

FUTURE TRENDS IN FIELD TESTING

Field-testing for hot / cold environments and durability will continue to have a vital role in vehicle development. However field-testing will have a different focus and style in the future.

The role of field testing to validate automotive systems cannot be replaced because it is the subjective assessment of drivers in “real world” conditions will always be the ultimate assessment of customer satisfaction. Full vehicle testing is also the best way to acquire data on the overall environmental suitability and operational durability of a vehicle.

However, there are clear and established new trends in vehicle testing. Several papers were presented at Testing Expo 2002 that addresses these trends.

We have identified 6 factors behind changes to vehicle testing. The first 3 are:

TREND 1 Reduced / compressed vehicle development cycle times.

TREND 2 Pressure to reduce the number of prototype cars that are built to reduce development expense.

TREND 3 Vastly Improved computer simulation techniques, IT design and environmental laboratory simulation facilities.

These first trends mean that field-testing will focus on:

- Validation of simulations, laboratory test and CAD designs.
- System calibration and full vehicle system integration
- Interaction of sub-systems developed by different suppliers
- Qualitative driving characteristics
- Regulatory and mandatory real-world testing (usually associated with emissions regulations).

Thus field-testing in the future will be shorter and more “surgical” with a clear set of objectives and specific in-house and regulatory testing requirements.

This view of the future dovetails neatly with the next clear, established trend:

TREND 4 Reliable and inexpensive remote data capture and electronic communication and data transfer facilitates facilitate immediate relay of results to the home office.

In the “Old Days” Hot / Cold test crews went to a facility in order to collect data for subsequent analysis. Test crews would often perform additional (redundant) tests in order to gain confidence that there would be sufficient “good” data. – Rather like taking multiple photos of an important event to make sure you get a good one.

Modern data logging and laptop computers mean that one can quickly analyse test data (in real or nearly real time) – thus reducing the requirement for repetitive tests. Once a “good” run has been completed you immediately know, obviating the requirement for additional test runs.

Furthermore, this data can then be immediately electronically transferred to the home office for confirmation that it fits earlier test-bed work or other simulations. Immediate analysis by other engineers can also be undertaken without the expense of them attending the field-programme.

THE IMPACT OF MODERN DATA HANDLING AND IT TECHNIQUES

It used to be that the most important criteria for important criteria for a field test was finding an appropriate road with the right weather conditions. The test team would work in the car or under a shade tree. Now a good, workable office with high-speed Internet access is nearly as important.

The Laptop computer has replaced chart recorders and clipboards as the key tool for test engineers. The selection of laptop computers and its configuration is usually controlled by a company's IT department. Thus they are generally optimised for office work in the corporate network environment rather than field-testing. Therefore, having an office – like environment to allow Internet connection, LAN access, file sharing between team members, printing and back-up facilities are vital.

Test-Trak believes that motor racing currently sets the benchmark for in-field data acquisition and handling. The areas where motor racing leads automotive testing are:

1. Data telemetry
2. Wireless networking of team members
3. Mobile data back-up strategies
4. Speed of data manipulation giving fast response time between measurement, analysis, new calibration strategies. Currently too much time is taken during field tests to transfer data from one application to another with the attendant re-formatting of data before a conclusion can be drawn from test.
5. Dynamic simulation

Data transmission is adequately dealt with (in most cases) by dial-up modem access, but the Test-Trak Woomera facility has faster capabilities. Microwave satellite links to home base can be utilised.

The final of the six major trends that we see are:

TREND 5 Increasing focus on occupational health and safety, industrial relations and human resource issues, and

TREND 6 A tighter and more demanding public liability and property insurance markets coupled with increasing community expectations for safety.

These two final trends create an imperative to use dedicated facilities, closed to the public, with full emergency services available on-site. Detailed risk assessment, environmental impact studies and other hitherto unknown disciplines will be required.

The days of testing on public roads are all but over – except for long-term durability testing of production vehicles under normal customer operational conditions, road laws and normal user driving patterns.

In conclusion Hot/Cold field-testing will:

- Involve shorter programmes seeking to validate or calibrate specific issues. This will probably occur later in the development cycle with pre-production vehicles rather than early build, incomplete prototypes.
- Occur in dedicated / private (closed) facilities
- Include smaller test-teams with IT communication to home base
- Require counter – seasonal (Northern and Southern Hemisphere) weather to fit with shorter development cycles.

ARE PHYSICAL TESTS STILL REQUIRED?

Yes- more than ever!!

1. Cars are more complex. There are more systems that need to interact with each other – typically from different suppliers; eg steering, brake, suspension, engine and transmission to all interact seamlessly.
2. Vehicle electronic software is more complex and needs to be tested in all conditions because the software requires all body sensors. This cannot be simulated on a test-bed and requires real world Hot & Cold testing.
3. On-Board Diagnostics (OBD) systems are becoming more complex and require fault code verification under real world conditions and have a growing regulatory requirement for safety and emissions..

Finally, there will always be a plethora of small details that can only be assessed with a full vehicle and under typical user conditions.

Modern cars are now very reliable so that the customer focus has moved to selecting a vehicle on day-to-day operating issues such as subjective feel, comfort and safety, , visibility, ease of access, control usability and other factors. Just as Ford discovered with the Edsel that a formulaic approach to styling does not guarantee market success, so also does computer simulation and test bed work by engineers does not guarantee market acceptance of a vehicles usability, safety or durability.

Real world users are not the same as designers and engineers. There is no substitute for real world people in real world roads

ADVANTAGES OF SOUTHERN HEMISPHERE TESTING

1. Counter Seasonal to the Northern Hemisphere
2. V-max on closed roads with full emergency response capability
3. Military level confidentiality
4. Stable Political system, with an English based legal system
5. Local support available from the local car manufacturing industry
6. Excellent Freight access
7. Reliable telecommunications
8. Hot testing with immediate Ice & Snow testing in New Zealand is Possible by testing in Australia in March then New Zealand in May, or New Zealand in July then Australia in September.

ADVANTAGES OF REAL ROADS VS PROVING GROUNDS

1. Straight road high speed testing does not introduce suspension variables and fuel handling is not affected by centrifugal force.
2. Steering feel & transient response is better on complex turns found in real roads rather than the manicured turns found in proving grounds.

HOW IS TEST-TRAK ABLE TO ASSIST?

Test-Trak offers the following benefits to European car companies:

1. Dedicated Hot & High Speed testing are with closed roads & full on-site emergency response facilities at Woomera
2. Project management services to reduce the time that overseas test teams need to be away from home, including:
 - Customs Clearance
 - European & North American specification reference fuels
 - Vehicle transport
 - Equipment supply to reduce the amount of equipment freighted to Australia
 - Local accommodation requirements.
3. Supply of local drivers and mechanics to reduce the number of overseas personnel that fly to Australia to only the key skilled & technical personnel.
4. Extremely high levels of confidentiality & security.
5. Data handling, data back-up & software capability.
6. Sequential Hot / Cold testing is possible between Australia and New Zealand.