OAK RIDGE NATIONAL LABORATORY
FUELS, ENGINES, AND EMISSIONS RESEARCH CENTER
A U.S. DEPARTMENT OF ENERGY NATIONAL USER FACILITY.

Engine Research Cell 4

Dynamometer:
Eddy-Current, 175 Hp, 2500 RPM Base Speed, 6000 RPM Maximum Speed

Dyno and Throttle Controllers:
Dyn-Loc IV Dyno Control
DTC-1 Throttle Control

Data and Control System:
Dyne-Systems Companion with Cell-Assistant Software

- Temperatures (32 pre-wired)
- Pressures (16 pre-wired)
- 8 Analog Inputs, 8 analog outputs
- Timer/Counter Inputs

Fuel Control:
Day-tanks plus in-ground fuel feed for commonly-used fuels. Fuel flow measurement and handling using a positive-displacement fuel metering system.

Combustion Air Control:
Engine intake air conditioned to maintain constant temperature and humidity. The setpoint is adjustable. (Maximum air flow is 2000 CFM.) Engine air consumption is typically measured with Meriam laminar-flow elements.

Combustion Instrumentation:
AVL Indimodul with IndiCom software. Up to 8 high-speed inputs (typically high-speed pressure transducers).

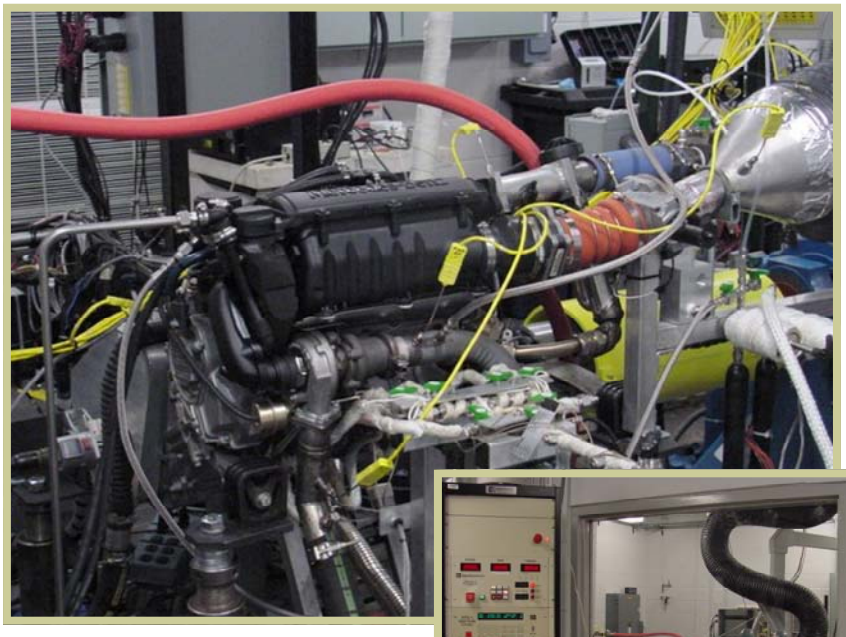
Emissions Instrumentation:
Micro-dilution tunnel for dilute samples including bags and filters.

2 flow paths with standard instruments:

- Heated Chemiluminescence (NO_X)
- Heated Flame Ionization (HCs)
- Non-dispersive Infrared (CO, CO_2)
- Paramagnetic (O_2)
- Thermal Conductivity (H_2) (one path)

ETAS-LA3 Lambda Meter

More advanced instrumentation is included in a pool shared among engine cells. (FTIR,



Currently Installed Engine:

Mercedes 1.7L Diesel equipped with RPECS-based controls. (RPECS is a flexible control system originally developed by Southwest Research Institute.)

Current Projects:

Several projects are currently underway or planned. Cell 4 has been used for experiments to determine low-temperature urea decomposition and SCR performance, high-efficiency clean combustion (HECC), fuel effects on HECC, a study of the impact of exposure of human and mouse lung tissue to exhaust, and efficient emissions control for engines operating in multiple combustion modes. Other shared instrumentation and the capabilities of the analytical laboratory have supplemented the cell's standard instrumentation for many projects. In October 2004 the RPECS-based control system will be replaced with a much improved control system identical to the one already in use with the Mercedes engine in Cell 2. HECC and related projects are anticipated to continue into FY2005 and beyond. Examples of data collected in typical projects can be found in SAE paper number 2004-01-0114.

For more information, please contact Dr. Ronald L. Graves. Email: gravesrl@ornl.gov. Phone: (865) 946-1226 Fax: (865) 946-1248