SNOW PATROL

Although winter tyres really come into their own in temperatures below 7°C, for tyre testers the fun starts when there's snow and ice on the ground. Our tame tester, Ray Collier, dons hat and gloves to report from the Arctic Circle

Photos: Owen Brown

As winter approaches some of us pack away our racing cars and use the closed season to think about performance-enhancing modifications. As we have been looking at the influence of tyre choice over the last few issues of *TrackDriver*, we thought it might be interesting to examine the dynamic capabilities of winter tyres. Not for track work, obviously, but simply because we all like to keep having fun in our road cars, even when it's cold outside.

For those readers who don't know, I run a tyre testing company called Tread, and towards the end of every year, when others are tucked up safely in their garages or scoffing a few mince pies, my team and I head out to Finland to help develop the next generation of winter tyres. Seasonal rubber is a legal requirement across large tracts of Europe, and gradually the UK market is waking up to the benefits of winter tyres, too. But perhaps what many people aren't aware of is the fact that the performance of a normal summer tyre drops quite considerably when the temperature dips below 7°C; for that reason summer tyres aren't tested below 5°C. Also little known is that the wear rate of summer tyres increases at low temperature. And all this before we've even seen the first headline where an inch of fresh snow has closed the M1…

So what is involved in a winter tyre test? Well, firstly everything needs to be thoroughly planned as consistency is critical in winter conditions as we don't want anything influencing the results — the two main potential problem areas are temperature instability and track variation. To remove these influences we need to go to a location where the temperature and tracks are consistent and nowhere is better than Testworld in Finland. Testworld's owners have many years' experience of winter track preparation and the winter temperature in Finland is a nice constant -18°C: there are minimal hours of daylight and that lack of sunshine ensures that the temperature is stable throughout the day.

Job one is getting all the tyres measured and mounted in the UK so we can analyse the relevant properties at a normal ambient temperature — it also means that the tyre fitter doesn't freeze to death while putting 80 tyres onto rims in the workshop. Everything is then packed into a large van for a few days' drive north, eventually stopping 185 miles inside the Arctic Circle, home of Testworld.

If we're using rental cars as test vehicles then we have to disable all their stability and traction control systems — although the ABS remains active — to ensure it's just the tyres we're testing and not the individual car's electronics. We also keep the cars and tyres in an unheated store so that they're at the same temperature as the ambient conditions: I see quite a few tests where journalists complain of a performance drop during the test which is because of the tyre being stored in a heated garage and then being taken outside for testing.

Before we can head onto the track the surface has to be prepared. This is usually done the previous night, as the snow has to be packed and graded, and the ice sections brushed and polished. During testing we also have a grader, which is towed behind a 4x4: handling tests cause the snow to ice up and rut, so to ensure each set of tyres receives

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Racelogic VBox (left) and associated ancillaries are wired into the Golf's CAN bus electronicsto precisely record data directlyfrom the car. Small blue box (below, left) measures inertia inthree axes: above it is proof that all of the Golf's electronic nannying systems were turned off. Digital readout (below) allows 'real time' and very accurate display of speed and other data,

the same surface one of the engineers drives the grader round the track after each tyre is tested.

As in other forms of tyre testing, winter tyre tests are conducted to reduce the influence of tread wear. So the ice acceleration and braking are carried out first, followed by the same pair of tests on snow. Testworld has built its tracks on snow-covered land rather than frozen lakes, as the surface is more stable year to year; the team there also stores snow throughout the winter to that there's enough of the white stuff available to maintain the tracks all the way to the end of the season.

During these tests you start at one side of the track and once you reach the end you turn around and move the car half a width across and repeat the test. This ensures each tyre has a fresh surface and any directional influence is removed from the test. I use a mathematical algorithm to throw out any results too far from the average, thus mitigating the effect of the odd random reading.

After the acceleration and braking tests are done it's onto the more fun bits. The ice handling tests require a great amount of skill because the co-efficient of friction, or Mu, is so low. And as a driver you have to ensure that you don't influence the result by going faster and faster, or by anticipating the car's behaviour — I tend to assess my lap times as well as my subjective scores. I frequently also repeat the tests during the day using the reference tyre as a way of keeping tabs on whether my lapping remains consistent, and that the track conditions haven't changed significantly. If you clip the apex any snow must be brushed away so it doesn't change the grip level and it usually costs you a beer to the proving ground maintenance guys.

After the ice testing comes snow handling, which is my personal favourite of any tests summer or winter. Speeds can exceed 80mph on the faster tracks and the precision required is very high: a big SUV like our Touareg will go a long way into the snow bank if you make a mistake. And while snow looks fluffy in photographs, in reality it's not, the stuff forming the banks edging the tracks usually taking the form of hard-packed ice and often hiding big rocks. Meanwhile, the extreme low temperatures make plastics very brittle, so it's all too easy to smash bumpers and underbody covers. Also, if you crash into a snow bank it takes a very big tractor to haul you out again: the cost is more beer plus teasing at the bar, coupled with the risk of tyre damage which can end the test.

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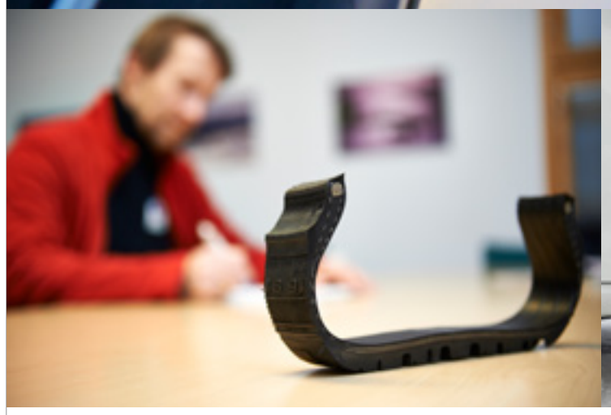

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When testing I'm looking for steering response both initially and then when the car is in the curve, plus the response in slip — can I tighten the line with more steering or does the grip saturate and the car slide wide? I also look for the handling balance: is it understeer biased, neutral or oversteer dominant? Even a Golf Mk7 with the ESP off will oversteer easily if the tyre balance is poor. The braking feel, slip point, acceleration grip (traction), and steering weight and precision are all key factors. We also consider more extreme situations, such as mid-bend lift-off and braking in the turn, all of which have a weighting factor applied to ensure every attribute of every tyre is assessed.

Engineering a good winter tyre is not all about a grippy compound; the tyre's structure has to complement it, and winter testing is much more critical for assessing these traits. But without this analysis and feedback the engineers don't know which features within the tyre are working or require changing to improve the performance. As it's not a one-stop test we evaluate all the results and then build new tyre specifications, returning to Finland after a few weeks to make sure the changes have worked.

In the meantime the wet and dry performance of the winter tyres will have been evaluated to ensure they work just as well on wet and dry roads. Ultimately the compromises of using a winter tyre in regular conditions are very small, but by comparison a summer tyre in winter conditions has a huge performance drop. So my recommendation is to fit a set of winter tyres around the end of October and smugly pray for snow: if it does come you'll be able to pop out for milk via the M1, waving at the news reporters as everyone else slithers to a halt on the hard shoulder.

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