Advanced Circuit Driving Techniques

VIDEO VBOX

Brain Power is the new horsepower.

This guide is made up of articles written by pro racing drivers and instructors who use video and data to illustrate various circuit driving techniques, with tips on how to get the most out of yourself as well as your car. Some may surprise you...

RACELOGIC

Contents

New Chapters

RACELOGIC publish a new chapter every 3 months. To make sure you receive them, go to: **www.videovbox.co.uk/circuitdriving** and insert your email address into the form.

Sharing

You are welcome to share this ebook. However if you would like to reproduce any of the content, please contact **RACELOGIC** at **marketing@racelogic.co.uk** to let us know, and ensure that you attribute **RACELOGIC** to any words and images you use.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 1: Compound Corners

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Definition – Compound corner: a series of corners, close enough such that the car is always turning and never travelling in a straight line.

Nigel driving in the Funcup Misano 2009

The following data was taken from a Funcup race at Misano in 2009.

Nigel Greensall – "It is a common mistake to treat compound corners as two separate items, whereas they should be tackled as one section, with sacrifices being made in the first corner to gain maximum exit speed. It often seems counter-intuitive not to maximise the speed through the first corner, but the end result is often a faster lap."
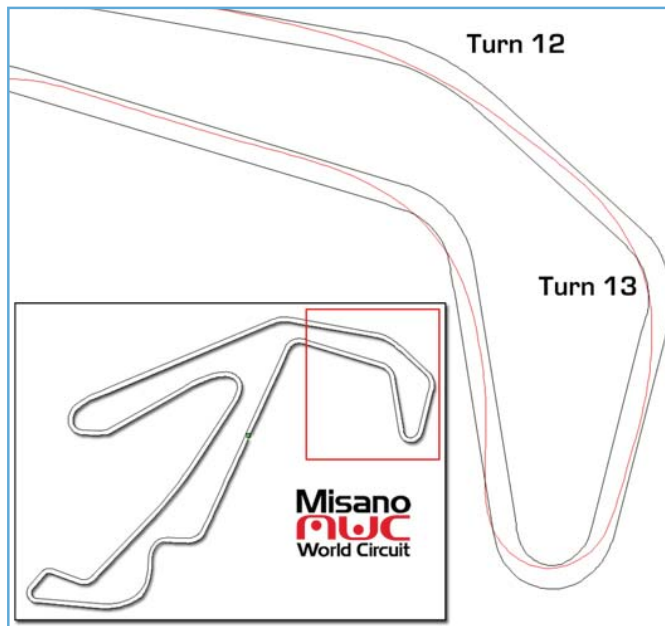
Misano World Circuit

There are many examples, but let's take Misano Circuit which is shown above, Turns 12 and 13 which consists of a shallow right hand corner followed by a sharper right hand corner.

On first inspection you may naturally assume that you have to clip apexes of both Turns 12 and 13 to get the best lap-time.
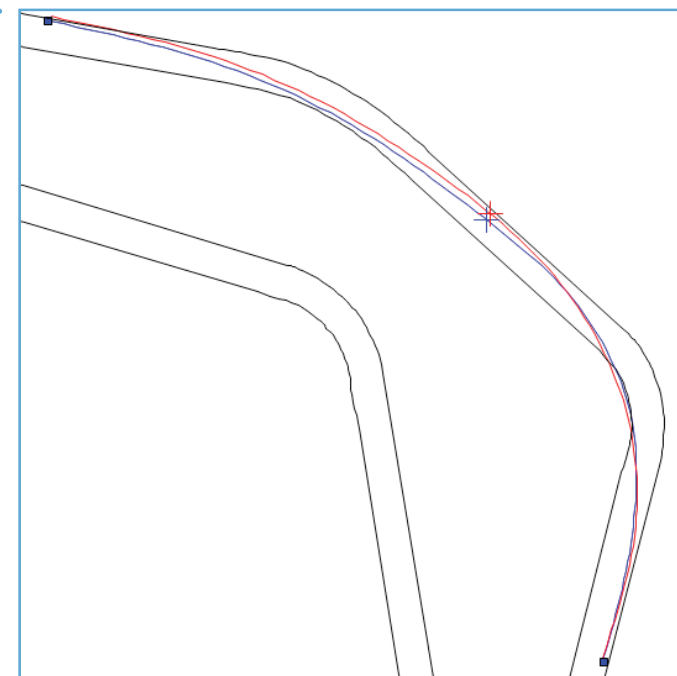
Two different lines

However, there are many other ways to take these corners and I have found that the quickest for me is to almost ignore Turn 12 by missing the apex completely, and set yourself up for a nice wide entry into Turn 13, which seems a little odd at first.

To see this line in action, have a look at the image above, which shows my preferred line in red, and my team mate's line in blue.

The red line misses the apex of Turn 12 by almost 2m, but maintains the same apex speed of 105mph as the blue line which clips the apex.

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC
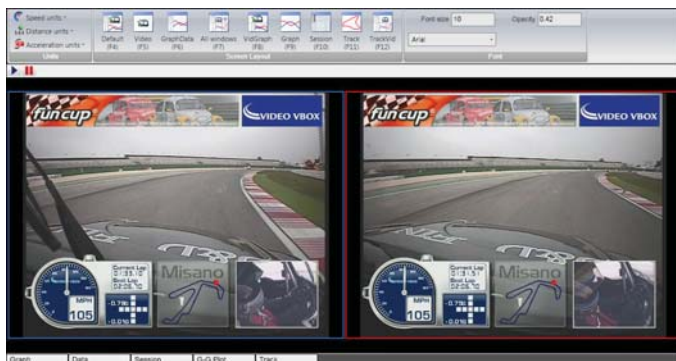
Different line, identical Apex speeds

Much wider entry into Turn 13

Analysing Apex speeds at Turn 13

Interestingly, through Turn 12 you are not quite on the limit of grip (a peak of 0.85G), so you can experiment with your lines through here without losing any speed.

This wider line is also slightly shorter, which also gives a small advantage.

The screenshot above shows the apex point of Turn 12, where both approaches have the same speed, 105mph.

It is after this point where the reason for this wider line becomes clearer.

If you treat Turn 12 as a conventional corner and clip the apex, you cannot get far enough across to use the whole width of the track into Turn 13.

By running wide in Turn 12, you can get much further over to the left for the entry into Turn 13 allowing more speed to be carried around the corner.

Using more screenshots from the in-car video, you can see just how much closer to the edge of the track (just before Turn 13) I could go, whilst carrying 7mph more speed.
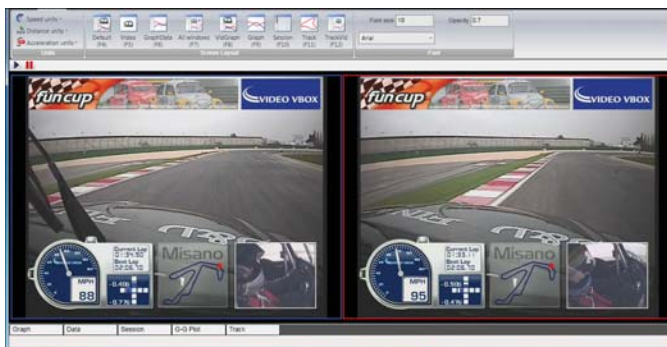
If we look at the Apex speeds of the second turn using **CIRCUIT TOOLS** software, the gain in speed is even greater.

In this screenshot you can see that the wider line allows me to carry 11mph more at the Apex, the upper graph is the speed, and the lower graph is the Delta-T or time difference between the two laps.

The analysis software showed a total gain of 0.67s in this section, which was very simple to achieve, just by taking a slightly wider line through Turn 12, which is very easy to do!"

We now zip 2700 miles across to the Dubai Autodrome in an Aston Martin GT4...

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC

Nigel driving in the Dubai 24 Hour race in 2010

Turn 14   Turn 15
Dubai Autodrome

Conventional line

Nigel Greensall – "Here's a great example of compound corner, Turn 14 (Parabolica) and Turn 15 on the Dubai Autodrome GP layout.

This is another example of where you need to think of them as a whole rather than as two separate corners.

Turn 14, the Parabolica, is slightly banked, and being a desert circuit sand tends to drift across and collect on the outsides of the track.

There is only a very short straight before Turn 15 and this is the reason why you can take an unusual line through and compromise the Turn 14 slightly to gain an overall advantage.
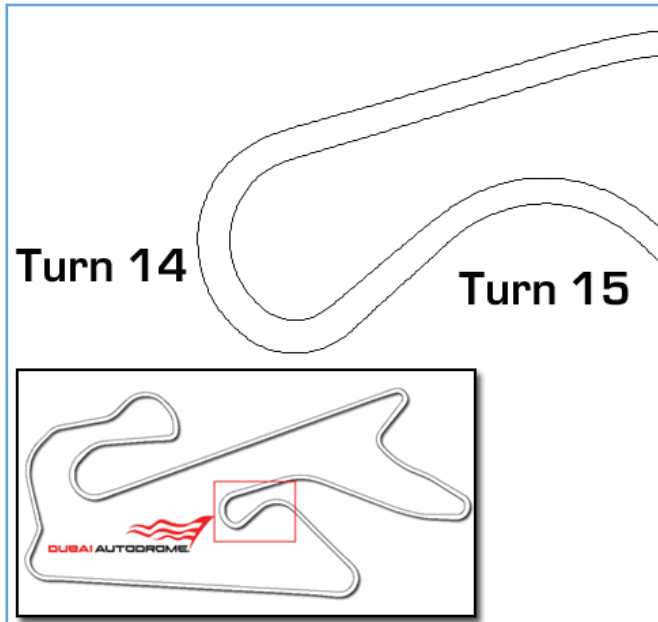
If you attack Turn 14 as a conventional corner, you may start off wide and sweep in for a late apex to maximize your exit speed. This is in fact the line that the race school teaches you.

This would probably work fine if there wasn't another corner straight afterwards.

This second corner means that the exit speed of Turn 14 is not so important, because you can't carry this extra speed down a long straight.
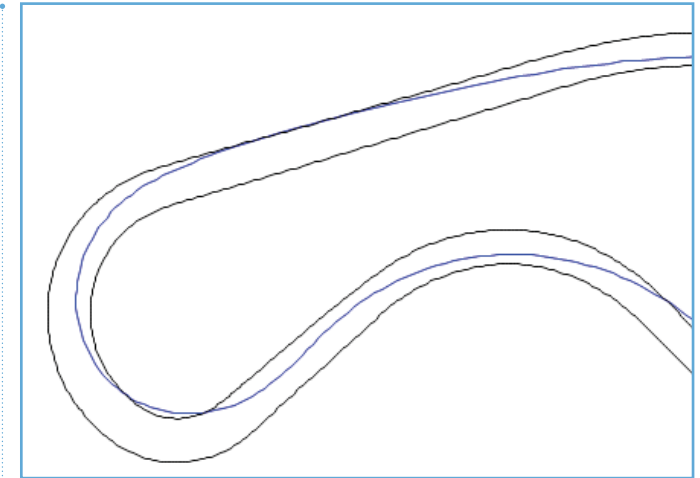
If there wasn't a corner straight afterwards, then you may take the conventional line to gain the maximum corner exit speed which would be carried all the way down the straight.

Because there is no long straight after Turn 14, what becomes important is getting to Turn 15 as soon as you can, so in this case it is better to take the shortest route possible and take a very tight line around the Turn 14.

This has the added advantage at this track of missing out on the sandy outer edges of the track.
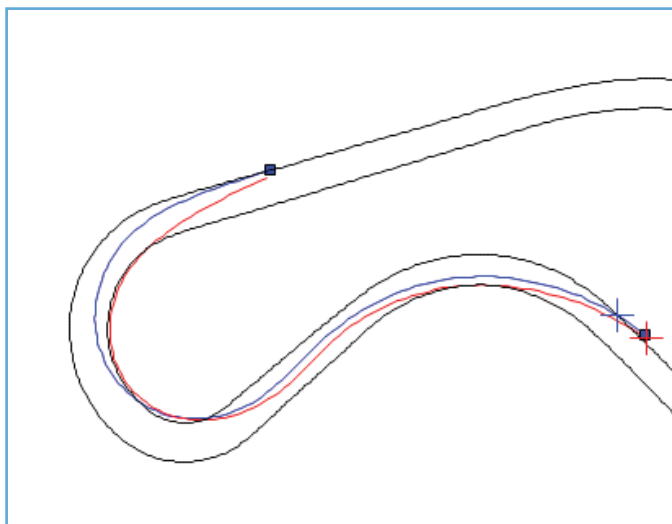
Two different lines

This seems as though you would lose a lot of speed going round Turn 14, and indeed the wider line has an apex speed of 89km/h (55mph) compared with 79km/h (49mph) for the tighter line. Yet this line is **0.45s** quicker, which is very counter-intuitive!

However, the reason this works is the really interesting part; the tighter line is **13.9m (45feet)** shorter than the blue line, so even though the blue line had a higher average speed, the significantly shorter distance has a pronounced effect and in this example gives a 0.45s advantage between the entry to Turn 14 and the exit of Turn 15 and the exit speeds are almost identical.

Incidentally, the blue trace was my team mate's fastest lap, who is an instructor at the circuit who was quite surprised when I showed him the data!

Time gained using the shorter path

Above is the data shown in the analysis software, the lower graph is the Delta-T or continuous time difference between the two laps (using position **not** distance as this wouldn't be accurate for such a situation) and the upper trace is the velocity. You can also see in the video that I am much further over towards the kerbing at this point, and also travelling 6 mph slower.

However, at the turn in point for Turn 15 I have travelled 13.9m (45 feet) less distance than the blue path, which has given me a big advantage."

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC
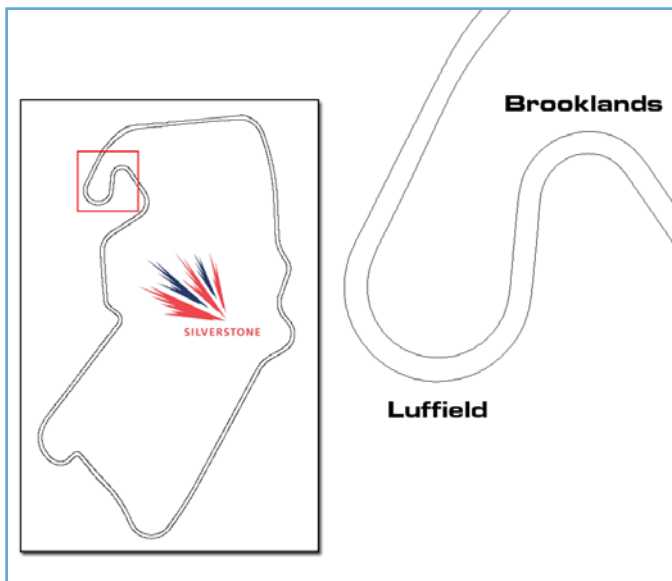
Back to home turf now, as we go to the fabulous Silverstone Grand Prix Circuit...

The Luffield complex at Silverstone is another great example of a compound corner where there are a number of different lines which can be taken. This time we will examine the line through this complex from Britain's top GT driver, and Goldtrack Trackday owner Calum Lockie.

Many people take a similar line (in red) through this complex, which consists of a wide entry into Brooklands, and a late apex through Luffield.

However, if we compare this with the line (in blue) Calum takes, we can see that he uses a completely different approach.
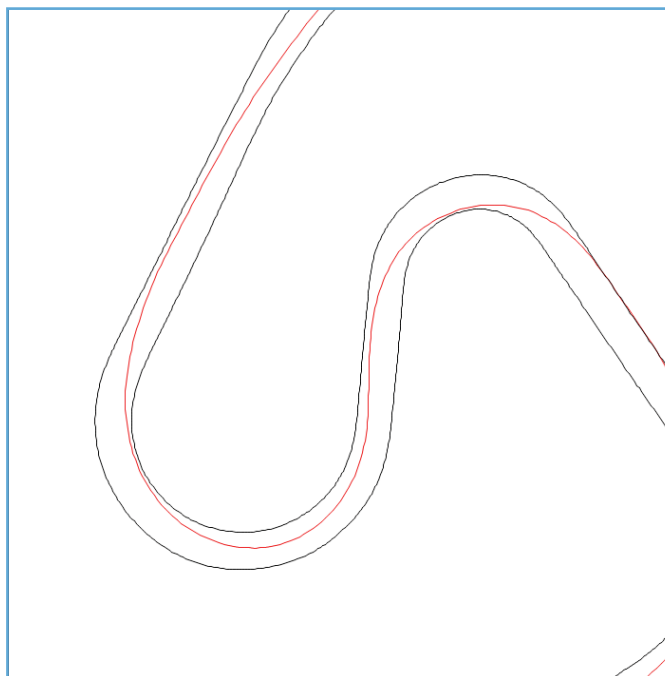
Conventional line through the Luffield complex

Calum's way of tackling these corners is to turn in much earlier to Brooklands, but at a shallower angle, and then he turns sharply on the apex. From here he dives across the track, taking the shortest line into Luffield. He then lets the car drift out slightly, and then turns sharply again on a grippier piece of tarmac.

Taking Calum's commentary from the Video:

Brooklands- "With this line into Brooklands you can brake ever so late, as long as you get the lock on early enough to get it turned in. It's a weird feeling to tighten the lock so much in a corner." Luffield - "There is patch of tarmac which has more grip than
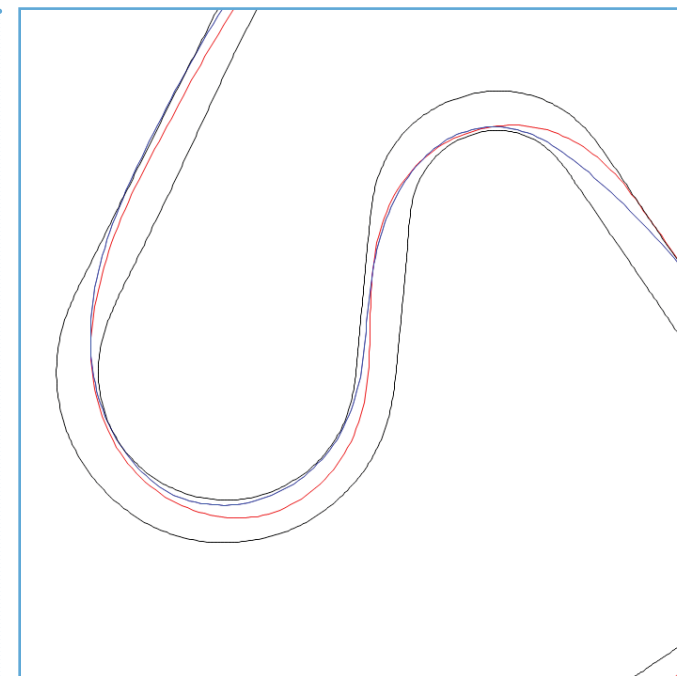
Calum's line in blue through Luffield

the rest, so you can turn the car towards the apex and get really early on the power."

By analyzing the data, we can work out one of the reasons why this approach is quicker than the more obvious line. From the braking point into Brooklands to the exit of Luffield, Calum's line is 11.72m (38 feet) shorter. Therefore the small amount of speed he loses on the apex of Brooklands is more than made up for in the reduction in distance. To put some numbers behind this, the average speed through this complex is around 87km/h, and an extra 11.72m takes an additional 0.5s to traverse.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 2:
Slow Corners & Hairpins

VIDEO VBOX

RACELOGIC

Advanced Circuit Driving Techniques
Article 2: Slow Corners & Hairpins

With the advent of affordable, focused training aids based on Video and GPS, driver training has enjoyed a surge in popularity.

In the second of a series of articles, we will be discussing Slow Corners and Hairpins with accomplished race driver and personal coach Nigel Greensall, to try to help you extract every last ounce of performance from yourself as well as your car.

Nigel Greensall – "You spend more time in slow corners than in fast corners, so you can often gain most lap-time by concentrating on these areas.

"Exit speed is important, but equally as important is minimising the time spent in the corner.

You often see drivers taking a big wide entry into hairpins to gain a fast exit speed, but due to the slow speeds involved, this sacrifices huge amounts of lap-time, in order to gain a few tenths down the straight.'
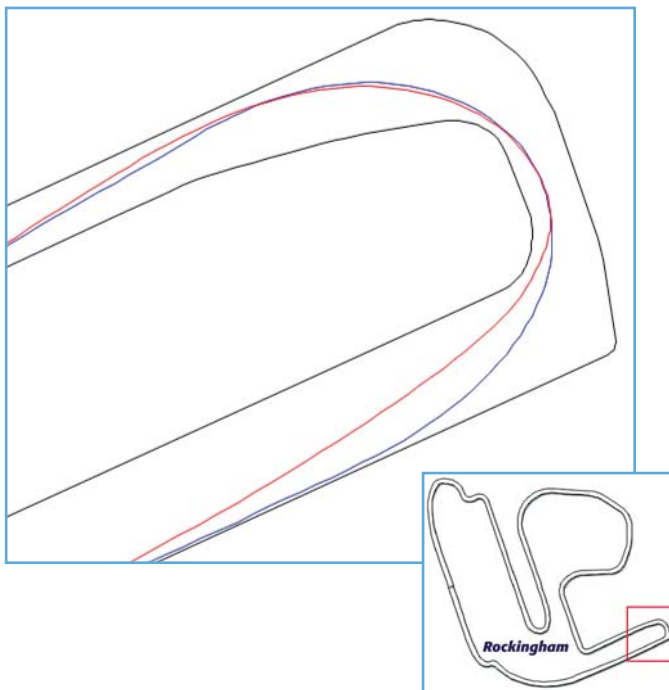
The hairpin at Rockingham is a great example. Take the two lines taken in the same car at the same race meeting (above).

The blue line was taken by my team-mate taking a wide entry, and the red line is my preferred approach, which is braking at a diagonal towards the first apex.

The red line is 14m shorter than the blue line, meaning I spend 0.45s less time in the corner.

The blue line does gain 2mph down the straight, but this is only worth 0.15s. Therefore the gain from the shorter line is 0.3s."

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC

Dubai Autodrome

"The next example of a slow corner / hairpin is at the Dubai Autodrome.

I'll take the fastest qualifying lap of both myself and my teammate, and examine the hairpin at the end of the long straight.

As you can see by the graph over the page, our approach speeds are within 1mph.

However I brake 45m later, and harder. This gains me 0.3s, and we both arrive at the corner with very similar speeds.
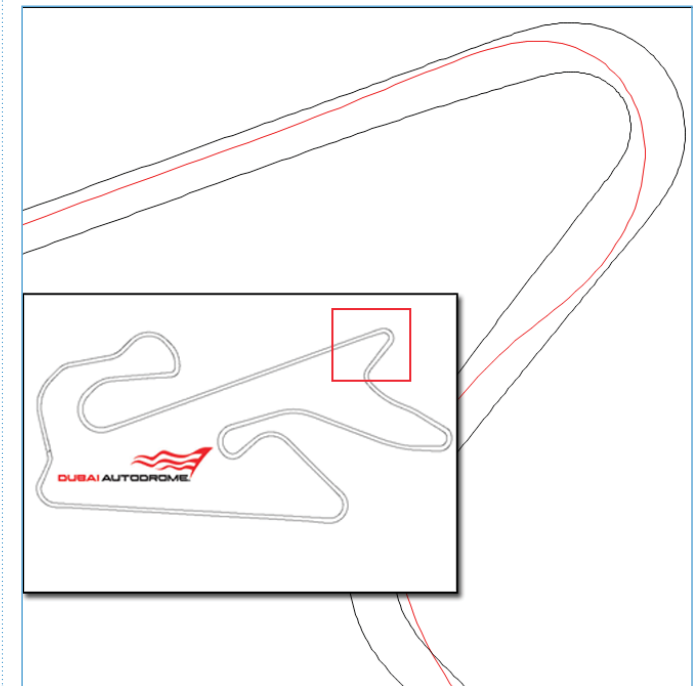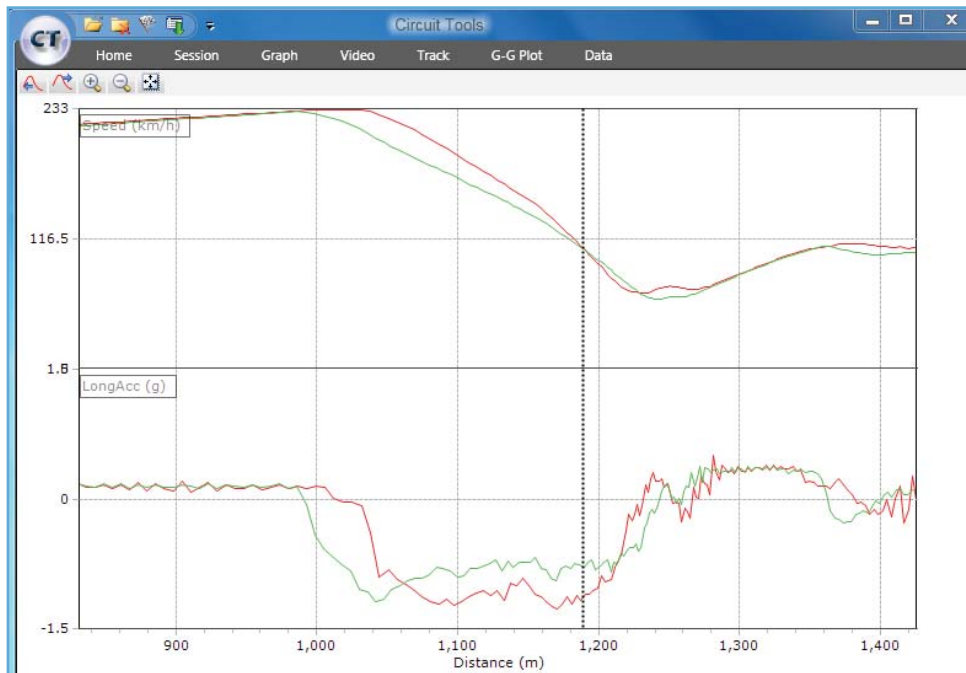
"Looking at screenshots from the in-car video (I'm driving the radical in the screenshot on the left) you can see I'm entering the corner much tighter than my team mate.

This means I need to go slower into the corner, but I am gaining time by travelling less distance. This compensates for the slight speed disadvantage onto the straight."

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC

This means I need to go slower into the corner, but I am gaining time by travelling less distance. This compensates for the slight speed disadvantage onto the straight."

Nigel Greensall – "The graphs above show how it's possible to shave off time on the hairpin at the Dubai Autodrome.

The red line shows my car, whilst the green line is my team mate's car.

The upper graph shows speed through the corner, whilst the lower graph shows acceleration (g-force).

As you can see from the two graphs, we both come in at about the same speed, but I brake later and harder.

You can see the difference in braking from the speed trace, and also from the acceleration trace.

My team mate starts braking about as hard as me, but comes off the brake pedal as he slows down, whereas I maintain the braking force throughout the braking zone.

Onto the hairpin, and exit speed here is key.

This is because you don't brake for another 600m after this point, so I find it best to sacrifice some entry speed into the hairpin in order to turn the car quickly and spend as little time in the corner as possible.

This means I can get on the power early, and carry the extra speed down the next section of track.

Have a look at some side-by-side video screen shots on the next page to show where I position the car to carry the optimum speed around the hairpin."

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC

1: The corner entry

(Nigel's car is in the screenshot on the left) At the end of the braking zone, I am using a slightly wider entry angle, by moving left just before turning in. This widens the corner slightly and allows a little more exit speed
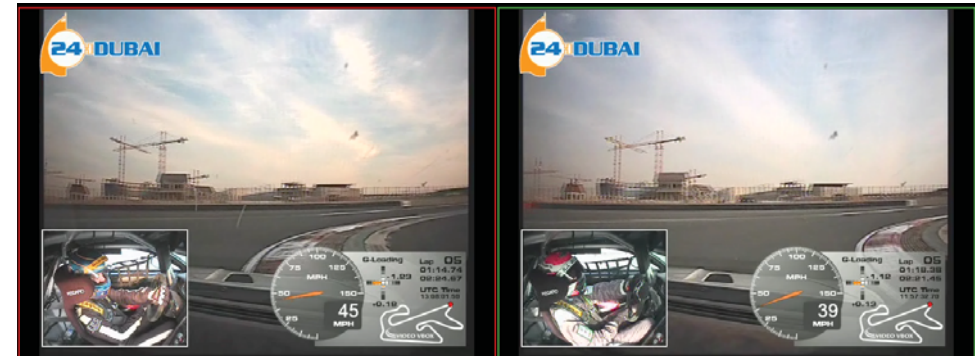
3: Hitting the apex

My car is over the apex, which shortens the corner and allows me to travel less distance. I'm also able to get on the throttle much earlier than my team mate. By taking a bit more kerb I manage 6mph higher speed at the apex (45mph as opposed to 39 mph), as shown by the speed on the graphic overlay of the video.

2: Turning in

Approaching the apex, you can see that I am now carrying much less speed, allowing me to turn the car more quickly. At this point I have lost a little ground to my teammate, who has carried more speed into the corner. As shown by the graph over the page, the data shows a 0.1s loss at this point.

However, this allows me to get on the throttle much earlier...

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC
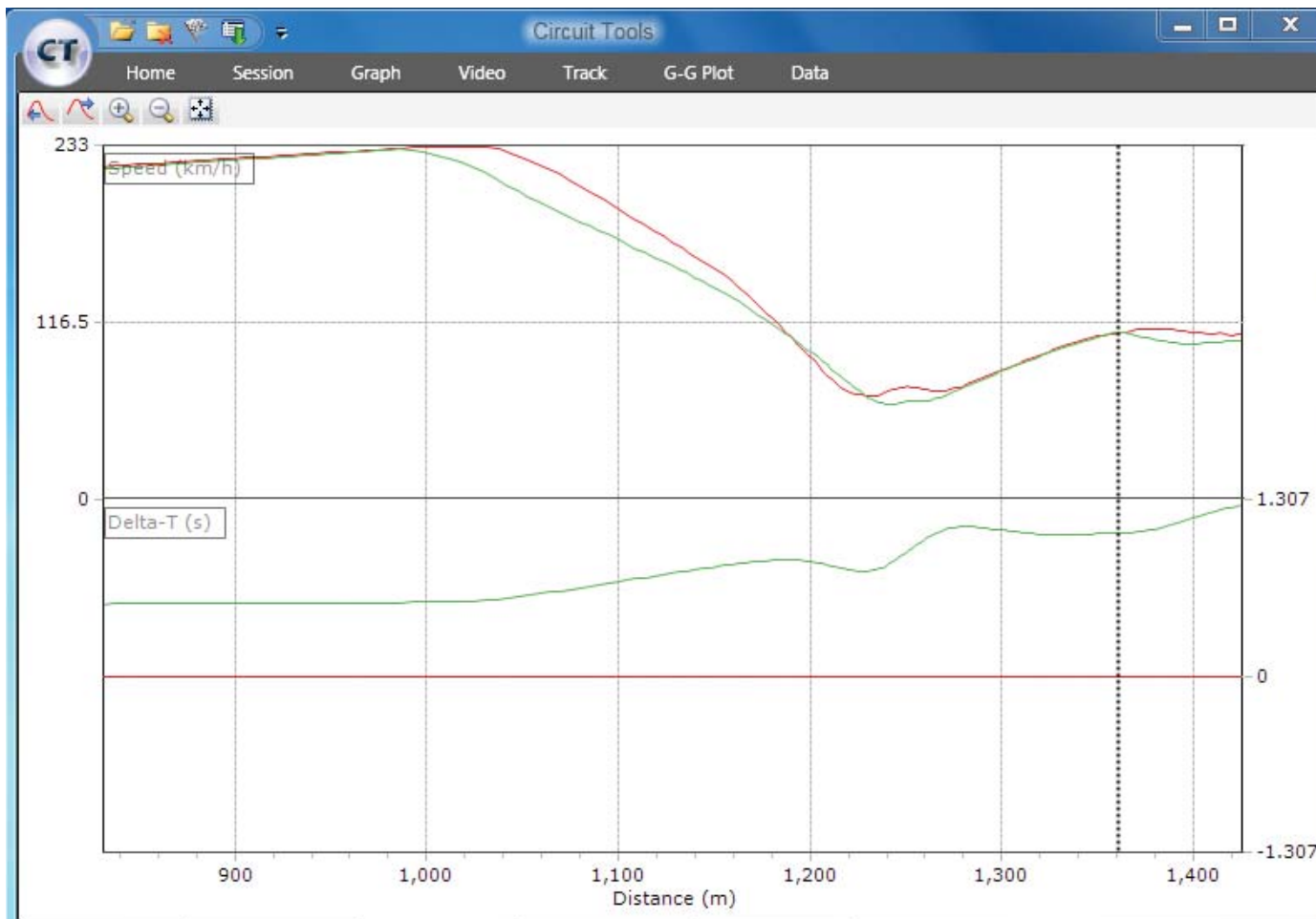
The **CIRCUIT TOOLS** graphs above illustrate how my car gained 0.25 seconds from corner entry to exit. This is best shown by the 'Delta-T' graph on the bottom, which shows where on the corner my team mate (represented by the green trace) loses time."

See over the page for a link to the side by side video of the Dubai hairpin corner...

Nigel Greensall's car is featured in the video on the left.

We hope you've enjoyed reading this article, and that it has provided an interesting insight in to how one racing driver approaches slow corners and hairpin bends. You can add your thoughts to the discussion on the **RACELOGIC** forum here.

There are, of course, many ways to tackle a corner, but looking at the video and data quickly shows which are the most effective!

VIDEO VBOX www.**VideoVBOX**.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 3:

"How I learnt how to cut 4 seconds a lap in one day."

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 3: "How I learned how to cut 4 seconds a lap in one day."

RACELOGIC's MD Julian Thomas on his rise from novice to competitive racer in 24 hours

If you have read the first two articles on compound cornering and hairpins, you might be asking yourself: exactly how effective is **VIDEO VBOX** and **CIRCUIT TOOLS** in driver training in a real life situation? Given a **VIDEO VBOX**, some track time and an expert driver to use as a comparison, just how close to the pace could a novice really get?

To answer this, we have put ourselves through this process...

Julian Thomas with Nigel Greensall and David Power, using in-car **VIDEO VBOX** to analyse their race data

The MD of **RACELOGIC**, Julian Thomas, has always been a keen trackday driver, but never had a proper attempt at racing. This year he partnered with Nigel Greensall, a very talented and active driver who has raced and won in everything from Legends to Formula One cars.

Julian Thomas – 'I took my ARDS test and the instructor said I would easily pass the test, but to my shock, he said I was driving too slowly to be competitive! This really made me think about my own driving, the car appeared to be on the limit and sliding into and out of the corner, where was I going wrong?

I began to realise the difficulty of the task that lay ahead...

On Nigel's recommendation, I booked a day in a FunCup car at Oulton Park, and he came along to provide a comparison. The day was alternating wet and dry, so we got a lot of varied conditions which made it difficult to compare laps directly between sessions. However, it became clear that I just needed to work on my slow, medium and fast corners!

During the day I got to learn the car, and began to think more and more about line and technique as the day progressed.
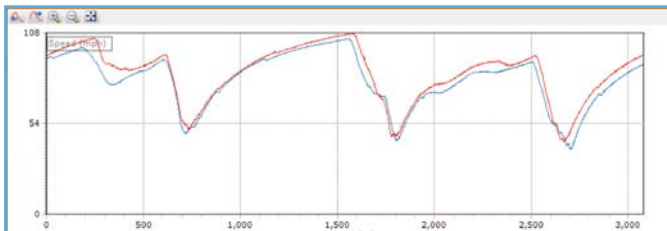
The next outing in the FunCup was a four hour endurance race at Snetterton. I would be up against other novice drivers, but also professional drivers and experienced teams who had spent the winter testing and sorting out their cars.

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC

Our FunCup Car

The 'before' comparison, Nigel's data in red, using **CIRCUIT TOOLS**, free with **VIDEO VBOX**

Typical close racing in the FunCup series!

We rented a petrol FunCup car from JPR who run the series, and Nigel said he put this car on Pole at Brands the Year before, beating the faster diesels, so there would be no excuses on that front! I shared the drive with Nigel and a long time friend of mine, David Power (from Powerflex). Both of us were Novices and hadn't driven Snetterton before.

We had booked two 40 minute slots on the Friday before the race for practice. I went out first to get used to the circuit and managed a 1'30.27", followed by Nigel who sent a benchmark of 1'27.98". Being only 2.29s off the pace seemed great until we looked through the data and saw that Nigel was held up in two corners and lost around 1s! Therefore I was at least 3.3s off at the start, which would put me quite close to the back of the grid come raceday. The ARDS instructor was right!

I then spent some time studying the data, and talking to Nigel, and we worked out the two main corners I was losing time, which were the two slowest corners. Nigel was taking a different line to me, and getting on the power much earlier which meant he was carrying this extra speed down the next section of track.

I then went out for the next section and eventually worked down to a 1'28.33", shaving a massive 1.94" off my time, just with one analysis session! This was now putting me into the competitive midfield area, a great improvement, but room for more.

In addition to the 2 sessions on Friday, we also had a 1 hour 'qualifying' session on Saturday, but since the grid was to be drawn out of a hat, we used this as a last minute training session. I had spent some time the night before going through the data, comparing my fastest laps with Nigel's, and I was pretty confident

I knew of a number of areas where I could find some more speed.

I went out first in qualifying and worked down to a 1'27.46", so I had found 0.87s overnight, and it would be enough to put me 4th in class out of 19! Nigel then went out and set what would be the fastest time in our class of 1'25.92", so I was now only 1.53s off his pace.

I was really relishing the race, as this would give me plenty of time in the car to find some extra speed.

It was honestly a pleasure using **CIRCUIT TOOLS** in anger, every time I compared my latest lap with Nigel's, I could quickly see areas to work on.

I made good use of the delta-T channel to see where the lap-time was ebbing away around the lap, and the video to watch his lines, apex points and driving style.

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC

We also discussed and then watched his slipstreaming technique, as he stayed a lot closer to the car as he overtook to maximise the slipstream when alongside another car.

One point which leapt out to me was how far ahead he was looking in comparison to me, see the screenshot below for an example of the Esses where you can clearly see Nigel looking a lot further around the corner than me. This was another area in which I could concentrate.

Side by side **VIDEO VBOX** screenshot in **CIRCUIT TOOLS**: You can clearly see that Nigel is looking a lot further round the next corner than me

We were drawn 29th out of 32nd on the grid, which would certainly make the race exciting! We decided on Nigel going first and using his experience to claw back some of the lost places. After Nigel's 40 minute stint he had worked his way back up to first in class, it was a real privilege to watch such a display of race craft and natural speed at work. He had also managed to shave a little bit off his fastest time to set the fastest lap of the race (in our class) of 1'25.75".

It was my turn next, and I was dropped right in at the deep end; we were leading our class, and fighting in amongst a big bunch of competitive teams! It took me a little while to acclimatise to being in the middle of a pack of competing cars, whilst maintaining quick lap-times.

The FunCup series is run really well, and as part of their forward thinking approach to racing, we all had a one way earpiece to the Race Director who gave out information about incidents, Safety Cars and penalties as we were driving. The first time his voice crackled into my ear, I promptly drove off the track as I tried to compute what he was saying, whilst driving on the limit! However, I soon worked out a system, where I wouldn't overly concentrate on what he saying, but play it back in my head when I reached a straight piece of track. After my first stint I had managed to equal my qualifying time, but I knew there was more in the car if I could just squeeze it out.

Learning the art of slipstreaming - footage using **VIDEO VBOX LITE**

I then spent the downtime before my next 40 minute stint comparing my race laps with Nigel's new fastest lap, and quickly worked out where the crucial time was being lost.

It was small differences all round the lap which added up to 1.71s, a combination of using more kerb at one corner, braking a bit earlier at the next, settling the car on the throttle on the entry and being more aggressive with the steering on the slower corners.

We had lead the class now for 2 hours when my second stint came round, but unfortunately a problem with the carburettor gasket dropped us to last place due to a 20 minute pitstop.

Nigel then told me to treat the last stint as a qualifying session, and he was putting the times of the class leaders on the pitboard with mine underneath with strict instructions to match or better their times which were in the 1'26" bracket. I also had the **VBOX OLED DISPLAY** showing me real time lap-times in the car, so I was all set for the challenge.
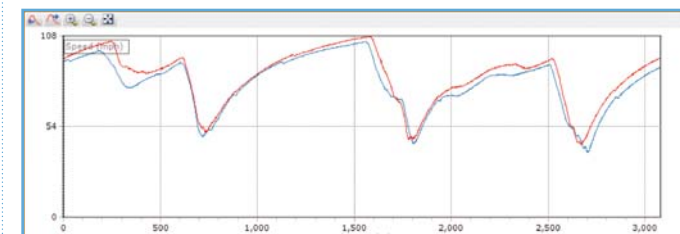
The 'after' comparison, using **CIRCUIT TOOLS** Analysis Software.

Comparing laps in **CIRCUIT TOOLS**

My fastest lap

Nigel's fastest lap

Armed with the new analysis data rattling round in my head, I headed out of the pits and put my head down.

Within 4 laps I had beaten my best time, and within 10 laps I had worked down to a 1'26.26", which turned out to be faster than set by any other team during the race by 0.3s!

Incidentally, my team mate, David Power had shaved 2.74s off his initial times, and was also putting in competitive laps which had kept us in the lead of our class, and he had never driven Snetterton or a FunCup before!

In conclusion, if we hadn't had the gasket failure (always the 'if onlys' in racing!) we would have won our class by some margin, which is quite an achievement for 2 novices.

The combination of Nigel's coaching and the **VIDEO VBOX** had brought us up to a competitive speed really quickly, and made the whole experience very special. It almost felt like we were cheating, and by-passing many hours of testing and practice, but in reality we were approaching the race using all of the modern tools at our disposal!

Will we be racing again? Oh yes, our next outing will be the Spa 25 hours in the same car, so even more time to analyse the data and try to set some competitive times!'

VIDEO VBOX www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 4:

Eau Rouge Corner:

Giving it to you straight!

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques
Article 4: Eau Rouge corner: giving it to you straight!

Video analysis shows how to gain a second through one of the best corners in the world

As one of the world's most complex fast corners, Eau Rouge is revered by racers.

Drivers know that you must take Eau Rouge flat to take advantage of the available down-force and gain speed onto the Kemmel straight.

What many don't realise is that the straight is a kilometre long, with a 70m uphill climb.

If you don't get Eau Rouge right you've lost vital time.
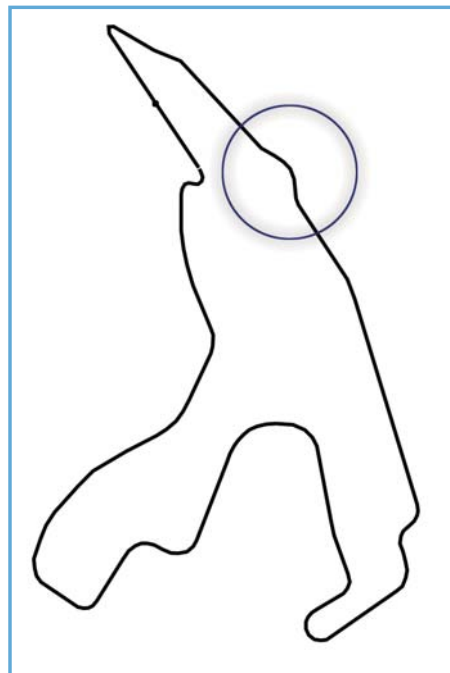
In this fourth article, we ask racing driver and instructor Nigel Greensall to give us his tips on how he tackles the famous corner to gain the most speed up the straight.

Nigel took some data from a practice run in a FunCup race car, featuring one of his laps and a comparison lap from his team mate Dirk (a very proficient racing driver) in the same car. FunCup cars are single seater race cars based on VW Beetles.

They're ideal to analyse different driving techniques because with their 160bhp engine and inefficient aerodynamics, it's even more important to perfect driving technique because there is little power to rely on.

At the same time, if you are racing a Radical or even an F1 car the principles discussed are just as applicable.

We start our discussion from the exit of La Source, and follow the circuit through Eau Rouge and to the end of the Kemmel straight, where Nigel has gained a whole second over his team mate, despite Dirk actually having a faster time in the entrance to the section.

So how did Nigel gain a second on this corner using the same car?...

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC
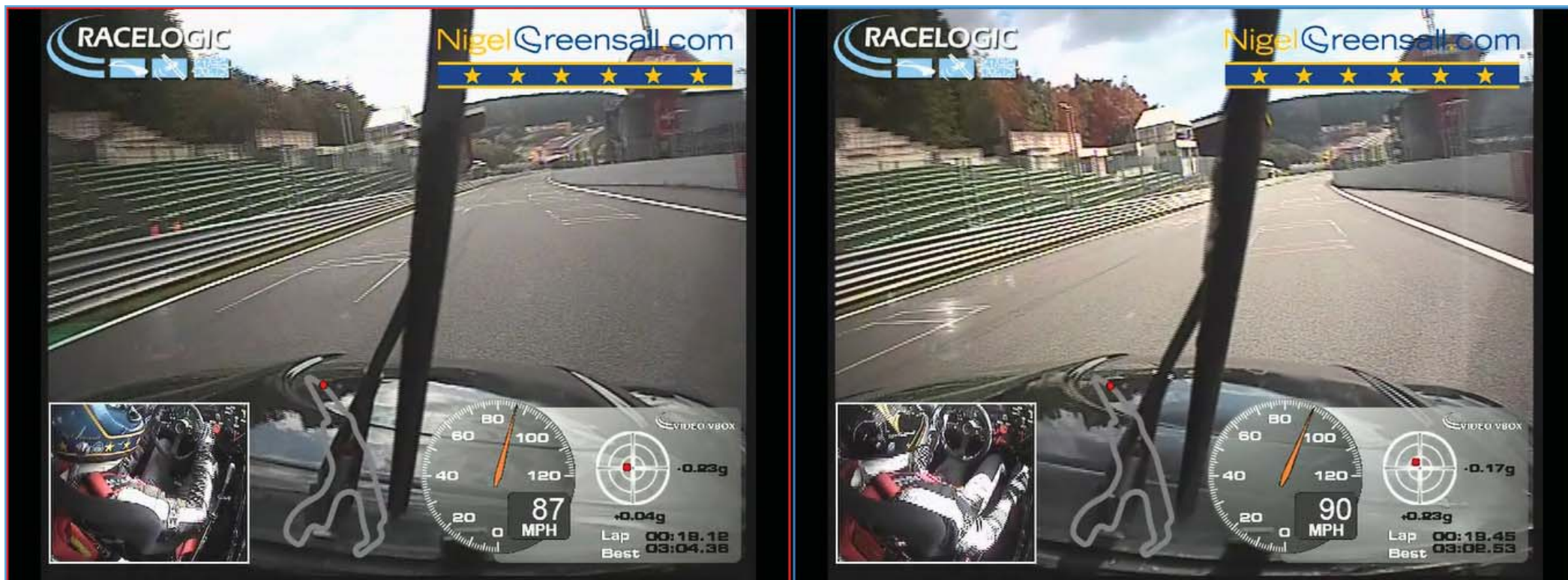
The straight from La Source

Nigel Greensall: "In the comparison screenshot, you can see that Dirk (in the right hand screenshot with the blue outline) is actually going 3mph faster than me, coming out of La Source with good speed. He's just 0.2s behind me up to this point.

However in an attempt to set himself up for the upcoming Eau Rouge, he goes too close to the wall on the right, whereas I stay in the middle of the track.

I positioned my car in the middle of the track for 3 reasons:

- To lessen the drag effect of the concrete wall – the closer to the wall you drive the more drag you encounter with the air bouncing back at the car and slowing you down

- To take advantage of the increased grip between the grid-lines

- To gain better visibility (you can see far more of the approaching section from my view at the centre of the track), to help anticipate any incidents
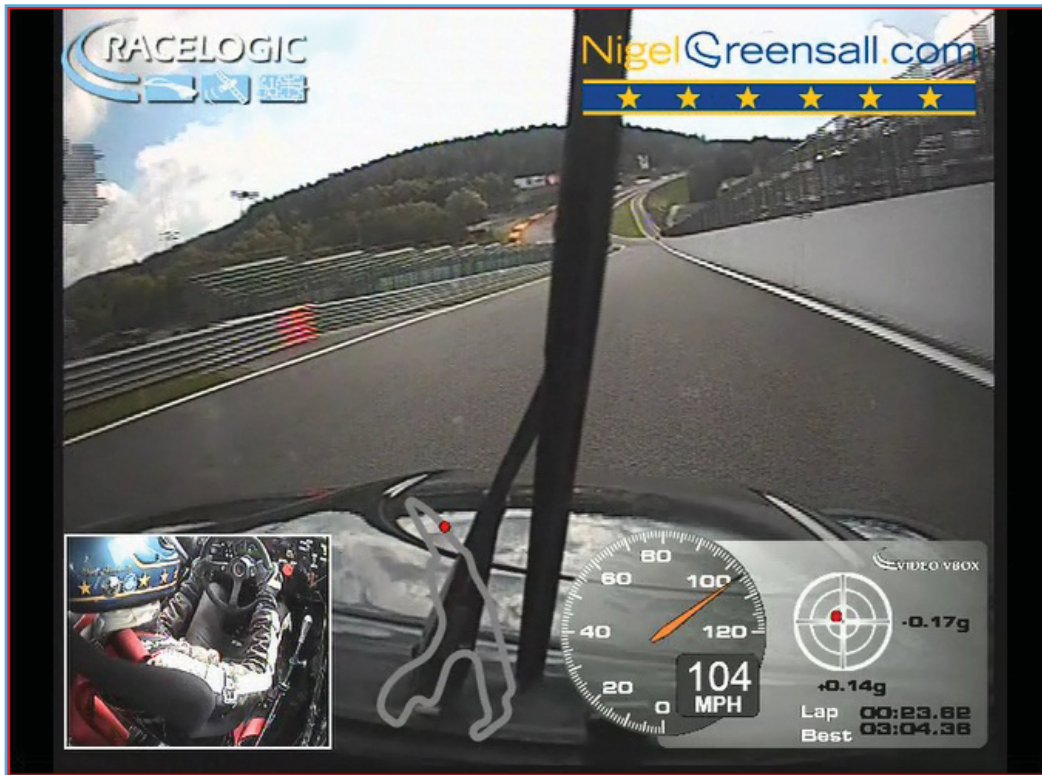
The approach to Eau Rouge

As you can see from the screenshot, in the approach to Eau Rouge my speed has now caught up with Dirk's and I am accelerating quicker, with 0.14g as opposed to 0.07g. This is because I have encountered less drag from the wall, but this is where I start to edge towards it to gain space.

Having gone very close to the wall, my entry onto Eau Rouge is now as wide as possible. This means I need to turn less sharply than Dirk which will help to maintain more speed. From my car you can see that the two apexes are lining up, showing a straight route from the first apex to the second.
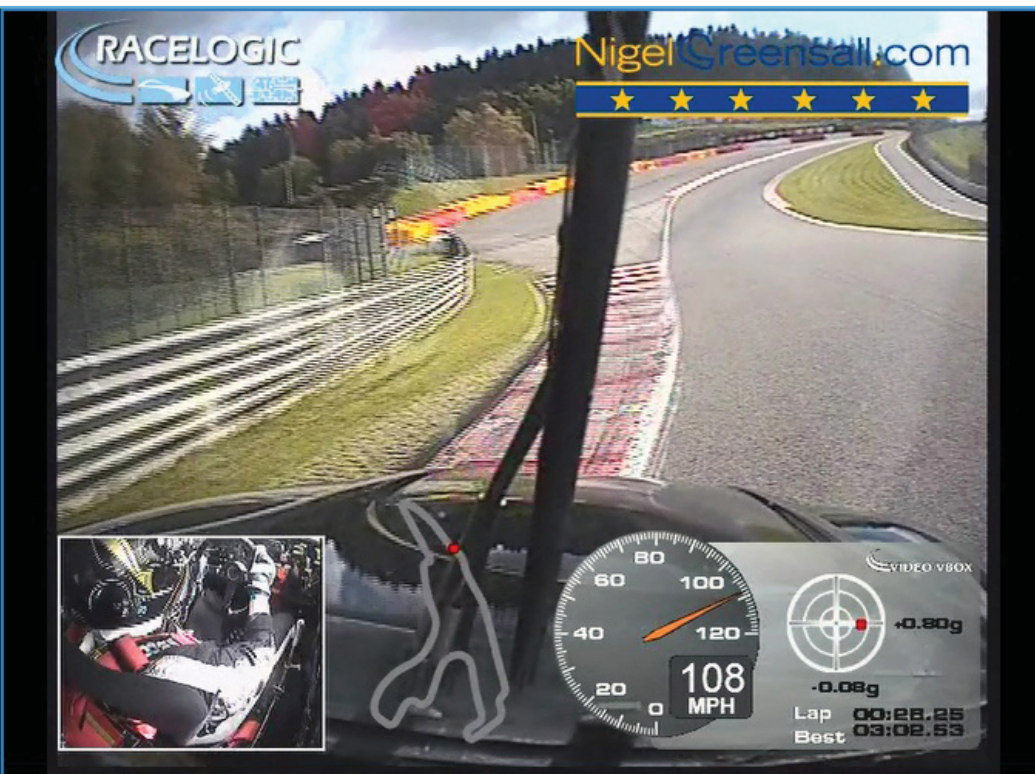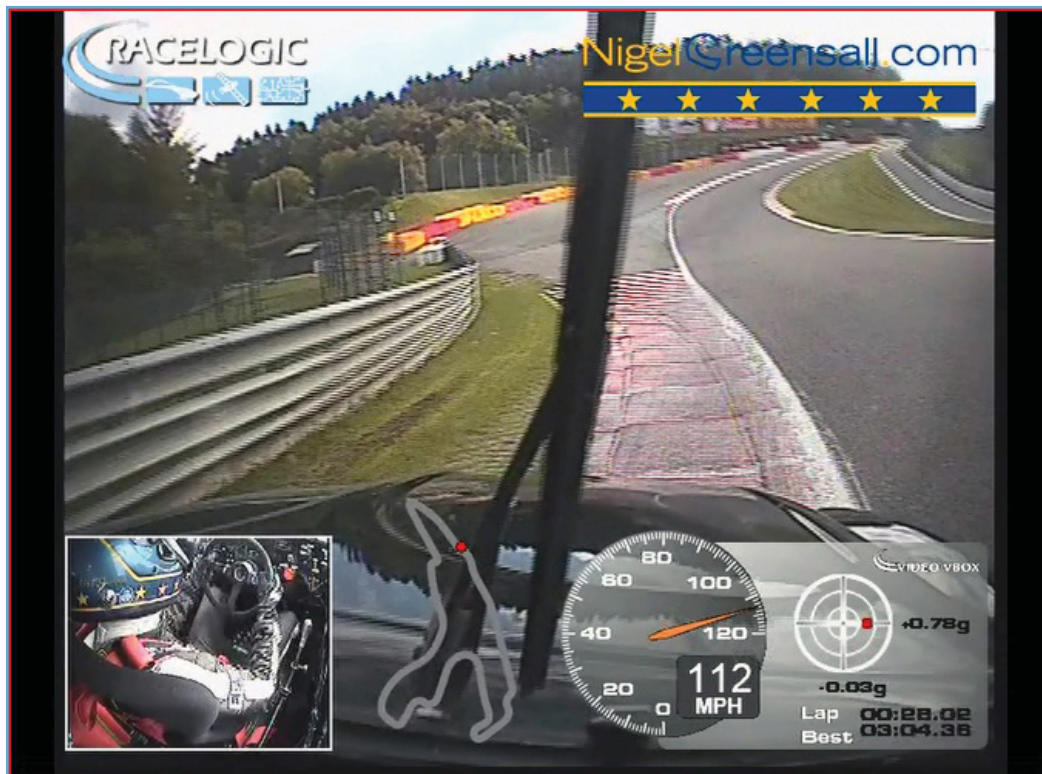
The first apex of Eau Rouge
The differences in track position are very clear here. I am cutting the corner as much as possible with just two of my wheels still on the track and the other two on the concrete strip beyond the curbing.

The line I have taken is less sharp than Dirk's (right), which means I only need to straighten up to hit the next apex, whilst Dirk has to lift a tiny amount in order to turn into the second apex.

I have now gained 4mph because I can straighten up sooner whilst Dirk is still scrubbing speed.
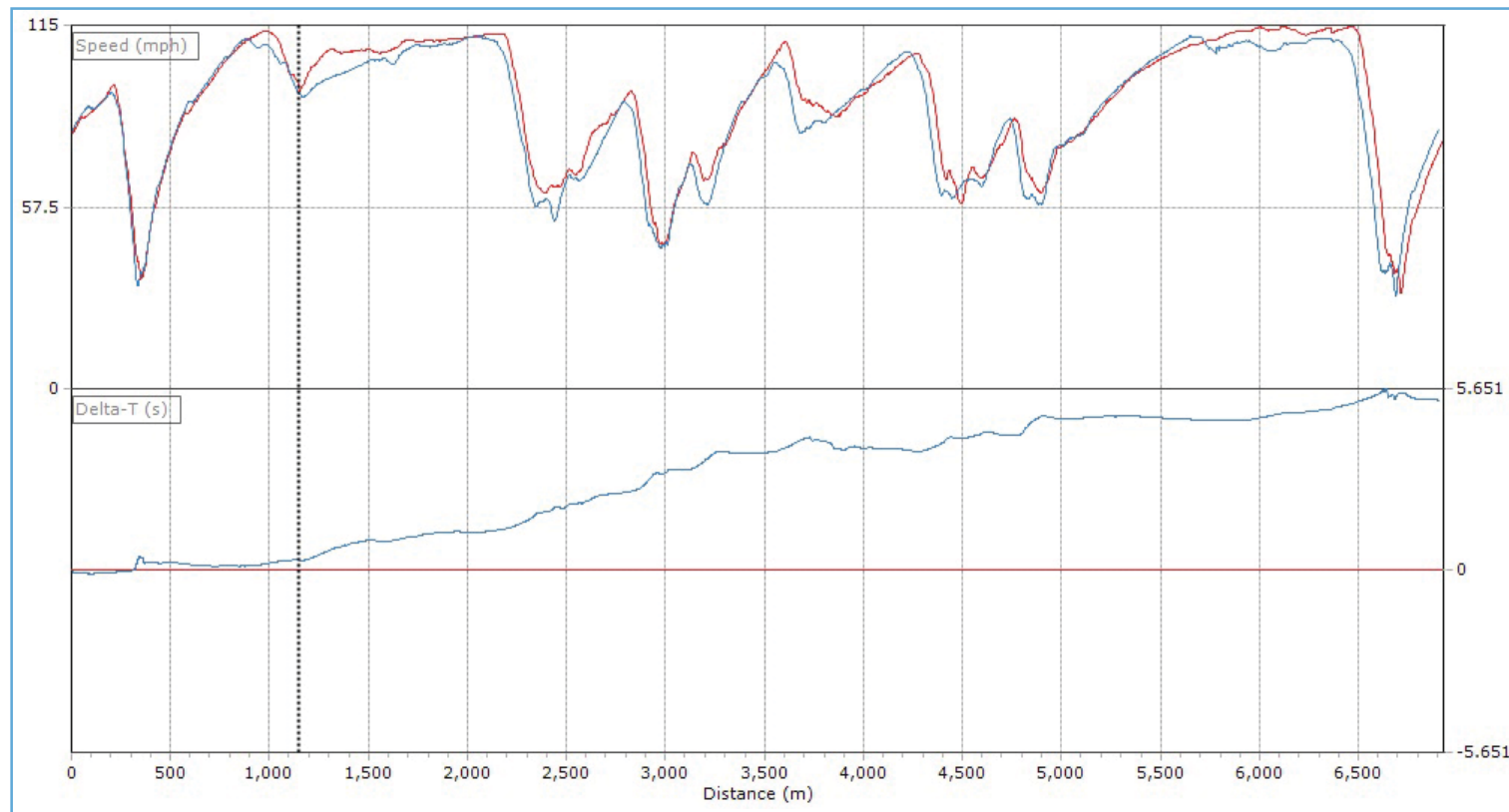
This shows an entire lap of Spa, where my lap is represented by the red line, and Dirk's by the blue. The top graph is a speed trace, which allows you to optimise your braking points and see where more speed can be carried.

The bottom graph shows the 'delta' time for the lap. This shows where Dirk lost time in his lap in comparison to mine. The position of the dotted cursor line is half way through Eau Rouge.

Before this Dirk and I are almost neck and neck, but it is clear that he loses considerable time in comparison to me on Eau Rouge. This impacts the rest of his lap, meaning that he is 5.6s slower than me in the practice session. However once we had looked at this simple data and seen how Dirk could improve his fast corner technique, he was able to take 2.5s off his lap-time in the race that followed!

It's possible to see this delta time live in the car with **RACELOGIC's** new predictive lap timer, which connects to a **VIDEO VBOX**. The predictive lap-timer takes your (or another driver's) best lap and shows you a real time, easy to glance at graphic on an **OLED DISPLAY** of where you are losing or gaining time in comparison.

Radillon

In the apex of the second corner of Eau Rouge (Radillon) you can see in the screenshots that I am again using more of the track, driving over the curbing in order to straighten the fast corner. Whilst the speed of the two cars is now the same, at 100mph, I am in a better position to carry this into the next apex.
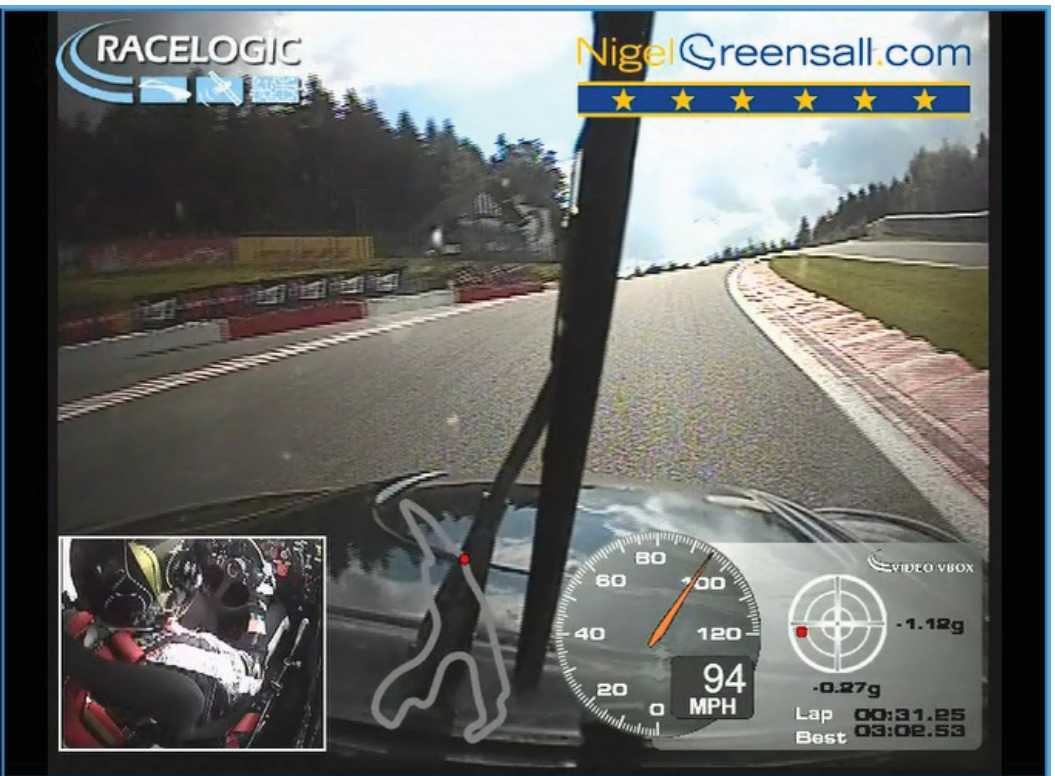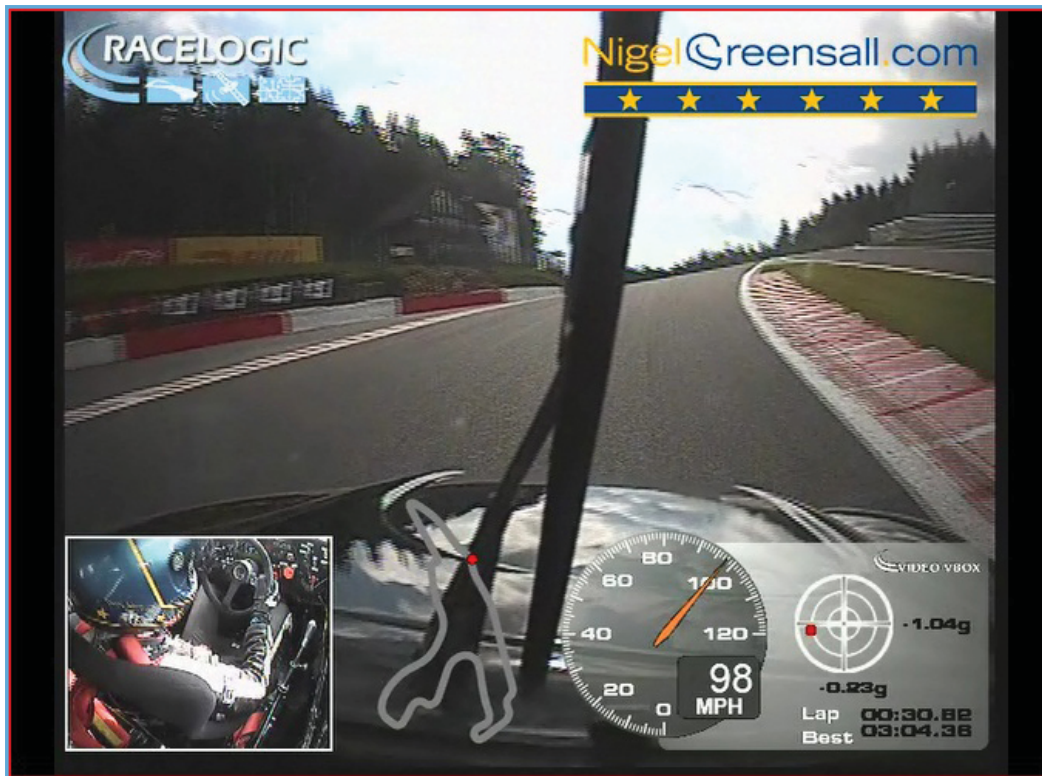
Exiting Radillon

0.8 of a second later and Dirk (right hand screenshot) has lost 6mph because he is turning tightly, due to his driving line preparation for the corner. My line in the approach has set me up to release the steering earlier, losing only 2mph.

The final apex at Eau Rouge

The differences in steering angle and driving line are clear here, which is why my speed increases to 101mph whilst Dirk stays at 94mph. Again, I am using the whole track by driving over the curbing and making the corner straighter. With less steering lock applied than Dirk, as shown in the picture in picture screens, my car is released to travel in a straighter line and I am able to build speed, with 0.15g more acceleration than Dirk.

VIDEO VBOX   www.VideoVBOX.co.uk

At the exit of the Eau Rouge complex and onto the start of the Kemmel Straight I am going 7mph faster than Dirk. The difference in speed is due to my driving line, keeping away from sources of aerodynamic drag, making the corners straighter, and keeping steering input to a minimum.
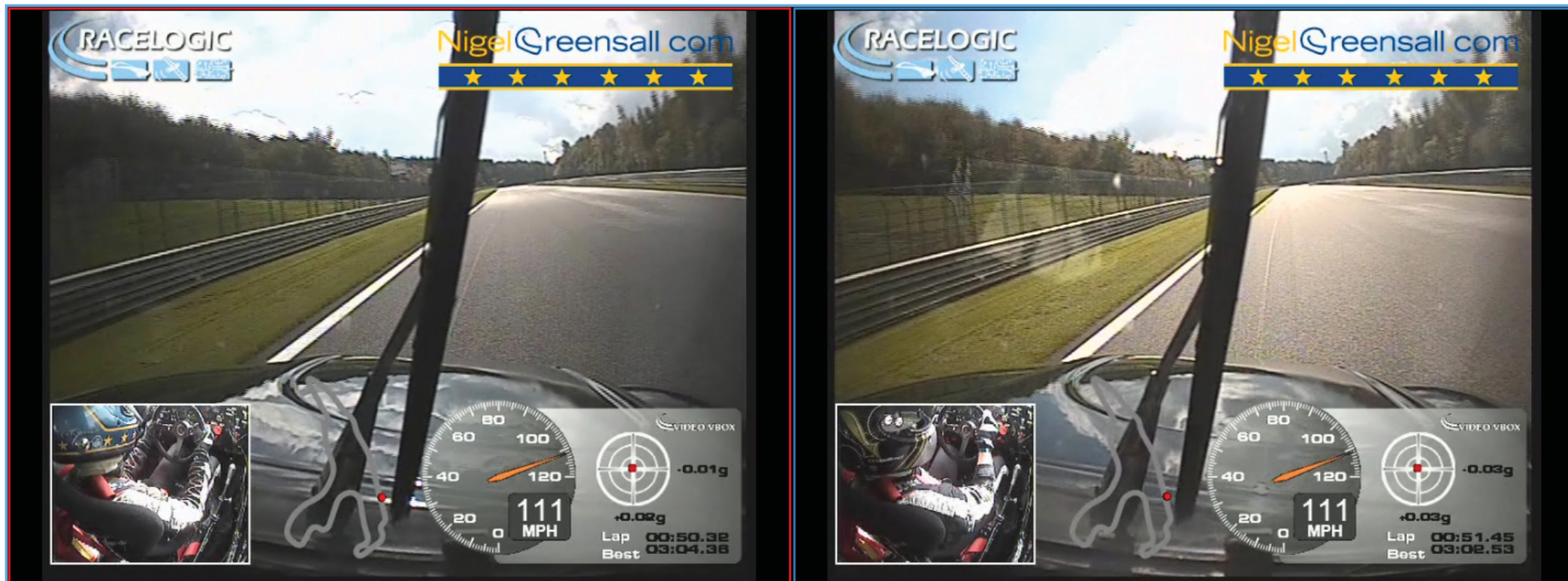
The end of the Kemmel Straight

By the end of the kilometre long Kemmel Straight both our speeds are the same (111mph – the top speed of our FunCup car). However if you look at the lap time in the bottom right hand corner of each screenshot, you can see that I have gained an entire second (00:50.32 compared to 00:51.45) over Dirk.

So how did I gain a second on Eau Rouge?

- I kept away from the aerodynamic drag of the wall after La Source in the approach to Eau Rouge

- I used every inch of available space, with just two wheels on the track through each apex

- I kept steering input to a minimum in order to release the car to gain speed

Despite being a very competent racer, due to his driving line Dirk had to lift very slightly in the entrance to Eau Rouge. This lift was barely perceptible, and equated to 0.1s increase in lap time. The rest of the 1 second deficit in time was due to the differences in our steering technique, straightening out every corner. This was worth 0.9 of the second"

We hope you've enjoyed reading this article, and that it has provided an interesting insight in to how one racing driver approaches fast corners and the legendary Eau Rouge in particular. There are, of course, many ways to tackle a fast corner, and looking at the video and data quickly shows which are the most effective!

VIDEO VBOX **www.VideoVBOX.co.uk**

RACELOGIC

Advanced Circuit Driving Techniques

Article 5:

Why traditional cornering techniques aren't always the fastest.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques
Article 5: Why traditional cornering techniques aren't always the fastest

One racing driver reveals his secrets on how he tackles long corners, showing how he gained half a second on 'Sunset Bend' at Sebring over other drivers who were using the traditional racing line.
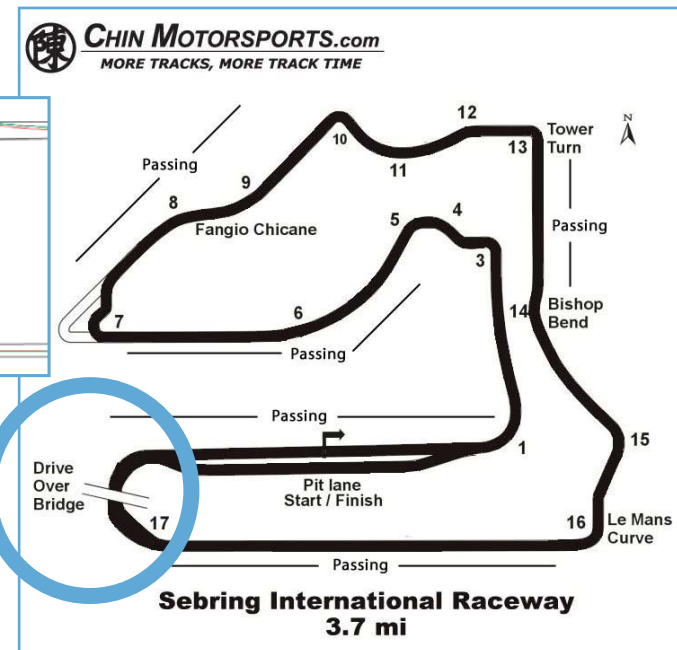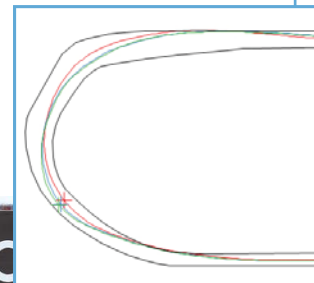
Sebring, Florida. If you're involved in USA motorsport, you've either been there or you want to go. Built on an old WWII air base, the classic circuit is often recognised for its famous, high-speed turn 17, otherwise known as 'Sunset Bend'.

It's a long, bumpy, fast right hander that can make or break your speed down the finishing straight. Because it can fit up to three cars wide, drivers are often divided on the best way to take the corner to maximise the available space and handle the challenging surface.

As the fifth in our series of articles discussing advanced circuit driving techniques, racing driver and instructor Nigel Greensall gives us a controversial perspective on how to best tackle the 500m long turn 17. He reveals his secrets on gear selection, driving line, surface awareness, and corner exit, and why they're essential in getting a fast lap. He also explains why cornering is not just about the entry and exit – and why what you do in the middle of a long corner can make a huge difference to your time.

The following video and data was taken at a Chin Motorsport test session, where Nigel compared his technique with two fast Sebring locals in a Mazda Miata track car.

Taking the fastest lap of each driver, each took a different approach at 17, with Nigel having the lowest entry speed by some margin. However, Nigel's time for the whole corner was still half a second faster. Read on to find out why.

Corner Entry: Video screenshots taken from the best lap of each driver. Nigel Greensall above left, outlined in red. He's braking earlier to balance the car and maintain speed around the long bend.

Nigel Greensall:

1. Entry

"The success of the corner depends on your preparation. The three screenshots (Corner Entry, above) are taken at the point the two other drivers start braking for turn 17. As can see, my speed is much lower than the other two drivers. In fact I started to brake 50m earlier.

It is very tempting to brake late here, and you will often hear talk in the Sebring paddock of just how late some drivers like to brake for Sunset Bend.

However, I have found that this can compromise mid corner balance and speed, as I will demonstrate.

Mid Corner: Nigel's speed (left) is 5mph greater than the next fastest driver. He's holding a tight line and is back on the power now.

2. Mid-corner

"In the screenshot above (Mid Corner), I have finished braking, and am back on the power (see the positive G on the graphic overlay of the screenshot outlined in red), which shifts the weight backwards and balances the rear end. This allows me to hold a tight line through the mid section of the long bend. The two other drivers are still braking, which carries them deeper into the corner."

"At this point my minimum speed is at least 5mph more than the other drivers (shown by the speed trace graph, below), and also I am on a shorter, tighter line. This is where I gain the majority of the time in turn 17."

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC
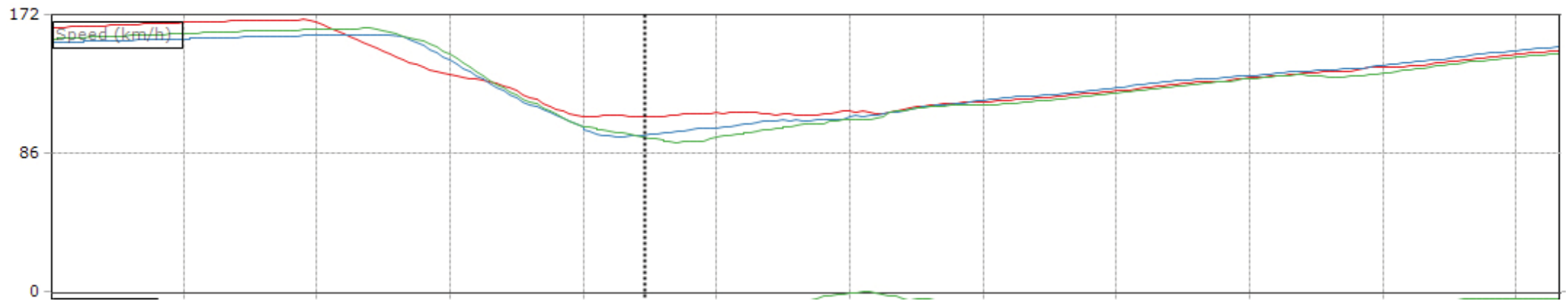
Speed trace for Turn 17: Nigel's lap is in red. He clearly brakes earlier than the other drivers, and his minimum speed is much higher through the bend, which helps him gain half a second.

"Gear selection is also crucial at this stage. Having previously tried taking the corner in 4th gear, I soon found that this caused the car to run too wide over the bumps and compromise exit speed. By using 3rd gear I was able to stay tighter to the apex which helped avoid the bumpy surface."

VIDEO VBOX   www.VideoVBOX.co.uk

RACELOGIC

Exit: Nigel (left), takes advantage of the whole width of the track to build speed

3. Exit

"On the exit of the turn, just before the bridge, there are several bumps which are caused by the large concrete slabs that made up the old air base runway. This change of surface occurs just where you are accelerating onto the straight, so it is critical that the car is balanced here! In a more powerful car, you may want to turn more before this point, allowing you to straight line the bumps, gaining more traction out of the corner.

The exit onto the start/finish straight is critical as it is 0.5 miles long. In taking the tighter line through the mid part of turn 17 instead of a traditional wide line with a late apex, it didn't give me the maximum possible speed onto the straight. However, the small speed I have lost (around 1mph in this example (shown in the screenshot below, 'exit') only leads to a 0.1s loss down the main straight, whereas I have gained 0.5s in the corner.

In order to maximise my speed onto the approaching finish line straight, I ensured that my left wheels reached the white concrete on the far left of the corner. The challenge was to see how close I could get to the exit wall to use all the available space and use maximum power.

As you can see by the screenshots above ('exit'), the other drivers managed to get fairly close to the wall, but it was those extra few inches that ensured my exit speed almost managed to match theirs, even though they took the deeper, slow in-fast out approach through turn 17."

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC

The screenshot above, highlighting turn 17 in Racelogic's free Circuit Tools analysis software shows the whole of turn 17, and you can see the different line I took (the red trace) compared with the other drivers. You can also see the delta-T channel graph at the bottom of the screenshot, which is the lap-time lost or gained through this section.

The Delta-T graph, shown at the bottom, shows where the other two drivers lost time in comparison to Nigel (shown by the red line). It's possible to see this delta time live in the car with **RACELOGIC's OLED DISPLAY** predictive lap timer, which connects to a **VIDEO VBOX**. The predictive lap-timer takes your best lap and shows you a real time, easy to glance at graphic, showing where you are losing or gaining time.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Why the traditional cornering technique isn't always the fastest

"As you have seen, this is opposite to traditional cornering technique, and is contrary to what many experts say is the only way to tackle a corner. For the Mazda Miata track car on turn 17, the mid-corner was maximised and the entry and exit speeds were sacrificed to gain more time overall. This demonstrates the fact that concentrating your efforts on a small portion of the corner can help you gain a lot of time. To ensure you're always improving and getting faster, it's important to keep pushing the limits and challenging the conventional wisdom!

However, it should be noted that different cars do have different characteristics. The less traditional line explained above worked very well in the Miata, but didn't work so well when I was driving a Corvette Trans-Am car which responded better to going wider into the corner and straightening out the bumps.

When cars and tracks are different, with varying levels of grip and surfaces, you need to be experimental and open minded when finding the fastest route. The best way to do this is with video data-logging and easy to understand analysis software that synchronises the video and data for you. This will enable you to easily pinpoint areas to improve. In addition to synchronised data I now find predictive lap timing very useful. By using a graphical display which uses GPS position to compare my current lap with my fastest so far, I can immediately see whether a new technique or line is making me quicker or slower.

The best technique is to try the traditional, recommended line to get some feedback and a reference time, and then see if you can better it by experimenting with different techniques. You might just find other drivers beginning to copy you!"

We hope you've enjoyed reading this article, and that it has provided an interesting insight into how one racing driver approaches longer corners, using turn 17 at Sebring as an example. There are, of course, many ways to tackle a long corner, and looking at the video and data quickly shows which are the most effective!

Watch a video of the corner here: http://www.youtube.com/watch?v=x6ImeHrO3e8&tracker=False

Advanced Circuit Driving Techniques

Article 6:

Why just changing head position can increase your cornering speed.

www.VideoVBOX.co.uk

VIDEO VBOX

RACELOGIC

Advanced Circuit Driving Techniques
Article 6: Why just changing head position can increase your cornering speed

### 'Owl Vision', and how to use video and data to improve circuit driving

Ben Elliot (ARDS grade A Racing Instructor), has won races in cars as varied as Formula Ford, Radicals, Westfields, and Ginettas. This gives him rich knowledge to draw on when he is coaching others to go faster. In this article, Ben discusses the importance of where a driver is looking on the track, and why reading the road, visualising racing lines, and aligning head and eye movement while driving is so important when chasing lap-times.

Ben Elliot: "The job of a circuit instructor basically involves identifying where a driver can improve, and showing them exactly how to do it. This involves finding where they are sacrificing lap-time, analysing why, and showing them how to take remedial action.

Using video and GPS data-logging enables me to back up what I am saying with objective information, and allows the driver to look at the video and data to see for themselves.

Let's take an example from a session at Bedford Autodrome, UK
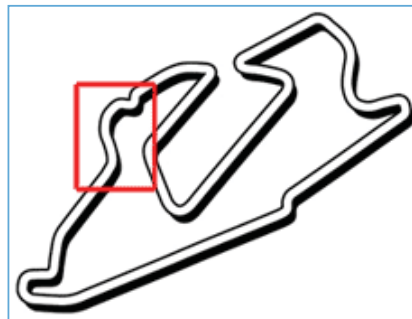
I spotted that the driver, Adam, was turning too late from left to right (corners highlighted above). The late turn to the right meant a tighter turn to the apex, so he couldn't accelerate as hard through the turn and onto the following straight.

I arranged the cameras to show the circuit in the main view and the driver in the picture in picture view. In the screenshot below with me driving you can see I'm looking through the left hand bend.

Ben

Progressing a little further around the corner we can now compare the video between myself (left) and Adam (right) as we come to the end of the left turn. We both have the car positioned nicely on the inside ready for the following right hand bend.

However, take a look at the inset camera pointing at each of us and you can see a big difference.

Ben

Adam

My head is starting to turn to the right as I look towards the apex of the next corner. Adam is still looking to left side of the circuit. Those familiar with Bedford circuit will know that there is normally a yellow 'turn in' cone on the left between the corners. Adam was focussing on this point.

Moving past the exit of the left turn, you can see that I (left) have let the car run away from the edge of the circuit and am in the process of changing direction. I have gained 5mph. Adam's head (right) is now straight to his body as he looks to the apex. Adam has gained just 1mph.

Ben

Adam

At the apex Adam is now hard on the throttle as he sees the road opening up in front of him. There is now a 13mph difference between us. Both of our heads are now in a similar position, showing that Adam is looking through to the exit of the corner properly.

Ben

Adam

So how can this driver improve his technique to go faster? Let's take a look:

Identifying the fault: Adam is turning too late into the right hand corner.

Analysing why: The reason this driver is turning in late is visual preparation. Adam is looking for a turn in point for the right hand bend and then looking for the apex once he arrives at the turn point. I call this 'Cone Spotting'!

His lack of head movement suggests that Adam is looking to the right by turning his eyes and not his head. By doing this your nose blocks your outer eye and you get reduced depth (and therefore speed) perception.

Remedial Action: I was watching Adam do this in the car and on subsequent laps worked with him to improve his use of vision. The real breakthrough, however, came in the debrief. Adam could see the differences in technique but genuinely had no idea that he was doing this in the car.

It's sometimes necessary to forget about the turn in point between two corners and immediately move your vision to the apex of the right hand bend as you're exiting the left (as I am doing) You can still use a turn in point as a reference but try to spot this in your peripheral vision, not focus on it.

For right hand bends you also need to keep your eyes ahead and turn your head towards the apex. I call this 'Owl Vision'.

Looking at the speed and lap-time difference graphs at the bottom of the circuit tools screen is very useful when finding the big areas where lap-time can be improved, but video adds another dimension to the analysis.

With the right equipment and driver focused software, it is very easy to compare two drivers and work out where time is being gained or lost.

The benefits of 'Owl Vision' include:

- Better speed perception
- Increased sensitivity to oversteer / understeer
- More consistent driving.

So, after having seen the video and worked on this technique, Adam is now turning his head to look into the corner and is preparing to turn in. This means he carries a huge 11mph more speed through the corner than he was able to earlier in the day.

Looking at the video and embedded data has helped Adam's corner preparation to improve dramatically.
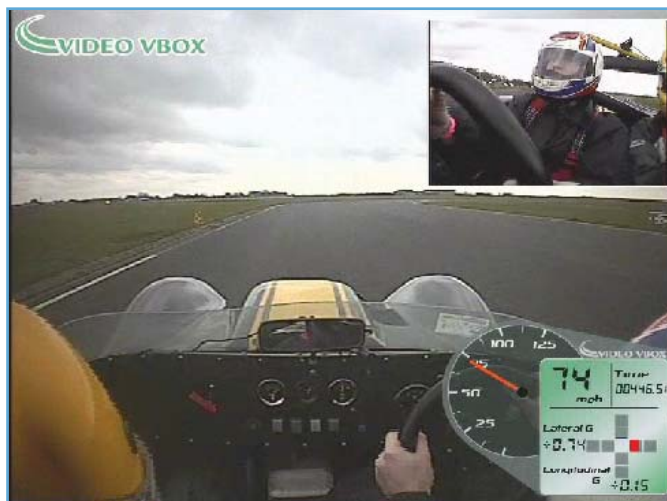
How does video data logging help in cutting lap times?

Normally I sit and watch the driver as they go through the corner. I can give feedback, but getting a driver to believe they are actually doing it is sometimes quite hard! Video gives the customer a clear demonstration of the differences in technique and speed.

I am a firm believer in the saying 'a picture tells a thousand words'. Video effectively allows the driver to teach themselves, and allows me to give useful tuition in less time than giving a description. Drivers always improve at a higher rate as a result of looking at the video and data, and I can therefore get more teaching done in a day which raises the value for money of my tuition.

By using a **VIDEO VBOX**, you can monitor your driving progress and improve at a faster rate. It's much easier to assess your performance by watching it afterwards than whilst driving!"

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC

Advanced Circuit Driving Techniques

Article 7:

Pro vs. Pro:

Finding lap time gains in the most unlikely places

VIDEO VBOX

www.VideoVBOX.co.uk

Advanced Circuit Driving Techniques

Article 8: Pro vs. Pro – Finding lap time gains in the most unlikely places

Nigel Greensall on why a corner sometimes isn't a corner.

"You're driving a Porsche GT3 RSR at 168mph around the banking of Daytona International Speedway. You're approaching the chicane. When do you brake? How hard? On a recent test day with a two times Porsche Supercup Champion, I realised our techniques were very different and that it was possible to gain time in an unexpected way.

Daytona is famed for its 31 degree banked corners, enabling NASCARs to exceed 200mph. The bus stop, half way along the back straight on the 24-hour circuit configuration, is often overlooked by drivers who see it as a standard two-corner chicane. I thought I'd compare my technique with the other pro driver to see if I gained any time using a different approach.

After all, even the best drivers in the world compare their data with team mates in order to go quicker. For example, F1 driver Mark Webber famously used Sebastien Vettel's data in order to find 0.5 seconds in sector two at Abu Dhabi whilst he was fighting for the world championship.

For the most accurate comparison, the other driver and I drove the same 2011 Porsche GT3 RSR Grand Am Spec race car.

Looking at the GPS and video data there was no difference in the lines we drove or our sector times around the circuit, except for the bus stop chicane. This seemingly insignificant section enabled me to gain 0.3 seconds. How? Let's take it from the approach...

VIDEO VBOX www.VideoVBOX.co.uk

RACELOGIC

As you can see from figure 1, we are both travelling at 168mph as we approach the bus stop. (My video is on the left, and my data is the red line). The speed trace graph below the screenshots and the delta-t graph below that (showing difference in lap times in as we progress around the circuit) shows almost identical performance until this point.

The only difference now is in track position - I am edging the car closer to the wall. This opens up my entry to the left-hander and enables me to carry more speed. Steering right towards a concrete wall at 168mph whilst looking to a left turn ahead takes some getting used to, but track position is the key to speed. You might think you are making full use of the entire width but it's important to look back at your video and data to see if you really are.

VIDEO VBOX   **www.VideoVBOX.co.uk**

RACELOGIC

Figure 2 Apex of bus stop left-hander. I am using slightly more of the kerb and carrying 9mph more speed

The braking zone

It is usually in the early part of a corner that the most gains and improvements can be made and this example is no exception.

The extra speed I have been able to carry by getting as close to the wall as possible before turn in has paid off when you look at figure 2, showing the first apex of the chicane. As shown by my video in the left screenshot, I am also making more use of the kerb, straightening out the corner as much as possible.

But the crucial element is trail braking, which enables me to hit the first apex at 97mph. The other driver braked in a straight line before the bus stop. This brought his speed down to 88mph, as he treated the chicane as two corners and coasted between them. However I am looking at the whole section up until the second apex as a braking zone, modulating my brake force as the car rounds the corner.

As I come down the straight and turn towards the first apex I apply the brakes at 100% pressure, then reduce the force to 30% to keep the car balanced (keeping on the brakes hard on the approach to the corner would spin the car), and then increase the pressure to 70% ready for the second apex.

As you can see by the delta-t (the bottom graph in figure 2) I'm beginning to make a gain here, as the blue trace of the other pro driver shows an increase in time in comparison to my red trace.

VIDEO VBOX **www.VideoVBOX.co.uk**

RACELOGIC

The bus stop

The trail braking technique compared to the traditional method is clear when you look at the G-force graph in figure 3. As you can see by the red trace, I apply the brakes hard at first, reduce the pressure for the first apex, and then increase the pressure again before the second apex of the bus stop – bringing the g-force to 0.7G.

The other driver (the blue trace) hits the brakes hard before the bus stop, but then coasts around the chicane at just 0.2G of braking force, having missed the opportunity for extra speed in the first section.

Leaving the bus stop

On reaching the second apex of the bus stop the gains made by the extra speed carried through the first section are now clear from the delta-t.

VIDEO VBOX **www.VideoVBOX.co.uk**

RACELOGIC

When a corner isn't a corner

As a driver you would usually see the chicane and brake for it as a normal left followed by a right. But this can mean braking too early. The second apex requires less speed but this doesn't mean you need to get down to this speed the corner before – a quicker lap time results in taking the speed off as close to the right hand corner as possible without coming off your line.

The key point is that I don't look at the bus stop as a traditional chicane, but more as a right hand corner with a curved braking zone. This means I scrub off only as much speed as required to get round it, and then continue the braking for the right-hander.

Of course, these techniques aren't just limited to the bus stop at Daytona. Any circuit featuring two corners close together is ideal for trying out this trail braking technique for a higher apex speed. The Knickerbrook chicane at Oulton Park and the chicane at Anglesey Coastal Circuit in the UK are comparable, as is Des Fagnes (Pif Paf) at Spa Francorchamps.

When you look at a track map don't necessarily accept the traditional approach as the fastest. Try to see where the important sections are, especially those that may appear to be insignificant. You can then use video and GPS data to look at your data and see where gains can be made, particularly when you compare with another driver."

Figure 4 Apex of bus stop right-hander. We now have similar speeds, but look at the delta-t channel at the bottom: I have gained 0.3s in this short section

"When you look at the track map, this section of Daytona appears to be fairly insignificant. But it's homing in on areas like this that enables you to find gains you would never expect."

Advanced Circuit Driving Techniques

Article 8:

How to use predictive lap timing for real time improvements

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

Article 7: How to use predictive lap timing for real time improvements

Learn how predictive lap-timing is used in racing for instant driver feedback, as used in VIDEO VBOX with the OLED predictive lap-timing display

Real time feedback to the driver is becoming increasingly important in racing, to help evaluate driving lines and vehicle set-ups whilst out on the circuit and get the most out of valuable track time. As GPS technology becomes more and more reliable, predictive lap-timing becomes more accurate and useful.

What are predictive-lap timers?

Predictive lap timing is nothing new, and has been around for some time on many high end data-logging systems. The ability to see if your current lap is quicker or slower than your fastest, in real time, is invaluable for driver training.

It enables amateurs to see where they're losing time and try out different lines and braking points, whilst pros can verify that the lines they are using are indeed the fastest. Real time comparison also saves a lot of time and money in vehicle set up.

However many existing systems are expensive. And because most use rolling distance around the lap (gathered from a wheel speed sensor) as a reference to compare two different laps, they're not very accurate either. They rely on the line the driver takes around the lap being very similar; otherwise the alignment will get progressively worse as the lap unfolds. Sometimes this method works, but when a driver wants to try a different line, overtakes another car, or locks a wheel, it's difficult to get a meaningful alignment. The longer the circuit, the more the margin of error increases.

Predictive lap-timing using GPS

A better solution is to use the GPS position from a fast updating data-logger to align the two laps. Whilst GPS position may only be accurate to a few metres, a typical average race speed would be well in excess of 30m/s, minimising any errors to around 1/10th of a second.
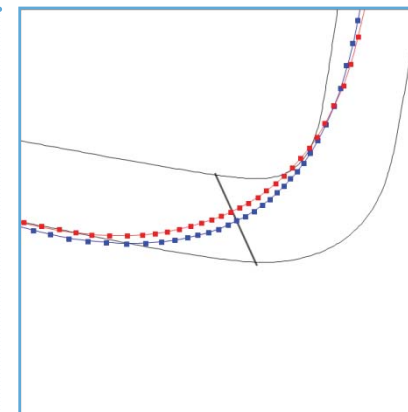
How much more accurate is GPS?

To see how this can help in the analysis software, we can take the two best laps during a race from a professional driver around the 1.6 mile Silverstone National Circuit in the UK.

The rolling distance variation was 11.6m even though the lap-time difference was only 0.06s. This equates to an analysis alignment error of 0.3s, and this is around a very short track, with a very good driver. On a longer track with a less consistent driver, this error can easily grow to over 1s!

However, by using GPS position, the timing error between these laps is virtually eliminated. GPS means that the time can be kept accurate to within 1/10th of a second.

VIDEO VBOX **www.VideoVBOX.co.uk**

RACELOGIC

'LineSnap': Predictive Lap-timing using GPS

After over a year's development, we've developed a new feature we call 'LineSnap'. Rather than distance, it uses GPS position to accurately align two different laps, 10 times a second. This offers unrivalled accuracy, even if the driver takes a completely different line each lap. The system will maintain 0.1s precision the entire way around any circuits, including very long circuits such as the Nurburgring or Spa.

VIDEO VBOX PRO with 'Linesnap' predictive lap timing

The technology has been built into our high brightness OLED dashboard display, which can be connected to the **VIDEO VBOX** product range.

It provides drivers with accurate, real-time lap comparison, and it works at any track. You do not need any external beacons, and there is no setting up required.

It adds another element to data-logging, as drivers have a real-time comparison of their current lap against their previously recorded best lap – so they will always be trying to beat it. It means they can judge the effectiveness of different lines and get immediate feedback on the graphical display of how much time they're losing or gaining. It's becoming popular with race teams and individuals drivers too.

Bump Drafting and Slipstreaming

Nigel Greensall, professional racing driver and coach, says: "The real time nature of predictive lap-timing makes it great for honing racing skills and getting an immediate impression of how much time you are losing or gaining.

It's good for working on techniques such as slip-streaming, because slight adjustments show up immediately in the display. It's also invaluable where there are a variety of different lines that you can take. On the banked HomeStead Circuit at Miami, I was able to see instantly which line along the long banked corner was quickest"

Using the OLED predictive lap-timer

RACELOGIC'S predictive lap-timing really does beat the alternatives, for two reasons. Firstly, it stays accurate all the time, and secondly, the display is nice and clear, so it's easy to glance at on your dashboard. It is also useful in races where testing is limited, as it means you don't need to keep going back to the pits to analyse the data. This enables you to be even more adventurous with the lines you use.

Drivers and teams at any level can quickly see where time is lost – so you can make big gains in consistency. It gives drivers the confidence to try different techniques and lines, and then see the instant feedback.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Cost and time savings in race car development

Instant feedback is great for race car development too. For example, the driver can give the engineers in the pits real feedback on how the car is performing with different set ups, compared in real time to previous set ups. Engineers can prepare new set ups whilst the car is out on the track. This speeds up car development, bringing down the level of trial and error that often occurs.

The future

For instant feedback on driving technique and line, this kind of predictive display can't be beaten. As prices for this kind of equipment have fallen, displays such as these will become an essential tool for any driver, professional or amateur, keen on improving lap-times.

Using Racelogic's Predictive lap-timer

The OLED predictive lap-timing display is designed to connect to a **VIDEO VBOX** GPS and video data logger. A key advantage of **VIDEO VBOX** over rival systems is that it is a one-box solution, combining a multi-camera video recorder, GPS data logger, and real-time graphic overlay into a single unit. Racers need to be sure that a video system is easy to use, quick to install, and above all that it can function reliably in the demanding conditions inside a race car.

VIDEO VBOX is small, flexible, and reliable, with automatic power back-up to ensure data is never lost. It also has automatic logging that can be set to start over a certain speed, meaning that drivers don't have to think about switching it on in the heat of the moment.

What other **RACELOGIC** products are suitable for predictive lap timing?

Firstly released as part of **RACELOGIC's OLED DISPLAY** and **VIDEO VBOX** range, the new Predictive Lap Timing upgrade has now also been launched as a free firmware upgrade for **RACELOGIC's** *PerformanceBox* and *DriftBox* GPS data loggers. **RACELOGIC** claim that this makes them the best value predictive lap-timers on the market – with a starting price of just £299+VAT.

PerformanceBox and *DriftBox* are already very popular. With their ability to record speed, acceleration, lap-times, power, and numerous other parameters, they can be found on race and track day cars, magazine road tests, and even vehicle proving grounds. The addition of Predictive lap-timing promises to add a new dimension to these powerful products.

VIDEO VBOX **www.VideoVBOX.co.uk** RACELOGIC

Who uses **VIDEO VBOX**?

Many drivers and coaches rely on **VIDEO VBOX** for their in-car video and data. Notable examples include Anthony Davidson, former F1 driver and 2010 Works Peugeot Le Mans driver who has won the petit Le Mans.

Nurburgring specialist and TV personality Sabine Schmitz also uses **VIDEO VBOX** for tuition on the Nordschleife, as well as former world rally champion and current Porsche test driver Walter Rohrl.

VIDEO VBOX is the official video and data-logging system for the Australian GT Championship, with every competitor in the 25 car field using a four camera **VIDEO VBOX PRO**.

Other well known users of **VIDEO VBOX** include:

The Works Porsche VLN racing team, Manthey Racing, Lamborghini, Ferrari, the UK Police, Tommi Makinen Racing, Car and Driver Magazine, EVO Magazine, AutoBild Magazine, Silverstone Circuit, VW, Yokohama Tyres, Continental Tyres, Hennessy Tuning and the Porsche, BMW and Audi Driver Training Centres.

There are a number of unit options, from the affordable **VIDEO VBOX LITE** with two cameras, to the high end professional **VIDEO VBOX PRO** with 20Hz GPS, 4 cameras and 32 channels of vehicle CAN logging for advanced vehicle data analysis.

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC

Advanced Circuit Driving Techniques

VIDEO VBOX PRO
with two cameras and
predictive lap timing display

VIDEO VBOX LITE
with two cameras and
predictive lap timing display

All data and video in these articles was recorded with **VIDEO VBOX**, and the data screenshots were taken from the intuitive **CIRCUIT TOOLS** software which comes included with every **VIDEO VBOX**.

VIDEO VBOX incorporates a GPS and video data logger with customisable graphic overlay, and is designed and manufactured by **RACELOGIC**.

More information and the online shop is available on **www.videovbox.co.uk**

You can add your thoughts to the discussion on the **RACELOGIC** forum: www.racelogic.co.uk/Forum

VIDEO VBOX

www.VideoVBOX.co.uk

RACELOGIC