

Hankook Z214 vs Goodyear Eagle RS

NASA NE NJMP Thunderbolt Oct 30th 2010

John Robbins – JPR AutoSports

The depth of engineering, and science in tire technology these days is staggering. I've certainly found that with racing you can get lost in any one aspect so completely it's hard to focus on anything else. The technical complexity and variety of tire choices certainly have this affect, but your attention is worth it as there probably isn't a decision that has a more immediate impact on the performance characteristics of your car or your lap times. It's amazing that so much math and chemistry could result in something that is so ultimately uniquely subjective, especially when trying to determine which is better on the race track. The characteristics of a tire and how it interacts with the car and driver are so varied affected by circumstance that detailed analysis alone isn't sufficient to produce a comprehensive assessment. I suspect that you knew this already or you wouldn't have found this to read.

The truth is, I've been screwing around with random racing tire selections for a long time, looking for what would fit, be cheap and last a while, without much consideration for how profound an impact tires can make on my lap times. I'm exhausted by my own stupidity. That is not to say I haven't been running some good tires. Nitto NT01, R888 Toyos, Hankook Z211 (let's not discuss those for too long) and the venerable Z214 Hankooks, even Hoosier R6s. All have found themselves wrapped around my RFP01s for some time. Like last call at the local pub, beer goggles tightly on, I've found myself choosing tires from what might be left, what I could afford, or, worst yet, what would tolerate my drunken stumbling. Go easy, wrapping poor college dating habits into a tire assessment is harder then you think.

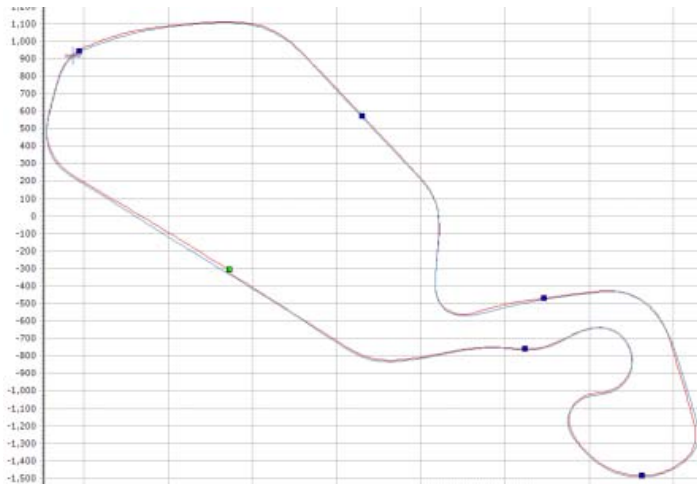
On to the show. The last event of my season was NASA NE's finale at NJMP Thunderbolt on Oct 30th. This is a great track, with a good mix of tight technical turns, fast sweepers and mixed length straights. Perfect for this comparison. NASA NE does a very good job at these events for HPDE and Racers and so it wasn't surprising that the event was very well attended. This is good and bad news. I run the Time Trial series in TTS and so we (the Time Trial groups) ran with the HPDE 4 sessions. The good is that these are very competitive TT events, the quality of the drivers and cars is extremely high, and the event is really well run. The bad news is that, on this track anyway, all those attendees meant for a pretty crowded track. Typically I don't mind as the TTS category tends to be a bit faster then the other groups (save TTU I suppose) and so it is just a matter of passing.



Today though, I was looking for clean laps to get a good comparison on these tires and I struggled to find them. A three day event, I arrived late Friday afternoon and had a few laps to bed some new Raybestos ST47 pads (more on these later) and to try to get the Goodyear Eagle RSs warm once before Saturday's full sessions. The weather was pretty cool Friday and damn cold Saturday morning.

I ran the Hankooks for the first two sessions. I had expected to alternate the Hankook tires then Goodyear and then Hankook again, but couldn't, as the Goodyears have a slightly squarer shoulder and thus would rub with the KW V3s setup. I learned this Friday night and had to spend a few minutes when I pulled the wheels to adjust each coilover up 9 mm. When I did this the Goodyears did not rub at all and so I would like to try to lower it a bit, maybe only up 7 mm, as I like the car as hunkered as it can be, sans serious rubbing.

The first session was nuts in that it was only about 42 degrees (according to the car) and I had very little grip. I had blocked the brake ducts to warm the pads more quickly but really, for the first 5 laps or so I slid all over the place and could hardly stop the car. To give you a good indication, my best lap was about 1:36 which, regardless of traffic, was very slow. I won the session for TTS which was nice, but I suspect really didn't mean anything given the cold temps.



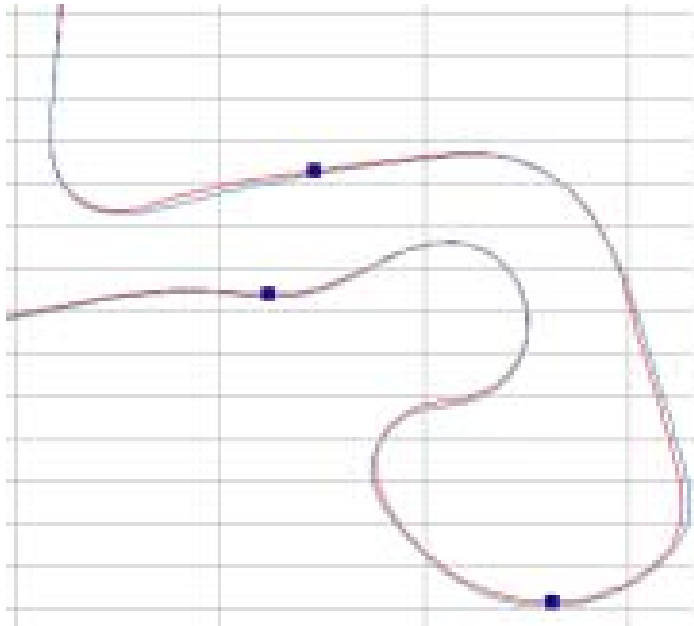
Session 2 was better and, as I said, I found a couple of clean laps. Lap times improved, as my RaceLogic PerformanceBox indicated I was running in the low 1:30s. The temps had increased to an almost balmy 50 degrees. I used this session's data as a principal point in comparing the two sets of tires. There was tons of traffic but I had more clean turns from which I could analyze data.

Basically, I like the Hankooks, I really do. They are fast, sticky and wear well. I like the way they break loose and communicate through the wheel. This session felt pretty good and I was pleased with the lap time improvement. I worried then, as I pulled in, about the Goodyears. I wanted to continue my progress at the track and I wasn't sure that the Goodyear would be as fast. I worried about the suspension changes needed to fit the tires. I worried about their still being too new and needing a full heat cycle. I fretted about the temp outside, the pressure in the tires, my new pads. I worried about all of these things, all at once and it consumed me, like when you worry about the little details of a first date or meeting her parents.

Hankook Z214 vs Goodyear Eagle RS Robbins

The Track

I shouldn't have worried. The tires are different, for sure, but different in a good way. While it took me a bit to sort out some of the differences, once I had gotten down the basics, it was clear the Goodyear tire was extremely competitive. I don't suspect that every setup will be sufficiently similar to allow you to blindly go forward in your next tire purchase (like me in the past!), but the combination of the overall lap time results combined with some interesting corner analysis, clearly indicates that with the Evo X, at this track, this is one damn fast tire.



I gave the Eagle RS tires two good laps to get to temp . It was easy to do as I was caught in a pretty good pack and was slowly working my through the group.

It was at the end of the second lap, coming through the esses, that I let the tire run some. I came through the hard left, redline in third and then a quick shift to fourth, spitting flames as I hit the gas hard. I shift the car's weight to the left while pulling by a Lotus through the first half of the esses. I was close to a Corvette that was setting up for the fast sweeping right to the long straight. This was my chance, as I planned to go a little deeper and late apex to take him on the inside. The Eagles bit in hard, and I rolled on the throttle - feeling the back end get a little loose. This is where AWD really helps, as I rotated the front around and accelerated hard, while the Corvette scrambled to find purchase. He finally hooked up and might have had the power to get me, but by that time I'm two car lengths ahead and in fifth, thinking about braking points.

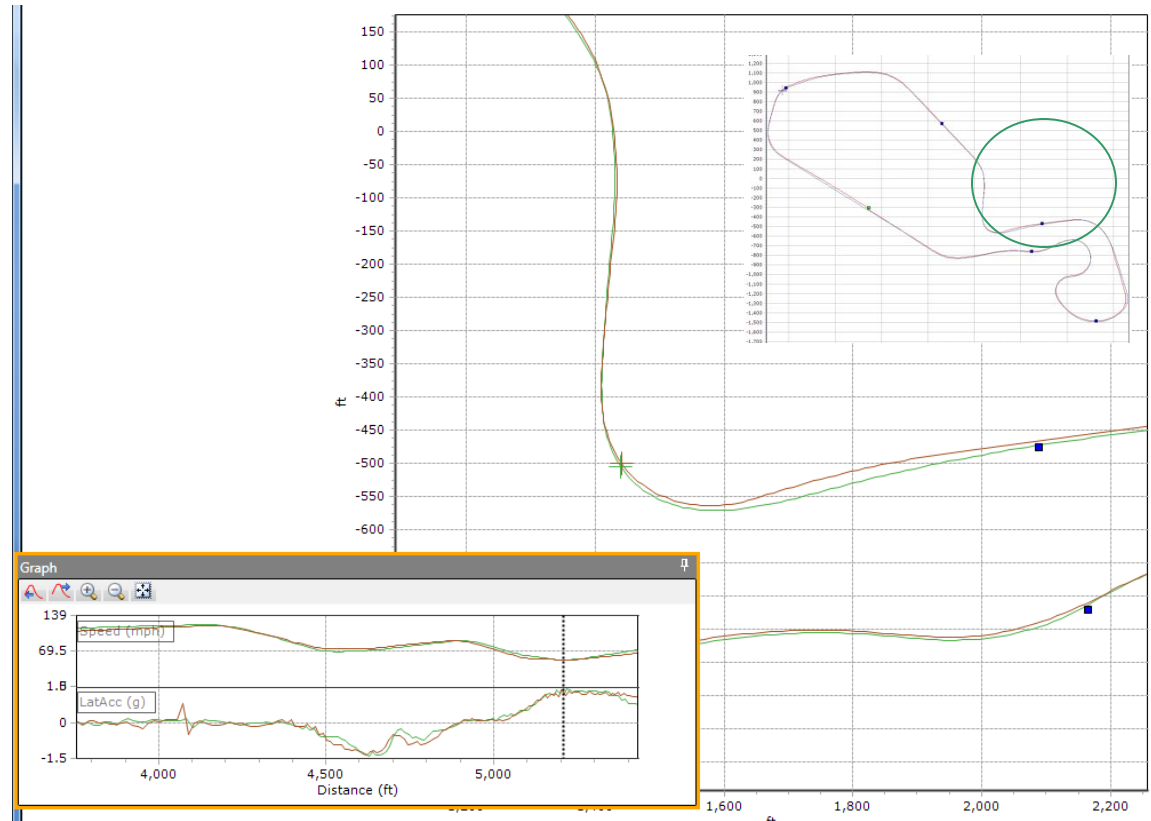
The tires made the difference. I spent lots of time passing in this session, which wasn't great for my lap times but provided an opportunity to try different lines, especially in the Octopus. To be honest, I'm pretty sure I don't have it sorted.

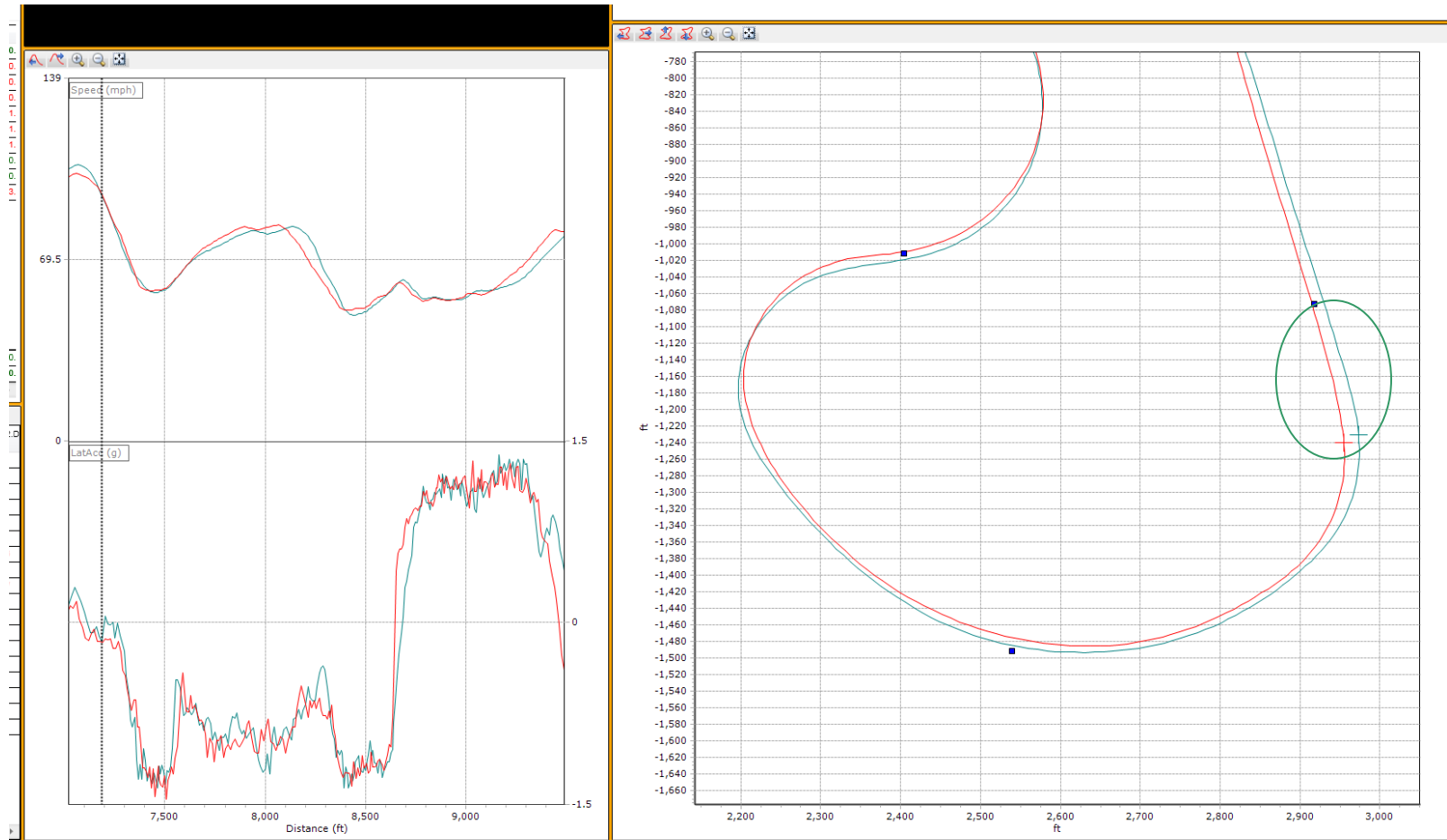
Here is some early data from turn five. The Brown line is the Hankook Z214s and the Green is the Eagle RS. While this data does not show the actual track outline it does show the relationship between the two laps and then, in the box, it shows the Brown line as slightly faster on exit while maintaining a slight increase in lateral G force. I attribute this to the tire doing a slightly better job of holding the line and not scrubbing speed on turn exit.

Notice the bowing of the brown line on exit. This is not the line but represents a bit of understeer as the back end came around on me a bit.

The preceding turn to this tight left is a very fast right and I typically found myself over slowing and not taking full advantage of the track at exit. I was a bit better at the end of the day but I believe I left a quarter of a second or more on the table.

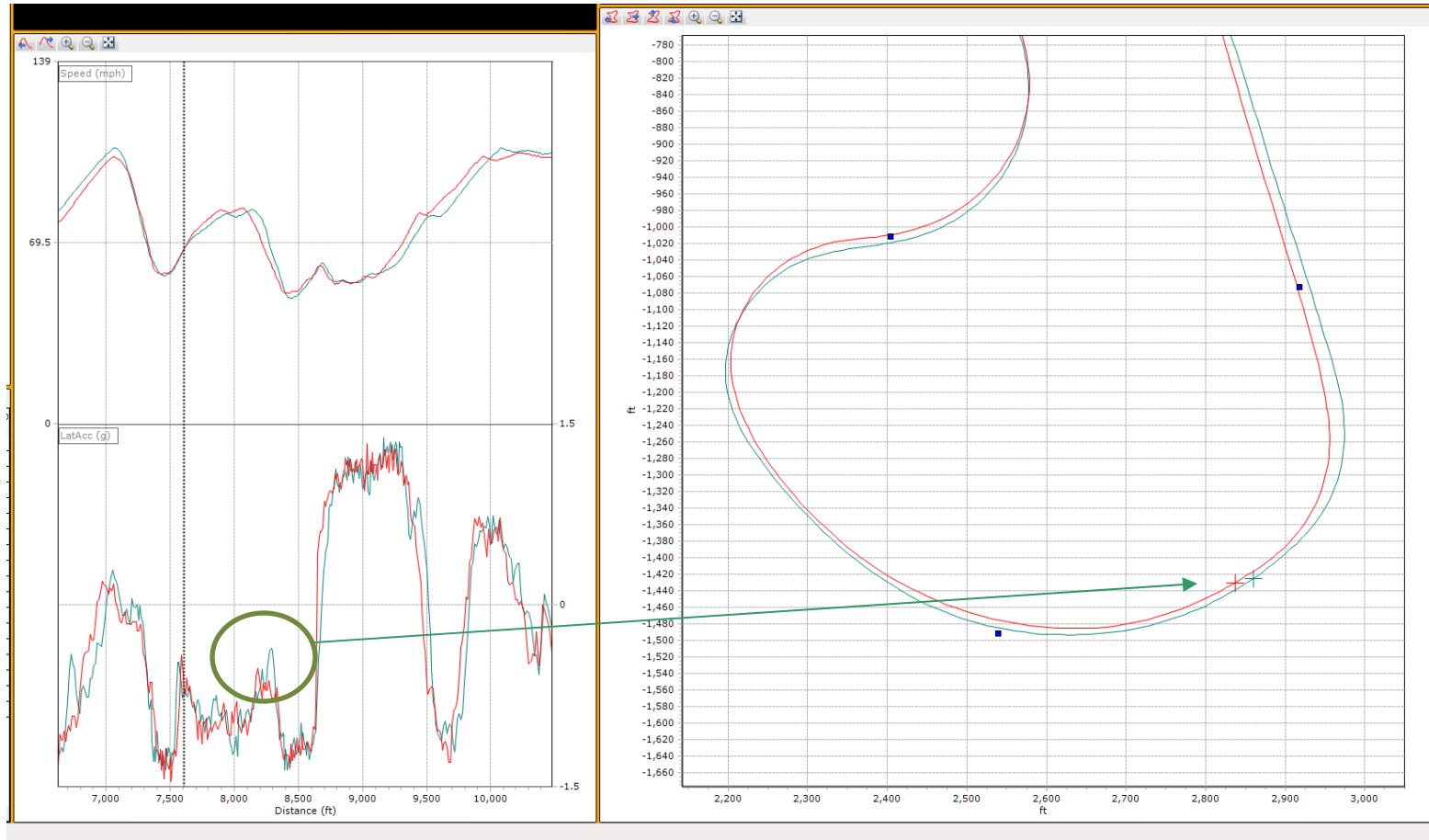
This left turned out to be one of my favorite corners as it is tighter than it looks and the AWD set up really excels on exit. I always made ground on whomever I was chasing, and aside from these slight deviations noted in the data, was pretty consistent. The Evo gearing was perfectly suited to the next short straight and the car literally exploded from this turn, heading into the beginning of the Octopus. Lots of challenge there but this part was great.





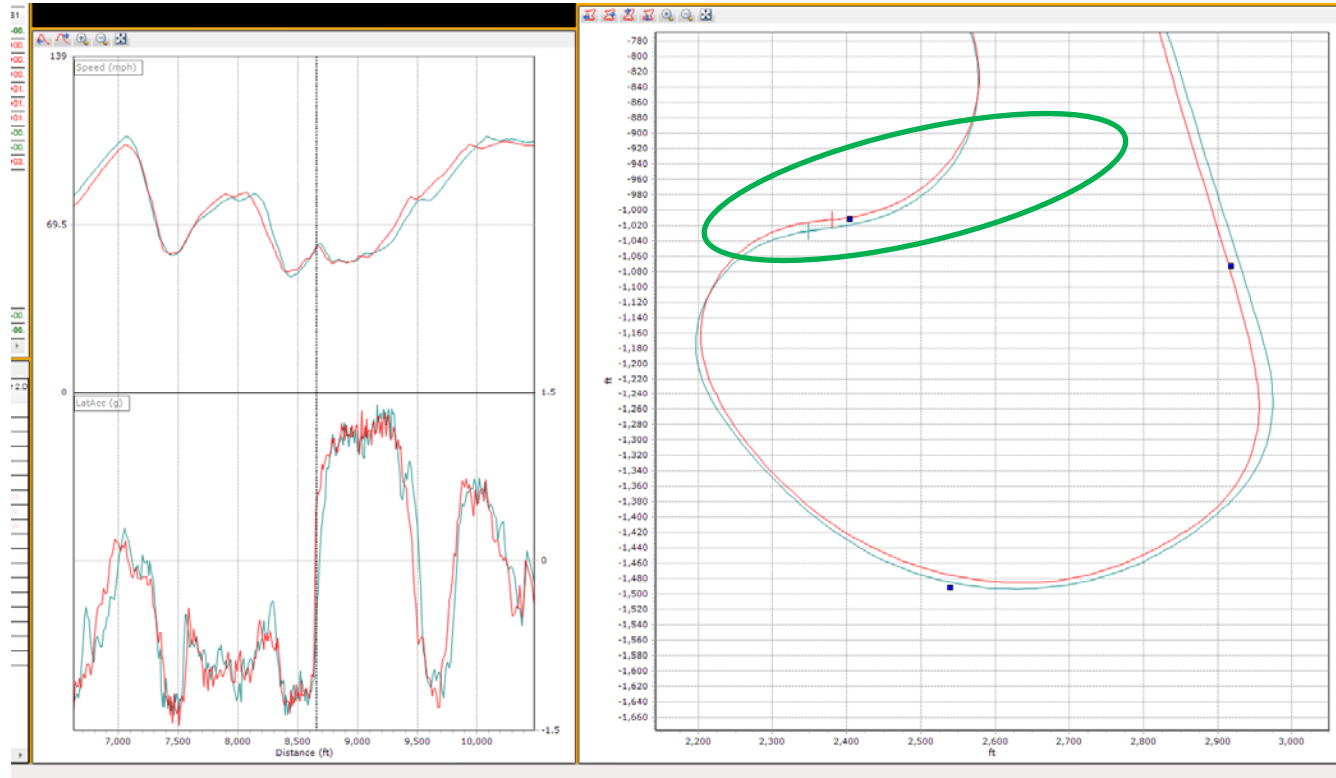
Coming into the Octopus I experimented with different lines, trying to find one that was consistently more comfortable. My best bet is illustrated here, with some trail braking in though the first apex and then a straight shot to the hard, decreasing right.

The data shows the Eagle RS in Red and the Hankooks in Blue. The X's represent the car's location and you can see they are close to identical on both runs, with the Eagles on a slightly tighter line. As I entered the turn it seems I was slightly faster on the Hankook run, though I slowed to an almost identical speed at corner entry.



Slide 2 – We get into the meat of it and can see that the Goodyear Eagle’s run is now ahead and the lateral G is higher. The speed is about the same as the earlier lap but I’ve carried it farther into the turn, relying more on the cornering ability of the tire and the car’s position to set me up for the next section of the turn. The tire’s grip consistency has allowed me to carry speed a bit further into the turn and into the braking point. Notice that for the same location and the same speed I am inside of the Hankook lap allowing for a shorter radius as well.

While the data indicates the Eagle run was a bit faster it didn’t always feel this way. The Hankook is extremely stable and possibly even more reassuring under braking. We’ll look at that a bit too.

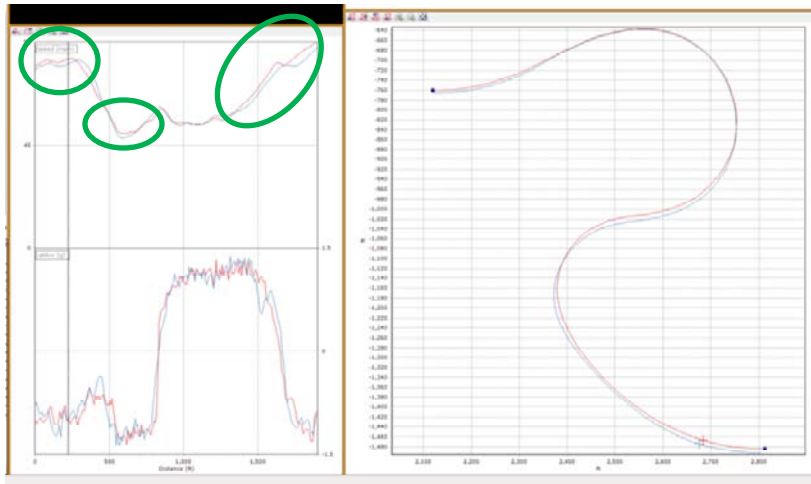


Finally, we come around a very tight right. This seems (to me anyway) a dangerous section as the car tends to snap back as you set up for the next left. Many cars were losing control and either running off track or sliding around massively.

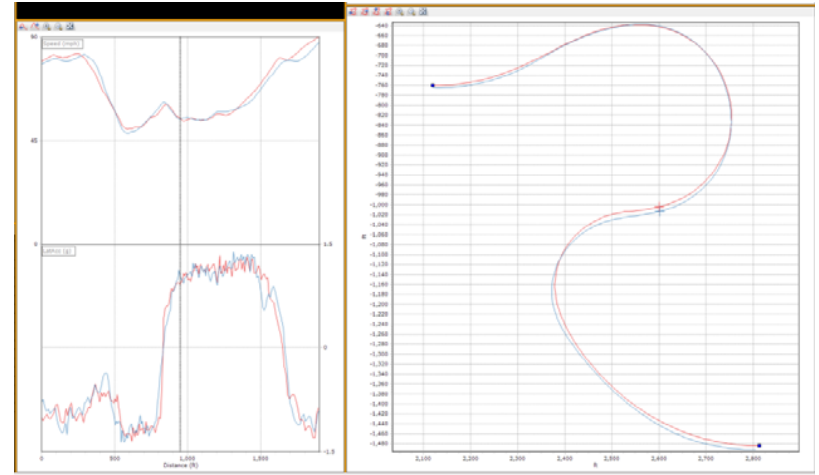
The red line of the Eagle's shows that I took it deeper here and then swung back in. I'm not sure if this is a faster line as I think I might prefer to be on my blue line, though the speed of the car and its position over the Hankook lap can't be denied. The lateral grip increase here and into the left hand, compared to the Hankook run, allows me to carry greater speed through this section overall and into the esses.

Here is where the turn in and rotation capabilities of the Eagles really shone. They provided great car control, in excess of what I was used to with other tires, including the Hankooks. I was schooled by the tires here, as they taught me just how much more control is available through very small inputs of steering and throttle. It's a constant education...

Data 1



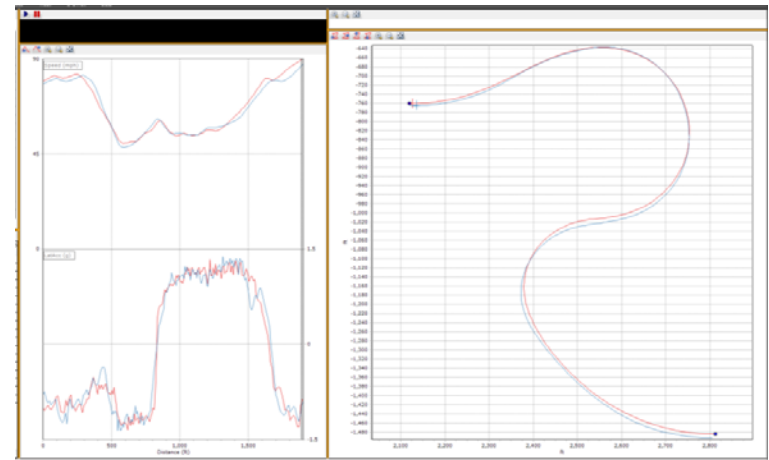
Data 2



Looking at the turn from a slightly different perspective we can see two distinct patterns. Overall, the split data results show the Goodyear run to be 0.26 seconds faster than the Hankook. Certainly, various additional factors were involved but the data seems to indicate two distinct and relevant points. One, I was able to consistently carry more speed through the corner. Data 1's green circles show instances where the car was just faster for the same points on the track. You'll notice too that it seems I gave some of that speed away after the first green circle, over braking a bit before I let off. My fault...

Two, the Goodyear's slightly increased grip allowed for a bit quicker turn in and a tighter line. Subsequently, back to point 1, I was able to get back on the throttle a bit sooner. The red (Goodyear) vs blue (Hankook) X movement from data 1-3 indicate there was not one point at which the Goodyear's outperformed, but that they were progressively faster throughout the turn. I suspect that with more seat time with the tires and more experience at the track,

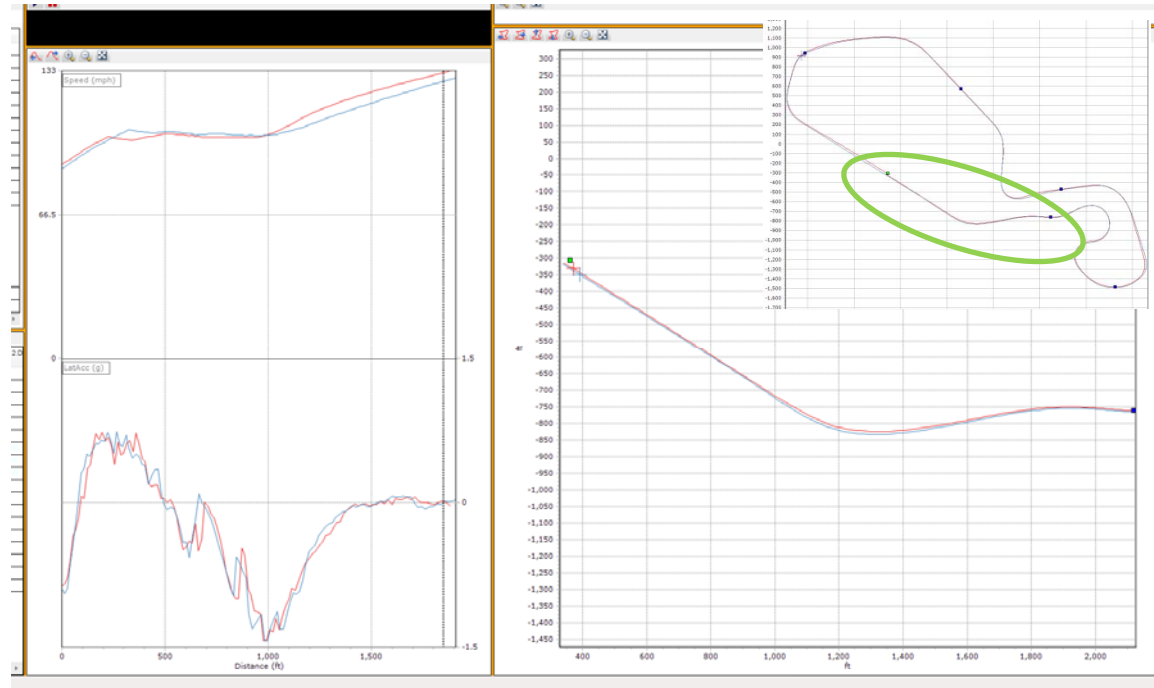
Data 3



this difference in grip and turn in capability would play itself out more dramatically with reduced lap times.

There is a blip where the blue Lateral G indicator line dips and then jumps. If I'm correct, at this point the Hankook run got away from me for an instant and I needed some steering.

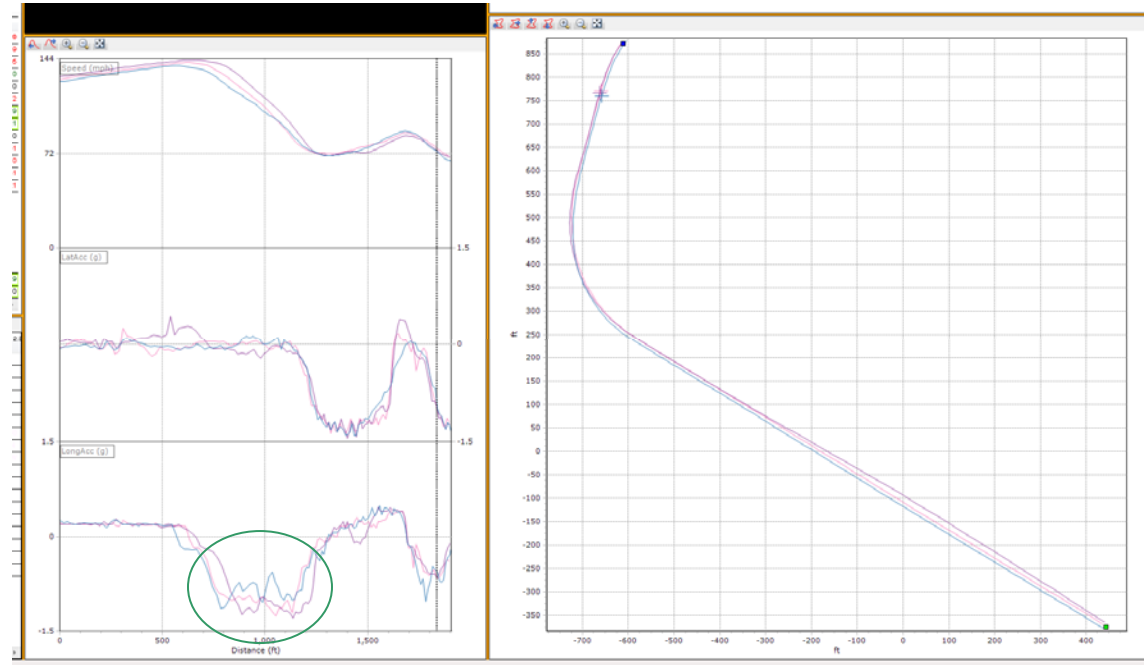
At first I thought this split was particularly boring, as the section results didn't seem disparate enough to warrant too much review. Looking closely at speed versus lateral G, in comparison to the position on the track, it was a bit more interesting. In reality, I struggled with this section of the track, having heard some horror stories about coming through too fast and breaking the car in two.



When it was cold in the morning session, I was pretty sure I saw great grandma Tilly staring down from above, her teeth clenched and cringing as I had heavy, boost filled, nostrils flaring, power induced oversteer after the apex, leading onto the straight. Significant pucker factor, it took me the better part of the day to get comfortable to take this at speed.

Pretty similar lateral Gs for both runs at almost 1.5, and the speed at that G exposure is almost identical. Two interesting observations. The speed increases dramatically just after the apex for the Goodyear run. Some of this is probably attributable to my getting more comfortable with the turn and getting to the throttle sooner, but additionally I notice that this speed increase does not result in a corresponding increase in lateral Gs at the exit. Consistent with other turns, the Goodyears are able to hold more grip at turn in and there is a slight G increase where I rotate the car through the apex and get on the throttle sooner. Then there is a general reduction in Gs, despite the increased speed (again at the same point in the turn), and I am on a tighter line. This is not necessarily great, in that had I allowed the car to run to the outside I would have carried even more speed through the apex and the results would have been more significant. Under the circumstances though, it's interesting to see the better rotation, faster speed, with similar lateral Gs all on a tighter line.

Braking was pretty consistent with either set of tires. This is not to say that it was particularly remarkable. I've been using the Hawk DTC 70 and had grown used to their tremendous initial bite. The Raybestos ST47s have good bite too, but not quite as robust as the Hawk. To their credit, they never fade and were somewhat more easily modulated into and through the turn.



The data bears this consistency out as well. I've provided three runs and you can see the Purple as the fastest run, hitting just less than 144. To my credit, I slowed to nearly the exact speed in each run. To my discredit, I may have over slowed a bit for turn 1, though the Purple line, later in the Goodyear session, shows the fastest run and exit speed. I went a bit deeper/ later braking into the turn as well. The stopping power of the pads/ tires as measured by the longitude G force is about the same, but I notice that the blue run triggered the ABS a bit, whereas the Purple and Orange did not. This was as likely triggered by the cold morning as it was by the tire itself.

The Purple and Blue Speed lines jog a bit though the next turn due to traffic and my coming up on another car rather quickly. What I don't have is the data run from my significant 4-off deviation from the track during the last session. I went VERY deep into the turn and didn't have enough braking force (or skill) to navigate the turn on line and slid quite dramatically off the rumbles into the dirt. Nice...

In reviewing through the data I've found splits in which a Hankook run was faster than the Goodyear. And a few instances in which the Goodyears felt more "loose" and I had decidedly more slip upon turn exit than with the Hankooks. Once, for example, on exiting turn 3, a big high-speed sweeper, I slid off the track, two wheels in the dirt at about 100 mph. This was not particularly fun, nor confidence inspiring. Was it the tire or my turning in early? I bet it was the latter, but I don't have the data mapped to video so it's a little hard to tell. All in all, it's clear that there were explainable instances in which the Eagles were faster than the Hankooks. As I said, there were instances when the Hankooks were fast, though, to be honest, they aren't as explainable and were more likely influenced by traffic, conditions, my poor driving line or other errors in judgment.



Some additional important caveats, aside from the obvious, that any tire test is extremely subjective. Further, that lap times are as much a component of each individual corner but also the coordinated linking of these corners and allowing the car to run effectively in between. A lot of this, for me anyway, is a result of comfort and confidence. If I feel like I'm on roller skates, I'm slow. Thus, as I had run a previous set of Hankooks (corded at Monticello) and had run this set two sessions at Watkins Glen (2:12.3) and two sessions at Lime Rock (0:58.5) I am more familiar with them on the car and knew that, for my car, 36 psi hot was about right. That translated to about 28 psi cold with a session ending (but not midpoint) operating temp of about 160 degrees.

I did not experiment with pressures with the Goodyear tires. I ran them at 28 cold, and hot they were about 36 as well. Admittedly, I struggled, due to the traffic and cold weather, to get either set of tires up to operating temp on each session. EFI Logics mounted and balanced the tires and indicated that the Goodyear's sidewall was pretty stiff. I'm not if that is a function of their construction or just being new but am very interested to see if a reduction in hot psi might increase the grip even further, at least maybe in the rears.



For tire temps, I was all over the map and so they were not particularly helpful. Both the Goodyears and Hankooks hovered around 155 – 170 degrees (adjusted) at the end of a session on the hottest edges on the fronts. The rears were a bit colder. What I needed, and didn't have, was a friend in pit lane to take temps and pressures during runs. Traffic was bad enough though, that I didn't feel like I had the extra time to get that data. The few temps I took indicate that the Goodyears ran a little cooler than the Hankooks, but I'm not sure if that's a result of the tire itself or my particular set up.

As I said at the start, I like the Hankooks, and always have. They were one of the first true road racing R Compounds I tried and I clearly recall the gut wrenching pressure I incurred at Lime Rock Park in the long right sweeper as I pushed the car faster through the apex than ever before. Read "It's a Volvo" for more on that hair raising newbie experience. Suffice to say, the tires stuck, my muscles ached for days due to the lateral stress (not a full harness), and I couldn't get the grin off my face. Heck, I've got Hankook stickers all over the car for goodness sake. So, I felt a little biased coming into the review which I suppose was a good thing, as it made me all the more critical of my new Goodyear Eagle RS tires.

Truth is, and I feel confident in saying this, both from seat of pants experience and from looking at the data: the Goodyear Eagle RS and Hankook Z214, are both very fast and competent racing tires. To choose, it's really going to be a question of fitment and application, preference, and some intangibles I couldn't easily assess. For example, impact of tire temp on performance during a normal (not 40 degrees out) session. Which get greasy faster - or which are more profoundly influenced when they are just past optimum temp? Which will wear better? I've heard great things about wear with the Hankooks though my own experience has been somewhat inconsistent. I can say that after the sessions with the Goodyears, well they looked like I could wipe them down and sell them as new. Hard to say.

On the track, both sets were quick, stable and had good braking. Without the lap data I would have said the Goodyear tires broke loose sooner and were slower to hook up on track out; the data shows the opposite, at least on several turns. As the day wore on, I was faster and able to carry more lateral G(rip) through the turns. I suspect that with more laps, and less traffic, overall lap times would have been reduced considerably. For my money (always in somewhat short supply) I plan keep working with the Goodyear Eagle RS. The Hankook Z214 is an excellent tire, but the data doesn't lie and I can now see how my driving development, experience at a given track, and care in set up will result in consistent improvement with the Eagles RS.