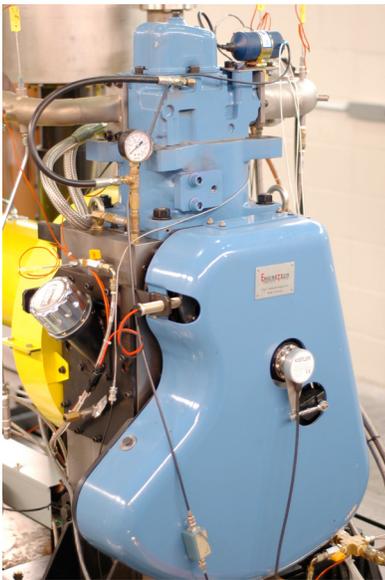


Distributed Energy Research Center (DERC) Advanced Reciprocating Engine Systems Program



Single cylinder research engine



Six-cylinder natural gas engine



Single cylinder engine test facility

What is DERC?

The Distributed Energy Research Center (DERC) is the home of Argonne National Laboratory's newest reciprocating engine testing facility. DERC will provide new insights into engine combustion with lower emissions and higher efficiency than its predecessors.

This facility uses a state-of-the-art single-cylinder research engine that can be used to evaluate, validate, and more importantly, prove conceptual ideas and make them a reality. The engine is capable of operating both as a normal as well as an optical machine for diagnostic purposes. It has the capability to run on different fuels such as natural gas, diesel, ethanol, etc. Homogeneous Charged Compression Ignition (HCCI) and other low-temperature combustion concepts can be studied with minimal hardware modifications.

Argonne's Research

Under the U.S. Department of Energy's (DOE's) Advanced Reciprocating Engine Systems (ARES) program, the single-cylinder engine is being used for research involving laser ignition, nitrogen enrichment, hydrogen and natural gas-hydrogen blends, ethanol-diesel dual fuel combustion and various other fuels and lubricants.

In-cylinder visualization using an AVL Visioscope for real-world engine conditions and an optical module for other operating conditions adds significant value and makes DERC unique and superior as compared to other research facilities.

Capabilities

DERC is equipped with:

- Single-cylinder research engine
 - Bore/Stroke: 130/120 mm
 - 33 kW @ 2200 rpm
 - Compression ratio: 11:1
- DyneSystems 150 hp AC dynamometer
- Optical Diagnostics
 - Combustion imaging (AVL Visioscope)
 - Spectroscopy
- Horiba MEXA 7100 gaseous emissions bench
- CellAssistant data acquisition system
- Multi-ignition capability
 - Spark
 - Laser (free space and optical fiber)
 - Compression
 - Pilot-fuel
- Multi-fuel capability
- Turbo-charging capability
- Win600e combustion analysis system
- Cummins QSK19G six cylinder SI engine
- Provision for two more engine test cells
- 4500 cu.ft./hr natural gas supply
- Highly-qualified staff experienced in industry and universities are available to undertake fundamental and applied research in the areas of engine combustion and emissions
- State-of-the-art Opposed Piston Rapid Compression Machine (RCM) for fundamental combustion research
- Advanced simulation codes

A User Facility

In addition to DOE-sponsored research, DERC (with all its state-of-the-art capabilities) can be made available to other interested organizations for research and testing. Argonne and DOE would like to offer this as a user facility to all engine manufacturers, other national laboratories, universities, and other research and development organizations.

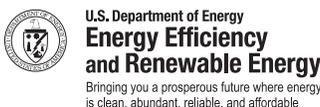
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