WHO IS ALL WHEELS UP?

- AWU is a 501(c)(3) non-for-profit organization
- AWU is the ONLY organization in the world crash testing wheelchair restraints for In-cabin use

@allwheelsup

All Wheels Up

www.allwheelsup.org

MicheleErwin@allwheelsup.org
Our Mission is to provide a wheelchair spot on planes for people with severe physical disabilities traveling on commercial and private airplanes
AWU KEY AREAS OF FOCUS

- Wheelchair user’s personal and physical safety
- Tarmac turn time reduction and affiliated cost savings
- Reduction of annual wheelchair damage and affiliated costs
- Increasing the Airlines customer base (20 million wheelchair users globally)
AGENDA

- CREATING ACCESSIBLE AIR TRAVEL
  - PHASE 1: WHAT EXISTS YESTERDAY/TODAY
  - PHASE 2: WHAT NEEDS TO BE DONE
  - PHASE 3: STRATEGY MOVING FORWARD
1943 President Franklin D. Roosevelt flew in the first ever modified wheelchair accessible plane. The plane was outfitted with an elevator and an aisle and cabin space wide enough for FDR to use his wheelchair.
WC TIED-DOWN ON MILITARY EXERCISES

MicheleErwin@allwheelsup.org
Section 9: Study on In-Cabin Wheelchair Restraint Systems

The United States Access Board will conduct a study to determine the ways in which individuals with significant disabilities who use wheelchairs, including power wheelchairs, can be accommodated through cabin wheelchair restraint systems. Further, DOT will put forward minimum guidelines consistent with the findings.
SEC. 543. Feasibility study on in-cabin wheelchair restraint systems.

(a) Study.—Not later than 2 years after the date of enactment of this Act, the Secretary of Transportation, in consultation with the Architectural and Transportation Barriers Compliance Board, aircraft manufacturers, and air carriers, shall conduct a study to determine—

(1) the feasibility of in-cabin wheelchair restraint systems; and

(2) if feasible, the ways in which individuals with significant disabilities using wheelchairs, including power wheelchairs, can be accommodated with in-cabin wheelchair restraint systems.

(b) Report.—Not later than 1 year after the initiation of the study under subsection (a), the Secretary of Transportation shall submit to the Committee on Transportation and Infrastructure of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate a report on the findings of the study.
Passengers with known medical conditions and disabilities are covered under the Americans with Disabilities Act and the Air Carrier Access Act. These federal laws require commercial carriers to provide transport to those people with disabilities whose condition does not represent a threat to the health and safety of themselves or others. For example, paraplegics must be provided with seating on a commercial airliner and their wheelchair or transportation device carried at no extra charge. Paraplegics who have good upper body strength prefer aisle seating and can often transfer themselves from the special aircraft aisle wheelchair to the seat. Quadriplegics will prefer cabin wall seating as providing more support on one side. Bulkhead seating also provides more room for transfers. Seating can be specially requested and like all accommodations, should be done at least 48 hours before scheduled travel. Failure to provide 48 hours advance time may prevent the airline from accommodating a request, particularly in regards to oxygen. These levels have forced airlines and airports to make numerous changes to their facilities in order to accommodate the needs of the disabled. Spill able batteries from powered wheelchairs, normally considered to be unacceptable hazardous cargo, become a waivered item requiring special handling.
Evaluation of Wheelchairs, Wheelchair Tiedowns, Occupant Restraint Systems, and Occupant Protection while in a Wheelchair on a Transport Plane
In 2011, Q’straint’s wheelchair tiedown occupant restraint systems passed a 20G sled crash test. Surpassing the 16G sled test of airplane seats that the FAA has set as the industry standard.
According to the AC25.562-1B “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 conditions is critical for the attachment” (Bahrami, 2006).
AWU MAKES HISTORY

MicheleErwin@allwheelsup.org
AWU has already tested this wheelchair tie down and occupant restraint system (WTORS) – **QRT-360**

- A Surrogate wheelchair was used (the same surrogate wheelchair used in automobile crash tests)
- Airplane floors have the same or similar “L” track as the accessible vans and buses

MicheleErwin@allwheelsup.org
Tested according the FAA standards for in-cabin use - the same test for airplanes seats, drink carts etc.

14CFR25.561 & 562

- Title 14 = Aeronautics and space
- CFR = Code of federal Regulations
- Part 25 - Airworthiness standards:
- .561 = General Aviation
- .562 = emergency landing dynamic conditions
1) WILL THE WHEELCHAIR FLY OUT OF THE PLANE
   - AWU RESULTS = NO

2) WILL THE WHEELCHAIR FALL OVER ON ITS SIDE
   - AWU RESULTS = NO

3) WILL THE TIE-DOWNS RIP AWAY FROM THE FLOOR HOLD
   - AWU RESULTS = NO

4) WILL THE STRAPS TEAR DURING CRASH TEST
   - AWU RESULTS = NO
16 G PULSE TEST

AIRPLANE SEAT CRASH TEST – 16G

All Wheels Up Crash Test – 16 G

MicheleErwin@allwheelsup.org
# PLAN OF ACTION – PHASE 1

<table>
<thead>
<tr>
<th>Projects</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research, Organizing and Sharing of Data</td>
<td>Complete</td>
</tr>
<tr>
<td>Initial Blue Print for first study</td>
<td>Complete</td>
</tr>
<tr>
<td>Fabrication of sled</td>
<td>Complete</td>
</tr>
<tr>
<td>Actual Crash Test at an FAA approved facility</td>
<td>Complete</td>
</tr>
<tr>
<td>Data Analysis (post-test observations, measurements and calculations, raw data, photos and video)</td>
<td>UNDER REVIEW/Writing</td>
</tr>
<tr>
<td>Creation of a Standards Committee for crash Testing</td>
<td>IN DEVELOPMENT</td>
</tr>
<tr>
<td>Wheelchairs for commercial/private flight, just as there are automobiles, trains and buses</td>
<td></td>
</tr>
</tbody>
</table>

MicheleErwin@allwheelsup.org
# PLAN OF ACTION – PHASE 2

<table>
<thead>
<tr>
<th>Projects</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secure Funding</td>
<td>PENDING</td>
</tr>
<tr>
<td>White Paper Studies – Specific Request from the United States Access Board:</td>
<td>PENDING</td>
</tr>
<tr>
<td>Tarmac Turn Time Savings study:</td>
<td>PENDING</td>
</tr>
</tbody>
</table>

MicheleErwin@allwheelsup.org
OTHER TIE-DOWNS WE PLAN TO TEST

- QUBE
- QUANTUM

MicheleErwin@allwheelsup.org
ADDITIONAL TESTING

BEFORE ACCESSIBLE FLIGHT IS POSSIBLE, MORE TESTING IS NECESSARY

- ALL MANUAL AND POWER WHEELCHAIR MODELS
- HEAD RESTS
- SEAT BELTS & RESTRAINTS (NOT LAP BELTS)
- BATTERIES (BATTERIES HAVE BEEN TESTED FOR TRANSIT FLIGHT)
- STRUCTURE OF THE AIRPLANE FLOOR

MicheleErwin@allwheelsup.org
OTHER AREAS OF RESEARCH

- WHITE PAPER STUDIES:
  - FOCUSED ON WC USER PHYSICAL SAFETY
  - WOULD RIDERSHIP INCREASE IF WHEELCHAIR USERS WERE PROVIDED A WHEELCHAIR SPOT ON PLANES

- TARMAC TURN TIME SAVINGS
  - UNIVERSAL DESIGN/SIMULATION OF WC USER USING A WHEELCHAIR SPOT IN-CABIN
ANIMOTION OF PROPOSED SOLUTION

Find this video and share: www.allwheelsup.org
PHASE 3 – STRATEGY MOVING FORWARD

- **FUNDING**
  - GOVERNMENT FUNDING
  - OUTSIDE FUNDING (Foundation, Sponsors, Individuals)

- **PARTNERSHIPS**
  - Airlines, plane manufacturers, wheelchair manufacturers, Universities

MicheleErwin@allwheelsup.org
PARTNERSHIPS

- ADVOCY GROUPS – Open Doors Organization
- AIROSPACE REGULATORS – FAA/CAA/EASA
- CAMI (Civil Aviation Medical institute)
- Universities (University of Buffalo, University of Michigan, Johns Hopkins)
- The United States Access Board
- Q’Straint - Leading Manufacturer of wheelchair restraint systems
- STANDARD ORGANIZATIONS: ANSI (American National Standard) RESNA (Rehabilitating Engineering and Assistive Technology Society of North America, ISO, SAE (Society of Automotive Engineers)}
TAKE AWAY

- WHEELCHAIR ACCESSIBLE AIR TRAVEL WILL HAPPEN
- ALL WHEELS UP IS THE ONLY ORGANIZATION CONDUCTING CRASH TESTING
- WORKING TOGETHER TOWARDS PARTNERSHIPS AND FUNDING

MicheleErwin@allwheelsup.org
SPECIAL THANKS TO:

- Q’STRAINT (USA/UK) – DONATION OF RESTRAINTS AND SURROGATE WHEELCHAIR
- CALSPAN (USA)
- FAA (USA)
- ISTAT FOUNDATION (USA) – PROVIDED FUNDING
- LIGHT THE WORLD (HOLLAND) - PROVIDED FUNDING
- UNICO (USA) – PROVIDED FUNDING

MicheleErwin@allwheelsup.org
Questions?

MicheleErwin@AllWheelsUp.org

www.AllWheelsUp.org
References


Proprietary Document: Permission first must be obtained to reprint portions or the entirety of this document. All Wheels Up representatives can be contacted at (917)414-0897. For citation purposes please use the following: Erwin, M. (2017) Evaluation of Wheelchairs, Wheelchair tiedown occupant restraint systems an occupant protection on transport airplanes.