

Evaluation of Wheelchairs and Wheelchair tie downs for in-cabin use

Presentation abstract

All Wheels Up (AWU) is crash testing the worthiness of wheelchairs (WC) and WC tie down occupant restraint systems (WTORS) for the use during airline flight, or for in-cabin use. AWU has proposed and conducted multidisciplinary testing at a Federal Aviation Administration (FAA) testing facility where we proved accessible air travel is possible. This research greatly impacts the 20 million wheelchair users worldwide. Currently, there are no commercial air carriers or privately-owned aircraft that are truly WC accessible. AWU is working to not just prove wheelchairs and WTORS can pass the FAA safety regulations for airline seating, but also prove a WC spot can be economical. AWU conducted the first crash test of WC and WC tie downs in 2016. For the purpose of our research, a WTORS is defined as a complete set of safety equipment for use by a wheelchair-seated occupant in a vehicle: it is comprised of equipment for securing the WC to the vehicle, equipment for keeping the WC occupant in the WC seat and limiting occupant movement during emergency vehicles maneuvers and crash events. A WC is a manually operated or power-driven device designed primarily for use by an individual with mobility disability for the main purpose of locomotion (RENSA).

Individuals who use wheelchairs should be accommodated to travel in an airplane in the safety of their own WC without risk of harm to their physical self or damage to their WC. In 2008, one major air carrier published spending \$1 million on WC repairs due to the damage or total replacement of the WC, that same air carrier spent 2.6 million in repairs in 2016.

AWU is working with Q'straint, the global leader in WC restraint innovation. Q'Straint develops the world's highest quality, most progressive WC passenger safety solutions for public and private transportation. In May of 2011, Q'Straint published a report describing findings after automobile crash testing, concluding their WC restraint systems passed a 20g crash test. (Q'Straint, 30mph/20G testing: It's NOT just the speed, but the Force that Matters, 2011). The Q'Straint study is significant to the AWU project because the FAA's standards for aircraft seats is 16g (Bahrami). According to the AC 25.562.-1B "A single 16g Longitudinal or 14g vertical test is sufficient to substantiate the attachment between structural members with a different design philosophy or variations within the same design philosophy, provided it can be determined which test condition is critical for the attachment." (Bahrami). The Q'Straint report was clear evidence that WTORS surpass the FAA's 16g parameters. However, the testing conducted was completed using automobile methodology, which varies from airline testing methodology. Therefore, the crash test needed to be replicated using airline safety requirements at a FAA approved testing facility.

Existing research and published documents have solidified the standards of safety for wheelchairs and their occupants in motor vehicles and buses. They are: WC18: Wheelchair Tiedown and Occupant Restraint Systems for Use in motor Vehicles, WC19: Wheelchairs used as seats in motor vehicles, WC20: Crash-tested seating systems for wheelchairs. These documents are the culmination of 20 years of dedicated research and documented crash testing data pertaining to wheelchair safety in moving vehicles, but not planes.

AWU tested a surrogate WC and WTORS at a FAA testing facility and tested according to the FAA advisory circular the

14.CFR.25.561 and 14.CFR.25.562: Title 14 = Aeronautics and space, CFR = Code of federal Regulations, Part 25 - Airworthiness

standards: .561 = General Aviation, .562 = emergency landing dynamic conditions

Our proof of concept showed current market tie down systems surpass the 16G parameters for FAA testing. We are now working test other models of tie down systems for aerospace use before stakeholder create a prototype for commercial air carrier use. Post Test observations were the following:

- a) The ATD remained in the surrogate WC
- b) The Surrogate WC remained upright on the test platform/sled
- c) There was no evidence of damage to or failure of, structural or load – carrying components of the WTROS or wheelchair securement adaptors

Our proof of concept study has engaged the airlines as well as plane manufactures. AWU is now working with major air plane manufactures at their request to share our data and research.

AWU is working with Universities to create a new area of study to develop the research needed to create a WC spot on airplanes. Our studies will not just include the dynamic crash testing of wheelchairs and wheelchair tie downs, but also include studies on mitigated costs due to WC accessible airtravel. We will prove a WC spot as a solution to cost expenditure and not loss revenue. One of our studies is a tarmac turn time efficiency study, showing cost mitigation by providing a WC spot.

Lead speaker : Michele Erwin

Organisation : All Wheels Up

City (Country) : Frisco(United States)

Biography : Michele Erwin is the President of All Wheels Up. Her interest in accessible air travel began in 2011 when it became clear traveling with a person who has a severe physical disability and uses a wheelchair was not safe. Today, Michele works to further accessible air travel through research initiatives. Michele has been interviewed & quoted in publications such as BBC, Yahoo Travel, and Aljazeera America Magazine. She has presented to the FAA, Congress, the US House Transportation committee, and Airlines. Before founding AWU, Michele had a successful career in the fashion industry working for notable fashion houses such as Ralph Lauren and Calvin Klein.

2nd speaker :

Organisation :

City (Country) : ()

Biography :