



CLEEN III

HONEYWELL CLEEN PHASE III

Consortium Public Session

November 8, 2023

Contractor Name: Honeywell International Inc.
Address: 111 S. 34th Street
Phoenix, Arizona 85072-2181

Honeywell

1941

1942

1943

1944

1945

1946

1947

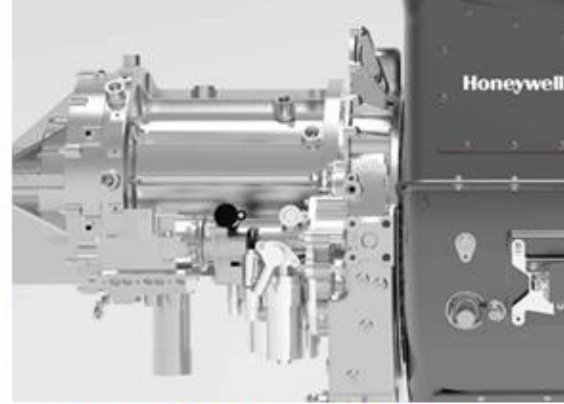
TODAY AND FOR THE FUTURE **HONEYWELL** TECHNOLOGY SUPPORTS SUSTAINABILITY



**SUSTAINABLE
AVIATION FUEL (SAF)**



**HYDROGEN
FUEL CELL**



**ELECTRIC POWER
GENERATION**



**NEXT GENERATION
PROPULSION ENGINES**



**HONEYWELL FORGE
ENABLES FLIGHT
OPERATIONS EFFICIENCY**



ELECTRIC PROPULSION



TURBOGENERATORS



HYBRID PROPULSION

Honeywell

CO₂

CARBON NEUTRALITY
We pledge to be carbon
neutral in all our facilities
and operations

BY 2035

TODAY AND FOR THE FUTURE

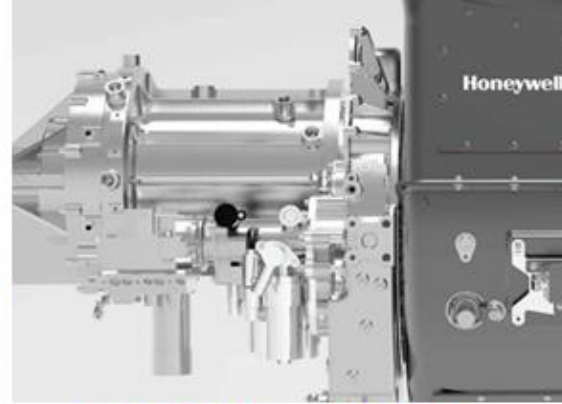
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CLEEN III

Honeywell and the FAA under the CLEEN program are maturing advanced propulsion engine technologies to power the Next Generation of cleaner, fuel efficient and quieter aircraft



Honeywell has been part of CLEEN since 2010 and is currently developing advanced engine technologies under CLEEN III that will substantially reduce Fuel Burn (CO₂), Noise and Emissions

CLEEN ENABLES NEXT GENERATION TECHNOLOGIES

Honeywell is integrating innovative technologies that improve engine performance and reduce environmental impact

**High Efficiency
Fan Module**

**Noise Reduction
Technologies**

**Efficient High-Pressure Green Core
(Compressor – Combustor - HP Turbine)**



**High Work / High Lift
Low Pressure Turbine**

**Advanced
Materials**

Technology Advances Enable Lower Fuel Burn (CO₂), Noise & Emissions

HONEYWELL'S NEXT GENERATION TURBOFAN LEVERAGES EXPERIENCE AND CLEEN III TECHNOLOGIES



- *State-of-the-Art (SOA) Engine Performance*
- *Industry Leading Dispatch Reliability*
- *Excellent Value: Cost, Performance and Durability*
- *Versatile Technology for Business Aviation Market*
- *Seven Aircraft Applications*
 - > 2900 engines in service
 - > 9 million cumulative flight hours
 - > 5 million cumulative flight cycles

Bombardier
CL300



2004

Gulfstream
G280



2012

Bombardier
CL350



2014

Embraer
Legacy 450/500



2014 - 2015

Cessna
Longitude



2018

Embraer
Praetor 500/600



2019

CLEEN III Technologies Enhance Next Gen Engine Capabilities

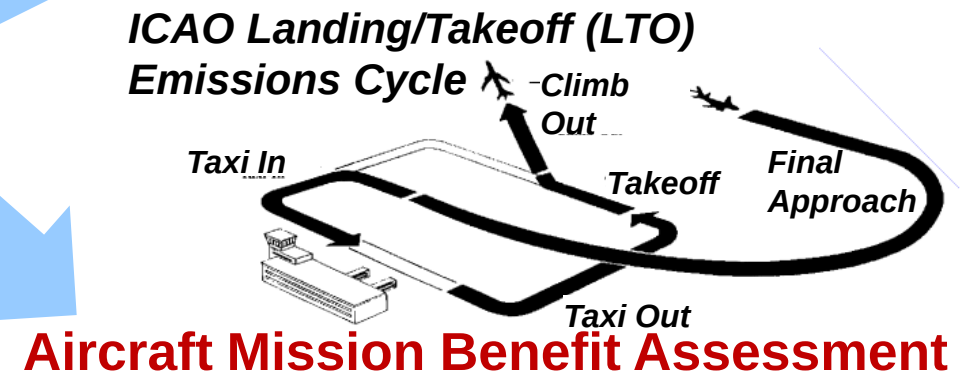
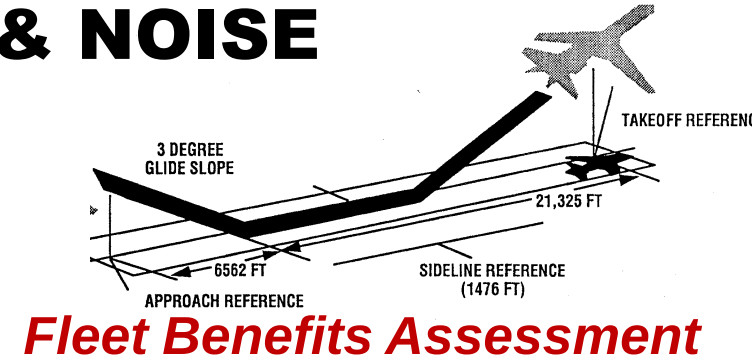
DATA SUPPORTS AIRCRAFT MISSION AND FLEET BENEFITS ASSESSMENT FOR FUEL BURN, EMISSIONS, & NOISE

- 1) Generate cycle-based benefit predictions for CLEEN engine
- 2) Aircraft Manufacturer assessing benefit for aircraft mission
- 3) Results will feed Georgia Tech for fleet wide technology benefit assessment

Honeywell generates engine Fuel Burn (TSFC), Emissions and Noise Predictions and Measured engine test data to assess Technology Benefits

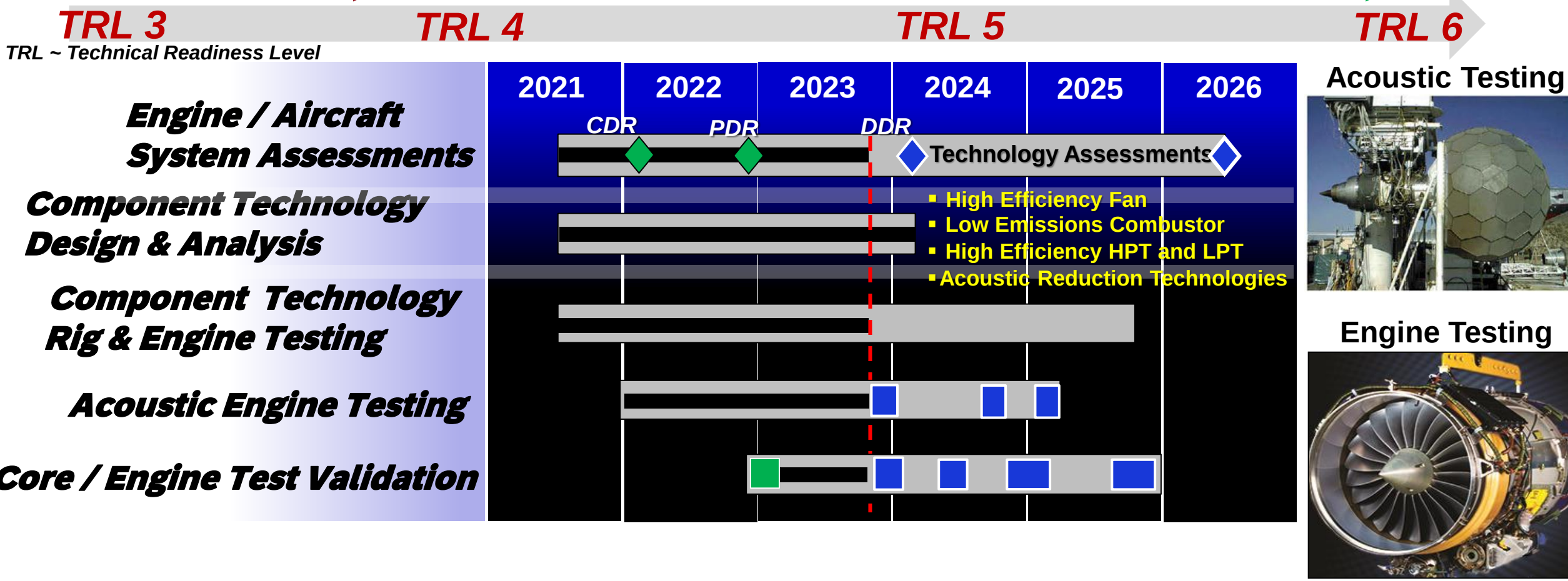


data
used
in



CLEEN III Technology Test Results Support FAA Global Benefits Assessment

HONEYWELL CLEEN III TECHNOLOGY MATURATION PLAN



Technology Maturation Progressing to Core & Engine System Demonstrations

PROGRESS & NEXT STEPS



- Honeywell's innovative engine technologies are being developed to substantially lower fuel burn, noise and emissions for our next generation of engines
- Significant progress has been achieved to date on advanced component technology designs and on technology demonstrations
 - Completed detail design for all major component technologies and Test Rigs
 - Multiple component technology rig tests were completed in 2023
- **Next Steps... CLEEN III Program Plans are to validate technologies through Component Rig, Development Engine and Core Engine testing in 2024**
 - ☐ High Efficiency Fan Module Rig Testing
 - ☐ Advanced Low Emissions Combustor Rig and Engine Testing
 - ☐ Advanced High Pressure Turbine (HPT) Technology Engine Testing
 - ☐ High Work / High Lift Low Pressure Turbine Rig Testing
 - ☐ Acoustic Technology Bench and Engine Validation Testing
 - ☐ Core Engine testing of HPC (Compressor) and HPT (Turbine) technologies



Honeywell

THE
FUTURE
IS
WHAT
WE
MAKE IT

THANK YOU!