexity, there will be posts and feeds going out into twitter, Instagram and other social media channels. If not taken care of bad publicity and reputational losses follow.

While extremely serious incidents, those with fatalities or large fires, are fortunately very rare, the serious and ordinary incidents are much more numerous and a regular cause for headaches to the Airport and Airline managers.

Thus, for Airlines and Airports both, there is a need to MANAGE incidents large and small; incidents that require a TEAM response from teams that could span many independent organizations. The start is a RAPID TRIAGE that becomes the best judgement on the scope of the incident and the response that needs to be launched. The key here is to have a plan that can launch the appropriate response that has been verified and used in many DRILLS so that the personnel involved are TRAINED to use it. The Key here is COMMUNICATION, COLLBORATION, SITUATIONAL AWARENESS and RESOURCE ALLOCATION. All of which need to be monitored real time. The days of periodic updates are long gone; the expectation now is for REAL TIME information - in one incident one Airport Manger saw the incident at his airport for the first time on the evening news.

Add to this pain are the financial losses such incidents inflict: Unless the plane is back in service immediately, the passengers and crew need to be taken care of in a city where the Airline has no personnel. Just the rebooking alone may cost the Airline \$200,000. And t h e h o t e l s a n d accommodations another \$50,000 a day. Saving an hour or a day can mean savings of hundreds of thousands of dollars.

Veoci for Airlines and Airports

We began with one Airline, United, three years ago and together with them across many drills and incidents we have reached the point where we provide a compelling answer to the needs of Airlines. For Airlines, there was a significant gain from leveraging the Incident Command System (ICS - procedures for responding to an incident developed by the US Federal **Emergency Management** Agency (FEMA). VEOCI provides all the ICS forms.) Over the last three years VEOCI has been used for multiple exercises and drills with many





unique scenarios including one with a remote island with just one runway that is not operational. With the maturity gained, Veoci, has added three more Air carriers in the last six months.

The Veoci story with Airports began five years ago with one small local Airport, HVN, with 30,000 enplanements a year. We developed Veoci to meet the needs for the small Airports which required meeting the price sensitivity that is critical to small US Airports, heavily subsidized as they are by local government. Step by step over the last five years, we were able to digitize almost a hundred processes that are required to operate an Airport. In doing so we extended Veoci far beyond the crisis management capability for which it is the "cool vendor" in the market. By first starting with small airports and understanding the everyday needs and pain points, Veoci was able to grow

step by step to meet the needs of the largest Airports. Today, Veoci is in daily use at three of the ten busiest Airports in the US – DFW, DEN and SFO and also at over one hundred Airports in North America. Global expansion is now taking place with Athens (ATH) and Entebbe (EBB) both coming on line.

An attractive feature of Veoci is the management of SYSTEMS of Airports in addition to meeting the needs of one Airport. Today, Veoci implementation at airport systems includes the Department of Transportation of Ontario Province with 29 airports under one umbrella and the State of Hawaii for configuring 14 airports of the state including the major AirportatHonolulu.

Technology

★ A unique capability of Veoci is that it offers both operational processes and incident and crisis management on the SAME platform and code. No other vendor does this. As a result, when an incident happens, the users are familiar with the software and as they do also use it every day.

★ Implementation Time line: For some features, a customer can begin using Veoci the day they sign the contract. A full implementation is almost always completed in less than threemonths.

★ Uptime: Veoci is also a part of the next generation of software as it is cloud NATIVE. It takes advantage of the cloud technology for provide unparalleled uptime (no outage in over two years) and pricing. Veoci is currently on the Amazon Web Services cloud in the US and plans to provide service from the AWS Mumbai and Frankfurt/Ireland data centers by mid 2019.

★ Mobile: Veoci is also mobile native with APPs available for both Android and Apple mobile



devices.

★ Security: Everything in Veoci is encrypted both in transit and at rest.

★ The computer science behind VEOCI has been in development for seventeen years and incorporate needs, aggregated from tens of thousands of real work processes.

★ The cycle time to make a change in the VEOCI application for users is minutes – as the base code does not change, only the configuration and information are changed in a point-and-click browser interface.

★ Sample Screen Shot showing a Dashboard with a GIS/Camera Feed:



Veoci Asia & India

With India's aviation sector expanding at an exponential pace both in volume and complexity, the problems and pain for those running the Airports and the Airlines are only going to increase. Veoci sees great potential in working with the Indian Airports while bringing collected global experience. With a large number of airports commencing commercial operations in India, Veoci can provide operational tools and dashboards at the individual airport level and also aggregate data, reports and real-time dashboards at regional and central levels. The opportunity is to leapfrog with Veoci technology in India and, especially at greenfield Airports, avoid the paper phase altogether.

With the rapid growth of Aviation in Asia, Veoci has made a significant commitment to develop the support and operational skills with a team based in Noida. The team is twenty five people and in the process of reaching fifty by year end 2019. The team has completed a full Veoci implementation at a large Airline in Asia and regularly supports Airports in North America as well. A significant part of the software development is in Noida as well and also poised to double by YE2019.

Summary

Veoci is the fastest growing SAAS product in the aviation space – both at Airlines and Airports in the US.

Veoci has been a product for choice for its rapid implementation, high quality and security, uptime, customer service and a flexible platform designed for continuous improvement and flexibility to adapt to changes of the organization's needs. With a





large team in Noida working with the original team in New Haven with talent from Yale University, Veoci is set up to deliver the software and support that Asian Aviation needs.

Appendix

Maninder Grewal, M.D, iPrime – Sole Veoci Representative for India/ Africa/Asia -Maninder graduated from IIT Kharagpur with a degree in Mechanical Engineering and has the distinction of ranking in the top 75 in the IIT JEE. He has 30+ years of experience in the information technology sector serving small and medium size businesses with technology solutions. His assignments included migrating the Ludhiana Stock Exchange to electronic trading, software for 2 large 1500 + bed teaching hospitals led other large major digitization initiatives, setting up large Indian Group's Fintech and a HealthTech company. He has been active member of Nasscom and anchors the

Nasscom National Annual Tech. Conference He mentors startups for growth and value creation and believes that going digital is now a core tool for managing disruption. His keen acumen in understanding large global customers' business problem and complexity across Aviation, Health and Hospitals, Financial Institutions makes him an integrated part of Veoci's growthstory





FOR WHAT IES AHEAD.

Backed by decades of successful execution and industryleading solutions, L3 Aviation Products has the advanced avionics you need to successfully complete military missions today and the innovative technologies needed to meet the complex challenges that lie ahead. L3AviationProducts.com





Passenger Survey On Air Travel: On-Time Performance And Inflight Wi-Fi Most Valued

What do airline passengers care about when it comes to in-flight Internet? It may not be what you think.

A new survey from Honeywell shows seven in 10 airline passengers value a reliable connection more than any other attribute, including speed. Passengers were far more interested in technology that gets their plane to its destination on time-and they ranked "watching live TV" as one of their least important concerns.

What's an airline supposed to do? How can they provide the Wi-Fi that passengers want while also making sure they have the technology that helps planes get to their destination on time and reduce operation costs? Simple: they use connectivity to do both and create the Connected Aircraft.

Enter the Connected Aircraft

The foundational idea of the connected aircraft is integration. It harnesses the power of data analytics with seamless connectivity to and from the aircraft.

For airlines, this means a reduction

in cost per available seat mile (CASM), including as much as 5 percent in fuel savings, and a 35percent drop in operational disruptions.

Passengers get access to the consistent, reliable and global Wi-Fi they are demanding, while flight operations get a more real-time data, reducing disruption and saving 5 percent in-flight time with air traffic control.

Finally, ground operations can reduce grounded time, avoid costly hazards and cut troubleshooting time by 25 percent.

Traditionally, maintenance crews respond reactively to broken mechanical systems. They often spend a significant amount of time assessing the condition of an aircraft once it lands, which leads to delays and grounded aircraft.

With connected maintenance, an aircraft can transfer data directly to maintenance crews to address any potential mechanical issue before it grounds the plane, saving time and keeping operations smooth.

With connected ground handling

applications, ground handlers receive and distribute flight information more efficiently, improving on-time performance and, ultimately, passenger experience.

On-time takeoffs, easier assessments for maintenance crews, happy passengers and cost savings for airlines – It's seamless, with the right connectivity.

The Future...

The real value of connectivity is more than cabin entertainment; it is in behindthe-scenes applications like flight data analytics, connected maintenance and real-time weather information that increase the number of on-time arrivals.

Most travelers will never know that a solid, global, dependable Internet connection was the reason they landed on time, or were able to avoid a storm and touch down early. The beauty is, they don't need to. The connected aircraft simply delivers.

For more details please visit https://aerospace.honeywell.com/caw

Honeywell The power of connected





United Airlines and United Express

By Harvinder Singh, Country Manager - India, United Airlines

United Airlines and United Express operate approximately 4,700 flights a day to 356 airports across five continents. Annually, United and United Express operated more than 1.6 million flights carrying more than 148 million customers. United is proud to have the world's most comprehensive route network, including U.S. mainland hubs in Chicago, Denver, Houston, Los



Angeles, Newark/New York, San Francisco and Washington, D.C. United operates 760 mainline aircraft and the airline's United Express carriers operate 546 regional aircraft. The airline is a founding member of Star Alliance, which provides service to 193 countries via 28 member airlines.

United has served India since 2005 by providing daily, nonstop service between Newark/New York and each of Delhi and Mumbai. United is proud to be the only U.S. airline to operate consistently between India and the U.S. for more than a decade. Flights from Delhi and Mumbai are conveniently timed to connectatour New York area hub – Newark Liberty International with an extensive network of destinations throughout the Americas. Starting December 2019 United will add a third route and flight between the U.S. and India when it launches nonstop Delhi - San Francisco service, making United the only U.S. carrier to provide service from Indiato both coasts of the U.S.

As the world's leading airline, United is committed to being a responsible global citizen. In towns and cities across the U.S. and around the world, United connects families and friends, colleagues and companies. We strive to meet our responsibilities by taking an active role in our global citizenship by implementing programs and services that help protect our environment, show pride in our communities, celebrate our diversity, protect our human rights and lead our industry in providing a clean, safe and reliable product.

Every day, United helps unite the world by connecting people to



the moments that matter most. This shared purpose drives us to be the best airline for our employees, customers and everyone we serve. United's "Shared Purpose" consists of four pillars by which we operate daily, including:

Fly Right: On the ground and in the air, we hold ourselves to the highest standards in safety and reliability. We earn trust by doing things the right way and delivering on our commitments every day.

Fly Friendly: Warm and welcoming is who we are.

Fly Together: We respect every voice, communicate openly and honestly, make decisions with facts and empathy, and celebrate our journey together.

Fly Above and Beyond: With an ambition to win, a commitment to excellence, and a passion for staying a step ahead, we are unmatched in our drive to be the best.





MRO: A problem and an Offset Opportunity

By Devesh Bahl, Sr. Partner & CFO, Boston Analytics

Humble middle-class population with decent disposable income and vying to fly to their destinations in style and speed rather than wandering via grimy railroads makes the Civil Aviation Industry in India one of the fastest growing. Bare statistics pertaining to the growth of India's Civil Aviation Industry are quite telling: in FY 2017-18, 123.32 million domestic passengers, more than the entire population of most countries, flew India's fleet of ~500+ aircrafts (as of July 2018) across some 100 airports in the country marking a growth of 18.86 percent over the previous financial year. In 2017 alone, domestic air traffic nearly doubled to 117 million with 100 flights taking off every hour compared to 67 in 2011. Flights operated at a fuller capacity from 75.5% in 2011 to 86.1% in 2017. It's therefore no surprise that over 500 million of this mass mid segment population is driving India to become the world's third largest air passenger market by 2025 overtaking the UK and following behind the US and China. Under the UDAN (Ude Desh ka Aam Nagrik) scheme, which is aimed at regional airport development and regional connectivity, the

Government of India (Gol) aims to cover 235 routes including water a erodromes too. By any measurement, this industry presents humungous growth opportunities.

Juxtapose this projected growth and therefore the need to set up aviation MRO (Maintenance, Repair and Overhaul) with the offset responsibilities of various global OEMs (Original Equipment Manufacturers) which is estimated to be US\$ 6 billion as per the Defense Procurement Policy. These OEMs – the likes of Boeings, Safran, Lockheed Martin, Pilatus and Textron - with obligations to fulfill such offset responsibilities could naturally be driven towards development of a very effective MRO if the two government arms of aviation and defense can work seamlessly. Let's take a closer look at the driving force behind such a statement.

Growthin Civil Aviation

With business growth in India and global vacation population swelling up year on year, international passengers in FY 2017-18 have grown to 60.58 million. The total passengers in FY 2017-18 accounted for almost 184 million reflecting a growth of 16.08 percent over the previous year.

A significant increase in ecommerce coupled with improving air connectivity to small airports and growing GDP would also push growth in air cargo traffic if infrastructure bottlenecks are addressed well. Between 2007-08, the domestic capacity for cargo grew at 8.3% and the domestic demand at 10.87%. In 2017 alone, aircrafts transported 0.7 million metric tons domestically, marking growth rate of 9.25% over the previous year and a high of 1.5 million metric tons internationally marking an increase of 14.61%. Once again, these figures are only expected to rise considerably in the decade ahead. Thus civil aviation presents an enormous opportunity in our country. Permissible FDI of 100% in the Aviation Sector, introduction of advanced information technologies and the ever-growing emphasis on regional connectivity have all combined towards an everdynamic expansion.

India's current aircraft inventory of 500+ and orders of another 1,200+,





large pool of engineering talent and low labor costs, India has the potential to become a global aviation hub for MROs. remote areas across 78 airports and 31 helipads under the Regional Connectivity Scheme.

Airport Expansion

The Airports Authority of India (AAI) has planned a capital expenditure of about US\$9.3 billion for airports in the country which will include US\$3.1 billion for brownfield expansion in New Delhi, Mumbai and Bengaluru and another US\$2.95 billion for greenfield airports. New airports have been planned for Deogarh, Rajkot and Allahabad while other new projects include the Navi Mumbai airport (expected cost US\$2.58 billion), a new airport in Greater Noida, near New Delhi and six new airports in Andhra Pradesh to name a few. Recently, new airports have been added in the states of Odisha, Sikkim and Kerala. In fact Kerala has become the country's only state to have four fully functioning international airports.

Furthermore, 325 air routes have been awarded to airlines and helicopters with the aim to enhance flight services to hilly and

Growing pains

Despite the run so far and the projected growth, airlines bleed today and need to be rescued often by external funding and investments. They face a crisis the moment there is currency depreciation and cost of ATF (aviation turbine fuel) rises. About 25 to 30 percent of aviation cost in India is 'dollar denominated' and comprises expenditures related to issues such as aircraft lease rents, maintenance, ground handling, aircraft parking charges overseas etc. Cost of ATF alone accounts for 40 percent of the operating expenses compared to about 20% for many foreign carriers. The 14% excise duty on ATF plus a sales tax as high as 29% by states has made ATF expensive to a point of huge concern. Therefore any hike in crude prices directly impacts pricing and hence flight occupancy. Passenger volume growth at 12% during 2018 Q4 was slowest in the last four years due to hiked prices to offset higher fuel costs and a weaker rupee.

Lack of local MRO to support growth

India has a major MRO opportunity and problem. This is strongly linked to a prominent part of India's industrial base and also its massive military aviation requirements and establishment.

The NITI Ayog or erstwhile Planning Commission estimates that India's MRO industry is expected to increase to US\$986 million per annum by 2020 although it will remain smaller than that of the UAE and China. India has the potential to be a major world MRO hub due to its steadily growing aircraft fleet, location advantage and availability of talent. Low cost carriers, which are a success story in India, would prefer servicing of aircraft locally to save cost and time in a highly competitive market.

But development of MRO units has not been happening at the speed and scale required. And herein lies both the challenge and opportunity. Taxes and royalties and the many hesitations of local investors have been an impediment. Indian MRO players have to bear additional tax



burdens over foreign MROs due to a 'discriminatory' policy of import duties, service tax etc. The rents at Delhi and Mumbai for MRO providers is estimated to be 50 to 100% higher than that charged for equivalent facilities in many countries in Europe including Turkey.

India flies over 60 types of aircraft and helicopters, the individual type of which requires trained technical manpower, tooling and approvals from the regulator as well as from the OEMs to enable an MRO to offer world-class maintenance services. But for reasons mentioned, infrastructure creation requires a level of investment which most MROs don't find viable to support.

Apart from a need for reasonable rents and procedures, a key challenge is the non-availability of spare parts in the region because local MROs are unable to maintain an inventory of key spare parts which leads to grounding of aircraft for longer periods. This is driven by limitations of OEM support for the Indian market and the custom duty regime which discourages MROs from stocking spare parts on behalf of customers.

Thus airlines are finding it cheaper to send aircrafts overseas to countries such as the UAE (Dubai), Singapore and Malaysia for maintenance even though labor cost is higher in these countries. The value of MRO work in India is expected to rise to \$1.75 billion when almost another 1200 aircraft are added in the next few years. If the same scenario continues, civil aviation growth in India will continue to strengthen MRO industry of neighboring region.

The airline industry spent US\$950 million in 2016-17 on aircraft maintenance and servicing but only 10 percent went to Indian MRO companies. While global players such as Boeing, Airbus, SIA Engineering, ST Aerospace and Lufthansa Technik have initiated MRO services in India, Gol needs to incentivize airlines to set up their dedicated MRO hubs through joint ventures with MRO service providers and airlines, significantly reduce the high tax structure, fuel costs and the user charges.

Can mounting Defense offset

obligation on OEMs be utilized to push the Civil Aviation MRO?

A staggering over US\$6 billion offset responsibility in India on possibly all major global Aerospace and Defense OEMs can actually be an opportunity for Indian government to push investment into the much-needed MRO refinement and development in India. The Offset and establishment of a sound MRO system will create and support an e cosystem for defence procurement and maintenance in the area of military aviation.

With similar aircraft platforms and global OEMs in Civil and Defense Aviation, this can be a huge winwin situation and a turning point towards growth. The Indian Air Force and the Indian Navy fly the Dornier-228 and so do some of the domestic Indian airlines in short routes in the country. The IAF also flies the B 737 and the Embraer aircraft as do some private players. The latest Defense Procurement Procedures permit Public Private Partnership and qualification of MRO under the Offset guidelines which will further the MRO capabilities in the country. The Indian Armed Forces are in dire





need to replace much of its aviation fleet which is outdated. In addition to the need to acquire ten squadrons of fighter aircraft (about 160 to 180 fighters), it needs between 80 to 100 new fixed wing transport aircraft as replacement to the ageing Soviet- origin An-32s and many light, medium and heavy capacity helicopters. The IAF has purchased 11 C-17 Globemaster heavy transport aircraft and two squadrons worth C-130 medium lift transport aircraft.

Likewise, the Indian Navy needs to replace much of its light helicopter (Cheetah and Chetak) and antisubmarine warfare helicopter fleet (SeaKing) and also the Sovietorigin IL-38 maritime reconnaissance aircraft fleet. Similarly, almost the entire light helicopter fleet of the Army needs replacement.

The rapid growth of civil and military aviation in India, the fast adding numbers to the civil aircraft fleet with a projected demand for 2,000 in the next two decades, the potential for more airlines, the need for at least another 600 to 700 military aircraft of various types for the four services including the Coast Guard, both the civil and military aviation sector open to 100 percent FDI, the need for a serious MRO facility and the huge Offsets involved – we can easily state the sky is literally the limit.

About Boston Analytics

Boston Analytics (BA), established in 2004, is a foremost US based Artificial Intelligence and Strategy Consulting firm driving transformation in enterprise decision making. BA is at the leading edge of helping large corporations embed AI and Analytics in their DNA. BA's core competence is:

★ Large Scale Public-Private Partnerships

• Driving industry indigenization in Aerospace and Defense (A&D)helping countries conceptualize and build Military Industrial capabilities

• Advisory on Strategic Offsetshelping global companies develop and execute on compelling Offset Programs

• Setup and management of Investment Funds for building A&D capabilities

★ Strategic Advisory

• Advisory for Global A&D companies to develop industrial partnerships with Indigenous Companies of Growth Markets

• Scaling up/ Supply Chain Integration and M&A Advisory for Indigenous Companies of Growth Markets

• Digital Transformation- using Al and Analytics in decision making Globally Unique Artificial Intelligence (AI) based Solutions A&D, Technology and other Industry segments and companies mapped in an analytics application to facilitate decision making on Supply Chain Integration, Partnerships and M&A

BA has worked on transformation projects in both in US as well as Growth Markets of BRICS and the Next 11 Economies.

For more information, please contact: Devesh Bahl, Sr Partner, <u>dbahl@bostonanalytics.com;</u> +919971229966

Rajeev Vaid, Sr Partner, rvaid@bostonanalytics.com; +919811855261







Logistics Plus India Continues Rapid Growth

By Sundreysh Sarup, Managing Director, Logistics Plus India

Logistics Plus India Pvt. Ltd. (aka LP India) is a leading freight forwarder, project cargo



Jim Berlin, Founder & CEO of Logistics Plus Inc.

manager, and global logistics company. LP India is an important division of the U.S. based Logistics Plus Inc., which maintains its global headquarters at the historic train station in Erie, Pennsylvania. Logistics Plus was founded by Jim Berlin, its' current CEO. The company was founded 22 years ago as a lead logistics provider for GE Transportation, a global manufacturer of equipment for the railroad, marine, mining, drilling, and energy generation industries.

Today, Logistics Plus serves thousands of customers, including major companies, from GE to Google, and from Amazon to WeWork, with over 500 employees operating in over 25 countries around the world.



Logistics Plus Global HQ in Erie, PA USA

Logistics Plus has been doing business in India for nearly two decades, but more recently, the company decided to make additional investments in the region with the creation of Logistics Plus India Pvt. Ltd. Sundrevsh Sarup was selected to lead the new division as the Managing Director at LP India's headquarters in New Delhi. Since the creation of LP India, Mr. Sarup has helped generate rapid growth and expansion that now includes branch offices in Bengaluru, Chennai, Jalandhar, Ludhiana, and Mumbai.

The growth of LP India has been driven by its expansion of new



clients across many different industries. One specific area of growth for LP India comes from its work with a leading coworking space provider that is also one of the largest private companies in the world. LP India has helped this co-working space giant install close to 30,000 desks at 19 new buildings in India in 2018 alone. This year looks to be even more promising for the LP India team, as this same client looks to double the number of desks installed in 2019. The plan is to install over 60,000 desks,



LP India helped the world's leading coworking space provider open offices in Bengaluru, Gurugram and Mumbai

covering all metro cities in the country of India. Recently, LP India helped set up offices in Mumbai, Bangalore, and Gurgaon that became fully operational in December of





2018. From a global standpoint, Logistics Plus has assisted this same client with the opening of 80 new offices worldwide in the month of November 2018 alone!



LP India has been instrumential in helping Indian Railways import locomotives from the U.S.

Another aspect of business fueling LP India's growth is the work it does with diesel locomotives for GE Transportation. LP India set up a new office in Marhowra, Bihar, closer to GE's production facility. As results of its successes with GE Transportation, Logistics Plus has also been awarded a new contract with GE Aviation to assist with all 4PL operations.

LP India is actively working to grow its aviation vertical by engaging in deeper talks with some of its current clients, such as Dynamatics and Boeing. As a result of these talks, LP India has proposed to open new offices in Patna, Bihar and Hyderabad in the coming months.



Sundreysh Sarup and the LP India team in New Delhi prepare to celebrate another successful year of growth

Jim Berlin, CEO of Logistics Plus Inc. said, "Sundreysh has assembled a very competent team for us in India. Thanks to his leadership and the hard work of our entire team, LP India has become an important division for this company altogether. The growth of LP India has really established Logistics Plus as a global company that views logistics in India as a critical element to global supply chain success."

Logistics Plus India offers a

variety of services including air, o c e a n , a n d g r o u n d transportation, as well as warehousing, project cargo, customs, compliance, and total supply chain management.

So, what does the future of LP India look like?

According to Mr. Sarup, the goal is to continue to expand by providing unparalleled service while upholding the company's signature 'passion for excellence' in all aspects of supply chain solutions and logistics. That includes full support of the ACP and its many member companies. Mr. Sarup added, "What we like to say is that we put the "plus" in logistics by doing the big things properly, and the countless little things, that together ensure complete customer satisfaction and success."







Expanding Aviation in the US and India

By Blair Hanuschak, PE, Senior Principal and Director of Airport Projects, Walter P Moore (Washington, DC) & Abhijit Shah, PE, Principal and Managing Director of India Operations, Walter P Moore (Pune)



The global aviation market is robust and growing, and Walter P Moore is proud to support many airports and airlines with multifaceted expansion programs around the world. Our firm specializes in integrated engineering and consulting services for airports, and our 87 years in business in the US and 7 years in business in India have allowed us to contribute significantly in many different ways to the aviation market.

Through our design of over US\$15 billion of airport construction in the last 20 years, we have seen many changes and trends that positively impact the travel experience for passengers, along with financial outcomes for airports and the entities that operate them. Airports have become a sense of pride for the cities in which they're built serving as the gateway to and from that region. A traveler's first and last impression of a city is the airport in which they pass through, so airport managers are hiring architects, engineers, and contractors that can help them achieve their vision.

Here's a few of the things that we're seeing that excites us

about the future growth of aviation in India and the rest of the world.

Airport Cities

Airport Cities is a growing phenomenon. The realization that airports are an economic engine with millions of captive customers (passengers and visitors) has spawned the creation of ancillary business activity on and around airports. Hotels, offices, restaurants, and retail are booming at airports around the world.

Globalization

The world is shrinking. With the creation of airport mega hubs that facilitate midpoint connectivity, to technological advances in aircraft and engines that allow further flight distances, global travel is an easy reality. The world of global commerce demands it, the world of airline alliances and partnerships enable it.

New Terminal Construction

Airports have outgrown their aging infrastructure. The days of

"freshening up" existing terminals have given way to fullscale replacement terminals in many cities. As communities strive to create that lasting impression and a sense of place, they've realized that new terminals need to be built to serve the current needs and anticipate the future needs of the travelling public. Terminals need to be built to accommodate future growth, and to be adaptable and flexible to accommodate many changing needs. Technology, amenities, security, passenger processing, concessions, and airline operations can all drastically change in a few short years, and buildings need to be ready to respond. Walter P Moore was fortunate to provide structural and enclosure engineering services for the Louis Armstrong New Orleans International Airport - North Terminal, which is a completely new, 30-gate replacement terminal that will open in 2019.

The firm also recently provided structural engineering, enclosure engineering, and secure design services for new terminals in Las Vegas, Los Angeles, Houston, and Dallas.







Image credit: Leo Daly

Terminal Renovations and Expansions

Not every terminal can be replaced, and sometimes terminal renovations are the right solution. There are many factors that weigh into the decision to renovate or replace, and they should all be weighed carefully utilizing a cost/benefit analysis that considers short-and-long term needs.

We've been involved in many terminal renovation projects across the US in Atlanta, Los Angeles, and Houston that have proven to be incredibly successful for our airport and airline clients. Each one has common goals of improving the passenger experience while also being fiscally responsible. When a "winwin" scenario is achieved, passengers, airports, airlines, and concessionaires and service companies all share in the benefits.

One of the most exciting things we've been involved with includes expanding concessions and amenities within an existing terminal. Creative strategies like horizontal and vertical expansions create spaces where passengers are more inclined to dwell and spend money, building a connection with their airport or airline. These spaces take the form of airline clubs, restaurants, bars, retail stores, and services like spas and business centers.

Other expansions that enhance airport operations are equally important in that they consolidate security check points in order to allow for more efficient passenger experience for O+D and connecting passengers, provide secure connectors between terminals, or provide more space for queuing, passenger screening, or passenger hold rooms.

Multi-level Car Parks

Real estate is a valuable asset, especially on airport property. The advent and explosion of Image credit: John Swain Photography



multi-level car parks seeks to optimize the utilization of this valuable property. Finding the right balance between providing close-in parking and shortening customer walking distances, offering multiple levels of conveniences and pricing (shortterm, long-term, valet, etc.), and initial capital costs is the task at hand for airports. Customer conveniences such as multiple payment options (pay on foot, credit card, toll tag, etc), space availability systems, vehicular and pedestrian wayfinding, remote baggage check in, and food and beverage concessions





are all considerations in today's car parks. We've incorporated many of these features in airport car parks we've designed in Houston, Dallas, Tampa, and elsewhere.

Currently, we're discussing the issues surrounding "futureproofing" of car parks, as airports consider future scenarios where passengers no longer need parking spaces due to their utilization of self-driving cars, transportation network companies (TNC's) like Uber, Ola and Lyft, or other alternative means of transportation to get to and from the airport.

We've done studies about how to repurpose car parks in the future, so that they can be converted to alternative uses, if needed. Forward-thinking about floor to floor heights, design loads, ramping systems, floor flatness, long-term durability, and other issues may require higher initial capital costs, but could extend the life and future adaptability for the structures.

Consolidated Rental Car Facilities (ConRAC's) In the late 1990s, airports began to consolidate rental car operations into a common or shared facility, either on-airport or adjacent to the airport. Through the early 2000s, the trend continued to evolve and the secondand third-generation facilities are coming on line that respond to everchanging needs of this industry.

The rental car industry has seen many challenges from rising fuel prices and economic downturns, to consolidation of companies through mergers and acquisitions, to competition from alternative modes of transportation. Despite these challenges, ConRAC's are growing in size and scale, while still striving to maintain the dual goal of providing excellent customer service and outstanding operational efficiency. In the last few ConRAC projects that we've worked on including new facilities for Bradley International Airport in Hartford, Connecticut, we've seen trends like Customer Service Buildings shrinking or being replaced with customer facilities in the ready/return space, in order to get people to their cars sooner. We've also seen Quick Turn Around (QTA) spaces being constructed within elevated superstructures that are directly adjacent to the Ready/Return spaces for which they support. The creation of multilevel fuel systems, car wash systems, and maintenance bays in these "stacked" superstructures has provided design and permitting challenges to overcome with local code officials.

Automated People Movers (APM's)

In the early 1970s, Tampa International Airport was the first airport to use APM technologies as a means of connecting satellite airside concourses with their Main Terminal building. Since then, the use of APM's in the US and worldwide exploded with the realization that they provide a high level of customer service with a high degree of reliability. Moving millions of passengers each year between terminals, CONRAC's, rail stations, and multi-level car parks saves time, provides a comfortable environment, and overall exceptional customer experience. Airports are realizing that the initial investment in the capital





Image credit: Dana Hoff

expenditure provides long-term benefits to their customers. Walter P Moore provided structural engineering on the new APM system at Tampa International Airport that opened earlier this year.

About Walter P Moore

Walter P Moore is an international company of engineers, designers, innovators, and creative people who solve some of the world's most complex structural and infrastructure challenges. Providing structural, diagnostics, civil, traffic, parking, transportation, enclosure, and construction engineering services, we design solutions that are cost- and resource-efficient, forwardthinking, and help support and shape communities worldwide. Founded in 1931 and headquartered in Houston, Texas, our 600+ professionals

work across 18 US offices and five international locations.

Walter P Moore established an office in India in 2011. The office enhances the firm's ability to serve clients and projects throughout India for a wide variety of project types, including aviation, commercial, residential, healthcare, hospitality, sports, entertainment and governmental facilities. Our local portfolio includes the World's Largest Cricket Stadium in Ahmedabad - the Motera Cricket Stadium. Our aviation experience in our India office includes terminals, ConRACs, and APM's in New Orleans, Newark, and Hartford.



Image credit: Randy Van Duinen

For more information, please contact:

Abhijit Shah, LEED AP

Principal, Managing Director of

India Operations WALTER P MOORE

Down Town City Centre, Office No 5B, 5th Floor, S. No 8 + 23/1/2, Erandwane, Pune 411 004 91.20.25448288p/918888827855c ashah@walterpmoore.com

Blair Hanuschak, P.E.

Senior Principal, Director of Airport Projects

WALTER P MOORE

1747 Pennsylvania Avenue NW, Suite 1050. Washington, DC, 20006

+1.202.481.8705p/+1.202.680.4543c bhanuschak@walterpmoore.com

www.walterpmoore.com

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SETTING THE STANDARD FOR SMART BUSINESS

You didn't get to where you are by compromising, and neither did Bell Helicopter. Impeccable craftsmanship, modern amenities and spacious seating highlight the Bell 429's sleek, elegant design. With impressive range and speed, plus a smooth and quiet ride, the Bell 429 sets the standard for smart business.





Advanced screening using Computed Tomography (CT) technology designed for the passenger checkpoint

By Pravin Surana, Director – Sales and Business Development, Smiths Detection India

CHECKPOINT CT HI-SCAN 6040 CTiX



Regulators are increasingly looking towards new developments in detection technology and the new Explosives Detection Systems for Cabin Baggage (EDS CB) standards have led towards the introduction of Computed Tomography (CT) technology for hand luggage screening. It is the only technology which currently meets EDS CB C3 standards and likely to meet C4 in the future.

Next Generation Screening

HI-SCAN 6040 CTiX is the first security system from Smiths Detection to use CT technology for the passenger checkpoint. It has both EDS CB C3 approval in the EU and TSA AT-2 certification in the US. Baggage can be scanned without removing electronic devices and liquids which in turn, expedites screening and makes the whole process less stressful for passengers. Handling fewer trays can significantly increase throughput. At an impressive o.2m/s, the CTiX belt speed will keep things moving. Further developments will focus on the ability to detect prohibited items such as guns and large





knives, potentially removing the need for operators to review every generated image.

Typically, X-ray scanners provide 2D images from fixed generators and detectors. Unlike these conventional scanners, in a CT, the X-ray generator and the detectors are mounted on a gantry, which rotates at a constant speed as

the baggage is carried through on the conveyor belt. It spins around the object taking hundreds of views at slightly different angles and then reconstructs the raw data into volumetric 3D images. The comprehensive data collected is used to make more precise measurements and very accurate judgements on substances within the bag.

For example, the HI-SCAN 6040 CTiX supports operators by automatically differentiating between explosives and other organic but benign items such as chocolate. It is easily incorporated into existing checkpoints. Integration into an advanced screening and management platform such as Checkpoint. Evo^{plus} will streamline operations even further through remote screening and directed search. This also delivers both real-time and historical data to facilitate resource allocation; and s u p p o r t s g e n e r a l administration and modification

of the system.

By taking the detection of explosives in hand baggage to a completely new level, the HI-SCAN 6040 CTiX will improve security, operational efficiency and the passenger experience. All this is achieved at a higher security level which meets the e m e r g i n g r e g u l a t o r y requirements of ECAC, TSA and other authorities.



Figure 1.1 The HI-SCAN 6040 CTiX is ECAC EDS CB C3 approved and TSA AT-2 certified. This means passengers can leave their electronic devices and liquids in their bags during the screening process. It can also be easily incorporated into existing checkpoints.

> smiths detection bringing technology to life

www.smithsdetection.com





Collins Aerospace: Redefining Aerospace at Aero India 2019

By Sunil Raina, Managing Director, Avionics & Mission Systems - Indian Subcontinent, Collins Aerospace

Collins Aerospace, a unit of United Technologies Corporation (NYSE: UTX), is a leader in technologically advanced and intelligent solutions for the global aerospace and defense industry. Created in 2018 by bringing together UTC Aerospace Systems and Rockwell Collins, Collins Aerospace has the capabilities, comprehensive portfolio and expertise to solve customers' toughest challenges and to meet the demands of a rapidly evolving global market. By building on the strengths and talents of Rockwell Collins and UTC Aerospace Systems, Collins Aerospace will redefine aerospace - creating value for our customers, our shareholders and our employees.

In India, the aviation sector is at a CAGR of 15-20% and Collins Aerospace is well poised to be part of this growth. We have been involved with numerous manufacturing, engineering and programs based out of India in partnership with various organisations to support the initiatives of the local government such as **Make in** India. The India facility located in Bengaluru is an integrated manufacturing, engineering and sourcing hub for Collins Aerospace. Products being built in India include aircraft evacuation systems, aircraft interior and exterior lighting, cargo systems, pilot and cabin attendant seats, flight control motors, actuation systems and sensor systems. Additionally, the **Engineering Centres in Bengaluru** and Hyderabad provide engineering support to all businesses of Collins Aerospace globally. The organization has an employee strength of around 4800 in India.

This year, Collins Aerospace will be participating at Aero India 2019 to demonstrate how we are redefining aerospace. Visit us at hall E, stand 2.20 to discover our latest solutions, including:

HeliSure™ flight situational awareness solutions

Helicopter flight crews must operate in some of the most extreme environments in the world. Whether they are part of an emergency medical response team, an offshore oil-platform transportation crew or lawenforcement agency, their mission is the same: Get in, get the job done and get out successfully. All too often in degraded visual conditions and unknownlanding areas.



HeliSure[™] flight situational awareness solutions helps them do just that. Within the HeliSure family, a variety of innovative technologies provides the right mix of capabilities for your helicopter operations. Wherever your crews fly, on aircraft small to large, only HeliSure provides a complete portfolio for superior situational awareness and maximal efficiency.

Features and benefits include: • Low-risk Digital "Glass Cockpit" upgrade



• Proven display menus and symbology

• Flexible data and video interfaces for mission systems integration

- Optional H-SVS for increased safety and survivability
- All-weather operations
- Flexible scalability

• Optimized size, weight, power and cost

Coalescence[™] mixed reality system

The Coalescence[™] mixed reality system merges the trainee's realworld view with a synthetic environment for a whole new way to effectively train in a seamless, enhanced mixed reality.

Features & benefits

• The first training system enabling trainees to interact with items in their actual environment while still immersed in a virtualreality environment

• High immersion and engagement for better learning transfer

• Provides training-critical haptic feedback through interaction with real equipment

• Enables real-time tracking and evaluation of trainees. Instructors can quickly insert themselves into a training scenarioto provide feedback.

• Flexible, adaptable and portable

• Train as "near-to-real" as possible with a small-footprint system at a lower price than traditional options

NavHub[™] GNSS navigation system

Our NavHub[™] GNSS navigation system employs next-generation GNSS technology. Currently based upon Collins Aerospace Selective Availability/Anti-Spoofing Module (SAASM) GPS receivers, NavHub is strategically designed to meet the fastmoving and demanding combat environments that global ground and maritime platforms demand.

Features & benefits

• Dual receiver card slots, enabling Multi-Constellation reception

• SAASM security (expansion to M-code), expansion to multi constellation GNSS

Extended platform interfaces,

including Ethernet, USB and CAN
Extended performance in a jammed environment (i.e. 41 dB while tracking and 24 dB during initial acquisition)

TruNet[™] AR-1500 networked communications airborne radio

This single-channel radio is part of the TruNet networked communications solution family, which includes ground and handheld radios, advanced networking waveforms, apps, ancillaries and services.

Features & benefits

• Enables proven, fully secure communication

• Matches form fit with ARC-210 family of products

- Interoperable with Collins Aerospace and non-Collins Aerospace V/UHF radio systems for cost savings
- Delivers critical, high-speed,

ad hoc networked communications between fast movers and mobile ground forces increasing

mission effectiveness and safety

• Enables software/network management; easily



configurable to a variety of missions

• Fully software

programmable, flexible and configurable, to cost-effectively meetfutureneeds

Periphery Surveillance System (PSS)

The PSS is a state-or-the-art all weather, surveillance and security system designed to provide 24/7 automatic

surveillance for defense, police, paramilitary and industrial installations. The system is configurable, provides features to mark areas/zones, define threats and generates alarms when any intrusion is detected in a defined zone.

Features & benefits:

- Surveillance of critical sites/activities
- High-resolution detection
- 24/7 all-weather automatic



operation

- Rapidly deployable for temporary operations
- Very low power transmitted





ALPHA BRAVO COLLINS

AEROSPACE REDEFINED

ABOUT COLLINS AEROSPACE

Collins Aerospace, a unit of United Technologies Corp. (NYSE: UTX), is a leader in technologically advanced and intelligent solutions for the global aerospace and defense industry. Created in 2018 by bringing together UTC Aerospace Systems and Rockwell Collins, Collins Aerospace has the capabilities, comprehensive portfolio and expertise to solve customers toughest challenges and to meet the demands of a rapidly evolving global market.



BY THE NUMBERS

GLOBAL PRESENCE:

70,000 employees

16,000+ engineering workforce

Nearly 300 sites globally



KEY FINANCIALS:

\$23 billion net sales*

\$3.1 billion

research and development investment**

> o forma, includes customer npany-funded R&D

SALES PORTFOLIO:



Commercial



STRATEGIC BUSINESS UNITS

Collins Aerospace includes six strategic business units formed to meet customer needs while representing the best in innovation, technology and expertise. These divisions primarily serve customers across the commercial, regional, business aviation and military sectors.



AEROSTRUCTURES

Based in Chula Vista, California, Aerostructures includes: nacelle systems; flight control surfaces; naval composites; and other material and structural components.



AVIONICS

Based in Cedar Rapids, Iowa, Avionics includes: commercial and government avionics systems; cabin management and content systems; information management systems and services; fire protection services; and aircraft sensors.



INTERIORS

Based in Winston-Salem, North Carolina, Interiors includes: aircraft seating; interior systems; evacuation systems; life rafts; lighting; veneers; potable water systems; and de-icing products.



MECHANICAL SYSTEMS

Based in Charlotte, North Carolina, Mechanical Systems includes: landing systems; actuation; propellers; flight controls; pilot controls; hoist and winch systems; and cargo systems.



MISSION SYSTEMS

Based in Cedar Rapids, Iowa, Mission Systems includes: solutions for secure military communication, navigation and guidance; missile actuation; simulation, training and range instrumentation; strategic command and control; unmanned aircraft systems; electronic warfare; ejection seats and propulsion; intelligence, surveillance and reconnaissance; and space solutions.



POWER & CONTROLS

Based in Windsor Locks, Connecticut, Power & Controls includes: electric systems; engine controls; air management; and airframe controls.

COMPANY LEGACY

Collins Aerospace builds on the legacy of industry-leading innovation at UTC Aerospace Systems and Rockwell Collins.

Founded as a radio company in Cedar Rapids, Iowa, in 1933, Rockwell Collins pioneered technological innovation, including: helping Rear Admiral Richard Byrd establish communications at the South Pole in 1933; providing the communications equipment used for every American astronaut traveling through space; and opening the door to modern-day GPS by receiving a signal from the worlds first GPS satellite. Over the course of the companys 85-year history, Rockwell Collins broadened its focus to become a leader in aviation and high-integrity solutions, from avionics and cabin systems to connected aircraft and simulation and training solutions. Formed in Charlotte, North Carolina, in 2012 when United Technologies acquired Goodrich and combined it with the companys existing Hamilton Sundstrand division, UTC Aerospace Systems built a heritage that included many of the iconic moments in aerospace and defense history. From the propeller that powered Amelia Earharts nonstop flight across the Atlantic to the spacesuits worn by Americas first astronauts during the Mercury program, the companys solutions helped shape the industry.

Collins Aerospace combines the talents of both organizations with a commitment to honoring their strong legacy while creating comprehensive strategies to propel their customers and the industry toward the future, every day.

LEADERSHIP

CHIEF EXECUTIVE OFFICER Kelly Ortberg PRESIDENT & CHIEF OPERATING OFFICER Dave Gitlin

AVIONICS

Kent Statler

STRATEGIC BUSINESS UNITS

AEROSTRUCTURES	
Marc Duvall	

INTERIORS Dave Nieuwsma MECHANICAL SYSTEMS Samir Mehta MISSION SYSTEMS Phil Jasper

POWER & CONTROLS Tim White

SUPPORT FUNCTIONS

AFTERMARKET SERVICES Ajay Agrawal

HUMAN RESOURCES Doug Balsbough CUSTOMER & ACCOUNT MANAGEMENT Henry Brooks

OFFICE OF THE GENERAL COUNSEL Christoph Feddersen DIGITAL TECHNOLOGY

Brian Galovich

OPERATIONS & QUALITY Paolo Dal Cin ENGINEERING & TECHNOLOGY Mauro Atalla FINANCE Patrick Allen

STRATEGY, DEVELOPMENT & COMMUNICATIONS Jeff Standerski

Collins Aerospace

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Bell growing from strength to strength in India

By David Sale, Managing Director - Asia Pacific, Bell

Bell is an industry-leading producer of commercial and military, manned and unmanned vertical-lift aircraft and the pioneer of the revolutionary tiltrotor aircraft. Globally recognized for worldclass customer service, innovation and superior quality, Bell's global workforce serves customers flying Bell aircraft in more than 120 countries.

Bell started its operations in India in 1995 with a liaison office in New Delhi. Today Bell has grown to more than 130 employees and has offices in New Delhi, Bangalore and Mumbai. Bell engineers work on various programs at the Textron India Pvt Ltd., engineering and technology centre in Bangalore.

Bell has been supplying helicopters to customers in India for more than six decades. The iconic Bell 47 first visited India in 1956 and flew Sir Edmund Hillary and Tenzing Norgay around India and was the first trainer helicopter for the Indian Armed Forces, based at Helicopter Training School.

After bringing the first helicopter to India back in 1956, the Bell Helicopter fleet in India has grown from only 2 helicopters in 1994 to over 85 helicopters today making Bell the market leader in India. Bell also has one Customer Support Facility (Air Works India Engineering Pvt Ltd), one Independent Sales Representative (Jubilant Enpro Pvt Ltd) and a Customer Support Engineer solely dedicated to supporting Indian customers.

The outlook for the Indian commercial helicopter market continues to be a vibrant and bright one for Bell, with our aircraft operating in a vast number of segments across India.

One interesting area is the urban air taxi space, which Thumby Aviation operates in Bangalore from the Bangalore International Airport to Electronic City using a Bell 407. A journey which typically takes two hours by car, can be completed in 15 minutes by air. The reliability and ease of maintenance for the 407 allows operators to provide an efficient service at a affordable cost for consumers.

At Bell, we believe the future of the urban air taxi is here due to the traditional limitations of land-based transportation and growing populations in Asia Pacific. We are also confident we have the right aircraft for urban air taxi with the Bell 505, our newest offering in the short light single space, and the Bell 407GXi, which is the latest iteration in the Bell 407 family. Both aircraft types come with advanced avionics, systems and engines to help our customers operate their aircraft efficiently, safely and reliably.

Elsewhere in South Asia, the Bell 505 recently underwent a successful high altitude





validation flight between 16,000 and 20,000 feet in Lukla, Nepal, where the performance of the aircraft was demonstrated and validated to our customers in Nepal. Demand for the Bell 505 remains strong throughout Asia Pacific with deliveries to seven countries in the region in the last year and a half.

Besides the urban air taxi space, Bell continues to make in-roads with Indian corporations that require the use of helicopters in their operations. In 2017, Tata Steel purchased a second Bell 429 to support their steel production operations. The helicopter will address Tata Steel's transportation needs at its steel plants and mines in the region.

The state-of-the-art technology in the Bell 429 includes a fully integrated glass cockpit, advanced drive system, best-inclass WAAS navigation and IFR capability. The Bell 429 has more cabin space than any other light twin helicopter, with flat flooring and seating for seven passengers and one flight crew. In addition to supplying helicopters to the Indian market, Bell is committed to the "Make In India" campaign through its agreement with Dynamatic Technologies in Bangalore. As part of the agreement, Dynamatic is tasked with manufacturing the major sub-assemblies of the Bell 407 on a global single-sourced basis from its facility at the KIADB Aerospace Park next to the Bangalore International Airport.





US-INDIA AVIATION COOPERATION PROGRAM (ACP)



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Honeywell's GoDirect[™] Connected Maintenance enables better on-time performance and significantly lower operational costs for your airline with 99% acccuracy predicting part failures before they become problems.

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