



COMPUTER CONTROLLED UNIVERSAL 2-STROKE ENGINE TEST FACILITY

FEATURES

- ◆ Study of relevant CEC procedures
- ◆ Lubrication oil and additive development
- ◆ Fuels research studies
- ◆ 2 Stroke engine performance and development

APPLICATIONS

- ◆ 6 and 15 kW D.C. Dynamometers enable wide range of engines to be studied
- ◆ Autotest Computer control system provides excellent repeatability
- ◆ Gravimetric fuel flow measurement
- ◆ Fan air cooling system
- ◆ Exhaust extraction system

DESCRIPTION

Cussons Computer Controlled Universal 2-Stroke Engine Test Facility comprises the following major assemblies and ancillary systems:

A bedplate assembly, combined control console and instrumentation enclosure, Thyristor drive dynamometer control cubicle, fuel storage tank, fuel flow measurement and handling system and portable ancillaries such as the air cooling fan and exhaust extraction system.

ENGINE AND DYNAMOMETER TEST STAND

A welded steel bedplate assembly that supports both 6 kW and 15 kW dynamometers, and is fixed to the floor. The engine support frame fixes to a ground pad on the front of the baseplate which is referenced to the same datum as the dynamometer supports. The support frame is positioned between the two dynamometers, and the engines coupled to the dynamometers via a toothed belt drive arrangement.

A service frame sits over the dynamometer and as well as housing the instrumentation interface enclosures, provides the anchor point for the dynamometer load cells. The fuel delivery section of the fuel handling system is mounted on one side of the service frame and presents the engine fuel connection point. The throttle actuator (P8276) is mounted on the other side of the service frame and connected to each engine via a flexible cable. Cooling water for the fuel cooler and mobile air coolerstand is piped to a manifold arrangement at the rear of the bedplate and from there via flexibles to their remote locations. Electrical power connections to the dynamometers, and mobile air cooling stand and exhaust extraction system are brought in to a power terminal box also at the rear of the test bed and again distributed to the relevant equipment. For the mobile equipment, long umbilicals from the terminal box are provided.

DYNAMOMETERS

Two precision trunnion mounted swinging frame D.C. machines are supplied installed on the test stand base. Each dynamometer is fitted with a high accuracy load cell incorporating overload protection and calibration arrangements via the addition of certified weights which will be provided. Dynamometer speed is directly measured by a toothed wheel and proximity sensor.

The nominal dynamometer ratings are as follows:

	Machine 1	Machine 2
Maximum speed	6000	6000 rev/min
Maximum power	6.0	15.0 kW
Maximum torque	14.3	47.7 Nm
Armature voltage	400	400 V

The dynamometers are controlled by a Thyristor drive module.

ENGINE SUPPORT FRAME

This is of solid construction providing a solid support for the engine. The platform includes a slide base to facilitate belt tensioning, with an interface plate mounted on top. Engines can then be rigged onto individual mounting plates that have the same bolting pattern as the interface plate, resulting in quick engine installation. The stand is a separate fabrication which fixes to the bedplate via precision machined pads.

Instrumentation

- 8 temperatures
- Cooling air
 - Fuel
 - Exhaust
 - Spark plug gasket
 - Cylinder
 - 3 spare
- 4 pressure transducers
- Atmospheric
 - Exhaust
 - Fuel
 - Air inlet

CONTROL CONSOLE

The system is arranged for either remote direct manual control operation of the major test bed systems dynamometer, throttle, AFR, exhaust pressure and cooling fan, through a manual control desk which interrupts computer control. Alternatively normal operation is via AUTOTEST computer control system. A work desk is also supplied.

AUTOTEST

This is a VMEbus based mini-computer system incorporating two processor cards, hard disk, 3½" disk drive, two high resolution graphics cards, analogue and digital I/O cards. The computer provides the supervisor intelligence for the test bed as well as powerful and accurate data logging/processing in real time.

Through well structured system software the performance, application, ability and flexibility of the system is virtually limitless. Refer to the appropriate manual for a more detailed description.

Autotest is used to control the following parameters:

- Dynamometer demand
- Throttle/Rack opening
- AFR control
- Exhaust Pressure control
- Air Cooling Fan Speed

Additional Information

- Fuel flow via Compuflow
- Air flow via CFM and mass flow computer
- 3 Channel safety shutdown module

NB All computer and electronics equipment are housed in a double 19" 31U high enclosure.

AIR COOLING MODULE

Mobile trolley housing a variable speed fan with short duct discharge, controlled via Autotest. System rated at 25m³/min providing exit velocities of up to 13m/s.

EXHAUST EXTRACTION SYSTEM

Mobile trolley based system comprising an extractor fan and extraction hood which is located on the end of a cantilever arm flexible hose assembly allowing the hood to be positioned in any orientation. Closed loop control of exhaust back pressure valve is via Autotest.

FUEL SYSTEM

Comprises a remote fuel services module, controls, interfaces and connections between the control enclosure, service module and test stand. Fuel handling system is by a Compuflow interfaced to Autotest for averaging and display.

ENGINES

The test bed is designed for use with any engine that is compatible with the power/speed/torque curves of the dynamometers. Engines can be supplied by Cussons or we can modify Customers free issued engines.

SERVICE REQUIREMENTS

- Electrical Supply:-* 415V 3ph 50Hz, 60 amp 5 wire
220V 1 ph 50/60 Hz, 15 amp, 3 wire
- Water Supply:-* Min. 20 litres/min, 1.5 to 6 bar inlet pressure

DIMENSIONS

- Test Stand:-* 1200 l x 1510 w x 1000 h 1030 kgs
- Instrumentation & Control Console:-* 3000 l x 1800 w x 1050 h 1050 kgs

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