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<http://www.teslamotors.com/blog5/>

Handing Over the Keys VI: Dr. Rob Wilder

by Dr. Rob Wilder
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Dr. Rob Wilder is Manager of the WilderHill Clean Energy Index, the first Index on Wall Street for renewable energy, better energy efficiency, and zero-carbon solutions. He was previously on faculty at U.C. Santa Barbara, and University of Massachusetts; he has been a AAAS/EPA Fellow in Environmental Science & Technology, Fulbright Fellow, and National Academy of Sciences Young Investigator.

With so many great posts already on first impressions driving the Tesla itself, I'll instead focus on some of my own feelings, hopes & concerns going into the first — and it turns out rather surprising — test drive. Please excuse the fairly personal nature of this post.

Since sending them a check over a year ago, I reckon I've 'sort of' owned an early Roadster sight unseen. But it still was a tremendous leap of faith for the whole family, for me to have spent so much on a car that I knew so little about.

So when Tesla asked recently if I wanted to actually test-drive a near-production car, I jumped at the chance. First it meant that the car itself was probably for real: at least I wouldn't need to endure years of teasing by my wife for buying a non-existent car!

Second with keys at last in hand, I was curious about what I'd feel in my heart and head behind the wheel driving this unique, entirely new kind of electric vehicle (EV)? I'd long been captured by the idea of wrapping a beautiful body around thousands of Li-ion cells, AC motor and regenerative braking. But still it was all merely a thought: could it really come together in a great driving car?? Nobody had pulled it off in production so Tesla was trying something pretty

special.

Because I'm passionate about fast cars, the emotional feedback was no small matter to me. But before going into the test drive, I'll share the thorny hurdle from when I first came across this car in concept long ago. I'll admit straight off the hurdle wasn't that it was electric. Rather it was the price: a calculation showed this would be not only the most expensive car I'd ever bought but roughly what I'd spent on all the cars before in my life ... put together. Yet in my gut I felt an EV put together in this disruptive way absolutely *could* yield a car unlike any before. More than anything, that caused me to swallow and send a check ... it was how much *better an electric car could be*, by integrating right parts and thinking. But whether Tesla could deliver when so many failed — still made this a leap of faith.

Mindful a Tesla *might* deliver superior ride, more thrills at speed and be better all-round to boot and profoundly change perceptions—or instead be the most expensive failure I'd ever known, I was going into this first actual test drive with a lot on my mind.



VP10 cruising through the canyon

Walking up to this car the mid-size and curvy proportions do not appear extravagant to my eye from the outside, nor once I first sit at the wheel: happily it is not too showy for my tastes inside or out. I want it to be simply lovely; not over-the-top expensive-looking, nor like an awkward science fair project as some EVs have been in the past. I think its styling hits the nail on the head as elegant while singularly different, maintaining a nice sense of balance. Whew(!) a first key hurdle is cleared; it's beautiful which is essential. It bears semblance to a lithesome Lotus Elise, or Exige though a bit longer wheelbase. However the Elise is evolving in appearance and a slightly larger Tesla seems more timeless to my eye.

Opening the door the doorsill is very high, making getting in not happy for non-limber me. To their credit Tesla lowered remarkably higher(!) doorsills of an Elise and so met added side-crash tests, but the high doorsill is my biggest complaint on getting in.

Turning the key creates buzzing and whirring but that's not too disconcerting and soon stops. The seats (near-production versions I think) hold one tightly and I quickly adjust to their feel. Next, on putting the car into gear I see there's creep programmed in so it feels like a gasoline-car (what I call a 'gasser'). I lightly brake to prevent inching ahead. The GPS screen on the dash has been described as ridiculously small and I totally agree: with so much free dashboard real estate available, this screen ought to be much bigger.

Next allowing the car to gently move from the curb, I find the steering is pretty stiff at a slow speed: this could take getting used to compared to power-assisted steering. OK, deep breath... will this car meet my hopes when I tap the accelerator? I'm worried for example about a cogging feel, or this car at last giving the sensation of just a very expensive golf cart. I'm hoping for something from Tesla better than any EV I've driven. Remarkably then a surprising feeling of abundance flows as I pull away from the curb even at slow speeds. An abundance of available pulling torque, and horsepower, silence, elegant engineering, and careful design is what this car 'is saying' to me.

Steering lightens and my hopes for what Tesla *could be* begin to find some basis in reality... so far so good and I begin to feel some road feedback now behind the wheel. My apprehensions start to melt away. But I still need to push it and not treat this beast like something I'm glad can actually budge — but rather treat this as a real sports car. At my first green light I punch it: what really surprises me is how we pull away quickly with no flat spots in the motor's power, followed by my mouth feeling funny... I then notice I'm actually grinning. The 'EV grin' and it is indeed pretty wild (-: So despite conventional wisdom, EVs do not need to be slow like regular gassers.

I think about our solar-powered home: we make about 6 kW from sunlight that lands on our roof so no oil accident, terrorism, or huge petroleum company can hamper my drive. With 'my Tesla' (I'm beginning to *really* want this car!) I should get 100+ MPG... heck, better than one million MPG because I *don't need* oil in the first place. I see no downside.

I now notice the speedometer says I'm going faster than I realize. I drive my gassers at high RPMs and lower gears using engine compression to slow which

really telegraphs the speed changes to driver. Lacking any engine sounds and not always hunting for a gear, I now find driving here is a bit like a 'game' or Disney ride (remember Rocket Sled?!). A turbine-like sound whirring behind my ears is relatively quiet. Having a motorcycle as a youth and owning many noisy older gassers today, I thought I might miss the instructive revving sounds of fossil fuels furiously converting into mainly waste heat in classic (read: old) British engines, but I find myself liking EV silence quite well. It strikes me that my long-term fuel costs should be different too; one expects gasoline to head upwards in cost. Yet for my Tesla the 'fuel' costs should amazingly enough, drop down towards zero. The solar panels sitting silently on my roof pay for themselves in 10 years or less; I've already had them for 4 years and so reckon in 6 years they'll have paid for themselves — and thereafter for decades I'll get green electron fuel for free. Imagine that: free fuel from the sun plus energy independence and a car faster than my brother's 2008 Porsche Cayman S ... wow. The stone-age didn't end because we ran out of stones; combining elegant solar power with EVs just feels like a solution at hand.

A sports car needs competent brakes: a car is only as fast as its brakes. So I do a series of fast 0-50-0 stops/starts and detect no fade. Importantly, stopping distance is short, feel of the pedal excellent and degree of power assist just right for me. Next up are ascending curves and a chance for 20-50 mph bursts, to push handling closer to where I like to be. I was convinced before this test drive I'd stay near speed limits, not push matters. Yet I kind of like to throw out the rear wheels a bit in my Lotus 7. Mid-range acceleration and handling are my favorites. Tempted, I go into the first curve pushing matters a bit.

I'd note here probably the one trait I seek most in any EV, or gasser is lightness. Adding in lightness creates snowballing benefits like allowing for great handling, and also makes for a better car. Heaviness has an opposite effect. So I am keenly aware of weight To briefly illustrate how far cars today drifted into obesity, if my three+ decades-old 1969 Lotus Super 7 weighing about 1,200 lbs were stacked atop an identical one, both would still weigh less than a single Miata, considered among lightest of new cars. Likewise my two older classic Minis (British/Australian Moke convertibles) each weigh about 1,500 lbs. They're great for a family & fun yet if stacked (as these were actually designed to do!) both would weigh well less than most any single 4-seater today. Thus I'd been encouraged early on to see the high priority Tesla was placing on lowest-possible weight, when I first saw the car's specs. With an aluminum extrusion frame and by adding in still more lightness such as via Li-ion batteries and carbon fiber body, they clearly were being attentive to every pound and this was pretty impactful upon me.

So I went into this very first curve attentive to how heavy this Tesla Roadster would feel, and how it might handle. With the batteries alone adding about 950 pounds, I think, truly the pounds being put on elsewhere on this car would be felt and count. Aiming into my first curve at speed, I first hear a heavy thunking sound at the wheels as I drift a bit over 'Botts' dots', those small raised yellow reflective markers in a centerline. Maybe it's because the car otherwise is so quiet or batteries make it (I am guessing 500+ lbs?) heavier than a roughly 2,000 lb. Exige, yet that thunking is noticeable in my mind. As the car continues to drop into this curve, I hit the accelerator at the apex and boy, does the rush of this Tesla make those problems go away! Unlike a gasser one commands loads of torque in one gear without bogging the engine down or needing to downshift.

It's so cool; even though I am heading uphill it seems effortless to hug curves at a high cornering limit. It appears so balanced I don't think my passenger sweats our speed. A fear I'd had driving other EVs, was this one too might feel like it needed to be pushed uphill — I now see that is totally unfounded here. And importantly this Tesla I'm driving isn't 'vaporware' like EVs great in concept only, but that never come to fruition.

Likewise this battery solution here doesn't require any *unobtainium* at all (a substance that's great if only it existed at a viable cost, but doesn't yet today): it's 100% real.

I don't notice its regenerative braking; I imagine it is dialed in not far from the feeling of engine compression slowing a gasser: the difference is instead of wastefully heating brakes and trying to vent heat, the energy captured in slowing this EV extends its range. How stupid a gasser now seems, to expend energy uphill but recapture none back down!

We take curve after curve and it's a whole lot of fun. A funny thing too is all is happening in 2nd gear only: first gear for 0-60 only is disengaged I think for debugging. Ironically that would give more performance and feel for the 10,000+ RPM range. That also tends to reinforce the notion production delays so far are over the transmission, not batteries. I can see how full torque at 0 RPM (unlike Otto cycle gas engines) means vexing challenges for tranny designers, regardless of a 1 speed or 2-speed transmission. Yet to have robust reliability and durability, this I'd guess needs to be 100% fixed since tranny choice isn't easily altered after production begins. Unlike a racecar that needs to only work brief periods, this EV and Tesla brand doesn't need a permanent black eye.

As my drive ends I'm surprised to find I now have much less of a 'Zen' attitude about actually getting my Roadster, compared to when I got in at the start of this drive. As others report, my feeling too is one of 'hey, I want this car as soon as I can get it!'

When first getting in for this test drive, a bicyclist came over and asked if this was an EV Tesla... when I reply 'Yes' he said he'd heard they were the most expensive cars ever made! I chuckled (I cannot afford something like that!) but also groan inside since this Tesla still costs less than a German, British or Italian sportscar of like performance.

But this to me now is a crux of the matter: Tesla is changing perceptions about electric cars and importantly creating the future. I thus hope once the Roadster comes out they can move towards producing a more affordable Whitestar EV, then a more affordable EV soon after. This Roadster's price mystique should soon dissipate as they come out and I look forward to that. But most of all I like the idea we could one day drive great such EVs, many running on clean energy and it's gassers that will give us all a chuckle.

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Johan wrote on February 14th, 2008 at 7:05 pm Thanks for your post I hope we'll get test drive in London soon

jmendez wrote on February 14th, 2008 at 10:19 pm "The stone-age didn't end because we ran out of stones" Nice one. Thanks for the personal nature of this post.

Malcolm Wilson wrote on February 15th, 2008 at 12:13 am Thank you for this excellent post and for taking a leap of faith with Tesla. Dr Wilder's previous blog entry is here:

www.teslamotors.com/blog5/?p=48 I've done a fair amount of Elon-needling over the last few months, but he was absolutely right to insist on lowering the door sills and paying the additional cost for the new headlight design. It shifts the Roadster away from the Elise and Europa just enough to make it distinctive, which is what this unique drivetrain deserves. I can't wait to see the styling for Whitestar.

Brian wrote on February 15th, 2008 at 5:02 am Favorite quote, "The stone-age didn't end because we ran out of stones". I look forward to

the day when oil isn't worth the effort to pull it out of the ground.

Kevin Harney wrote on February 15th, 2008 at 9:04 am Dr. Wilder: Thank you so much for an awesome post and thank you for taking the risk of posting something of a personal nature. This is truly what makes this post intriguing, unique and a fantastic read. I can't wait for a Whitestar so that I can start making the same difference in the world as you are today - or will as soon as your number is delivered

Felix Pius wrote on February 15th, 2008 at 9:26 am Great post. I'd liked your reminder very much: "The stone-age didn't end because we ran out of stones, and the oil age won't end because we run out of oil." Near Dubai a city will be created, completely based on renewable energy and independent of fossil fuels, based on a huge invest of some 70 billions or so. Gassers will have to be parked outside! Felix Pius, Switzerland

TEG wrote on February 15th, 2008 at 9:46 am # "The stone-age didn't end because we ran out of stones, and the oil age won't end because we run out of oil." Check out the last page of these Tesla presentations: www.teslamotors.com/display_data/tedpresentation_final.swf www.teslamotors.com/display_data/pressguild.swf

Andrew Kelsey wrote on February 15th, 2008 at 11:08 am TEG, thanks for posting that. I've been wanting to see these slide shows of Martin's for a long time. Very interesting and a lot of detail that I hadn't seen before.

Max wrote on February 15th, 2008 at 1:33 pm Oil will be worth it for quite a while to be pulled out of the ground. For one, carbon fiber, is made from oil. Tesla Roadsters are made from carbon fiber - and that's a good thing. Pharmacy, plastics, vinyl, etc. are made from oil. Oil is here to stay for quite a while, happily. What will change is that we won't needlessly "waste" such a precious resource on something mundane as propelling vehicles forward. (IIRC 20%-30% of all oil is used for that purpose at the moment) Besides, with cars as exciting as the Tesla roadster (hopefully the Whitestar) and as beautiful looking as the Fisker Eco-chic, who will want to drive carbon burning vehicles? The might one day seem as ancient as the Ford model-T seems now. Petroleum burning vehicles will have an important place in history, but that will be about it.

Joseph wrote on February 15th, 2008 at 2:50 pm "I don't notice its regenerative braking" Wow! Very impressive!

Max wrote on February 15th, 2008 at 5:32 pm Dr. Rob Wilder, Thanks for posting this. You truly are a great writer. Your article made me feel like I was driving the car myself. Thank you for taking the time to post this.

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