

# ACOUSTICS AND VIBRATION TEST SYSTEM PROVES ITSELF

China's Aircraft Strength Research Institute has used m+p international to perform vibration, impact reliability and acoustic fatigue tests across a range of aircraft

The Aircraft Strength Research Institute (ASRI) is the only aircraft strength research, verification and identification center in the Chinese aerospace industry. ASRI provides ground testing facilities for full-size aircraft, which helps to predict vital performance data before the airplane embarks on its maiden flight.

ASRI serves as a center of excellence in testing and qualification for the latest aircraft developed in China and supports the many other institutes involved with the overall production of aircraft in China. The tests at ASRI play an important role in the overall aircraft development process, including design, manufacture, testing and test flights.

During normal operation many parts of the airframe endure extremes of both temperature and acoustic excitation. This is especially the case around areas such as the jet exhaust, the exhaust nozzles and the tail of the plane, where temperatures can exceed several hundred degrees while being submitted to sound pressure levels of up to 163dB (during full thrust measured at an angle of 30° along the outer edge of the tail plane and 2m (6.6ft) from the outer edge). Consequently, damage can occur during initial testing. Examples of this damage include loose rivets and fairings, if they are not designed with the suitable durability.

However, the aerospace industry is always striving for better performance and cost-effectiveness. Engineers are constantly looking to reduce weight and increase the overall operational life of aircraft structures. When an aircraft is an infinite life design based on the fatigue limit, the safety margin of the aircraft is very high. But the aircraft will be heavy and there may be compromises in performance.

As an alternative, Chinese engineers are looking to use finite life designs, which require extremely accurate testing and simulation for both acoustics and temperature. The aim is to use the combination of finite life designs and accurate testing and simulation to reduce the weight of aircraft as much as is possible, without compromising the integrity of any of the components.

To rigorously simulate the acoustic levels required as part of this testing campaign, ASRI has used the m+p international traveling wave tube closed-loop acoustic control

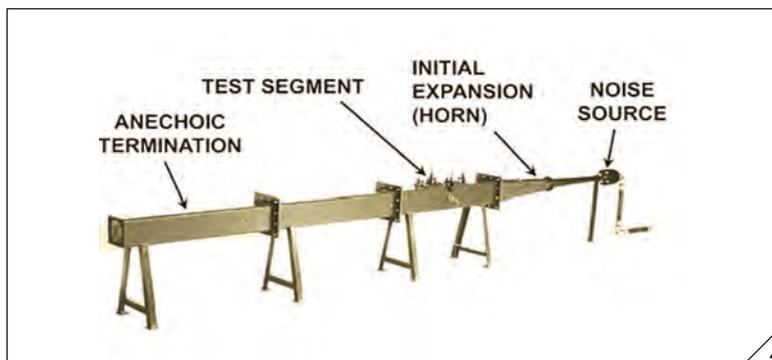


1 // China's Aircraft Strength Research Institute provides ground testing for full-size aircraft

2 // The progressive wave tube used during acoustic testing

system since 2011. This control system can achieve up to 165dB. In addition, engineers have used six m+p VibControl vibration controller systems, which are present at the ASRI site in China. The hardware platform is a high-channel count m+p VibRunner ideally suited for the specific needs of noise and vibration engineering and general data acquisition. The structural tests performed on aircraft include sine sweep, random, impact and shock response spectrum analysis.

For high-end vibration and strength testing, the stability of the system and absolute confidence in the test data are crucial. Engineers at ASRI have been extremely confident in the overall system stability and reliability that m+p international offers and have confirmed the advanced nature of the system's technology. \ \



2

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