

“The wing’s in the boot, sir!”

Andrew Charman looks back two decades to an aerodynamic controversy that changed Touring Car racing, and discusses whether it could ever happen again

SUNDAY May 29 1994, Oulton Park, Cheshire – the British Touring Car Championship’s 2-litre era, soon to become renowned as Super Touring, is at its height. Thousands of spectators are pouring into the circuit even to watch qualifying for the following day’s round seven of the series.

As the crowds head in, however, the red transporters of the Alfa Corse Alfa Romeo team are already heading out of the gate and on the long road back to their base in Turin, Italy.

Oulton Park marked the tipping point of an increasingly bitter battle over aerodynamics that had been raging ever since the two Alfa Romeo 155s arrived in the BTCC at Thruxton in early April, and then proceeded to win five of the first six races.

Giorgio Pianta, head of the Italian manufacturer’s Alfa Corse motorsport division, had seized upon what he saw as a loophole in the technical regulations and exploited it to overcome an aerodynamic deficiency with his cars. Others cried foul, the fallout eventually reached the RAC tribunal room, and the result would within months fundamentally change 2-litre Touring Car racing.

Peter Riches, today the technical director of the BTCC, was during those controversial days in only his second year as series chief scrutineer. Two decades on, he is confident that the modern-day BTCC, with its NGTC regulations, could never again become embroiled in the arguments that characterised the 1994 season. But before we detail why, some history...



Jakob Ebrey/BTCC

ABOVE Scarred by the Alfa wing scandal, the BTCC now performs wind tunnel tests on any potential new entrants. Here the prototype NGTC racecar is seen in the MIRA tunnel



ABOVE & BELOW In supplied road form (above) the rear wing of the 155 lacked the packing spacers used to extend it upwards on the racecar (below)

So Alfa closely studied the FIA regulations for 2-litre Touring Cars, and in particular the requirement for 2,500 road versions of a particular model to be produced to make it eligible for FIA homologation for racing, and hit upon a solution. For 1994, parent company Fiat produced a 'special edition' version of the road 155, dubbed the Silverstone and with a kit supplied in the boot.

Included were spacers that were 61 mm high at their front edge, 65 mm to the rear, and which raised the rear wing into cleaner air coming off the roof of the car. There was also a front splitter that could be mounted in two positions, the second significantly ahead of the front air dam to effectively line up with the front of the bodywork.

“The BTCC’s big guns were left looking like April fools”

The kit even included the 30-plus pop rivets needed to secure the additions, and full fitting instructions with measurements. Alfa Romeo submitted the 155 Silverstone to the FIA and it was duly homologated, thus making it eligible to race in the BTCC.

Throughout official pre-season testing the team kept its aerodynamic aids under wraps, finally revealing them for scrutineering before the first round of the series, at Thruxton on Good Friday – and on Easter Monday, race day, the BTCC’s big guns were left looking like April fools. Team leader Gabriele Tarquini had dominated every practice session and he led the race from start to finish.

LOUD COMPLAINTS

At Brands Hatch two weeks later Tarquini was undoubted number one, with his young and inexperienced team-mate Giampiero Simoni now adding to the domination in second spot. At Snetterton a fortnight on, Tarquini hit problems in qualifying, so Simoni took the pole and Tarquini won the race from fifth on the grid.

By now, however, the loud complaints over the add-on aerodynamics were being heard. Stung into action, the FIA had issued a 'clarification' stating that any additional components fitted to a car must be installed ►

ALFA WINGS IN

At the start of the 1994 season the BTCC was entering only its fourth campaign as a purely 2-litre formula and the phrase 'Super Touring' was still new to many observers. But the popularity of the championship – built on the original idea of racecars that looked just like the sales repmobiles populating the UK’s motorways – had mushroomed, and the big manufacturers wanted in.

Ford had debuted its new Mondeo halfway through 1993, even before the road car was launched, and with the race version immediately on the pace the Andy Rouse-run team was expected to be the one to beat in 1994. Renault was upping its game with the new and very slippery

Laguna, while the arrival of Alfa Romeo and Volvo increased the BTCC’s manufacturer count to an unprecedented 10.

Alfa planned to campaign its 155 model in Britain and signed up top team Prodrive as its UK partner, though the squad would be run out of Turin. At the launch announcement Pianta also stated, to murmurings of discontent, that the racecar would be a 'homologation special' – something that simply did not fit in with the road-based image of the BTCC.

The 155s had competed in Touring Car series in mainland Europe in 1993. When they first came up against the Mondeos, at the season-ending FIA Touring Car World Cup at Monza, it was clear that the red cars were inferior, particularly in the aerodynamic department.

Jakob Ebrey

on the manufacturer's production line. The RAC, governing body of UK motorsport, enacted the directive immediately, and the Snetterton race was Alfa's first without the rear wing extensions.

Scrutineering the 155 at Snetterton, Peter Riches also rejected the front splitter in its extended position. Alfa Romeo appealed the decision on the basis that the splitter was fitted to the road cars before they reached customers (whether in its retracted or extended position), and Riches was overruled by the meeting stewards, who permitted the Alfas to race with the splitter extended. Ford Team Mondeo immediately announced its intention to appeal this decision to the RAC.

LOSING POINTS – AND COOL

At the next meeting, Silverstone, Alfa finally failed to win – but only because Tarquini was caught up in a race-ending accident early on. Before the next round at Oulton Park, an RAC Tribunal heard the Team Mondeo appeal, by which time Rouse had obtained a road-going 155 Silverstone and made it available to the tribunal.

After seeing the splitter, which either in



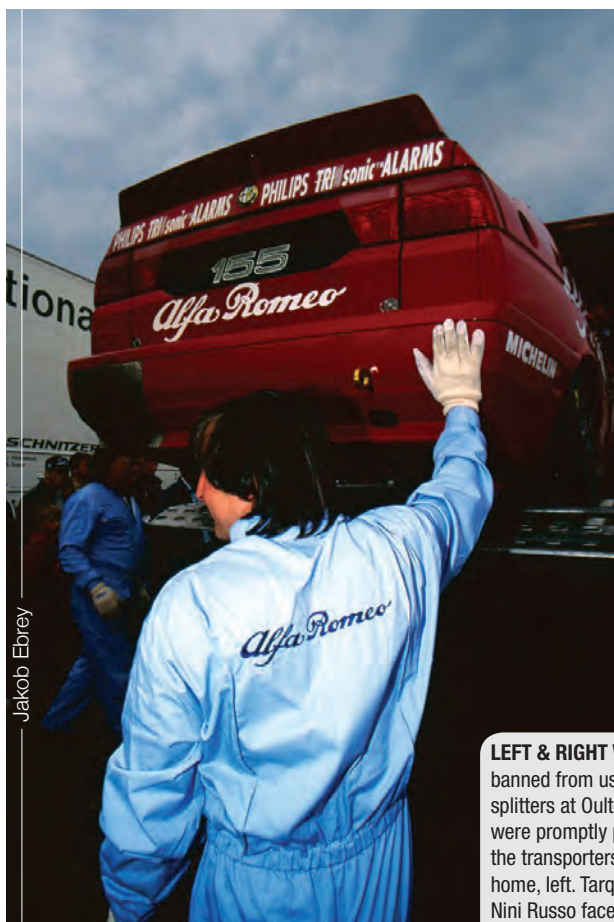
ABOVE As Tarquini's Alfa Romeo accelerates away into a practice session at Brands Hatch, passing another 1994 headline-maker in the Volvo 850 Estate, the Alfa's extended rear wing is clearly visible

forward or rear form was secured by some 31 pop rivets expected to be installed by the dealer, the tribunal decided that it infringed the FIA's ruling on 'add-on' components. Alfa Romeo lost its points from the Snetterton and Silverstone races, and was told it could only compete with the splitter in its original, retracted position. The team was defiant, however. In pre-meeting testing at Oulton Park the 155s

ran with splitters extended. The scrutineers stated firmly that they must be retracted before the cars could qualify or race, and Alfa Romeo went home – much to the disgust of a growing army of UK fans.

Now it was the Italians' turn to appeal. Before this could be heard, however, on June 9 the FIA issued another clarification of its Class II (2-litre or Super Touring) regulations. To be homologated cars ▶

“ Away from the smooth surface of a race circuit, an extended splitter was anything but practical”



LEFT & RIGHT We're out of here: banned from using their extended splitters at Oulton Park, the Alfas were promptly packed back in the transporters and headed for home, left. Tarquini and team boss Nini Russo face the cameras, right



should be in a form delivered to customers 'entirely completed', so parts supplied with a car but not fitted to it could not be used for racing.

Already homologated cars such as the 155 Silverstone had a valid claim to race with bodywork in any road-legal position, stated the FIA, but as this was not the intention of the rules, to be able to race in the category's World Cup event at the end of the year, and the FIA Asia-Pacific Championship, manufacturers would have to indicate the 'entirely completed' position of any adjustable bodywork on the homologation form, and race with it mounted in that position. So for example, for the 155 Silverstone to race with splitter extended, all road versions of the car must be supplied

“The age of aerodynamics had arrived and some of the purity of the original 2-litre vision was lost”

this way – and away from the smooth surface of a race circuit, an extended splitter was anything but practical...

The FIA added that it was up to national authorities to decide when to adopt this regulation but it should not be before July 1 1994. The RAC happily seized the opportunity for compromise. Alfa Romeo's appeal was allowed, its points returned, and the 155s allowed to race with their extended splitters until July 1, after which they had to adopt a fixed position. Other

big-budget manufacturers took their opportunity too, and the first race after July 1, at the Silverstone Grand Prix meeting, saw BMW and Renault debut newly homologated wing and splitter packages.

Alfa's advantage had been pegged back, and the second half of the season was more difficult for the Italian team. But the early-season domination had proved decisive and Tarquini became the 1994 drivers' champion, Alfa securing the manufacturer and team titles.

FAR-REACHING CONSEQUENCES

The aero controversy had more far-reaching effects, however. Before the 1995 season, the FIA decided it had to act to prevent a similar occurrence in future. So the minimum number of road cars built to meet homologation requirements was increased ten-fold to 25,000, but manufacturers were also allowed to homologate specific wing and splitter packages for racing, within strict dimensions.

The design of the front air dam and the splitter mounted below it was not regulated. However, it was not permitted to project beyond the bumpers of the original road car when viewed from above, and it had to be 45 mm above the ground with the car at rest.

The rear wing, complete with endplates and mountings, was required to fit within an imaginary box measuring 150 mm square when viewed from the side of the car. The wing was not permitted to extend beyond the bodywork in any plane and the endplates could not extend above the wing itself.

While the ever-secretive teams always refused to discuss figures, it's generally accepted that thanks primarily to the splitter far more efficiently channelling air passing under the car, overnight Touring Cars gained around the same amount of front-end downforce that they had suffered as lift previously. The age of aerodynamics had arrived, braking distances tumbled and became more critical, and some of the purity of the original 2-litre vision was lost. ►



ABOVE & BELOW Unlike the racecar, the front spoiler of the road-going Alfa 155 Silverstone provided by Andy Rouse to the RAC Tribunal (below) had its splitter mounted in the rear position



Racing to court

THE FILE provided to Race Tech detailing the controversies of the 1994 season is a very thick one. It contains many, many pages of lawyers' submissions as the result of the BTCC organisers and teams, in particular Alfa Romeo and Ford's Team Mondeo, spending a great deal of their time in judicial proceedings.

Matters finally came to a head in the RAC Tribunal that resulted from Peter Riches' rejection of the extended Alfa front splitter at Snetterton. It would subsequently result in the Italian team walking out of the Oulton Park meeting.

The Eligibility Panel of the RAC British Motor Sports Council met on May 27 1994, as a result of Team Mondeo appealing the decision of the Snetterton stewards to overrule Riches and to allow the Alfas to race with their front splitters extended.

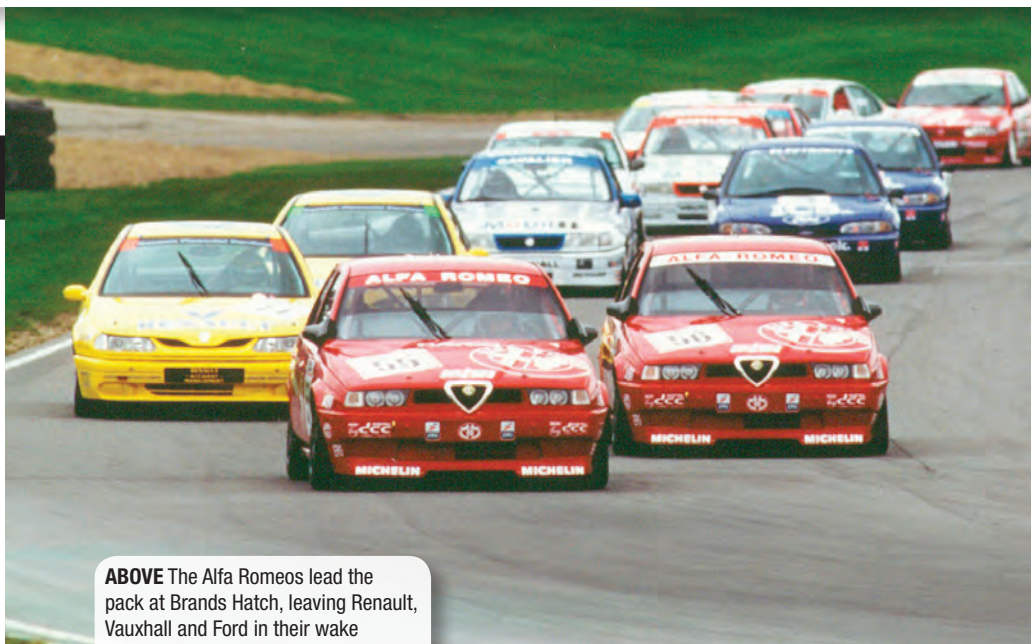
Detailing every aspect of the reasons for the appeal would result in a very boring issue but the major points argued included:

From Team Mondeo

- The FIA homologation papers for the Alfa 155 were flawed because every car of the 2,500 minimum production should be identical – two versions of the car (ie with splitter in and splitter out) could not exist.



ABOVE With the car on a ramp the 31 pop-rivets required to secure the splitter were clearly visible



ABOVE The Alfa Romeos lead the pack at Brands Hatch, leaving Renault, Vauxhall and Ford in their wake

- Alfa should be able to show that all 155 Silverstones had been delivered to the customers with the front splitters in the forward position. Team Mondeo argued that this was not the case.
- Because the homologation papers were flawed, it was not possible to scrutineer the car and as a result it was ineligible to race in the BTCC.

Andy Rouse even provided an example of a 155 Silverstone road car to the tribunal, which the team had purchased from an Alfa Romeo dealer. This, it was said, had been provided without the extended front splitter fitted, the salesman saying that these were only fitted "to cars that raced on the track", but that it could be added at the car's first service if requested.

The team also quoted examples of 155s seen in other dealers and even in the paddock at race meetings with the splitters mounted in the rear position.

The Snetterton stewards' reasons for allowing the car to race included a contention that the splitter was adjustable, having two mounting points as standard. Team Mondeo argued that to adjust the splitter from rear to front position would involve drilling out all 31 pop rivets, drilling 31 further holes and fitting new pop rivets, after obtaining said rivets.

From Alfa Corse

Defending its case, the major points of the Alfa Corse argument included:

- Homologation was solely the concern of the FIA and the car had been properly homologated.

- The homologation papers included the fitting of the splitter in two positions, and this was not the first time an adjustable spoiler had been homologated, Alfa quoting examples of the Lancia Delta's rear spoiler and the front spoiler of the Ford Escort RS Cosworth.
- The only requirement for the 2,500 production run of road cars was that they be fitted with a front spoiler, not for them all to be fitted in either the forward or rear position. Alfa argued that it was normal practice within Fiat Group for road cars to be fitted with any spoilers at the dealer, to avoid damage in transport.
- The FIA had not been challenged over the homologation of the car.

Alfa Corse flatly refuted all of Team Mondeo's submissions, including the purchase of the road car without a front spoiler fitted, arguing that it was the urgency of the purchaser that had resulted in the front splitter not being fitted before the sale, and even supplying evidence that shortcomings in the particular dealer's sale process had been revealed by the incident.

Alfa Corse concluded that in a reversal to most homologation arguments, the scrutineer at Snetterton (Peter Riches) and the Appellant (Team Mondeo) were asking that the car be excluded because it complied with its homologation. The RAC Tribunal disagreed, excluded the car, and the Oulton Park bank holiday crowd were denied the sight of racing Alfa Romeos... **RT**

ENTERTAINMENT v ENGINEERING

So, two decades on, could the BTCC ever see another aerodynamics scandal to the contentious levels of 1994? It is very unlikely.

First has to be considered the fact that the makeup of the championship has changed fundamentally since the glory days of Super Touring. Then the series was dominated by manufacturers that were spending increasingly mushrooming budgets. Today, there are only two officially recognised manufacturers, Honda and MG, in a BTCC that is dominated by private entrants filling out a 31-car grid, bigger than in even Super Touring's most successful times. And should the two manufacturers – or a new entrant coming in – want to throw money at their race programme in search of success, they could only spend it, to quote BTCC head Alan Gow, "on a bigger awning to entertain their guests."

“Rear wing angle can be adjusted upwards by two degrees or downwards by three degrees”

This is because cost control is a very strict part of the tightly regulated NGTC formula produced by championship organiser TOCA. This extends to aerodynamics, with measures taken to ensure every entrant has virtually the same aerodynamic performance whatever the model of car.

The front ends of NGTC cars must generally replicate those of their equivalent road car and are combined with rear wings standard to all the cars and supplied by GPR Motorsport. A mounting point for this wing was originally determined in February 2011 during wind tunnel tests carried out at MIRA, Warwickshire.

The prototype car for the NGTC formula was built as a Toyota Avensis, so the BTCC

placed an Avensis road car in the MIRA wind tunnel and fixed the wing in a suitable position on the rear boot lid. The resultant rear downforce, 269 Newtons measured at an effective speed of 150 km/h or 93 mph (the actual wind speed used is 100 km/h or 62 mph with the results extrapolated up to 150 km/h for consistency), provided the baseline figure that would be used, and is still used today, to determine the rear wing mounting positions of all models that compete in the BTCC.

With each new model announced, the procedure has been the same – before the season begins a road version of the car a team wishes to race with is taken to MIRA, the rear wing mounted upon it and its ▶

BELOW Wind tunnel tests on the Avensis road car produced the reference figures that are used as the baseline for rear wing mounting positions in the BTCC

Jakob Ebrey/BTCC



aerodynamic figures measured. The wing is then adjusted, in both angle and mounting point, until the data falls within 2% of the original Avensis figure. The only exceptions to these figures involve rear-wheel drive cars as will be detailed shortly.

This test provides each team with a stipulated mounting location and 'zero point' angle for its rear wing. This angle can then be adjusted by teams at races within closely set parameters, upwards by two degrees to improve downforce or downwards by three degrees to reduce drag.

To provide examples, two BTCC entrants who submitted cars for tests before the start of the 2013 season were Tony Gilham Racing and West Surrey Racing.

Tony Gilham Racing wished to race with a VW Passat CC and duly dispatched a road version to MIRA's Full Scale Wind Tunnel for testing. This tunnel can measure drag, lift and side force, rolling, pitching and yawing on its 15.24-metre long, 7.94m

wide and 4.42m high test chamber.

The initial test was carried out with the same settings as the base Toyota Avensis, ie with the wing in the same mounting position, which on the Passat mounted it at an angle of 6 deg nose-up (the reference point for the angle being the inner door sill line of the car). This produced a downforce figure of some 352N – 83N better than the Toyota.

In total a further 11 tests were conducted, partly due to some play in the wing mount being discovered during some of the runs which skewed the results. The wing was moved up and down through the choice of 24 bolt mounting holes provided and its angle changed, until similar figures to the Toyota were achieved.

The final position placed the wing trailing edge 1150 mm from the screen/roof intersection, and 73 mm from the vertical line upwards from the rearmost point of the car. The determined wing angle was 8 deg nose-up and the position of the bolts of both the bracket mounting the wing assembly on the car and the mounting of the wing itself on the bracket moved compared to those of the Toyota.

Similarly when West Surrey Racing provided a road version of the BMW 1 Series for testing, the initial run produced rear-end downforce of some 447N. A further seven tests were conducted, initially changing the angle of the wing to 7 deg nose-up. The final configuration chosen placed the wing five bolt holes down from the first test and at an angle of 3 deg nose-up, producing

Fast reactions

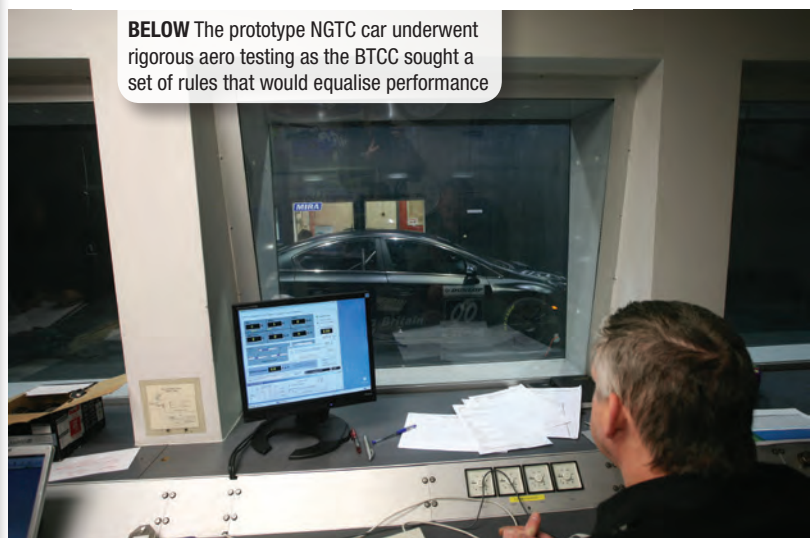
NOT generally known from the 1994 controversy is that while immediately protesting the eligibility of the Alfa Romeos following their Thruxton debut, rival teams equally rapidly began designing their own, similar solutions to the 155 Silverstone.

Within 10 days Ford was submitting drawings of rear wing packing pieces and front spoiler additions to the FIA with the aim of having them homologated, the parts designed to be dealer-fitted to a version of the Mondeo dubbed the 'Monza'. Within another week Vauxhall had done the same, other manufacturers following suit and even testing with such devices.

The subsequent rejection of the Alfa's additions meant that none of these proposals ever saw a race, but they were a precursor to the toned-down aerodynamic aids that were permitted from July 1 1994, and the wings and splitters that became a part of the FIA 2-litre regulations, and thus the BTCC, in 1995. **MT**



ABOVE & BELOW Rival teams were forced to react to Alfa's aero coup. The BMW and Renault (above) both sprouted rear wings not seen earlier in the campaign (below)



BELOW The prototype NGTC car underwent rigorous aero testing as the BTCC sought a set of rules that would equalise performance

a figure of 274.1. The trailing edge of the wing on the racecars would be at a distance of 617 mm from the intersection of the rear windscreen and roof, and 78 mm from a vertical line running from the rearmost point of the car's rear bumper.

However, as more rear-wheel-drive cars have come into the championship, principally the BMWs and the Audi A4s of Rob Austin Racing, experience has shown that their characteristics have major effects on the aerodynamics, with the originally chosen wing positions producing less-effective downforce and thus excessive understeer compared to their front-wheel-drive rivals.

Therefore new calculations have been necessary, and now the figures for the BMWs, for example, are very close to those of the original baseline. The rear wing is mounted with its trailing edge 661 mm from the screen/roof intersection and 20 mm from the rear bumper edge, and at an angle of 2 deg nose down.



ABOVE This picture from the recent BTCC round at Knockhill clearly shows the variety of rear wing mountings on the NGTC car, all achieving effectively the same aero values

Jakob Ebrey/BTCC

As stated this produces a rear downforce figure of 447N, but is compensated for by the aero drawbacks of the rear-wheel-drive transmission.

Note that in many cars the final determined wing position has been significantly nose-up. This first occurred with the second car tested, the Rob Austin Racing Audi A4, in March 2011, and led to TOCA changing the specification of the rear wing effectively to avoid it looking odd. Already fitted with large endplates to generate potential advertising space for

teams to sell to sponsors, the rule tweak specified that no matter what the angle of the wing, the endplates must remain parallel to the door sill reference line.

By carrying out these tests, TOCA has removed the need for teams to spend large amounts of money testing aerodynamic configurations in wind tunnels, and at the same time very likely removed any chance of a repeat of the Alfa Romeo affair. Should a manufacturer want to spend millions on creating a special edition road car with a bespoke front end crafted to produce

excellent aerodynamics, any advantage gained will simply be negated by the placing of the rear-end aerodynamics during the pre-season test of the road car.

Teams do still work hard to gain an advantage, however – some have pushed the envelope regarding TOCA's intention that the cars employ front ends that reflect the road cars they are derived from, though mainly by adding extra holes in an effort to improve engine cooling. So before the 2014 season TOCA tightened up the front-end regulations, emphasising the requirement for maintaining a road-car appearance, and adding that all manufacturer badges and the shape of the grille should be retained. The Ford Focus entries were notably affected by this clarification.

The close monitoring of aerodynamics is evidence of how the BTCC has changed. Riches admits that two decades ago, the series did reflect a battle between engineers seeking to innovate, but today it is purely about entertainment, with teams not permitted to gain a significant advantage through the engineering of their cars. But this philosophy also ensures that the championship will be fought out at all times not in the court room, but on the track. **RT**



Jakob Ebrey/BTCC

ABOVE The backward tilted wing position adopted after most of the tests prompted TOCA to tweak the endplate rules for the sake of aesthetics

- Race Tech wishes to thank Peter Riches for his extensive assistance with this feature.