Introduction

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  – Human Protection and Survival Research Laboratory

• Rick DeWeese, Section Manager
  – Engineering Sciences

• David Weed – Primary Investigator
  – Team Coordinator, Cabin Safety Research Team

• Melissa Beben – Co-Investigator
  – Human Factors Research Specialist
Background

• FAA Reauthorization Act of 2018
  – Section 337 – Aircraft Cabin Evacuation Procedures
  – Section 577 – Minimum Dimensions for Passenger Seats
  – CAMI to conduct study to provide data for requirements
More Background

• Definitions and Disclaimer
  – Seat Width
  – Seat Pitch
  – UK CAA AN64:
    • “Dimension A”
    • “Dimension B”
    • “Dimension C”
Study Design

• Research Questions:
  - 3 topics of interest:
    • Anthropometry of current population
    • Body types able to utilize seats
    • Effect of seat spacing/dimensions on egress
Study Description

• Variables tested:
  – Seat Pitch\textsuperscript{1,2}
    • 28 inches, 32 inches (control), 34 inches
    • Narrowest flying, Average flying, Average “Economy Plus”
  – Seat Width
    • 18 inches, 16 inches
Study Description

• Methodology
  – Motivation
    • First 70% out each evacuation received 25% bonus.*
    • Flight attendants shouting evacuation commands
  – Anthropometrics collected
    • Height, Weight, Girth, Shoulder Width, Hip Breadth, Buttock-to-knee, Knee-to-floor
  – Experimental seating mock-up
Study Description

• Methodology cont.
  – Comparative study
    • Effect of just seat pitch and width on evacuation times
  – Limited Variables/Safety of the subjects
    • No slides, baggage, children, pets, disabled persons, etc.
  – Evacuations
    • 12 days of testing, 4 evacuations per testing day
    • Counterbalanced run order
Study Description

• Methodology Conc.
  – All groups experienced changes in Seat Width.
  – 2 distinct Seat Pitch comparison groups
    • A: (Average vs. Narrow) Test Days 1-8
    • B: (Average vs. Econ. Plus) Test Days 9-12
Preliminary Data

• Number of Subjects
  – Anthropometric data collected from 775 participants
    • 368 (47.5%) Male / 407 (52.5%) Female
    • Ages ranged from 18-64 (Avg. 35.7 years old)
      – 18-30 (293), 31-40 (213), 41-50 (160), 51-60 (105), 60+ (4)
  – Averaged comparison of study evacuees (719) to general population data*
    • Height (+2.57cm), Weight (+6.07kg), Girth (+2.51cm)
Preliminary Data

- Number of Subject cont.
  - Evacuation data collected from 719 participants
    - 335 (46.6%) Male / 384 (53.4%) Female

- Number of incidents
  - 14 total IRB reportable incidents
    - 9 injuries requiring evaluation/treatment
      - 8 treated on-site/minor
      - 1 required medical transport
Preliminary Data

• General Trends:
  – Groups mostly adhered to previous observations
    • First evacuation generally slowest, Subsequent evacuations tended to speed up
    • Lots of variance based on individuals
  – “Advanced Egress Techniques”
    • Emergent behaviors: Monkey see, monkey do.
    • Climbing, Seatback Walking, “Swimming”
Research Plan

• Data Breakdown
  – Paper Data
    • Demographics, Anthropometry, Self-reports
  – Video Data
    • 48 Group Evacuation Times
    • ~2832 Individual Egress Times
Current Status

• Planning Phase: Complete
• Data Collection: Complete
• Data Analysis: Ongoing
  – ~600 hours of video data (4tb)
  – 32.4kg (71.4lbs) of paper data
• Report: Pending, est. 4Q20
Example Pictures
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• 47 FTE’s
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• CAMI Clinic
• OKC ARFF
• 6 FA’s
• MMAC Security
• Many More
Conclusion

• Questions?