

AEDC's PMEL advances turbine flow meter calibration



The AEDC Precision Measurement Equipment Laboratory (PMEL) pioneered the use of propylene glycol and water blends as surrogate calibration fluid for turbine flow meters used for aviation fuel flow rate measurement.

After collaborating with AEDC and conducting its own evaluations, the National Institute of Standards and Technology (NIST) recently adapted this approach as well.

Outside customers have also requested help from AEDC in evaluating the use of propylene glycol and water as surrogate calibration fluid for their hydrocarbon flow meter calibrations.

When the U.S. Army Metrology Program needed a benign, non-flammable and non-hazardous fluid for calibration of turbine flow meters employed for hydrocarbon lubricants and hydraulic fluids, along with aviation fuel, AEDC was contracted to perform the research and development (R&D). AEDC's engineers assisted in determining the effectiveness of using propylene glycol and water blends over a range of kinematic viscosity for the Army's assortment of turbine flow meters in use.

Lower kinematic viscosity fluid of 1.3 and 5 centistokes (cStks) proved to produce turbine flow meter response with excellent agreement between the aqueous based fluid and the hydrocarbon fluid for all turbine flow meters tested.

Larger turbine flow meters of 1-inch diameter and above also produced excellent response agreement for higher kinematic viscosity fluids of 17 and 54 cStks. Smaller flow meters, 3/8 inch diameter, produced as much as 2 percent response difference between fluid types at 54 cStks kinematic viscosity and 1 percent for 17 cStks.

Modeling via computational fluid dynamics (CFD) and numerical computation is being conducted to better understand these response phenomena.

