Cooperative Visual Segments

Rotorcraft and VTOL Symposium 2019

HELICOPTERS

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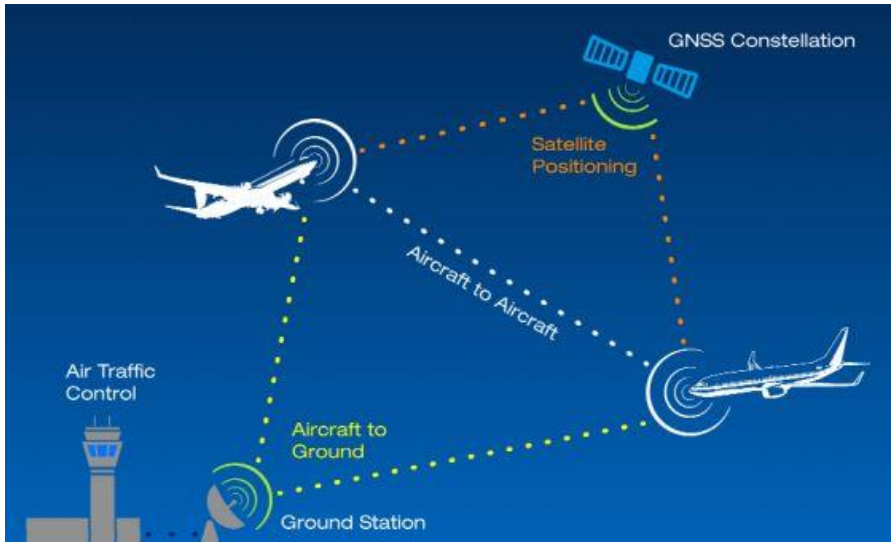
Cooperative / Non-Cooperative – Definition and Terminology

- “Cooperative” and “Non-Cooperative” are terms currently used to categorize on-board airborne surveillance sensors
- The technical term **Non-Cooperative** mostly addresses Detect and Avoid (DAA) Systems
- Aircraft equipped with Surveillance Transponders or Automatic Dependent Surveillance – Broadcast (ADS-B OUT) capabilities are grouped within **Cooperative** traffic



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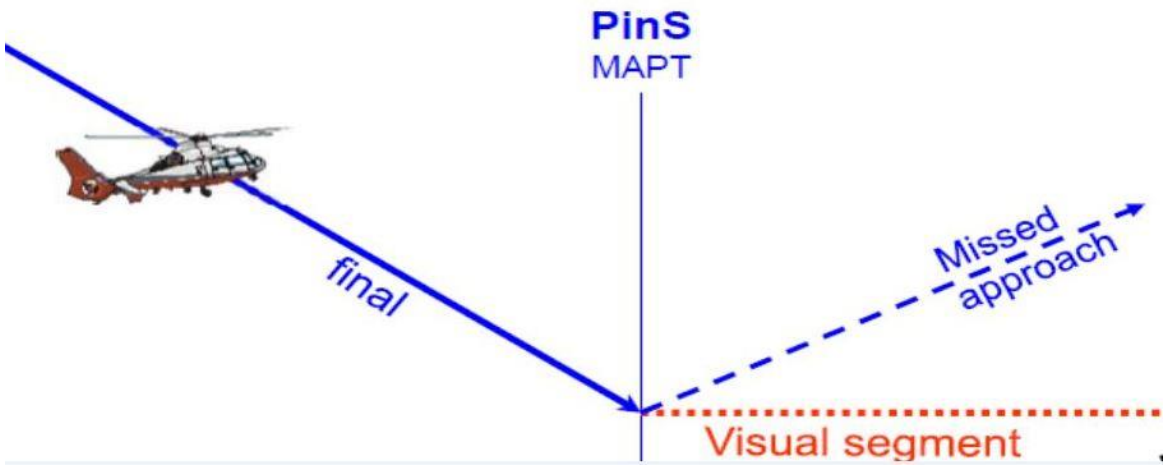
Visual segments within Helicopters Point-in-Space (PinS) approaches

- Visual Segments sustain flight path from the Missed Approach Point (MAPT) to a Final Approach and Take-Off Area (FATO) or suitable landing areas / locations
- During this operational phase, visual references necessary for landing have been acquired and the decision has been made that an instrument missed approach procedure is not performed.
- Visual segments are supported by visual aids to ensure conspicuousness of obstacles and FATO or landing area physical characteristics



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Visual segments within Helicopter Point-in-Space (PinS) approaches

- Such characteristics are currently collected within standardized aeronautical mapping data and made available to rotorcraft flight crew as Aeronautical Information Service (AIS) products.
- Adhering to AIS concept, helicopter landing locations out of Aeronautical Information Publication (AIP) coverage, may be mapped and used by rotorcraft crews and operators.
- Data formats used to capture terrain, obstacles and aerodrome infrastructure features are already established.

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Characteristics considered for electronic conspicuousness

- Additional observability channels can improve the quality of visual detection (being noticeable or easy to see) for FATO, landing areas or obstacles.
- Prerequisite: Visual aids status includes **operational functionality**
- An affordable implementation may be achieved by using **functional state vectors** associated to existing visual aids parameters / features
- Functional and operational status information transmitted to the flight crew in real time may improve the safety envelope
- Helicopter installed equipment may enable functional status reporting covering all landing locations allocated to the procedure

Identifier
Horizontal position
Elevation
Height
Geometry type
Units of measurement used
Lighting
Marking
[…]
Functional parameter i
Functional parameter j

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Operational benefits expected for observability channels

- Flight planning performed with additional data (functional status for landing location ground facilities)
- Increase the quality and quantity of information available to pilots (situational awareness)
- “Check Operational Before Use” like capabilities for the elements associated to landing locations and obstacles infrastructure
- Timely removal of deficiencies at landing locations
- Obstacles avoidance for the visual segments is improved (up to aided operations at night)

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Operational Considerations

- Functional state vectors may be exchanged using aeronautical or commercial network data exchange
  - Aeronautical Telecommunication Network e.g. Aeronautical Mobile Airport Communication System, Mode S network
  - Commercial networks
- The network ground stations may be implemented by devices co-located with the obstacle / lighting facilities. These devices monitor the object functional status / availability and distribute the information to authorized mobile stations upon requests.
- The network airborne mobile station may be equipment or hosted applications installed in the rotorcraft to provide the information i.e. the visual segment element functional status.
- Functional state vectors data availability should be provided equally to all helicopter crews
- Co-located devices installations performed by the ground facilities operators

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Feasibility discussion - general

- Appropriate rotorcraft antennae fit to be ensured and in line with applicable airworthiness requirements / guidance material
- Aeronautical Mobile Airport Communications System (ETSO- C207a) : transmissions from airborne aircraft are to be inhibited [Doc 10044]
- ADS-B reports contain state vectors focused on kinematic data
- Electronic Flight Bags / airborne network mobile station may host Cooperative Visual Segments applications, if related safety assessment identifies only minor failure conditions for functional state vectors data exchange
- Flight crew interactions with the installed system should not significantly affect workload

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Conclusion

- Cooperative Visual Segments data may complement aeronautical information
- Functional state vectors associated to ground facilities and obstacles, when available for helicopter operations, may ensure observability
- Conditions or changes relevant for visual aids / segments associated to Point-in-Space landing locations may be received on flight crew request

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Thank you