Evaluating the Use of Unmanned Aerial Vehicles & LiDAR for FAR Part 139 Inspections, Obstruction Analysis, and Airfield Maintenance

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• **Combining Technologies**
  - LIDAR → surveying method that measures the distance to a target by illuminating it with a laser
  - UAV → “unmanned aerial vehicle”, also known as UAS or drone
  - Aerial Imaging → The taking of photographs of the ground from an elevated/direct-down position
  - Photogrammetry → The use of photography in surveying and mapping to measure distances between objects

• **Efficiency**
  - Short period of time needed for Runway/Taxiway closures
  - Cheaper than alternative methods and technologies
  - Equipment is easily accessible and ready to use

**Goal and Objective**
Industry Trends

• Technology
  • Collision Avoidance
  • Geo-fencing

• FAA Part 107
  • FAA recently released a 624 page publication that provides the first national, uniform regulations regarding the commercial operation of UAVs under 55 pounds
  • Establishes pilot certification procedures
  • Aims to simplify the application process for operating UAVs in the National Airspace System.
  • Allows users to request waivers of most operational restrictions if the proposed operation can be conducted safely
Use of UAV’s on Airports

- **Pavement Evaluations**
  - UAV flies along the pavement taking images
  - Images are analyzed and pavement distresses identified
  - Repair plans are recommended based off runway condition data

- **GIS and Aerial Imaging**
  - High resolution imaging can be used for a variety of applications such as planning, construction administration, and estimating
  - Aerial imagery can be used in conjunction with GIS software

- **Obstruction Analysis**
  - UAV to map approach / departure surfaces collecting obstruction data

- **Security**
  - UAV’s are faster than officers on foot
  - Another eye in the sky to watch for unsafe and illegal actions
Overcoming Challenges

• Operating in controlled airspace
  • Challenges:
    • Risk of aircraft collision
  • Solutions:
    • Operate under restricted Runway / Taxiway Closures
    • Incorporate transponders in UAVs

• Transponders
  • Challenges:
    • Current UAVs cannot bare the weight of a transponder
    • Without transponders it is hard for control towers to track UAVs
  • Solutions:
    • Companies are currently designing and testing small / lightweight transponders for UAVs

• Weight of Technologies
  • Challenges:
    • LIDAR equipment still weighs a lot, thus making it a challenge to keep the drone under 55 pounds required by FAA Part 107
  • Solutions:
    • Companies are developing technologies to reduce the size of LiDAR equipment without losing resolution and data storage as well as the use of photogrammetry
Into the Future

• New Technologies Evolving

• Meeting Demands of Planning and Design Industry

• Regulations and Safety
Closing

• Many opportunities ahead for UAV and LiDAR technology

• Innovative ideas to the airport planning and design process for Part 139 certifications, pavement evaluations and planning issues

• New ways to provide additional services to airports for security, wildlife, and more