

CAS

Real-Time Combustion Analysis System



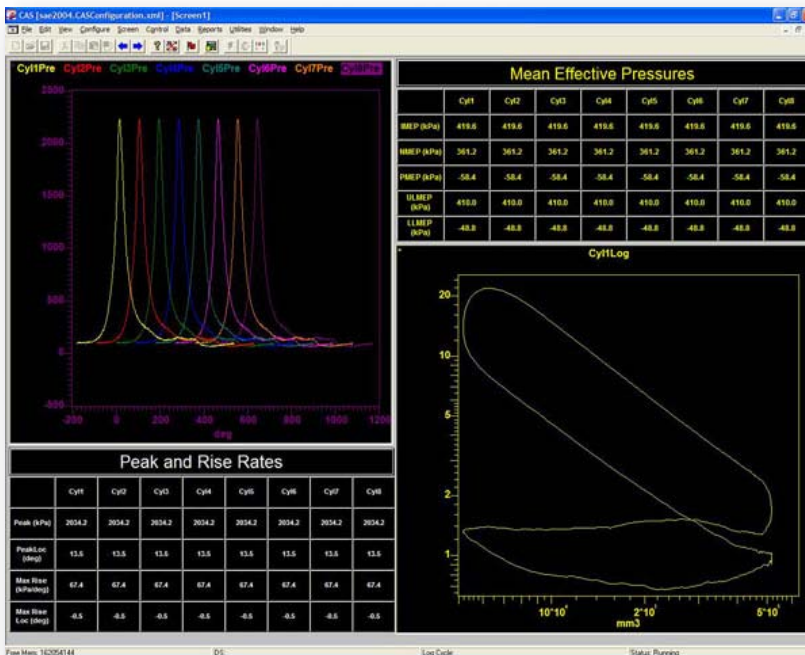
Real-time statistical analysis of combustion data

A&D Technology's CAS Combustion Analysis System is a high-performance data acquisition system. It is specifically designed for combustion analysis of two- or four-stroke gas or diesel internal combustion engines. The specially designed hardware uses an encoder mounted on the engine crankshaft to digitize

pressure signals from piezo-electric in-cylinder transducers. Analog signals from these can be digitized at up to 0.1-degree resolution using an encoder. The digitized signals from these and other transducers can be used to calculate thousands of parameters for evaluating the combustion process.

Features

- MATLAB® interface for custom calculations.
- Flexible o-scope displays any raw input signal or calculated trace, including cylinder pressure, mass fraction burned, heat release, etc.
- Pop-up toolbar allows signal analysis while system is acquiring data.
- Strip charts provide visual representation of any calculated parameter; CAS tables display related parameters in a concise easy-to-read format
- Bar graphics display visual indication of engine parameters
- Indicator boxes provide quick feedback of critical engine operating parameters
- Context-sensitive help



A&D's CAS combustion analysis system provides accurate, reliable combustion data in real time for each cylinder for every cycle.

Real-time combustion data for each cylinder for every cycle:

- Mean effective pressures such as IMEP, PMEP and NMEP
- Peak pressure, location of peak pressure, maximum rise rate and location of maximum rise rate
- Number of cycles with misfires or partial burns
- Needle lift, injector timing and injected mass values for diesel single or dual spring unit injector systems
- Average, upper and lower signal envelopes
- Heat Release
- Burn durations and mass fraction burn calculations with user-defined durations
- Diesel common rail injector timing and injected mass values for up to five injections per cylinder per cycle
- Polytropic coefficients for compression and expansion
- Parameter statistics calculated in real time over a user-specified number of engine cycles

Advanced Knock Analysis

With the advanced knock analysis option, cylinder pressure signals being monitored for knock are digitized at 800kHz, and then filtered using an FFT with up to three user-selectable frequency bands. The FFT allows the user to quantify the knocking energy on up to the third mode of the primary knock frequency. Measuring knock energy at these frequencies eliminates false readings due to passage resonance, or background noise caused by engine operating speed. Anti-aliasing and low pass filters ensure that the high frequencies being measured are generated by actual knock events and not random electrical noise.

True Real-Time Performance

The CAS system uses a very specialized parallel processing CPU to perform all data acquisition operations and combustion-related calculations. This advanced architecture is capable of performing over 3500 complex calculations in the time it takes an engine to complete one revolution. The results, along with the actual signals can be displayed on the system host PC, recorded and stored on the hard drive. By delivering combustion results in real time, control loops can use parameters such as Peak Pressure, Knock Intensity, or CA50 for feedback to the control system.



United States — A&D Technology, Inc.
4622 Runway Blvd., Ann Arbor, MI 48108 U.S.A.
Ph: 734.973.1111 Fax: 734.973.1103
www.aanddtech.com

United Kingdom — A&D Instruments, Ltd.
Unit 24/26 Blacklands Way, Abingdon Business Park
Abingdon, Oxon OX14 1DY U.K.
Ph: 44.1235.550420 Fax: 44.1235.550485
www.aandd.net

