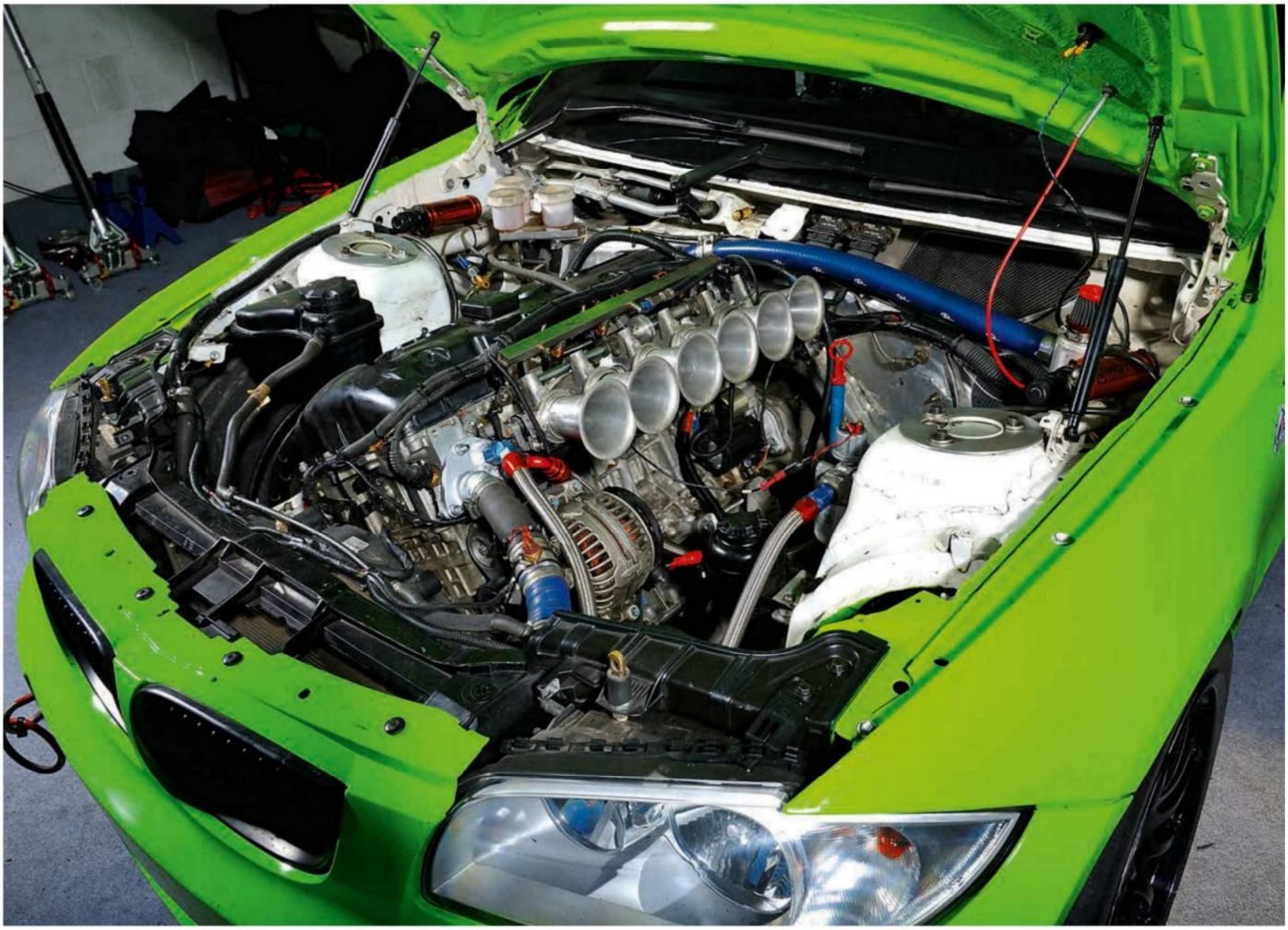
# New Dimension

**There's more to building a 24-hour endurance racer than you might think but what better choice than a 1 Series, even if this one does have some tricks up its sleeve…?** Words: Simon Holmes Photography: Matt Woods


24
sparco
TOW




WWW.BRUNSWICKRACING.CO.UK

To create a successful racing car it's logical to expect the key ingredients to revolve around a highly tuned engine, a capable chassis and primarily, reliability. And usually that would be correct, but those key factors do depend on the format. Whilst they may be appropriate for a few sub one-minute laps around Brands Hatch, racing flat-out for 24 hours straight brings on a whole new dimension to the successful racing car recipe. Not only does reliability become even more important, so does a new consideration; economy. We're not just talking fuel consumption either. Factors such as controlling tyre wear, managing operating temperatures and reducing driver fatigue suddenly become as crucial as outright speed.

"One of the initial challenges was to keep the differential and transmission cool – we found that was the Achilles' heel with the car after long use," explains James Thorpe, owner of this race car and one of its four drivers. "It does a litre of fuel every minute on track so the big 90 litre tank fitted gives us about an hour and a half at a time between stops, so it doesn't get much of a break."

Endurance racing is the most demanding of its type for both the car and driver and it's just as important to be consistent hour after hour as it is fast. That requires the car to be built in a particular way as it must be easy to refuel, easy to work on and above all, easy to drive.

James has been racing for 17 years now and although it's always been a hobby things have got a little more serious since those early days: "I began racing in 1997. A friend of mine suggested it to me so I had a go and enjoyed it, and I still enjoy it now. I started with a Honda CRX and then I raced in the Super Coupé Cup with a Rover 220 Turbo and won the series. I've done lots of other racing over the years since and raced a classic Lotus Cortina in 2012," recalls James.

However, after nearly a decade of racing, James realised that for the amount of investment in both time and money, the amount of physical seat time actually racing didn't seem to balance out. That was what initially attracted him to endurance racing back in 2006: "Rather than doing five or six races of only a few laps, paying for each event and travelling to and from the track I just thought you get a lot more bang for your buck and more seat time in a 24-hour event."

So James decided to move it up a notch and enter the Britcar 24-hour race at Silverstone. This required a new car to be built and being a BMW fan he chose a 1 Series, which were still relatively new at the time. So when the car was just two years old he purchased this totally standard, 2004 116i in white.

"It was one of the first off the production line," he says. "I've always liked BMWs but I chose it because I wanted something a bit different and because it's light. And due to regulations I was limited to a 3.0-litre engine, so I knew it could be converted to 130i spec straight away."

The task of transforming the car into a fully-fledged, endurance racer was then carried out by a specialist. It began with a full strip down before a comprehensive roll-cage was welded in place to make it safe and to add some structural rigidity to the four-door shell. The N52 engine was fitted with Motec standalone management and complete running gear from a 130i was installed along with uprated suspension and AP Racing brakes that used to call a touring car home.

With the basics out of the way, the car was then adapted for endurance racing, so air jacks were fitted to allow quick tyre swaps and a larger fuel tank was fitted in place with twin fillers for quicker refuelling stops. Inside, the original instruments were all replaced with a standalone Stack dash display to monitor all the car's vitals in one place and polycarbonate windows were installed with plenty of ducting to allow cool air to pass through the cabin. These additions would crucially help a 90-minute stint in the driving seat seem less tiring.

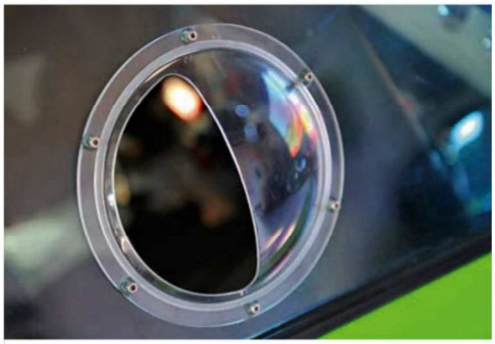
The car was prepared in the space of two years and by 2008 it was ready to race. First time out, in the 24-hour event at Silverstone it managed third in class, which was a result James was pleased with. However, the season proved the car needed to be refined further to be more competitive, and it needed to be easier to drive. Having noticed the presence of another 130i campaigned in Britcar by Brunswick Racing, James entrusted them to refine a few key areas. But what started out as a mild revamp soon turned into another full-blown rebuild as parts of the car were redesigned and rebuilt.

First off was the handling. As it was, despite the uprated suspension and wide slicks, James found the car had developed a nasty tendency to hop around corners, upsetting the fluid balance of the car. It was soon discovered that the rear suspension components were to blame and it just so happened the team stumbled upon the perfect solution, as Dave Ashford, head of Brunswick Racing explains: "When James brought it to us the car handled badly. It turned out to be the rear lower arms themselves. They were made from pressed steel and were effectively buckling under strain and then spring loading, causing the car to hop," he tells us. "But it just so happened we had an E92 M3 rear beam sitting in the workshop and we noticed it looked similar, so we offered it up."

It was a stroke of luck, as the beefier axle was a direct fit that required no additional fabrication and it also gave an increased track thanks to the extra width. At the same time, the axle was solid mounted and the original anti-roll bar was strengthened, too. "We did everything we could to reduce any kind of flex in the back end and it's worked well. We're pleased with the results and it handles so nicely now, it's very balanced," Dave enthuses.

Next of the major changes was the engine. The 3.0-litre N52 engine was reliable but James felt it was lacking power and more importantly lacking torque, which made it harder to drive fast for extended

**Left: The 130i N52 engine has been heavily modified to remove the Valvetronic system and replace it with a set of throttle bodies from an E36 M3**




Above: James also drives the stunning 2002 prepared by Brunswick Racing

periods on track. The obvious solution would have been to fit a 3.0-litre E36 M3 engine, but Dave didn't want to as the car now handled so nicely with the lighter engine he felt the heavier, iron block M50 engine would detract from that. He also happened to like the N52 so instead he went about modifying it to suit James' request for more power.

However, this caused issues. The problem stemmed from the complex BMW Valvetronic system fitted to the engine that used the valves to control the amount of air passing into the engine at certain times. After initially trying to work with it and around it, the decision was made to eliminate the Valvetronic system altogether and revert back to a regular twin-cam and inlet setup. That's when the M3 parts bin was raided again… "We happened to have an E36 M3 head spare and we tried the throttle bodies against the N52 head. The port spacing was near-perfect and it just required the head to be redrilled and tapped for new studs for it to fit. The standard ports are really good so we didn't port it, we just gave it a clean up," explains Dave.

Once mapped using the existing Motec management the result was 245lb ft; a very impressive 40lb ft gain and some 25 per cent up on standard along with 285hp.

The last hurdle to tackle were the brakes. The large callipers were working with the standard servo still in place and although they physically worked well there was no feel to them, as Dave recalls: "They were vague and it was either all or nothing. So we removed the servo and adapted a bias pedal box from an E46 M3 to fit in order to get some feedback and feel, so when it did lock up it was easier to modulate."

To complete the car's evolution, the bumpers were replaced for M Sport items and it was treated to a new coat of paint to replace the original white it was still wearing. As with everything else on the car there's


CORBEAU
WWW.BRUNSWICKRACING.CO.UK
TOW

a reason behind the choice of green, selected because it's actually luminous. This way it was easier to see visually and therefore safer during the car's stints at night during the 24-hour races.

The car is now back together and testing is almost completed so it's ready to race, and although plenty of work has gone into the car to make the throttle bodies and rear axle work, Dave tells us the hardest part was setting the car up to be neutral. With three, four or five drivers racing it hour-after-hour in an endurance race and no way of adjusting any settings to tailor-suit the driver, the car has to be able to match everyone's driving style.

"We had to play with the suspension settings a lot to get everyone happy with the car," Dave tells us. "We eventually opted to fit softer rear springs and a stiffer anti-roll bar as a nice balance and it's really good now. There's better feel and grip and it turns in nicely. Then it just squats and puts the power down so you can get on the throttle really early. The power comes in very linear and early, and just holds on. It's really impressive on track."

James agrees. "It's easy to drive and keep in the powerband at all times and the extra torque means it's easy and fast, which is what you want. I've haven't been able to race the 130i for two years so I'm keen to get out there with it and see how it goes."

It's hard to believe this car started out as a standard 116i but it's now been developed into a finely honed racer that should do well on track. With plans to take on the 2014 season we wish James and the team at Brunswick Racing the best of luck

Right: Testing so far has been good and James is happy with the car. It's due to compete in 2014


## 130i Racer

**ENGINE & GEARBOX:** N52 3.0-litre engine, Valvetronic removed, E36 M3 throttle bodies adapted to fit, Motec management, custom exhaust system, standard gearbox, high-performance clutch

**CHASSIS:** Intrax remote reservoir dampers, solid mounted E92 M3 rear axle, strengthened anti-roll bar, air-jacks

**BRAKES:** AP Racing callipers from a Touring car, E46 M3 bias pedal box

**WHEELS & TYRES:** 9x17-inch Team Dynamics Pro Race 1.2 wheels with range of slick/wet tyres

**INTERIOR:** Fully stripped, multi-point roll-cage, Corbeau and Sparco racing seats, Stack dash, custom fuel cell

**EXTERIOR:** M Sport bumpers, fibreglass boot and bonnet, polycarbonate windows, luminous green paint, ATL quick fuel filling points

**THANKS:** James Thorpe and the team at Brunswick Racing