



Research Combustion Laboratory at NASA Glenn Research Center

The **Research Combustion Laboratory (RCL)** has more than 60 years of experience conducting scientific research of fuels, ignition, and combustion methods and high-temperature materials.

Facility Description

To fit unique research goals, the laboratory's highly flexible test cells can tailor test conditions in subscale environments, including a low-flow ignition rig, a high-temperature thermal shock test bed for testing rocket materials, a low-thrust chemical rocket altitude facility, and several sea-level test stands. The facility is also capable of testing fuel cell technologies.

Propellants used in the RCL include gaseous hydrogen, methane and oxygen, liquid hydrogen methane and oxygen, and hydrocarbon fuels to allow testing of rocket and air-breathing propulsion engines, components, fuel cells, and other power system components. A variety of nonconventional propellants can also be tested.

Facility Benefits

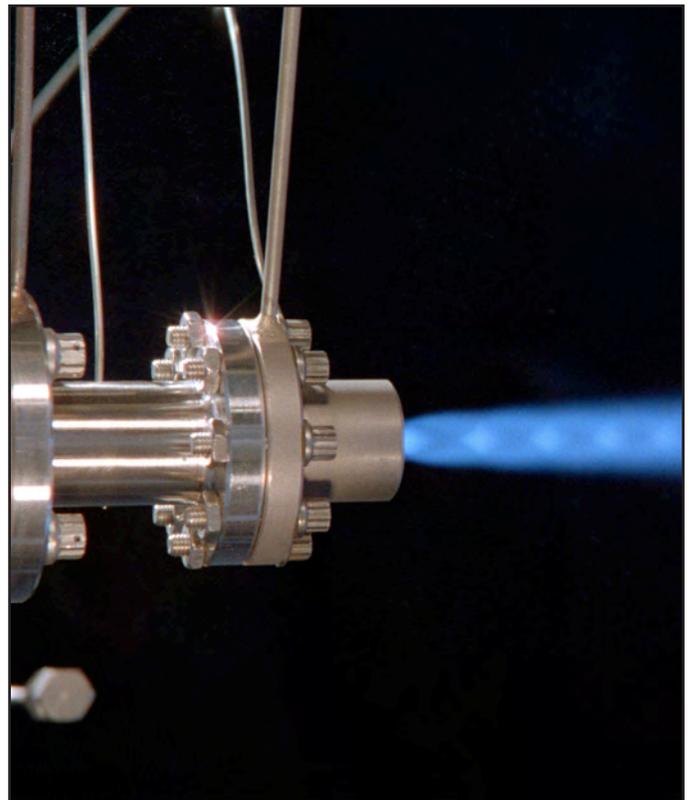
- Full-scale combustor rig with flexibility to test a wide variety of test hardware configurations
- Offers tailored test conditions in subscale combustion environments
- Capable of providing a variety of conventional and nonconventional propellants
- Equipped to provide high heat flux conditions or material and fuel testing
- Provides test conditions to study ignition and combustion methods

Commercial Applications

- Space shuttle thrusters
- Insulation and transfer technologies for cryogenic fluids
- Advanced ignition systems for next-generation launch vehicles

Programs and Projects Supported

- Next Generation Launch Technology (NGLT)
- Low Emissions, Alternative Power (LEAP) Propulsion and Power Resources
- Mars Hopper
- Propulsion and Cryogenic Advanced Development



RCL flametube test.

Capabilities

Combustion and Cryogenics Space Facilities				
Propellants	RCL-11	RCL-21	RCL-22	RCL-32
Volume (Scf)				
GH ₂ (scf)	70,000	140,000	140,000	70,000
LH ₂ (gallons)	n/a	25	n/a	200
GOx (scf)	60,000	60,000	60,000	60,000
LOx (gallons)	n/a	5	n/a	50
HC (gallons)	n/a	8	n/a	100
Ethanol (gallons)	0.5	8	n/a	100
Supply pressure, psi				
GH ₂	2,400	2,400	2,400	2,400
LH ₂	n/a	1,800	n/a	1,800
GOx	2,400	2,400	2,400	2,400
LOx	n/a	1,800	n/a	1,800
HC	n/a	1,000	n/a	1,800
Ethanol	n/a	1,000	n/a	
Maximum flow, lb/sec				
GH ₂	0.022	0.3	2.0	3.0
LH ₂	n/a	0.25	n/a	1.0
GOx	0.08	1.0	4.0	4.0
LOx	n/a	2.0	n/a	7
Ethanol		0.1		
Other Capabilities				
Maximum thrust (lbf)	50	300	2,000	2,000
Altitude (ft)	95,000	95,000	n/a	n/a
Cooling				
	RCL-11	RCL-21	RCL-22	RCL-32
Volume (scf)				
GH ₂ (scf)	70,000	140,000	140,000	70,000
LH ₂ (gallons)	n/a	0.25	n/a	200
Water (gallons)	60,000	60,000	60,000	60,000
Supply pressure, psi				
GH ₂	2,400	2,400	2,400	2,400
LH ₂	n/a	1,800	n/a	1,800
Water	2,400	2,400	2,400	2,400
Maximum flow, lb/sec				
GH ₂	0.022	0.3	2.0	3.0
LH ₂	n/a	0.25	n/a	1.0
Water (gpm)	0.08	1.0	4.0	4.0
Other capabilities				
Maximum thrust (lbf)	50	25	2,000	2,000
Altitude (ft)	95,000	95,000	n/a	n/a
National Electrical Code (NEC), hazardous atmospheres	RCL-12			
	HAN; Xm46; and Chemical Material Compatibility (Fume Hood)			

Facility Testing Information

<http://facilities.grc.nasa.gov>

Contact

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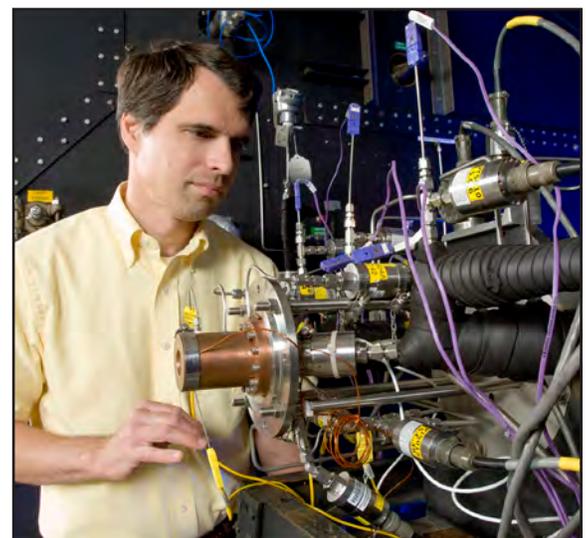
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Cooled panel nozzle extension test.



Propulsion and Cryogenic Advanced Development (PCAD) 100-lb LOx methane thruster.