



# Environmental attitude

Want to know what the future of environmental auto testing looks like? We have the answers

✦ by Brian Cowan



**C**onsider this: severe-climate vehicle testing teams, with telemetry systems derived from Formula 1 practise, using mobile computer servers with wireless connection to a network of laptops. They employ

24-hour, high-speed secure links to home base engineering staff and computers. Tests are conducted with minimum duplication as onsite facilities allow rapid and complete analyses after each run to confirm target acquisition.

Independent of the time of year, such teams follow the desired season (hot or cold) around the globe, at least 10 months in every 12, from the northern hemisphere to the south, and back. For car manufacturers and OEM suppliers, there is no winter or summer but some of their teams live in an endless winter while for others it's an eternal heatwave.


A pipe dream? No, it's already a partial reality and it won't be long before the rest of the pieces snap into place, such is the time pressure on new vehicle development. No longer can severe climate teams afford to wait for the right season and disappear into the wilderness for weeks at a time, returning with masses of data that need analysis before further engineering decisions can be made. There just isn't the time in modern development schedules.

With the competitive pressures of shorter and shorter development times, everybody has to test quicker, smarter, greener. No-one has the luxury of time any more. Temperature extremes are still the target for environmental evaluation, and the wild places are just as wild, but they also need the support infrastructure for quick data acquisition and transmission. Environmental testing, once a drawn-out process, is now targeted at providing near-instant feedback of results so that control modules can be reprogrammed, test parameters remapped, or certification signed off before teams leave the field.

According to Australian-based test coordinating engineers Doug Gould of Test-Trak and Graeme Gambold, a renowned local expert, such a future is very close, with integration of the southern hemisphere into companies' regimes as a counter-seasonal addition to the classic northern hemi venues being a key to the overall strategy.



Test in the cold of NZ's Snow Farm...



...or days later be testing in the heat of Oz's Woomera-based Test-Trak



Naturally, they're pushing the benefits of their own location but, as Gould points out, Australasia offers significant advantages: stable politics, sophisticated transport and communications infrastructures, accommodation and so on. His dream of seeing the region become a significant element of vehicle companies' severe climate programs took a step forward recently when Test-Trak won approval to conduct hot-climate evaluation tests on the rocket test range at Woomera in South Australia. In the near future, he predicts, companies will be able to dovetail hot testing in Australia with cold testing in New Zealand on the Snow Farm facility near Queenstown, which is operated by former sheep farmer John Lee.

"A car can be running in temperatures of -15 Celsius in New Zealand in August, and within little more than a month be subjected to 40° heat in Australia's early summer. In other words, a single prototype can be tested in both hot and cold environments within a very short timespan. The same applies at the other end of the year – from heat in late March in Australia to cold in early May in New Zealand. Nowhere else in the world is this currently possible, and the doubling-up of tests renders the cost of shipping cars to the southern hemisphere much more economical."

He feels that, despite the rise of simulation, harsh climate testing will still be needed: "Computer simulation techniques and environmental testbed facilities are improving all the time, meaning that fewer vehicles need to be shipped to the field at the prototype stage, but field testing for hot and cold environments and durability will still play a vital role in vehicle development. Despite all the information obtained from simulation and the like, you cannot replace field testing as a means of validating automotive systems. The assessment of any assembly under real-world conditions will always be the ultimate predictor of consumer satisfaction.

"The increasing use of entire electronic subassemblies built by outside suppliers that need to interact with many other systems within a vehicle means one of the more critical stages of testing is when they are finally married together in the vehicle, complete with body sensors. This is not something that can be completed on a testbed and requires real-world hot and cold testing. OBD systems too are also becoming more complex and require fault-code verification in real-world conditions."

Because of these factors, Gould sees a

the final full-vehicle calibration and confirmation will be carried out at Snow Farm in the southern hemisphere winter months immediately preceding an end-of-year launch.

"This approach to counter-seasonal testing is good both for TMC and the region. The Snow Farm facility itself, the logistical support, the infrastructure... all make it ideal for Toyota's needs."

However, both men say reduced vehicle development cycle times mean that field testing in the future will be shorter and more 'surgical', with a clear

## "For TMC (Toyota Motor Corporation), Snow Farm in New Zealand is now the primary counter-seasonal cold testing venue and a critical link in the developmental process"



Hot and cold weather tests can be dovetailed; the same vehicle can be subjected to both in just a few weeks

good deal of the emphasis on environmental field testing shifting to later in the development cycle, with preproduction vehicles rather than hand-built prototypes. It is a shift that Graeme Gambold has already observed with Toyota's cold climate testing: "For TMC [Toyota Motor Corporation], Snow Farm in New Zealand is now the primary counter-seasonal cold testing venue and a critical link in the development process. During the two-year development cycle of a new model, the company will do its basic winter testing in the northern hemisphere but

set of objectives and a specific work list. There will be a reduced need for redundant testing to ensure sufficient good data, and what data has been acquired can be immediately emailed to head office for confirmation that it fits earlier simulation and testbed results. This rapid response also allows development teams to immediately rewrite control software and email the code back to the field team who can burn new control chips and be testing them within a day.

Gould says that for future testing, the provision of a top-class field office

## Keep on running

Keeping a test team working at peak efficiency in extreme temperature conditions means more than simply having the right datalogging and analysis equipment on hand. Engineers and drivers as well as the vehicles are put under stress by the combination of long hours (in cold tests often working through the night) and harsh environment.

The correct food is important, which is why each year Snow Farm brings in a chef from Japan to cater to the many Japanese working on the proving ground. Meals are available round the clock in the complex's dining area.





environment with full electronic support facilities is becoming as important as the right extreme climate: "The laptop computer is now the key tool for testing engineers, but because the selection of the computers and their configuration is largely controlled by a vehicle company's IT department with the emphasis on in-house operation, they're often not optimized for field operation. Consequently, it's vital to provide an office-like environment that allows Internet connection and file-sharing between team members with back-up facilities like printing."

He believes that motor racing currently sets the benchmark for in-field data acquisition and handling, not only with its telemetry, but also with its wireless networking of team members, data back-up strategies and speed of data



Woomera's original development as a military range means that, despite its remote Outback location, it offers a first-class infrastructure set-up and good external links

manipulation: "This is an area of vital concern for environmental testing. Currently, too much time is lost on field tests to reformatting data and transferring it from one application before engineering conclusions can be drawn and new strategies mapped out."

Gambold concurs: "A lot of the measurement and data capture equipment that test engineers use is still industry- or company-specific, meaning that in many cases it's not compatible with standard computer operating systems. In addition, the laptops used by the engineers are generally set up to operate in their home-office networks, which often means features that don't translate well to a small network based on a local server, as is ideal for a field team. However, we're starting to see specialized test equipment that's PC-optimized. When that practise becomes more widespread, the sky will be the limit as far as on-site analysis and quick feedback from results is concerned."

Beyond the technical considerations, an increased focus on occupational health and safety plus a tighter and more demanding insurance market will force a trend, with hot-weather testing – traditionally carried out on remote public roads – shifting to dedicated facilities that will provide emergency services, detailed risk assessment and in-place environmental risk plans.

In these respects, Woomera is ideal. It has a top-class communication infrastructure and exterior links, with many kilometers of sealed road suitable for high-speed and hot testing. It also offers extremely high levels of privacy and security. All buildings on the facility have modem links to the Australian telephone system. At Snow Farm, microwave transmitters link to the New Zealand telephone network.



The fact that high-speed driving can be done on Woomera's roads as opposed to the comparatively artificial world of a proving ground is another plus, says Gould: "For the high-speed runs, a straight, level road of the sort Woomera offers does not introduce the suspension compression and fuel-feed variables that you can find with a banked oval, while on the other hand the complex turns of real roads can give test drivers a better feel of steering feel and transient steering response than the manicured turns of many proving grounds."

A drawback with Australasian testing is its distance from automotive manufacturing and research centers, although the extra cost is offset by the political stability of the region, well-established and simple regulations for the Customs clearance of vehicles and entry visas for personnel, quality accommodation close to test sites, sophisticated vehicle transport networks and the existence of local automotive

## Soak it up

Instant contact with the far side of the world doesn't make a severe climate any less hazardous and even the most mundane of tests has to be carried out with an eye on safety. Graeme Gambold tells of the test driver doing heat soak runs in the Australian Outback who had been pistoning back and forth along a 30km (19 mile) stretch of road but made the decision one morning to continue going straight to avoid the blip on the readouts at each turnaround point.

After an hour-plus of driving he'd moved well out of cellphone range when the vehicle was stopped by a minor fault. What had begun as a milk run turned into a long day alone in a flat wilderness in 40° heat before his failure to return in the evening sparked a search and eventual rescue.

engineering industries to supply or fabricate required components.

International cargo links are not a problem. Despite its located in a remote part of the Outback, Woomera has an airstrip capable of handling a loaded B747 freighter, while Snow Farm is served by the international airport at Christchurch, which is 450km (281 miles) away by good highways. Last year, Toyota shipped nearly 40 vehicles and five tons of equipment into Snow Farm for winter testing.

To these intrinsic benefits Test-Trak brings expertise in management services, like arranging Customs clearance for vehicles, coordinating transport, providing equipment and – importantly for environmental certification – supplying European and North American-specification fuels. Test-Trak's ability to supply local drivers and mechanics can also reduce the number of personnel needed to be flown from the northern hemisphere. ●



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