... Five Questions to Teledyne Controls

Until now, airlines haven't had the means to record and measure the quality of their cabin environment consistently, with objective data. A new solution from Teledyne Controls focused on cabin air quality data is seeking to solve this problem. *LARA* Editor Glenn Sands asks the questions.

Can you explain the reasons for developing ACES, was this brought forward due to COVID-19?

At Teledyne Controls, we work very closely with our customers, and we listen carefully to the issues they share with us to bring solutions to their problems quickly. ACES is the direct result of hearing from multiple airlines about challenges related to cabin air quality and the lack of means to monitor it comprehensively. While COVID19 put more emphasis on air quality on commercial aircraft, the need for accurate and comprehensive air quality data on aircraft had been recognised before COVID-19. We have launched ACES now to help airlines address this clear industry need of monitoring air quality.

Teledyne Controls is part of Teledyne Technologies Incorporated, one of the leading sensor companies in the world and includes multiple businesses focused on air quality and gas monitoring. We have leveraged the extensive air quality expertise within Teledyne Technologies, with our own core expertise at Teledyne Controls in data acquisition, wireless transfer, and analysis, to deliver a solution for the aviation market. ACES evolved quickly from concept to certification in just over two years and is now FAA certified on the 737 with A320 certification expected by Q2 2021.

ACES is part of a broader vision. Our objective is to continue to leverage the vast array of imaging, electronic measurement, and other sensing technologies available within Teledyne Technologies to deliver additional solutions to our airline and OEM customers and help them derive safety and operational benefits from data.

How did you acquire the necessary research data before developing ACES?

We reviewed decades of published reports, investigations, and studies from scientists, regulators, and others, to understand and identify contaminants under various operating conditions. Leveraging our internal scientific and engineering resources, we selected and tested an ensemble of sensors best suited for identifying the contaminants associated with reports of smoke, fume or odours in the airplane. In consultation with airlines and references to industry standards, we validated the sensor selection, device design and features, and suitability for the aircraft operational environment. We studied aircraft environmental system architectures, modes of operation, and cabin air distribution models to determine optimal installation locations for air quality measurements.

What do you think it will bring to the industry, and have you had feedback from potential operators?

ACES fills a huge gap in knowing the state of air quality on the aircraft. There are no permanent monitoring systems installed onboard most aircraft today. Before ACES, airlines did not have a practical way to comprehensively monitor the air quality in the cabin and flight deck. For example, many aircraft have ozone converters, and ozone has been known to be a source of concern. By measuring ozone levels, operators can monitor the performance of those systems. Another example is to verify cabin cleanliness. The recording of particulate and volatile organic compound data can help ensure the effectiveness of

the aircraft's HEPA filters. In addition, when an incident involving smoke, odour or fumes occurs today, understanding what happened is largely based on human perceptions, not objective data. Cabin air incidents are identified based on perceived odour types, which often do not correlate with actual events. ACES solves this problem by providing comprehensive and accurate data for every flight, so airlines can continuously verify the air quality in the cabin and have objective data available if an air quality event occurs. Additionally, by monitoring trends on specific aircraft, airlines can identify and address potential emerging issues to help prevent future incidents.

The ACES system is now installed on a major US airline and is performing exceptionally well in various on-aircraft and off-aircraft tests. We are getting positive feedback from numerous airlines and are excited to be bringing this new capability to the industry.

Currently, ACES is only for the Boeing 737 aircraft. Will you be developing the system for other types

The ACES system itself is aircraft agnostic. Only the installation kit varies with the aircraft type. We have completed FAA certification for installation on the Boeing 737 and plan to obtain FAA A320 certification by Q2 2021. EASA certification is in progress, and other airframes will follow.

Can you explain how the data is relayed and recorded during a flight?

As soon as the aircraft is powered, ACES performs continuous air sensing and monitoring and records data that is stored in the ACES onboard units. Upon landing, ACES automatically transfers the data to the ACES Cloud Service (ACS) for processing and analysis. Importantly, ACES transmits the data autonomously without relying on any other aircraft connectivity systems. The transfer happens seamlessly and securely via the ACES built-in wireless module, which works with both cellular (4G LTE) and WiFi networks when the aircraft is on the ground. With an available Wireless Access Point and air-to-ground connectivity, the data can be sent to the ACS continuously during flight. Air quality data can also be accessed during the flight on a mobile device. ■

ACES high: The Teledyne Controls' sensor unit.