

Aircraft maintenance needs high-tech lift-off

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Despite rapid innovation in the aviation industry over the last few decades - from advanced aerodynamics and composite materials to making planes lighter yet stronger - the technology to support on-ground engineers maintaining and certifying aircraft is still stuck in the 20th century | PHOTO: SPH

DESPITE rapid innovation in the aviation industry over the last few decades - from advanced aerodynamics and composite materials to making planes lighter yet stronger - the technology to support on-ground engineers maintaining and certifying aircraft is still stuck in the 20th century

In the final two decades of the last millennium, coinciding with the advent of the Internet, rapid advances have been made in front-end aviation, such as dynamic pricing, slicker marketing and online bookings.

Low-cost carriers (LCCs) are on the rise, particularly in Asia. Other commercial aircraft - significantly bigger than previous models, and carrying more passengers or cargo - are made of sophisticated composites that help reduce fuel consumption, and fly with smart computers and avionics on board.

Despite these advances, maintenance, repair and overhaul (MRO) work is largely stuck in the 20th century. Engineers on the tarmac and in the hangars still inspect aircraft largely in the same way as they did decades ago. A great deal of certification is still done on pen and paper. Parts and logs are checked manually after landing and before take-off.

Pressure of turnaround

The time has come for MRO innovation to shift gears and bring about a major improvement in productivity in the face of high growth in traffic. Airports around the world, from Singapore's Changi to London's Heathrow, are adding new runways and terminals, as more people travel overseas, for work or leisure.

But even as air travel increases - recently accelerated by the plunge in aviation fuel prices - airlines are scrambling to find enough qualified engineers to cope with the pressure of turnaround amid tightening deadlines and increasingly crowded airports.

Rapid innovation must come to the tarmac and the hangars to reduce aircraft on ground on a massive scale - lest air carriers, MRO companies and civil aviation authorities face a gridlock.

Ironically, the carriers and big MRO companies themselves are among the slowest to innovate, often stymied by corporate bureaucracy.

Singapore - widely regarded as Asia's aviation hub - is taking steps to address this crucial issue. The city-state employs around 20,000 aviation workers and holds about 25 per cent of the region's MRO market share. These numbers increase every year as the government invests in aerospace education and research.

Singapore is probably one of the few countries to address this problem head-on, with the Economic Development Board of Singapore (EDB) partnering with MRO software specialists to develop solutions to real-life engineering problems faced by carriers, such as Air France Industries KLM Engineering & Maintenance. Launched in February 2016, it is the first-of-its-kind innovation hub launched in Singapore.

These carriers can avoid administrative problems like expenses, staff training and internal approval by working with such a MRO research lab which will be a hothouse for innovations such as:

- BOT IT, a software robot that helps field engineers access enterprise information easily in the form of simple verbal and typed conversations, as well as video and image, without compromising on information security. BOTs use artificial intelligence, natural language processing and machine learning algorithms to automate mundane tasks and improve productivity;
- Virtual reality devices for live data transmission, so that aircraft maintenance engineers can work with teammates and control centres to diagnose problems;
- Additive or 3D manufacturing as a low-cost, customisable means of replacing damaged or missing plane parts;
- A robotic arm equipped with about 20 cameras, which can photograph and scan aircraft engine components from 200 different positions, in less than half the time it would take a trained line technician; and
- A drone which can conduct 360-degree safety inspections on grounded planes without the need for mechanical lift equipment, saving precious man hours and minimising aircraft on-ground time.

The Singapore government's emphasis on Big Data means the country is well-placed to venture into predictive analytics for aviation MRO, which can crunch data from maintenance records to predict and prevent component failures before they occur.

Currently, most carriers collect data through monitoring systems such as Airbus' Aircraft Maintenance Analysis or Boeing's Airplane Health Management, which transmit warning messages and provide access to trouble-shooting methods.

Algorithms can now crunch this safety data to deliver actionable MRO-related insights, such as determining whether a component should be streamlined or replaced altogether.

Improving workflow

A brave new world awaits the aircraft engineer as well as senior leaders of the aviation industry. To get aircraft off the tarmac and flying instead of idling on ground, more functions can and should be taken online to improve workflow.

Many basic MRO processes such as scanning, signatures and record management have yet to go online, which would enable engineers and technicians to save significant time and effort, and to channel their resources more productively. Forward-thinking airlines must, therefore, take their resources digital and enlist fresh innovators to stay competitive in the years ahead.