

TAKING SAFETY TO NEW HEIGHTS



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Last year was the safest year in history for commercial airlines.

Alicia Dimas explores how quality in the aerospace sector is helping to shape and assure a culture of safety

Would you board a plane if you knew it wasn't going to be inspected before taking off? Would you put your life in the hands of an airline that uses defective parts for its aircrafts? If you answered no to both questions, then you will appreciate the importance of quality in the aerospace industry.

The safety of air travel relies on the assurance of quality manufacturing of aviation equipment, the operation of the aircraft and air traffic control. All the pieces of this complex and sensitive puzzle have to sit perfectly together for the success of each flight that takes place anywhere in the world.

According to the Aviation Safety Network (ASN), 2017 was the safest year in history for commercial airlines. There were no passenger jets crashes anywhere in the world, despite more flights being made than ever before.

In fact, flying is considered the safest mode of transport. However, this realisation of safety assurance has only been possible through the establishment of strict safety and quality procedures, which guarantee not only that the commercial aviation industry mitigates its operational risks, but also that consumers can trust this mode of transport with their lives.

Risk management also plays a crucial part in this achievement and the International Standards Organization (ISO) recently updated its ISO 31000:2018, 'Risk management – Guidelines' standard, which provides principles, framework and a process for managing risk.

International standards and other regulations are crucial; after all, not following safety procedures can be catastrophic, and the possibility of a

plane crash is enough to keep many people from flying.

John Strickland, Aviation Analyst, and Director at JLS Consulting, tells *QW* that through his long career as an Aviation Analyst, there have been many improvements in quality and safety. The industry is constantly learning and seeking new ways to deliver improved quality standards and safety procedures. He gives the example of the recently introduced Boeing 787 Dreamliner flight from London to Perth by Qantas, which is the first non-stop flight on a regular commercial basis from Australia to the UK, taking 17 hours. This flight is only possible due to the new generation, lighter weight aircraft equipped with more efficient engines and state-of-the-art technology. Strickland says that quality assurance played "a crucial part in this achievement and in ensuring these new technologies work to perfection."

Samantha Withers, Quality Manager Aerospace Materials Testing Europe for Element Materials Technology (Element), a material testing and product qualification company that works with the aviation industry, agrees that quality management has played a crucial role in improving commercial aviation safety.

"I believe that quality management has played a key role in 2017 being reported as the safest year in history for commercial airlines, by ensuring that robust standard systems and procedures are in place for material qualification and testing," Withers comments.

"Quality covers every area of air safety, from the conception of an aircraft to its decommissioning," she says.

She stresses the importance of a quality culture that is shared by everyone in the company: "At Element's Aerospace laboratories we test the material that is being manufactured into components on aeroplanes every single day. We ensure that each technician is ▶



EVERY PART COUNTS

The use of counterfeit parts increases the risk of errors and fatalities in the aviation industry, as quality cannot be guaranteed when materials, or even whole parts of an aircraft, are forged. The industry wants to show commitment to quality and authenticity on an industrial level, ensuring safety for travellers. Therefore, the Counterfeit Avoidance and Accreditation Program (CAAP) has expanded its scope to include distributors. Based on SAE International (Society of Automotive Engineers) standard AS6081 'Fraudulent/Counterfeit Electronic Parts: Avoidance, Detection, Mitigation, and Disposition', distributors and industry leaders have developed new audit criteria, AC7402 from CAAP, to recognise companies who are committed to eliminating counterfeit parts in the supply chain.

Jim Lewis, Programme Manager at the Performance Review Institute, the not-for-profit organisation that administers CAAP on behalf of the industry, tells *QW* that CAAP decided to include distributors in its certification programme, because one of the ways to minimise the risks of counterfeit parts is to maintain traceability to the manufacturer.

"The further away you get from the manufacturer, the greater the chance of a counterfeit. Distributors buying from the open market, especially for obsolete parts, cannot always obtain this traceability and therefore have some of the highest risks of having counterfeit parts introduced into the supply chain," Lewis explains.

"The properties and performance of counterfeit parts can be different from authentic parts, meaning that end products may not function as designed and intended." And to make things worse, Lewis says that

"it can be very difficult to spot a counterfeit part. That is why it is so important to keep up with the latest trends in counterfeiting."

But how can the aviation industry ensure the quality of the parts used and avoid counterfeit materials or parts?

According to Lewis this can be done by "ensuring quality starts with implementing a quality management system, typically one of the ISO 9100 series of standards, which are developed and maintained by the International Aerospace Quality Group (IAQG). These documents are co-published by SAE International, as AS9100 series, The European Committee for Standardisation, as EN 9100 series, and the Japanese Standards Association, as JISQ or SJAC 9100 series." He adds: "Once a system is in place, it is audited by the IAQG. There are also organisations which look at other processes such as Nadcap, which audits and accredits manufacturing products. Qualified parts and products, which undergo rigorous testing prior to qualification, can also be specified for critical parts."

As for counterfeit prevention and mitigation, Lewis says that organisations implement processes and procedures which utilise risk analysis to determine the necessary level of control. Testing of parts and materials for indicators of counterfeiting is also critical. SAE International publishes several standards in this area, AS5553, AS6081, AS6496, AS6174 and AS6171, which are written to address different levels of the supply chain from distributors to end users. CAAP then audits the organisation's system and its effectiveness, which Lewis says "allows the customers of the organisation to have greater trust in their system". ▶

fully aware of what they are testing and why they are testing it, from the smallest rivet to the largest wing spar."

All Element aerospace laboratories are ISO 17025 (General requirements for the competence of testing and calibration laboratories) accredited, as well as National Aerospace and Defense Contractors Accreditation Program (Nadcap) accredited for materials testing.

Before Nadcap was established, each aerospace organisation audited the laboratories to their own requirements. In 1989, it was recommended by the US Government and the Industry Equal Partners Conference that a consensus solution be found, as many aerospace organisations had similar requirements. As a result, Nadcap established a number of stringent industry consensus standards to satisfy the requirements of all participants. These have been in place since 1990.

"Nadcap is unique in bringing together not only competing aerospace primes, but also competing test laboratories to strengthen air safety through the consensus decision-making process of members from the user community," Withers says.

NEW RISKS

Terrorism, cybercrime and lithium-ion batteries catching fire on board are pointed out as some of the main new risk factors for the aviation industry. There has also been an increased awareness on the importance of mental health and crew rest for air travel safety.

Withers explains how the quality of aerospace materials helps airlines mitigate some of these risks. "Quality requires attention to detail and traceability. Mitigating the risk of terrorism and cybercrime will always be challenging because people will eventually find their way around a system. However, the quality of aerospace materials can reduce the impact of terrorism and cybercrime, by developing materials that give the desired properties and ensuring that these materials are then used in the correct application."

As for cybercrime, Withers says quality can work hand in hand with IT, and other relevant parties, to consider whether each area of a process has been considered and

ensure that systems are in place. "Quality procedures are in place to ensure a system is robust, repeatable, compliant, and to ensure that the procedures are followed. For example, many disasters in the industry occur due to procedures being ignored or not enforced as intended. The systems exist but are only effective when implemented correctly," Withers warns.

Strickland says: "Sadly security has become a huge challenge and every effort is made to keep air travel safe." He adds that technology has improved many elements of the air travel experience, such as online check-in and digital tickets, but from a security point of view there is still much progress to be made in reducing intrusiveness, whilst maintaining the highest standards of effectiveness.

Strickland also believes that there are improvements that could be introduced relatively quickly, if costs are not prohibitive. He says there has to be a practical balance between affordability of the latest technologies, especially expensive security equipment, and the ticket price for the customer.

PRICE WARS

The rise of low-cost airlines has changed the aviation industry landscape significantly; flying is more affordable than ever, and the number of flights and airports has increased exponentially. However, customers can't help but ask if this low-cost trend doesn't come with a heavy price on quality and safety?

Strickland explains that "nowadays price is a driver not only for low cost airlines, but for all airlines. Every airline has price sensitive customers, and low-cost airlines have only set the trend in the marketplace but there cannot be any question of cutting safety or security standards in order to keep low prices."

He adds that, in fact low-cost airlines have actually been "early adopters of new technology and new processes, which other airlines have followed. There is so much competition and choice in the market today, that really no airline can afford to not learn from what low-cost airlines have done for more than 20 years now. Some of the latest aircraft have been introduced by low cost airlines, along with the use of new technology for online bookings and check-in, amongst other innovation."

Low-cost airlines are bound by the same regulations as all other airlines, and their managements have to keep safety and security as the top priority."

"There cannot be any question of cutting safety or security standards in order to keep low prices"

LOOKING OVER THE HORIZON

When considering the future of any sector of the economy, it is inevitable to think about technology advances and automation. The aviation industry is no exception.

Airlines and air traffic control are already exploring the many possibilities that the digital age brings, but there are still factors to consider. Withers highlights the ongoing challenge of controlling human behaviours and performance. “As the industry tries to eliminate human error, there will be a move to more automation in processes. A company can have the most robust system, but if a person makes a mistake or ignores the system, then errors can occur. Robots and automated devices are capable of performing the same operation, the same way, every time.”

She says that the aviation industry is also improving its quality approach, as it realises that best practice goes beyond compliance: “There is a trend to go beyond compliance to

standard or specification and look for best practices in the industry.” The industry is also taking a fresh approach to preventative actions and risk mitigation. Withers considers that this is not just improving on established systems but looking to prevent things that could result in an incident, and how to prevent them before they occur. This includes using audits as a preventative measure to look for opportunities and risk points in a process.

Moreover, Withers predicts that the aviation industry will also work towards increased transparency and creating a culture of partnership with its customers. She also forecasts improvements in material testing, with the use of proficiency testing, statistical process control, gauge repeatability and reproducibility, calibration and uncertainty of measurement, to provide more reliable results.

As the aviation industry continues to further improve its safety and quality procedures, will we continue to achieve the desired zero fatalities per year on commercial air travelling? Or was this an exceptional year? ■

Learn more

Find out more about the Counterfeit Avoidance Accreditation Program (CAAP) at: <https://p-r-i.org/other-programs/caap/>

“There is a trend to go beyond compliance [...] and look for best practices in the industry”

ELEMENT'S ROAD TO QUALITY

ELEMENT'S QUALITY GOALS

Samantha Withers says that Element, the material testing and product qualification company, is focused on delivering assurance to its clients. “We exist to help all of our customers to make certain that the materials and products that they make are safe, quality compliant, and ultimately fit for purpose, using our 200 years of testing experience and global testing capabilities.”

Element's mission is to be the best testing partner in the world. In order to achieve this, it has four values: Safety, Partnership, Integrity and Excellence.

QUALITY TOOLS

Element considers the cost of non-conformance, on-time delivery and turnaround times, as well as many other quality tools, to achieve its quality objectives. Its laboratories employ Lean and Six Sigma techniques to achieve their goals. Accreditation and compliance play a big part in the day-to-day business of Element, with all aerospace laboratories holding ISO 17025 (General requirements for the competence of testing and calibration laboratories) and the Nadcap Materials Testing and Non-Metallic Materials Testing accreditation.

Having quality tools alone, however, is not enough to drive quality results. Withers says: “People also play a big part on what Element does. Robust training plans and qualification play a key part. Lots of people within Element have worked for the company for many years and retention of people is very important to us. Strong recruitment and succession plans focus on the future, to ensure we maintain our competency as a business.”

TIMELINE OF COMMERCIAL AVIATION

- 1903**
American brothers Wilbur and Orville Wright invent the first successful aircraft.
- 1908**
First passenger flight: Wilbur Wright takes an employee along for a ride.
- 1911**
Burgess Co. becomes the first licensed commercial aircraft manufacturer.
- 1919**
KLM begins operation, making it the oldest carrier in the world still operating under its original name.
- 1920**
Sydney Airport opens for commercial service.
- 1923**
First transcontinental non-stop flight.
- 1973**
The first female airline pilot, Emily Warner, flies as second officer for Frontier Airlines.
- 1976**
Concorde jet flies first supersonic passenger flight.
- 1999**
First web-based passenger check-in and online boarding passes.
- 2007**
Airbus A380 enters commercial service capable of carrying 850 passengers.
- 2011**
Airbus announces signing of the largest aircraft deal in history based on aircraft ordered: 200 planes ordered by AirAsia.
- 2017**
Considered the safest year for air travel.

