



AAR-100

Human Factors Newsletter # 02-15

August 31, 2002 – September 13, 2002

Research Report: *Human Factors Associated with the Certification of Airplane Passenger Seats: Seat Belt Adjustment and Release* (R. DeWeese, R.V. Gowdy; FAA Office of Aerospace Medicine, Civil Aerospace Medical Institute, DOT/FAA/AM-02/11, June 2002)

Two separate studies were accomplished to investigate human factors issues related to the use of lap belts. Human performance trials were conducted under two protocols to measure and assess: (1) seat belt tension adjustment during normal flight and emergency landing conditions, and (2) the effects on passenger emergency egress performance related to the lift-latch release angle of typical lap belts.

In the lap belt tension adjustment study, subjects were asked to sit in a typical passenger seat and adjust the lap belts as they normally would for take-off or landing during a commercial flight. Participants were then asked to adjust the lap belts as if they were anticipating an emergency landing. The airplane seat used in this study was instrumented to measure the tension in the lap belt, which was recorded for both the normal and emergency conditions. A total of 1182 subjects participated in this study. An analysis of results indicate that most passengers (90%) tighten the lap belt to a tension less than 7 lbs. during normal flight conditions, and less than 10 lbs. or an anticipated emergency. These data indicate that the tension adjustment of lap belts restraining anthropomorphic test dummies in airplane seat certification tests should not exceed 10 lbs. to be representative of belt tension applied by a typical passenger. The current standard practice for adjusting the belt tension prior to these tests was evaluated and found to be adequate in light of these findings.

The lift-latch release angle experiments were designed to study lap belt restrained human subjects as they released the belt buckle and proceeded to egress from a typical passenger seat. Some foreign regulatory authorities require the release angle to be between 70 degrees and 95 degrees, whereas typical US buckles release between 45 degrees and 60 degrees. Three lap belts with latch release angles of 30 degrees, 60 degrees, and 90 degrees were installed on a triple passenger seat. Subjects were observed and timed as they tried to release the belts and exit from the seat. Each was instructed to perform the exercise quickly. A total of 201 subjects participated in this study. No significant differences in human performance factors related to the lift-latch angle were detected from an analysis of the data.

HOCSR: Human factors researchers from the William J. Hughes Technical Center/ACB-220 traveled to Denver ARTCC (ZDV) where they conducted a post-deployment usability assessment of the Host and Oceanic Computer System Replacement (HOCSR) Phase 3. This phase of the program replaced the Direct Access Storage Devices (DASDs) and introduced a Monitor and Control interface for the replacement disk drives. The researchers conducted structured interviews with Airway Facilities personnel. They also addressed usability issues such as display of system status, navigation, and error reporting. (T. Yuditsky, WJHTC/ACB-220)

Human Factors Research Grant Award (August 2002) – Ohio State University

- **Project Summary**

Visual inspection is an important component of aircraft maintenance. The National Safety Transportation Board (NTSB) has cited the failure to identify visually detectable corrosion, cracks, or inclusions as the probable cause of several aviation accidents. Nondestructive Inspection (NDI) and Testing (NDT) procedures require optimal vision to properly inspect aircraft. NDI/NDT personnel must use their vision with or without various aids to make initial gross judgments regarding defects, as well as when inspecting aircraft using highly sophisticated imaging devices (ultrasonic scans, eddy current imaging, X-ray, etc.). Although Air Transport Association (ATA) Specification 105 recommends a minimum visual performance standard, there is no existing federal policy to ensure that persons performing aircraft maintenance and inspection tasks meet a specific vision requirement. A complete assessment of the visual performance demands placed on NDI/NDT personnel is needed to develop effective vision standards. In this grant research project, a preliminary survey is to be developed and disseminated to NDI/NDT personnel to gather information concerning the type and frequency of NDI/NDT procedures performed at various major aircraft maintenance and manufacturing facilities in the United States. The goal is to determine the essential tasks for these workers and whether they vary appreciably with respect to the type of procedure, location, and/or worker seniority. Subsequently, site visits will be scheduled during which detailed information will be collected regarding the visual nature and complexity of various job duties. These data will be used to help determine recommended vision standards for the inspector positions. If it is determined that the present vision recommendations are not appropriate, a vision screening shall be performed on a representative sample of NDI/NDT personnel to determine the potential impact of incorporating the newly recommended vision standard. Overall, the goal of the proposed research is to determine defensible, job-relevant vision standards required for NDI/NDT personnel to help ensure safe and reliable air travel. (V. Nakagawara, CAMI)

Air Transportation Human Factors: Dr. Bob Helmreich, FAA researcher at the University of Texas, gave the keynote address to the recent FAA Risk Management Workshop at the William J. Hughes Technical Center. His presentation, titled “Managing Threat and Error”, covered the following topics: Line-Oriented Safety Evaluations, Threats to Manage, Error Avoidance, Flight Crew Error Types, Error Response/Outcomes, Undesired Aircraft State, Error Frequencies, Organizational Differences, a Model of Threat and Error Management, and Organizational Interventions. For information regarding this topic, contact <http://www.psy.utexas.edu/HumanFactors>. (E. Edens, AFS-230)

Admiral Loy's Visit to the Transportation Security Laboratory (TSL): Admiral James A. Loy, Acting Under Secretary for Transportation Security, and Chuck Burke, Deputy of the Chief Technology Office of the Transportation Security Administration (TSA), visited TSL on September 3rd. Major program leads provided briefings on key technology areas (certification, bulk and trace explosives detection, aircraft hardening, and human factors programs) and vector leads (checked bags, checkpoint, access control, cargo, and secure flow.) Anne Harlan, the Technical Center Director, and members of her staff, Ron Esposito, John Wiley, and Bruce Singer, as well as and Congressman Frank Lobiando also attended the briefings. (T. Kraus, AAR-1)

Human Performance: A CAMI researcher traveled to Memphis, TN to assist the National Transportation Safety Board's Human Performance Group with investigation of the crash of FedEx Flight 1478 in Tallahassee, FL. The performance group attended the FedEx Boeing 727 Second Officer's Human Factors/CRM courses that included topics on crew resource management, situation awareness, CFIT risk assessment, decision-making, sleep and fatigue for back-side-of-the-clock operations, and flight deck distractions. Interviews were held with key FedEx flight training instructors and management, and a visit was made to the Aircrew Operations Center for familiarization with sleeping and flight preparations facilities. Follow-on investigation activities for the performance group are pending direction from other NTSB groups. (T. Nesthus, CAMI)

Employee Selection: A CAMI researcher participated in an Aircraft Certification (AIR) workgroup September 4-5, 2002 at the Team Technology Center in Washington, DC. The purpose of the workgroup is to define a new supervisor selection process for AIR. Included in the discussions was a tutorial on the Uniform Guidelines on Employee Selection Procedures (29 CFR 1607) and an overview of the relevant professional standards and principles for the development and use of employee selection procedures. At the conclusion of the meeting, the workgroup recommended that AIR conduct a selection-oriented job/task analysis of the target 75 supervisory positions in AIR as the first step in developing a new selection system. (D. Broach, CAMI)

More information on human factors research can be found at the FAA Human Factors (AAR-100) web site: <http://www.hf.faa.gov>

Mark D. Rodgers
FAA (AAR-100)



September 16-18, 2002 – Conference on Aerospace Materials, Processes and Environmental Technology, Huntsville, AL <http://ampet.msfc.nasa.gov/>

September 17-20, 2002 – International Air Cargo Forum, Hong Kong <http://www.tiaca.org/>

September 29- October 4, 2002 – Human Factors and Ergonomics Society 46th Annual Meeting, Baltimore Waterfront Marriott Hotel, Baltimore, MD <http://www.hfes.org/>

September 30 – October 1, 2002- FAA R,E&D Advisory Committee (REDAC) Meeting, Holiday Inn Westpark, Rosslyn, VA http://research.faa.gov/aar/redac_meetings.asp

October 1-3, 2002 – SAE S-7 Flight Deck and Handling Quality Standards for Transport Aircraft, Prague, Czech Republic <mailto:elizd@sae.org>

October 7-11, 2002 – SAE S-18 Airplane Safety Assessment Committee, Reno, NV <mailto:lemon@sae.org>

October 8-9, 2002 – SAE S-9 Cabin Safety Provisions Committee, Reno, NV <mailto:elizd@sae.org>

October 9-10, 2002 – SAE AE-8B1 Protective Devices Committee, Tampa, FL <mailto:elizd@sae.org>

October 10-19, 2002 – The World Space Conference, Houston, TX www.aiaa.org/wsc2002

October 14-16, 2002 – Third LOSA Week, Dubai, United Arab Emirates <mailto:dmaurino@icao.int>

October 14-16, 2002 – SAE A-10 Aircraft Oxygen Committee, Dayton, OH <mailto:elizd@sae.org>

October 21-24, 2002 – 2nd Annual FAA Centers of Excellence Meeting, Wichita, KS <http://www.niar.twsu.edu/faacoe>

October 23-25, 2002 – International Conference on Human-Computer Interaction in Aeronautics, Massachusetts Institute of Technology, Cambridge, MA <http://www-eurisco.onecert.fr/events/hci-aero2002.html/>

October 23-25, 2002 – SAE AC-9 Aircraft Environmental Systems Committee, Albuquerque, NM <mailto:elizd@sae.org>

October 27-31, 2002 – 21st Digital Avionics Systems Conference, Hyatt Regency Hotel, Irvine, CA <http://www.dasconline.org/>

November 4-7, 2002 – 55th Annual Air Safety Seminar “Keeping Safety a Worldwide Priority”, a Joint Meeting of the Flight Safety Foundation, International Federation of Airworthiness, and International Air Transport Association, Citywest Hotel, Dublin, Ireland
wahdan@flightsafety.org.

November 5-7, 2002 – SAE World Aviation Congress and Display, Sheraton Crescent Hotel, Phoenix, AZ <http://www.sae.org/calendar/aeromtgs.htm>

November 21-24, 2002 – 43rd Annual Meeting of the Psychonomic Society, Hyatt and Westin Hotels, Kansas City, MO <mailto:psp@psychonomic.org>

December 10-14, 2002 – Neural Information Processing Systems 2002, Vancouver, Canada <http://www.nips.cc/>

January 13-17, 2003 – SAE S-18 Airplane Safety Assessment Committee, Salt Lake City, UT <mailto:lemon@sae.org>

January 14-16, 2003 – SAE Aircraft Seat Committee, San Diego, CA <mailto:elizd@sae.org>

January 27-31, 2003 – SAE G-10 Aerospace Behavioral Engineering Technology Committee, Melbourne, FL <mailto:lemon@sae.org>

February 4-6, 2003 – SAE North American Aviation Safety Conference, Atlanta, GA <http://www.sae.org/calendar/aeromtgs.htm>

March 3-6, 2003 – SAE 2003 World Congress, Cobo Center, Detroit, MI <http://www.sae.org/congress/index.htm>

March 17-19, 2003 – 15th Annual European Aviation Safety Seminar presented by the Flight Safety Foundation and European Regions Airlines Association, Hotel Intercontinental Geneva, Geneva, Switzerland <http://www.flightsafety.org/seminars.html>

March 24-28, 2003 – SAE Airplane Safety Assessment Committee, Lisbon, Portugal <mailto:lemon@sae.org>

April 2-8, 2003 – Sun ‘n Fun EAA Fly In, Lakeland, FL <http://www.sun-n-fun.org>

April 5-10, 2003 – CHI 2003 Conference on Human Factors in Computing Systems, Broward Convention Center, Ft. Lauderdale, FL <http://www.chi2003.org/>

April 7-27, 2003 – Aviation World’s Fair, Newport News/Williamsburg, VA <http://www.worlds-fair.com/> or <http://aviation-worlds-fair.com/>

April 9-11, 2003 – SAE Aircraft Environmental Systems Committee, Dayton, OH <mailto:elizd@sae.org>

April 22-23, 2003 – 48th Annual Corporate Aviation Safety Seminar, presented by the Flight Safety Foundation and the National Business Aviation Association, Westin Diplomat Resort and Spa, Hollywood, FL <http://www.flightsafety.org/seminars.html>

April 27-30, 2003 – Symposium on Interactive 3D Graphics, Monterey Marriott, Monterey, CA
<mailto:Pausch@cmu.edu>

May 3-10, 2003 – International Conference on Software Engineering, Hilton Portland, Portland, OR
<mailto:ldillon@cse.msu.edu>

May 4-9, 2003 – 74th Annual Scientific Meeting of the Aerospace Medical Association, Convention Center, San Antonio, TX
<http://www.asma.org/>

May 12-17, 2003 - 2003 IEEE International Conference on Robotics and Automation, The Grand Hotel, Taipei, Taiwan
<http://www.icra2003.org/>

June, 2003 – SAE Digital Human Modeling for Design and Engineering, Location TDB
<http://www/sae.org/calendar/aeromtgs.htm>

June 15-22, 2003 – 45th Paris Air Show le bourget
<http://www.paris-air-show.com/index3.htm>

June 22-27, 2003 – 10th International Conference on Human-Computer Interaction, Institute of Computer Science Foundation, Research and Technology, Science and Technology Park of Crete, Heraklion, Crete, Greece
<mailto:info@hcie2003.gr>

June 24-26, 2003 – Human Systems Integration Symposium “Enhancing Human Performance in Naval and Joint Environments”, Sheraton Premier Hotel, Tyson’s Corner, VA
<http://www.navalengineers.org/>

July 7-10, 2003 – SAE 33rd International Conference on Environmental Systems, The Westin Bayshore Resort and Marina, Vancouver, Canada
<http://www/sae.org/calendar/aeromtgs.htm>

July 14-17, 2003 – AIAA/ICAS International Air & Space Symposium and Exposition, Dayton Convention Center, Dayton, OH
<http://www.flight100.org/>

July 29-August 4, 2003 – 51st Annual AirVenture, Oshkosh, WI
<http://airventure.org/>

August 7-10, 2003 – 111th Convention of the American Psychological Association, Toronto, Ontario, Canada
<http://www.apa.org/convention>

September 9-11, 2003 – SAE Aerospace Congress and Exhibition, Palais des Congrès, Montreal, Quebec, Canada
<http://www/sae.org/calendar/aeromtgs.htm>

October 13-17, 2003 – Human Factors and Ergonomics Society 47th Annual Meeting, Adams Mark Denver Hotel, Denver, CO
<http://www.hfes.org/>

April, 2004 – SAE General Aviation Technology Conference and Exhibition, Century II Convention Center, Wichita, KS
<http://www/sae.org/calendar/aeromtgs.htm>

July 27-August 2, 2004 – 52nd Annual AirVenture, Oshkosh, WI
<http://airventure.org/>

May 2-7, 2004 – 75th Annual Scientific Meeting of the Aerospace Medical Association, Egan Convention Center, Anchorage, AK
<http://www.asma.org/>

July 28 – August 1, 2004 – 112th Convention of the American Psychological Association.
Honolulu, Hawaii <http://www.apa.org/convention>

September 20-24, 2004 – Human Factors and Ergonomics Society 48th Annual Meeting,
Sheraton New Orleans Hotel, New Orleans, LA <http://www.hfes.org/>

Note: Calendar events in Italics are new since the last Newsletter



Comments or questions regarding this newsletter?
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