There are many applications available for testing in the automotive sector. From engine monitoring to ECU calibration and onboard devices, it can be difficult to decide which test is best. So what solutions can meet the needs of these applications in a cost-efficient manner?

The solution, proposed by D2T, is modularity. D2T is introducing a comprehensive remake of its OSIRIS combustion-analysis system, including new hardware. This is aimed at meeting the needs for fast combustion-analysis development. The design of this system is based on performance, speed and agility.

As an engine expert operating 30 engine testbeds and 40 customer testbeds per day, D2T is aware of flexibility as the outstanding quality of a test facility. The testbed equipment must be able to be easily integrated into any type of environment, and match with the inherent development of the testbed, which is not a frozen system but periodically integrates new types of engines or measurements.

To this end, the new OSIRIS is fully modular. The fast-acquisition section is housed in a 1U 0.5 19in module with 8-channel capacity. It may be integrated either on a shelf next to the engine or in the measurements box. It can be easily withdrawn from the rack to be fitted to another testbed.

The charge amplifier is a self-contained module, and the test facility’s existing amplifiers may also be reused. If new charge amplifiers are needed, the D2T-developed solution, called ACPM, can be readily connected to OSIRIS via a flat-cable link, making it possible to power up and connect the channels.

Figure 1 shows how the assembly comes up as a single and extremely compact product that can be built in various environments.

A testbed will not always check the same engine. For example, imagine a testbed testing a four-cylinder engine, instrumented with one measurement per cylinder. The first device will measure one of the four cylinders’ intake data, and another, identical device, will measure the exhaust data. In this case, eight channels are sufficient and the configuration shown in Figure 1 will be fully fit for the job.

In a second step, the same testbed is used to check a six-cylinder engine, measuring intake and exhaust data on each cylinder. It is now necessary to change over from eight to 16 channels. This is easier and faster with OSIRIS, where it is only necessary to connect an additional module to the previously used 8-channel module. This makes the whole system work as a single compact unit with a capability reaching 32-channels. This functionality is obviously reversible and it is possible to change over instantly from a 32- or 16-
channel system to several 8-channel systems (Figure 2).

This modularity provides OSIRIS with a fully upgradeable capability necessary for the flexible management of a test facility and for using the equipment in close compliance with the requirements.

“OSIRIS means performance suited to the need: neither too much, nor too little,” says D2T product development manager, Thierry Drecq.

“Your testbed is not always in need of a Rolls-Royce. OSIRIS modularity enables you to tailor your workload to the testbed configuration and to the test to be performed, with the capability to very easily change over from one architecture to another.

“OSIRIS was already a system featuring an outstanding quality/price ratio,” he adds. “This modularity makes it possible to reduce fleet operating cost”.

The growing complexity of testbeds and the increasing number of electronic devices called for a change in system architecture for performing measurements next to the engine. D2T had previously selected a system including a single PC combining the operating system with fast-data acquisition. Now, the PC – or the laptop for onboard applications – stands in the control room as acquisition measurements are acquired as close as possible to the engine to minimize electromagnetic interference.

The components were selected to build a system with a very high reliability level, able to operate in rugged environments and in extremely low temperatures.

OSIRIS is one of the most complete systems on the market. It features a wide range of large standard or optional calculation libraries: PMAX, IMEP, heat release, CA 10, CA 50, polytropic coefficient, knocking, combustion noise, acyclism, and needle lifts. Attending an appropriate training course enables the customers to perform their own customized calculations. The OSIRIS ADC, will ensure direct reception of the computer data, especially with regards to onboard applications.

An essential combustion-analysis feature consists of correctly linking measurements to their positions within the cycle. To properly identify them, mechanical or electronic encoders are used.

D2T has designed an electronic encoder – built in OSIRIS or self-contained, as required. It will match with a wide range of targets beyond the conventional 60-2. In this way it makes it possible to connect measurements to their position in the cycle, whatever the motorization.

OSIRIS was recently upgraded with a new functionality – simultaneous angle and time measurement. This boosts it to a wide range of applications by directing it to a fast acquisition system exceeding the sole-engine combustion applications, making it possible to perform time acquisitions in parallel with the conventional angular ones. These new acquisitions are available over fixed-engine cycle periods, defined in relation to a crankshaft angle, or the TDC. The aim is to provide fine analysis at very high sampling frequencies over some engine cycle periods, and ensure full synchronization with angular data. This function is already implemented on injector adjusting testbeds (control current analysis and injected flow-rate analysis).

In the near future, OSIRIS will use this new mode as an opening to new applications, which will extend the range and enhance the position of OSIRIS as leading multifunctional equipment. New applications include: noise measurement battery voltage, ignition signals, electric motor voltage/current, and OSIRIS’ acquisition of slow measurements, such as temperatures, and slow pressures or voltages (useful for onboard combustion analysis).