



NEAT Summary and Update

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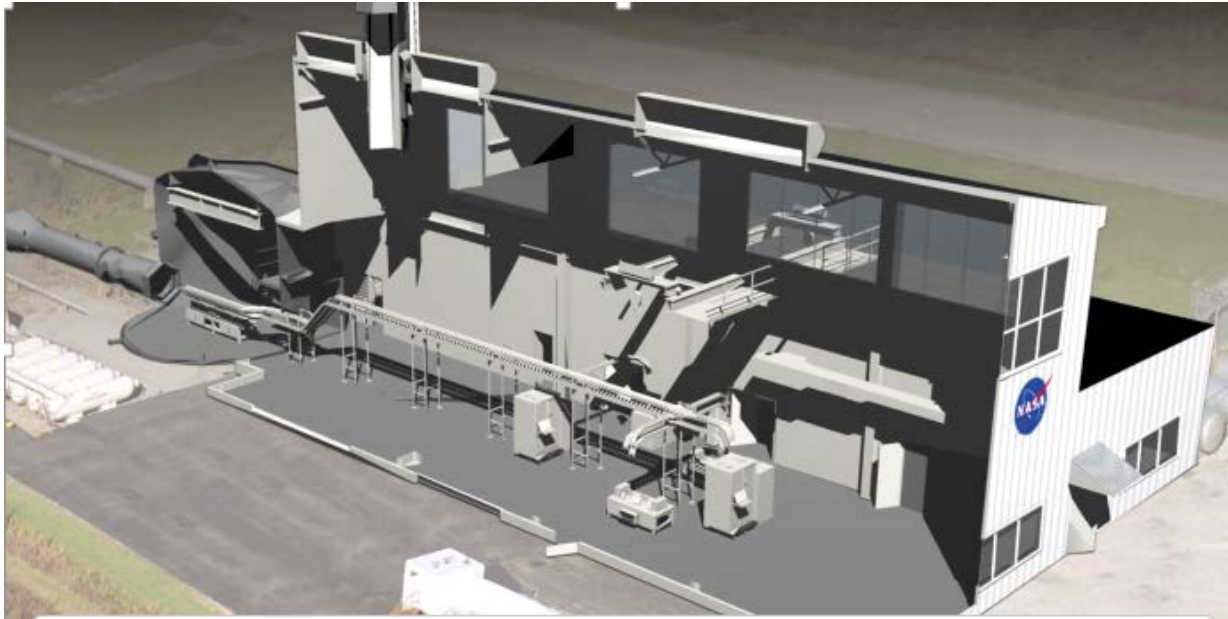
For Pratt & Whitney TIM
August, 2018

Hybrid Gas-Electric Propulsion Subproject (HGEP)
Advanced Air Transportation Technologies (AATT)
August, 2018

NASA Electric Aircraft Testbed (NEAT)

Overview

- Reconfigurable testbed to support full-scale large aircraft powertrain testing
- 12 MW facility power can support up to 24-48 MW systems (*w/ regeneration*)
- Can support cryogenics and has *potential* for turbogeneration
- TRL-6 testing of key components and design approaches:
 - High voltage bus architecture
 - High power MW Motors, Generators
 - EMI Mitigation and Standards
 - High power MW Inverters, Rectifiers
 - Communication & Fault Protection
 - Thermal Management



- Animation (left) shows NEAT laid out in STARC-ABL configuration
- Electric machines emulate turbine and fan
- Altitude chamber can mimic realistic flight environment – high voltage at altitude a major technical risk

NASA Electric Aircraft Testbed (NEAT)

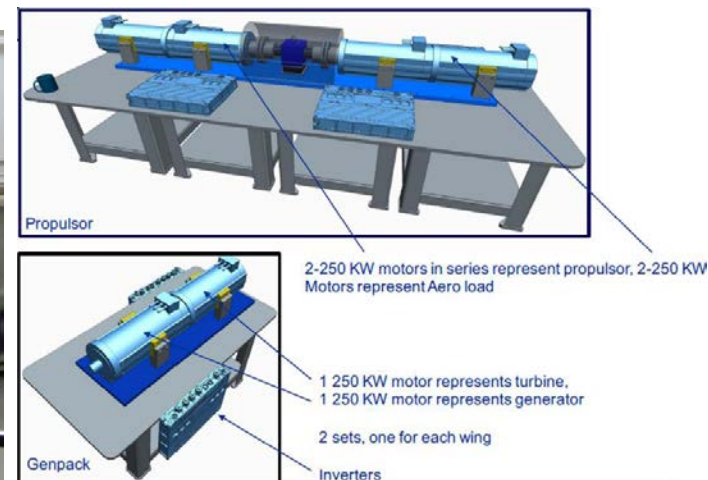
Progress to date

Buildup – Bringing the capability to test powertrains at HTF

- Added power conditioning and conversion for up to 600 V
- Increased cooling capability
- Designed and assembled motor mounts for large electrical machines on a shared shaft
- Designed and built a cable tray – provides physical constraints of full-size aircraft (cable lengths, proximity among high V equipment, access, thermal considerations)

Experimental Testing – Pushing boundaries for high power, high voltage powertrains

- ✓ Validation testing for single-string machine pair, 125 kW, 600V
- ✓ Validation testing for single-string machine pair, 250 kW, 600V
- ✓ Refinement of control technique using NPSS to provide turbine behavior



NASA Electric Aircraft Testbed (NEAT)

Next Steps through 2019

Buildup – Bringing the capability to test powertrains at HTF

- Increase power conditioning and conversion for up to 700 V
- Add gearboxes for flightweight machine testing

Experimental Testing – Pushing boundaries for high power, high voltage powertrains



- ✓ 500 kW, 600V (subscale) STARC-ABL powertrain built with best available, non-flightweight components (*testing began Nov 22, 2017*)
- MW-scale, 700V powertrain (*STARC-ABL architecture*) with next evolution design (fault management and protection, EMI mitigation, energy storage, control)
- Flightweight component testing (FY19 and beyond)