

Generation of Emission and Performance Data using a Heavy-Duty Chassis Dynamometer

Program Capabilities:

SwRI routinely performs emission studies using engine dynamometers and chassis dynamometers. Emission testing following USEPA procedures require engine testing. However, chassis test results are recognized by in some areas (California) and they are also useful to rank technologies for specific applications.

Alternative fuel conversions, hybrid system and other technologies that are application specific are evaluated using an electric, 48-inch, twin roll chassis dynamometer having the ability to simulate vehicle weights up to 55,000 kg for tandem axle vehicles and 27,000 kg for single-axle vehicles. Maximum power is 450 kW. Road load and vehicle inertia are simulated by the dynamometer to approximate the actual driving conditions of the vehicle. Depending on the inertia to be simulated, the system can also be programmed to distort the road load to simulate selected levels of grade during various portions of the driving cycle. The dynamometer is equipped with a 300 hp fan that is capable of simulating wind speeds up to 100 mph, either independently of roll speed or proportionally to roll speed during testing. The ambient test cell temperature is controlled by an HVAC system and the fresh air intake for the fan.



Transient tests use various drive cycles to quantify the powertrain performance, fuel economy, and exhaust emissions of the vehicle while simulating in-service operation. The facility also has the distinctive ability to perform route test cycles in addition to typical drive cycles. Route test cycles ensure that the vehicle matches the distance of the drive cycle by instantaneously modifying the time scale. This method is useful when assessing a vehicle that cannot match the accelerations and/or the speeds of the driving cycle. Steady-state operation is run at fixed load or fixed speed to study powertrain or cooling issues or when a finite number of specific operating conditions are of interest.

SwRI's HD Chassis Facility is equipped with sampling systems for measuring exhaust emissions of total hydrocarbons (HC), oxides of nitrogen (NO_x), particulate matter (PM), carbon monoxide (CO), carbon dioxide (CO₂), and fuel consumption. In addition, individual hydrocarbon species and particulate matter composition can be determined and equipment procedures are in place to measure unregulated emissions including dioxins, furans, aldehydes, metals, semi-volatile compounds, and other toxic compounds that may be found in exhaust emissions. Standard data acquisition includes second-by-second data for the dynamometer load and speed for each roll, exhaust emissions listed above, and 20 other channels for thermocouples, pressure transducers, or other analog signals. Additional data acquisition is available and can be set-up quickly to meet test specifications. This includes high-speed thermocouple multiplexers.

SwRI is confident that we can meet your testing needs and you are invited to review our website at www.swri.org for an overview of the Institute and the Engine, Emissions and Vehicle Research Division, described at <http://www.swri.org/4org/d03/d03home.htm>.

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