Utilizing Unmanned Aircraft Systems (UAS) for Bridge Inspections

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Collins Engineers Inc.
Project Background

- MnDOT Bridge Office identified UAS as a potential useful technology
- Additional Research Dollars Available
- Phase I project was scoped, funded and completed in two months, Phase II complete, Phase III started
Assessment of Current Practices

Access Methods
- Aerial Work Platforms (AWP’s)
- Rope Access and Structure Climbing
- Ladders

NBIS and MnDOT Requirements
- Hands On Inspection
- Non Hands on Inspection
- Measurements/Testing
Assessment of UAS Technology

• Phase I Technology
  – Not capable of looking up
  – Unable to fly without GPS
  – Photo, Video and Thermal Imaging

• Phase II and III Technology
  – Inspection-specific UAS
  – Object Sensing
  – Capable of looking up
  – Fly without GPS, under bridge decks
  – Photo, Video and Thermal Imaging
  – Confined Space
Phase II Study

- Cost comparison with UBIVs, traffic control
- Explore inspection specific technology including the Sensfly Albris
- Compile a best practices document
- Incorporate into an actual inspection
- Use UAS in the planning of an inspection
- Use a secondary display for bridge inspector
- Deck surveys with zoom camera
- Culvert and Box Girder Inspection
- IR Deck Delamination Assessment at Dawn
- Paint Assessment
- Data on how many hours UAS vs. other methods
Phase II Study

Nielsville Bridge 5767
Phase II Study

Bridge Mapping Mission
Phase III – Project Goals

• Statewide UAS Inspection Contract – based on the MnDOT Bridge Access Inspection Policy list

• Overall Cost Effectiveness – at a statewide level for both District and local agency bridges

• Inspection Quality and Safety Improvements – close-up, 3D, and thermal imagery

• Identification of Sustainable Future Funding
Phase III – Confined Space

Flyability Elios Drone
Phase III – Confined Space

Flyability Elios Drone
3D Photo Log

Bridge Inspection Modeling
Bridge Modeling

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Bridge Modeling

Bridge Inspection Modeling
Conclusions

- UAS can be used in the field during bridge inspections safely.
- Image quality allows for the identification of defects.
- Tactile functions cannot be replicated using UAS.
- UASs can be cost effective.
- UASs can provide a very efficient way to collect infrared images
- Safety risks could be minimized with the use of UASs.
- UASs can be utilized to determine channel conditions.
- UASs can provide important pre-inspection information.
- “Off the shelf” UAS’s have limited inspection capability.
- FAA Part 107 allows greater flexibility than Section 333 process
Public Response

- Hundreds of news articles and stories
- Overwhelmingly positive
- Safety, reduced closures and cost efficiency valued by public
Questions/Contact Information

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