FAA Airport Technology R&D Branch Safety Program Update

Presented to: 2017 NEC AAAE Airports Conference

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Presentation Outline

- **Introduction**
- **Brief FAA Technical Center Overview**
- **Current Safety R&D Projects**

FAA Technical Center

- 3,000 Fed/Contractor
- 1,000 non-FAA Tenants
- Over 5,000 Acres

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FAA Technical Center

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Airport Safety R&D Section

- Visual Guidance
  - Lights, Signs, Paint/Markings, LEDs, Other Visual Cues, Incursions
- ARFF
  - ARFF Vehicles, Firefighting Systems, Agents, Tools, Composites
- Operation of New Large Aircraft (NLA)
  - NLA Firefighting Strategies & Agent Methodology, Other Future NLA Issues
- UAS Integration at Airports and Detection
  - Airport Applications and Detection
- Aircraft Braking Friction
  - Aircraft braking performance on contaminated surfaces
- Runway Surface Operations & Technology
  - Friction, CFMEs, Winter Ops, TALPA, Deicing, EMAS
- Airport Planning & Design
  - Trapezoidal Grooves, FOD Detection, Taxiway Deviation Study, Noise
- Wildlife Mitigation
  - Avian Radar, Wildlife Strike Database, Wildlife Management

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Federal Aviation Administration Airport Technology R&D Program

- **Research conducted at the FAA William J. Hughes Technical Center, Atlantic City, NJ, USA.**
- **FAA Office of Airport Safety and Standards**
  - Airport Engineering Division (AAS-100)
  - Airport Safety and Operations Division (AAS-300)
- **FAA Office of Planning and Programming**
  - Planning and Environmental Division (APP-400)
- **Provide support for development of FAA pavement and safety standards (Advisory Circulars).**

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Visual Guidance

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Evaluation of In-Pavement Light Fixtures

- In-Pavement Light Fixture Assemblies Utilize a Circle of Six (6) Bolts and Two-Part Locking Washers to Secure The Light Fixtures to the Light Bases or Light Base Extensions.
- Incidents Have Occurred at Certain Airports Where In-Pavement Light Fixture Bolted Connections Have Failed Resulting in Light Fixtures Completely Separating from the Light Bases or Light Base Extensions.
- Possible Root Causes of the Bolted Connection Failures Include Inadequate Bolt Clamping Forces for Resisting Impact Forces Generated by Modern Commercial Aircraft and Improper Installation/Maintenance of Bolted Connections.

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Light Assembly Bolt Clamping Force Requirements and Limitations

- FAA Criteria Requires Combined Clamping Force of Bolt Circles be Capable of Resisting a 3,000 Pound Horizontal Shear Force, Simulating a Braking Aircraft Tire. FAA Currently Assessing Whether the 3,000 Pound Horizontal Shear Force Criteria is Adequate Based on Current Generation Transport Category Aircraft Developing Greatest Wheel Loading.
- Bolt Clamping Forces Must Also Be Adequate to Prevent Significant Fluctuation in Bolt Tension When Subjected to Aircraft Tire Loading.
- Significant Fluctuation in Bolt Tension Can Result in Fatigue Failure of the Bolts.

Light Assembly Bolt Clamping Force Requirements and Limitations (Continued)

- Light Fixtures Use Six (6) 3/8 Inch Diameter Bolts (Stainless or Coated Carbon Steel) Typically Installed into Threaded Holes in the Light Bases or Light Base Extensions, with Two-Part Lock Washers, and a Maximum of 3 Spacer Rings.
- Alternatively, Adapter Rings are Installed Between the Light Fixtures and Light Bases or Light Base Extensions.
- Clamping Forces are Limited Based on Strength of Overall Light Fixture Assemblies including Light Fixtures, Adapter Rings (If Applicable), Internal Threads in Light Base or Base Extension Flanges, Threaded Inserts (If Applicable), Spacer Rings, Bolts, and Two-Part Lock Washers.

Torque-Tension Relationships of Bolted Connections

- Developing Torque-Tension Relationships for Various Bolt and Tapped Hole Combinations (Including Threaded Inserts) for Light Fixture Installations is being Accomplished Utilizing a Skidmore-Wilhelm Bolt Tension Calibrator.
- Testing of Each Combination of Bolt and Light Base or Light Base Extension, and Threaded Inserts with Lubricants Applied to Uncoated Bolts Is Being Accomplished to Determine Accurate Torque-Tension Relationship and Resulting Friction Factor (K).

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In-Pavement Light Fixture Assembly Materials

- Bolts are either SAE J429 Grade 2 (Coated) or Stainless Steel Alloy 18-8. Testing will also Include SAE J429 Grade 5 (Coated) and ASTM F593P Grade 410 (Black Oxide Coated) Bolts.
- Two Piece Lock Washers are Required by the FAA to be Stainless Steel.
- Light Bases and Light Base Extensions are made of Galvanized Mild Carbon Steel (ASTM A36) and Stainless Steel (Type 304).
- Light Fixture Housings are Made of Aluminum Alloys Specified by the Manufacturers that Satisfy Requirements in FAA AC 150/5345-46. Testing is Being Conducted with Light Fixture Housings of Varying Strengths.
- Adapter Rings, Utilized in Some Designs for Connecting Light Fixture Housings with Light Bases or Light Base Extensions, are made of Ductile Cast Iron.

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Strategy for Evaluation

- Project Phase I: Laboratory Testing

  - Determine Strength Limitations of Light Fixture Assemblies for Resisting Increased Bolt Clamping Forces.

  - Evaluate Performance of Light Fixture Assemblies using Bolts Prescribed in FAA EB 83 and Bolts Having Greater Strengths and Larger Diameters.

  - Evaluate Light Fixtures over a Range of Commercially Available Strengths.

  - Conduct Horizontal Shear Force, Compressive Load, and Vibration Testing Including Assessing Influence of Spacer Rings.

  - Evaluate Corrosive Properties of Coated Carbon Steel Bolts and Black Oxide Coated Stainless Steel Bolts.

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Strategy for Evaluation (Continued)

- Project Phase II: Field Testing

  - Instrument and Install In-Pavement Light Fixtures in the FAA National Airport Pavement Test Facility (NAPTF) and on ACY Runway and/or Taxiway.

  - Evaluate Performance of Installed Light Fixture Assemblies under Controlled Aircraft Wheel Loading/Tire Pressure Conditions.

  - Controlled Wheel Loading with Test Vehicle in the FAA NAPTF and Instrumented FAA Aircraft (B727 and Smaller Size Aircraft) at ACY.

  - In-Pavement Light Fixtures will be Installed and Evaluated in Both Asphalt and Portland Cement Concrete (PCC) Pavement.

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End Product

- Identify Torque-Tension Relationships of Various Bolt-Light Base Flange Tapped Hole Combinations.
- Identify Limiting Bolt Clamping Forces that Can Be Safely Applied to Light Fixture Assemblies.
- Evaluate Performances of Various Light Fixture Assemblies based on both Laboratory and Field Testing.
- Identify Changes for Incorporation into FAA Engineering Brief No. 83 “In-Pavement Light Fixture Bolts” Regarding Selection, Installation, and Maintenance of Bolts.

Project Status

- Laboratory Testing is being Conducted under an FAA Contract with Intertek of Cortland, NY (FAA Accepted Third Party Certification Body in Accordance with FAA AC 150/5345-53).
- FAA Laboratory Testing Scheduled for Completion in June, 2017.
- FAA Contract for Installation and Testing of Installed In-Pavement Light Fixtures in the NAPTF is Planned for Award in Spring 2017.

Aircraft Rescue and Fire Fighting

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New Fire Fighting Systems for Class 4 & 5 ARFF Vehicles

Objectives

- Research new fire fighting systems and technologies which can be used on Class 4 and 5 ARFF vehicles as the primary discharge for extinguishing agent.
  - **CAFS**
  - **High Pressure**
- International ARFF community moving towards these technologies however no performance based standards exist.
- Conduct live fire testing and analysis of these technologies extinguishing fuel fires and compare the results with current vehicles.
- Develop performance based standards for OEM's to build to and airports to specify.

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New Fire Fighting Systems for Class 4 & 5 ARFF Vehicles

Vehicle Facts

- First Class 4/5 ARFF vehicle utilizing CAFS as a primary discharge in US.
  - HRET and ASPN
  - High flow, multi-position bumper turret
  - Handlines
- Capable of discharging in CAFS or standard modes to all discharges.
- Capable of varying air injection to change expansion ratio of foam.
- Capable of varying foam discharge rates.
- Electronic foam proportioning with advanced flow monitoring for R&D evaluations.

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New Fire Fighting Systems for Class 4 & 5 ARFF Vehicles

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New Fire Fighting Systems for Class 4 & 5 ARFF Vehicles

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Thermal Imaging and FLIR

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Thermal Imaging and FLIR

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Thermal Imaging and FLIR

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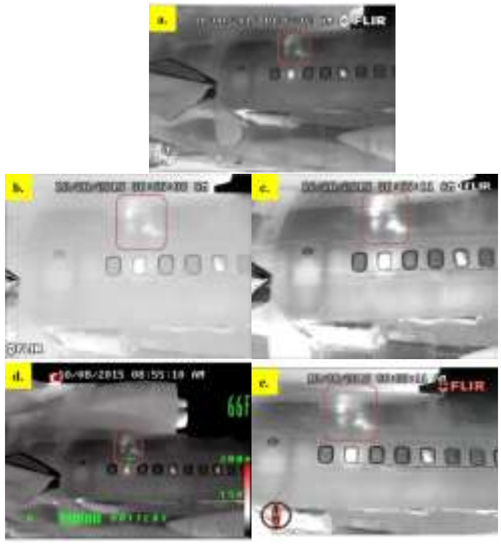
Thermal Imaging and FLIR



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Airport Applications for UAS

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Airport Applications for UAS

Airport Applications – Several vendors have suggested the use of UAS for meaningful applications on the airport surface:

•Wildlife Mitigation – Ability to use UAS to deter or monitor wildlife activity.

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Airport Applications for UAS

Pavement/Airport Surface Inspections: Ability to use UAS to conduct quick inspections of airport pavement and airport surface infrastructure, reducing the need for vehicles on the airfield.

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Airport Applications for UAS

Aircraft Rescue and Firefighting: Investigating the use of UAS during ARFF response for immediate size-up and/or live imagery for better situational awareness.

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Airport Applications for UAS

Aircraft Rescue and Firefighting: Investigating the use of UAS during ARFF response for immediate size-up and/or live imagery for better situation awareness.

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Airport Applications for UAS

•**Airport Security:** Ability to use UAS to conduct remote monitoring of airport perimeter fences, patrolling remote areas, closed ramps, etc.

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Airport Applications for UAS

Related Topic: Use of Autonomous Ground Vehicles on Airfields for Security and Safety Applications

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UAS Detection Technology Assessment

UAS Detection Technology Assessment

- **Collaborating with the FAA's UAS Integration Office to initiate "a pilot program for airspace hazard mitigation at airports and other critical infrastructure using unmanned aircraft detection systems."**
  - *FAA Extension, Safety and Security Act of 2016, PF 114-190, Sec 2206, enacted July 15, 2016*

UAS Detection Technology Assessment

- **Various types of detection systems are being assessed to determine basic detection functions and to verify that these systems did not interfere with airport and aircraft communication, navigation, and surveillance systems.**
- **Detection systems being assessed include :**
  - Radio Frequency (RF)
  - Radar
  - Electro Optical/Infrared (EO/IR)
- **Detection systems were deployed and assessed at four civil airports:**
  - Atlantic City International Airport (January – February 2016)
  - John F. Kennedy International Airport (May 2016)
  - Denver International Airport (November 2016)
  - Dallas-Ft. Worth International Airport (April 2017)

Aircraft Braking Friction

BASIS OF AIRCRAFT BRAKING RESEARCH

- **Project Initiated in Response to NTSB Safety Recommendation**
  - NTSB Issued Safety Recommendations to the FAA, Dated Oct. 16, 2007, in Response to the SWA Airplane Accident
  - The Following Recommendation is Included in the NTSB Document:

    "Demonstrate the technical and operational feasibility of outfitting transport-category airplanes with equipment and procedures required to routinely calculate, record, and convey the airplane braking ability required and/or available to slow or stop the airplane during the landing roll. If feasible, require operators of transport-category airplanes to incorporate use of such equipment and related procedures into their operations. (A-07-64)"

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Aircraft Braking Friction Challenges

- **Anti-Skid Braking Systems of Civil Transport Aircraft Are Not Optimized to Interact with Contaminants Offering Low Maximum Mu's, anticipated during landings on Winter Weather Contaminants.**
- **Maximum Mu's Offered by the Winter Weather Contaminants of Snow, Slush, and Ice are Not Known.**
- **Performance of Anti-Skid Braking Systems on Winter Weather Contaminants Is Also Not Known.**

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Aircraft Braking Friction Project Objectives

- Enable Civil Transport Aircraft to Quantify Wheel Braking During Landing Flight Phase Operations on Winter Weather Contaminants.
- Civil Transport Aircraft Do Not Measure Wheel Braking Directly But Do Measure Parameters From Which Wheel Braking Can be Calculated.
- FAA Test Aircraft (B727-25C) is Equipped to Measure Wheel Braking Coefficients and Other Parameters Measured by Civil Transport Aircraft.
- An Algorithm Can Be Developed Relating Braking Coefficients and Other Measured Aircraft Parameters During a Variety of Winter Weather Landing Flight Phase Tests.
- Methodology Can be Applied to Civil Transport Aircraft Whereby Each Can Have Its Own Algorithm Developed For Calculating Braking Coefficients.
- Braking Coefficients Can be Displayed in Real Time and Transmitted to Trailing Aircraft Upon Completion of Landings.

Variables Measured by Civil Transport Aircraft Indicating Braking Experienced

- Aircraft Ground Speed (Derived from Main Landing Gear Rotational Speeds)
- Wheel Rotational Speeds.
- Brake Pressures.
- Electrical Current to Anti-Skid Brake System Control Valves.
- Deceleration of Aircraft (Derived from Main Landing Gear Rotational Speeds).

FAA B727-25C Aircraft Braking Friction Testing Conducted in 2017

- Testing Conducted on ACY Runway 4-22 on Natural Snow, Approx. 1 inch in Depth.
- Testing Conducted on Two Separate Days on FAA Ramp with Manufactured Snow Test Strips, Approx. 2 inches in Depth.

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Testing Details

- Testing Conducted Exclusively with Main Landing Gear (MLG) Braking on Both Natural Snow and Manufactured Snow.
- Braking Applied with a Combination of Anti-Skid Brake System to all Four MLG Wheels and Programmable Brake System to In-Board MLG Wheels.
- Natural Snow on ACY Runway 4-22 Approximately 1 Inch in Depth.
- Manufactured Snow Test Strips were 2 inches Deep, 8 ft. Wide, 400 ft. Long, and Spaced 18 ft.- 8 in. Center to Center.
- Manufactured Snow Produced by Ice Blocks Fed into an Ice Crusher/Slinger Machine.

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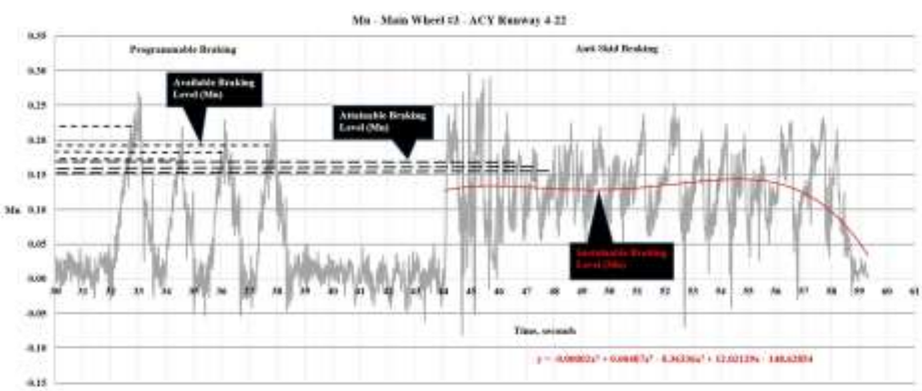
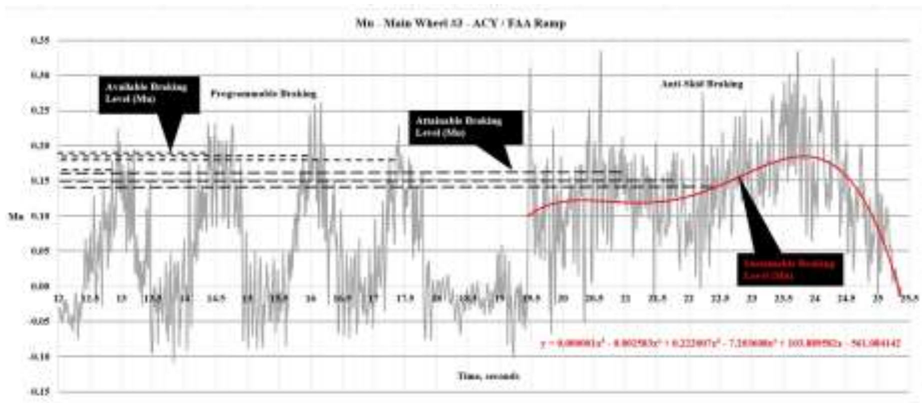
Test Details (Continued)

- Testing on ACY Runway 4-22 and FAA Ramp Conducted at 50 Knots with Both Anti-Skid Braking and Programmable Braking.
- Testing on FAA Ramp with Manufactured Snow Included the Team Eagle Braking Availability Tester (BAT) Vehicle (Shown Below).

Testing During Natural Snow Event on ACY Runway 4/22



Testing with Manufactured Snow on FAA Ramp



Engineered Material Arresting System (EMAS)

11th EMAS Aircraft Arrestment

Oct 27, 2017 @ LGA – B737 landing on Rwy 22

"Vice Presidential candidate Mike Pence on board"

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FAA - EMAS Fact Sheet

https://www.faa.gov/news/fact_sheets/news_story.cfm?newsId=13754

- **As of October 2014, there are <u>2 manufacturers of EMAS products that meet the FAA requirements</u> of advisory circular 150-5220-22B, "Engineered Materials Arresting Systems for Aircraft Overruns." The FAA must review and approve each EMAS installation.**

- **EMASMAX® - Zodiac Arresting Systems America (ZASA) – Engineered Arresting Systems Corporation (ESCO)**
  - 106 runway ends at 63 airports
  - 11 incidents where EMAS has safely stopped 11 overrunning aircraft

- **Runway Safe EMAS – Runway Safe**
  - 4 runway ends at 1 airport
  - Not Eligible for AIP Grants - Currently does not meet Buy American Act

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EMAS NEWS

December 2016

ESCO and Runway Safe announced that they reached an agreement to end the lawsuit between them.

The terms were not announced and will remain confidential. Trial in the action had been scheduled to begin on November 7, 2016, in federal court in Austin, Texas, but was adjourned in light of the parties' agreement. The parties dismissed all claims in the case against each other without any admission of liability by either party. Both ESCO and Runway Safe expressed their satisfaction with the agreed resolution.

Contacts:

Runway Safe: **Marc Klein** - Marc.klein@runwaysafe.com 630.816.6495

Zodiac Arresting Systems America (ESCO): **Kevin Quan** - Kevin.quan@zodiacaerospace.com 856.241.8620 Ext 4452

See more at:
http://www.zodiacaerospace.com/en/filiales/zodiac-arresting-systems-america#sthash.Mq66GQr4.dpuf

http://runwaysafe.com/media/press/2016/emas-litigation-settlement/

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FY17 R&D Activities

- **New report Spring/Summer 2017**
  - Development of EMAS from 1994 to 2003. Report highlights collaborative research efforts of the FAA, ESCO, and PANY&NJ. Lead to first Advisory Circular on EMAS.
- **EMAS Software Application, ARRESTOR**
  - FAA developed software (1995) will be made available for public download. Used for computing aircraft wheel rut depths in soft ground.
- **FAA R&D reviewing NEW EMAS manufacturer designs**
- **Two (2) additional manufacturers developing EMAS**

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Airport Technology Research Taxiway

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Airport Technology Research Taxiway

- **Memorandum of Agreement between the FAA and Delaware River Bay Authority (DRBA)**
  - November 15, 2010 through September 30, 2030.
  - Grants the FAA the “right to construct, operate, and maintain research infrastructure” at the Cape May County Airport (WWD).

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Airport Technology Research Taxiway

- **The objectives of the project are to:**
  - Rehabilitate former Taxiway C to develop a state of the art research test bed.
  - Allow for other airport safety and pavement research needs to be conducted.
  - Be utilized as a taxiway by the airport when the FAA is not actively conducting research on the test bed.

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Research Taxiway Update

- **Paving completed December 2016**
- **Lighting infrastructure completed February 2017**
- **System commissioning February 24, 2017**
- **Scheduled turnover to Government Spring 2017**

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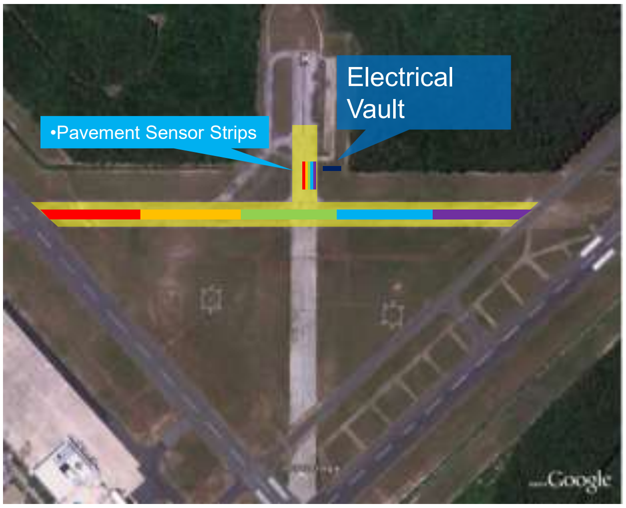
Airport Technology Research Taxiway – Paving Layout



Legend

PG 76-22 Marshal P-410

PG 64-22 Marshall P-401

PG 64-22 Superpave P-401

WMA (PG 76-22) P-401

Stone Matrix Asphalt

NJ State Mix

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Airport Technology Research Taxiway – Aerial View

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Airport Technology Research Taxiway – Aerial View

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Airport Technology Research Taxiway

- **Primary use of the test bed will be for evaluating various airfield lighting systems.**
  - Full array of standard runway and taxiway lighting
  - Prototype lighting systems
  - Electrical Infrastructure
  - Test bed will be reconfigurable – multiple duct banks, hand holes, pull boxes and conduit

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Airport Technology Research Taxiway – Airport Safety Research Plans

- **Test Bed for Visual Guidance Research**
  - LED and other lighting innovations
  - Signs and Paint Markings
  - In-Pavement Light Fixtures
- **Runway Surface Safety Research**
  - Friction:
    - Evaluation of various pavement surfaces over time
    - Testing of various devices
- **Support Electrical Infrastructure Research Team (EIRT)**
  - Vault Centric LED Lighting Circuit Architecture
  - Fixture Centric Architecture Research
    - Currently being conducted at Purdue University
    - Bring Research here for more access
- **UAS - Currently an FAA approved test site**

Evaluation and Monitoring of FOD Detection Systems

Evaluation and Monitoring of FOD Detection Systems

- **Senate Report 113-182 to the Transportation and Housing and Urban Development, and related Agencies FY 2015 Appropriations Bill:**
  - *"The committee recommends the FAA study whether it is appropriate to expand the installation of foreign object debris detection technology at hub airports in order to increase safety."*
- **Analysis of automated vs. traditional FOD detection methods at General Edward Lawrence Logan International Airport (BOS), located in Boston, MA.**
- **Expanding the research effort to domestic and international airports with FOD detection systems**

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Aircraft Noise and Annoyance

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Aircraft Noise and Annoyance

- Update scientific evidence of the relationship between aircraft noise exposure and its effects on communities around U.S. airports
  - Current policy is based on data from the 60's and 70's with data from all modes of transportation.
  - More air traffic overall, but quieter

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Aircraft Noise and Annoyance

- **Why:**
  - Even though the number of people in the U.S. exposed to significant aircraft noise since 1975 has dropped by 95 percent, complaints, opposition and challenges regarding aviation noise have not.
- **How it's done today**:
  - Since the late 1970s, DNL 65 dB has been used as the level of significance for aviation noise. The current landscape leads us to believe that the DNL 65 dB may no longer be appropriate.
- **What is new in the approach:**
  - The research and surveys being done will allow for the re-evaluation of the level of significance for aviation noise. It will allow for new data to gain a better understanding on how aviation noise is perceived by communities around airports.

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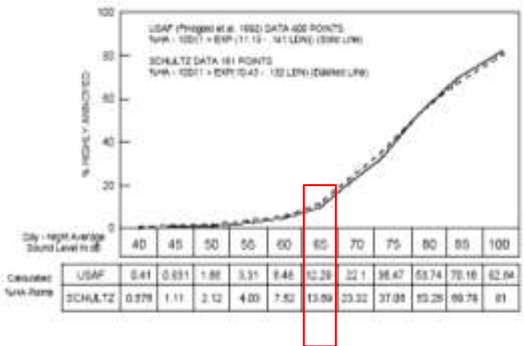
Goal:



- **Core Question: Has there been a significant change in public perception for noise?**

To create a new dose-response curve based on updated data collected by a national survey in a scientific, systematic way to represent the wide breadth of airports in the U.S

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Data Collection Methods

- **Mail Survey began October 13, 2015**
  - 6 Waves
    - Each wave lasts 6 weeks, spaced 2 months apart
    - Surveys taper off within first couple weeks.
    - No end date for each wave – seasonal measures
    - 4,676 completes (47% goal)
    - Final wave will be sent Sept 27, 2016
- **Phone Survey**
  - Follow-up to mail to explore contributing factors to annoyance levels
  - 850 completes (39% goal)

Analysis Complete March 2017

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Runway Incursion Mitigation (RIM) Program

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Runway Incursion Mitigation (RIM) Program

- 15 year improvement program to identify airport risk factors that might contribute to a runway incursion and develop strategies to help airport sponsors mitigate those risks.

- **Announced June 3, 2015**
- **Follow-up to the Runway Safety Area Program**

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RIM Inventory Cycle

- Annual data analysis for RIM point inclusion
- Validated by FAA field personnel
- Added to public RIM Inventory

http://www.faa.gov/airports/special_programs/rim/media/RIM-Inventory-2015-12-15.pdf

- These locations may receive priority AIP funding for capitol improvements
- Mitigations are tracked
- Currently 117 RIM Locations at 75 airports

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Trapezoidal Grooving Research

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Trapezoidal Grooving Research

- Evaluate Performance of Trapezoidal-Shaped Runway Grooving for Maintaining Skid-Resistance and to Prevent Hydroplaning of Aircraft Tires During Wet Weather Condition.

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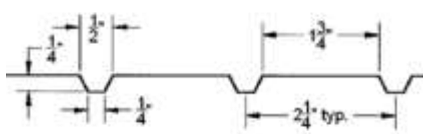
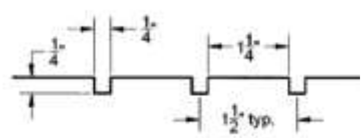
Testing Methodology

- Runway Grooving Test Bed to be Constructed on ACY Runway 4-22
  - Test Bed will be 1,500 Feet in Length
  - Trapezoidal and FAA Standard Grooved Sections (Full and Half Depth)
  - Non-Grooved Section
  - Wet (Soaked) Runway Condition

(Steady Rainfall or a Fire Truck Spray with Spray Nozzle)





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Testing Methodology (Continued)

- Instrumented B727 Aircraft Used for Full-Scale Performance Testing on Wet (Soaked) Runway Grooving Test Bed
  - Aircraft Traveling at 100 Knots Into Test Bed
  - Maximum Pilot Pedal Braking
    - Maximum Mu's for Each 300-ft Section
  - Programmable Braking
    - Mu-Slip Characteristics for Each 300-ft Section

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Objectives

- Critical Aircraft Parameters to be Measured During Braking Conditions on Individual Wet (Soaked) Runway Grooving Test Sections
  - Aircraft Braking Friction Levels (Mu)
  - Behavior of Anti-Skid Braking System
  - Mu-Slip Characteristics

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Project Plans

- **Project Phase I: ACY Runway 4-22 Evaluation and Grooving Test Bed Design Completed.**

- Evaluation Concluded that Condition of ACY Runway 4-22 Was Acceptable for Installation of Trapezoidal Grooving Test Bed.

- Plans, Specification, Schedule, and Cost Estimate Have Been Developed for Construction Contract.

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Project Plans (Continued)

- **Project Phase II: Construction of Trapezoidal Grooving Test Bed and Full Scale Performance Testing**

- Contract for Construction of Grooving Test Bed to be Awarded in 2017

- Grind 3/8 Inch Material from Surface of Runway 4-22 (Obliterate Existing Grooving)

- Machine Trapezoidal-Shaped and FAA Standard Grooving (Full and Half-Depth)

- Re-Grind Half-Depth Grooving Sections

- Machine New FAA Standard Full-Depth Grooving

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Wildlife Hazard Mitigation

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Wildlife Hazard Mitigation R&D

Research and Development

1. Methods and Tools for Mitigating Wildlife Hazards through Habitat Management
   (IAA with USDA Wildlife Services)
2. Technologies to Detect Bird Hazards
   (Radar, Optical Sensors, etc.)
3. Technologies to Control and Deter Wildlife Hazards
   (Light, Acoustics, etc.)

Wildlife Strike Reporting

- Online at http://wildlife.faa.gov
- Deploying new web interface – Spring 2017
  - More dropdowns and text extenders
  - Enables imaging uploads

Wildlife Remains Identification

- Identification of Strike Remains through Feather and DNA Analysis
  (IAA with Smithsonian Institution)

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Research and Development

Interagency Agreement with USDA

- **Managing Habitat**
  - Limiting sources of food, water and cover
- **Understanding Behavior**
  - Tracking Bird Movements
  - Bird use of surrounding properties
- **Controlling Hazards**
  - Harassing and deterring

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Strike Reporting

Understanding when, where, how many and what…

Although the number of reported strikes has steadily increased (127%), the overall number of reported damaging strikes has declined 24% since 2000

- **72% below 500 ft AGL**
- **92% below 3500 ft AGL**
- **37% occur during takeoff**
- **63% of birds struck during daytime**
- **41% of commercial strikes occur at 0 ft AGL**
- **74% of strikes are reported using online report system**
- **Total Count: 172,370 Strike Reports** *(through August 2015)*
- **581 species of birds, 41 species of terrestrial mammals, 21 species of bates and 17 species of reptiles**

Annual Report available at:
http://wildlife.faa.gov/Wildlife-Strike-Report-1990-2015

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Bird Radar

"Wildlife Surveillance Concept"

WISC

Scope of the Concept:

- Tactical assessment of bird threats for the purposes of delivering advisories to pilots.

Benefits of the concept

- Controllers receive more timely and accurate representations of wildlife threats.
- The information is presented in a way that best supports decision-making processes and
- Maximizes benefits to the NAS while minimizing any impact on controller workload.

Questions?

Contact Information

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