Technology Opportunity
Glenn Research Center • Cleveland • Ohio
Technology Transfer & Partnership Office

TOP3–00218

Research Combustion Laboratory

Facility

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, an air-breathing combustor rig, and several sea-level test stands. The facility is also capable of testing fuel cell technologies.

Propellants used in the RCL include gaseous hydrogen and oxygen, liquid hydrogen 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

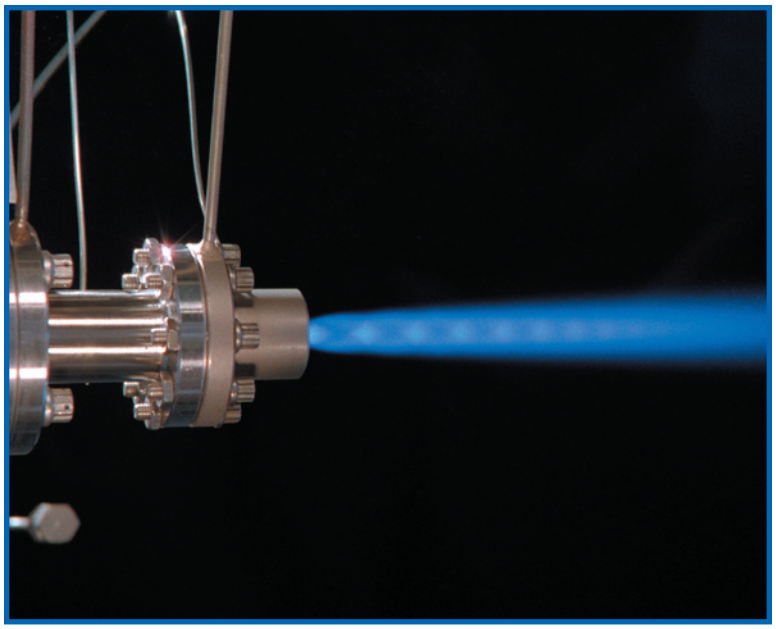
- Offers tailored test conditions in subscale combustion environments
- Capable of providing a variety of conventional and nonconventional propellants
- Equipped to provide high heat flux conditions or material and fuel testing
- Provides test conditions to study ignition and combustion methods

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 Propulsion and Power Resources (LEAP)
- Mars Hopper tests



RCL flametube test.

Capabilities

Combustion and Cryogenics Space Facilities				
Propellants	RCL–11	RCL–21	RCL–22	RCL–32
Volume (Scf)				
GH_2	70 000	140 000	140 000	70 000
LH_2		16 lb		
GOx	70 000	60 000	60 000	60 000
LOx	100 gal	50 lb		50 gal
HC		8 gal		100 gal
Ethanol	50 gal	8 gal		100 gal
Supply Pressure,				
GH_2		2400	2400	2400
LH_2		1800		1800
GOx		2400	2400	2400
LOx	1100	1800		1800
HC		1000		
Ethanol		1000		
Max flow (lb/sec)				
GH2	0.022	0.3	2.0	3.0
LH2		0.25		1.0
GOx	0.08	1.0	4.0	4.0
LOx		2		7
HC				
Ethanol		.1		

Combustion and Cryogenics Space Facilities				
Cooling				
Volume, Scf				
GH_2			140 000	70 000
LH_2				200 gal
Water, gal	100		1300	150 gal
Supply pressure, PSI				
GH_2			2400	2400
LH_2				1800
Water			1200	1500
Max flow, lb/sec				
GH_2			1.5	1.5
LH_2				1.5
Water, gmp		50	300	200
Deionized water		No	Yes	No
Other capabilities				
Max thrust, lbf	50	300	2000	2000
Altitude, ft	950 000			
NEC, haz atm	HAN; Xm46; Chemical/Material compatibility (Fume Hood)			

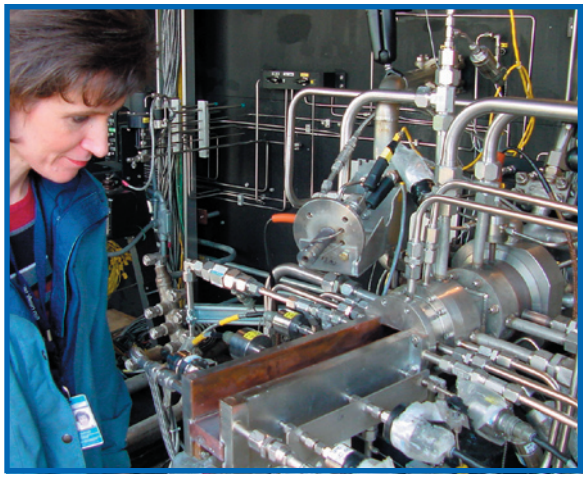
Facility Testing Information

http://facilities.grc.nasa.gov

Contacts

Wayne M. Bartlett, Facility Manager
NASA Glenn Research Center
Phone: 216–433–5745
Fax: 216–433–8551
E-mail: Wayne.M.Bartlett@nasa.gov

Technology Transfer & Partnership Office
E-mail: ttp@grc.nasa.gov
http://technology.grc.nasa.gov



Cooled panel nozzle extension test.