Research, Engineering and Development Advisory Committee

Subcommittee Report -Aircraft Safety (SAS)

> Terry McVenes, SAS Chair April 21, 2021



SAS Meeting February 23-24, 2021 Day 1

- Briefing on New MOA between AVS and ANG
- Homework Discussion
 - COVID-19 Impacts to Aviation
 - Aviation Industry Direction and Challenges
- F&R Action Items Follow-Up
 - Kathy Abbott HF Certification Work
 - Stacy Zinke COVID-19 R&D Impacts
 - Tom Nesthus Fatigue Research
- UAS Research William Oehlschlager
- Air force, Industry and FAA collaboration Nathan Dillar
- Emerging Technologies Wes Ryan

SAS Meeting February 23-24, 2021 Day 2

- FAA Budget Update Beth Delarosby
- Update on FY2023 research portfolio/revised process– Mark Orr
- Review of FY2023 portfolio Domains
 - Aircraft Safety Assurance
 - Digital Systems and Technologies
 - Human and Aeromedical Factors
 - Aviation Performance and Planning

Finding #1 – Visibility in the Source of RE&D Funding

- Some FAA research, engineering, and development activities are being sponsored and managed under Facilities and Equipment (F&E) funding
- Some research topics such as ATM and CNS were moved from RE&D funding to F&E funding in the late 1990s
- UAS Pilot Programs research is being managed with F&E funding
- Some research, engineering, and development being conducted under F&E funding also serve to inform FAA aviation safety policy, regulations, and rulemaking
- Lack of SAS visibility into projects sponsored and managed under F&E funding leads to an incomplete SAS review of research related to aviation safety policy, regulations, and rulemaking
- Potential exists for regular F&E activities, pressures, and priorities to overcome and negatively impact the prioritization and resources for mid- and long- term research

Recommendation # 1

The SAS recommends that the FAA brief the SAS on the process by which the research, engineering and development sponsored and managed within the RE&D funding and F&E funding is coordinated and ensure mid- and long-term research objectives prioritization is appropriately maintained.

The SAS recommends that the FAA include F&E research, engineering, and development which inform FAA aviation safety policy, regulations, and rulemaking BLI and/or projects in future SAS briefings.

Finding #2- Ice Crystal Icing

- FAA Research on Ice Crystal Icing Conditions to Address Fundamental Knowledge of High-Altitude Icing on Turbine Engine Damage and Power loss is currently un-funded through the 2023 fiscal year. Further in-depth research can aid current rulemaking work to address this issue appropriately.
- Prior funding was used for several flight campaigns:
 - Data analysis portion requires addition funding for an additional flight test campaign evaluating the effects of atmospheric Aerosol content on ice crystal concentrations at high altitude.
- Funding should be available for ongoing work including additional testing for modeling and testing for ICI accretion behind the fan.

Recommendation #2

The SAS recommends that FAA should consider further funding for ice crystal icing research for Fiscal years 2021 and beyond to ensure it is adequately addressed in certification and rulemaking. Additional research should be considered in the following fields:

- Aerosol testing to determine the effects on high altitude ice crystal concentrations
- Continental vs Oceanic Mesoscale Convective Systems and lapse rates and their effect on High Altitude ICI
- Basic physics studies of ice formations within turbine engine flow paths from high altitude ice crystal icing in mesoscale convective systems

Finding #3- Artificial Intelligence/Machine Learning (AI/ML)

- Future advancements in control system technologies will depend upon an artificial learning process that has the potential to impact the basis of certification for such systems.
- The demands of industrial or ground-based systems differ greatly from those requirements for aircraft systems. If not fully researched and understood, the impact to aviation safety critical systems is significant.
- More research is required to better understand the means to establish criteria to judge the confidence and validation of such systems that ultimately can lead to a basis of certification of these same systems.
- There is significant standards development work being conducted by RTCA, SAE, and ASTM on these technologies across the entire aviation ecosystem, both airborne and ground, addressing both manned and unmanned systems. This includes unmanned traffic management (UTM) solutions.

Recommendation #3

The SAS recommends that FAA place a priority on the funding of this research in ML/AI. This research will enable the FAA to work toward achieving a means of compliance by addressing the added challenge of better understanding the current and future scope of technology.

The SAS recommends for close collaboration with industry to understand the FAA requirements and FAA to understand the technology to develop/modify requirements based on new technology.

SAS Meeting

Next Meeting:

August 10-11, 2021

Questions?