

ASCENT Project 02



Re-Examination of Engine to Engine PM Emissions variability using an ARP Reference Sampling and Measurement System

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Cost Share Partner: EMPA

Objective:

- The effect of ambient atmospheric conditions on the nvPM emissions from aircraft engines is not yet well understood. A quantitative relationship of this effect is required to develop standard day corrections for nvPM mass and number emissions. By changing the inlet conditions in a combustor rig test, this research seeks to quantify the effect of ambient conditions on the nvPM mass and number emissions.
- The research will also address the impact of fuel composition on the nvPM mass and number emissions for various inlet conditions to improve our understanding of the fuel composition effects.

Project Benefits:

- Standard day corrections for nvPM mass and number emissions that can be implemented in ICAO Annex 16 Vol.II
- Evaluation, verification and validation of cruise and performance based nvPM emissions modeling methodologies
- Improved understanding of fuel composition effects on nvPM emissions including any correlations between inlet conditions and fuel composition variability.

Research Approach:

- A series of combustor rig tests will be conducted by Honeywell at their testing facilities in Phoenix Arizona. The North American Reference System (NARS) and its ancillary equipment will be used in conjunction with Honeywell emissions testing facilities to characterize the non-volatile Particulate Matter (nvPM) emissions and develop predictive emission functions for a series of conventional and synthetic alternative jet fuels.

SCHEDULE	Q3 2021	Q1 2022	Q2 2022	Q3 2022	Q4 2022
Test Planning	*****				
Test Execution		**			
Data Analysis			*****	*****	****
Final Report					▲

Major Accomplishments (to date):

- Testing with conventional Jet A has been completed
- Analysis including development of predictive emissions functions is underway.
- Real-time size data acquired with MS&T DMS 500 analyzed and delivered to Honeywell for inclusion in predictive emissions development.

Future Work / Schedule:

- Develop phase 2 test plan for rig testing using 3 synthetic alternative jet fuels.
- Develop fuel delivery and doping protocol.
- Deploy MST NARS to Honeywell and execute test plan
- Analyze data and develop predictive emissions functions
- Prepare final report