

Frequently Asked Questions

Updated: 8/15/22

How did CNC Track Design get started?

When I was a kid (late 1960's – 70's) I used to dream about having a big routed wood track like I saw in the slot car books from that era. Instead, I had an Aurora Model Motoring lock and joiner style track, with a pretty nice selection of turn radii and straights. I was constantly changing the layout, trying to understand what made it more fun to race. As I got older I started making asymmetric, variable radius turns that were much nicer to drive, especially with the older non-magnetic cars.

Fast forward and now I'm an adult (sort of), an Engineer for Chrysler, doing engine design and performance development. I was also a Supervisor of the Engine Air Flow Lab at Chrysler. I ask the famous Tim Connolly (one of the Technicians), what is the best flowing valve seat shape? I start analyzing it and discover it is an approximation of a 2/3 ellipse. Then I confer with Mark Gleason (Aero Manager and designer of the Wind Tunnel at Chrysler's Tech Center, who also worked with of Gary Romberg who did the Aero work on the '69 – '70 Wing Superspeedway cars), and he gives me this spreadsheet for scaling 2/3 ellipses for different applications. So now I start using those for designing intake and exhaust port splines, and it works remarkably well. I ended up working on almost every Motorsports program at Dodge/SRT, including Managing the Powertrain group from 2010 – 2015.

When I decided to design a CNC routed slot car track for myself, I used the principles that I had learned and worked with one of our fantastic Motorsports Designers. Took a lot of sketching and a few iterations, but this is what we came up with, see image below. I call my track "Thunder Road".



It is a 4-Lane with variable lane spacing, meaning as the radius of the curve decreases, the lane spacing increases so the cars are less likely to nerf each other out of the groove. I wanted to have some super big sweeping turns that you can't get in plastic track as well, where the cars come together to look more realistic.

One of the features of the very powerful CAD package that we use is we can analyze the rate of change of curvature, and apex the turns like how a real Racing Driver would navigate the course. We work to make what would be a jerky layout, very smooth and sinuous. The result is your slot car drives more like a real car, which again adds to the realism and fun of the layout. My track designs are typically easier to learn, so in a short time you are racing your Competitor, rather than just trying to learn and stay on the track.

A friend of mine had his Dad in town from CA, and he raced slot cars on the big commercial tracks back in the day. We spent a night racing on my track, and he enjoyed himself so much, he commissioned a track!

So that is how CNC Track Design got started.

Who is a typical CNC Track Design customer?

I would say most fall into 2 categories: 1. Engineers 2. Business Owners

Engineers appreciate what I am doing and know it is the next step in slot car track design.

Business Owners have the disposable income and typically the space for large layouts and want something customized to their interests. Most also realize (especially after we start working together) that I am putting a lot of thought into this and giving them the best possible design.

It is always a collaborative effort with the customer, and our goal is to provide something that we are all really excited about. It is great when you can excite a 55 - 75 year old Motorsports Enthusiast!

So you just design the circuit, and cut it out of MDF, right?

Yes, there is a bit more to it than that.

Ahh, OK, what is the first step?

The steps are listed on the CNC Track Design website, some suggested reading links, and then a button for a **Request for Quote** form. The Request for Quote is something the customer fills out with some very basic information like the available space within the room, how many lanes they are thinking about, if they want to leave some space for adding scenery, stuff like that. What is also helpful is if they have an idea of what they want, like a replica of a certain track or part of the country or provide a sketch or pictures of an existing track. Once we have an idea of the scope of the project, then I start with a graph paper sketch to show them what is likely to fit in their space. This is usually a sad revelation (space is not as conducive to their layout plans as imagined), and then we start modifying it from there. There are a lot of factors to consider like balancing right and left hand turns to provide similar momentum and flow around the track, making each turn unique, line-of-sight from the Driver's stations, and most importantly making something that the customer can envision and get thrilled about. The sketch phase is free.

How long does the sketch phase take?

Anywhere from 2 weeks to a month. Some people get busy and they may not contact me again for months. Like I say, a lot of customers are business owners and I work to their schedule.

What's next?

Once a layout sketch is approved, then I write up a contract describing the deliverables, cost and timing. Once the customer signs and sends a 50% deposit, then we start on the design. It may take us a month to complete the design, depending on how many iterative changes. It is not uncommon to have 4, 6, or even 10 changes. The number of changes can increase the final cost of your track. Likewise, if we can reduce the number of sheets of MDF, we can offer you a savings. So you have to be a little flexible on budget, especially if you are the type that is likely to keep tweaking something. The later we are in the process, the more changes cost. It is just a function of design time, and I have to pay the IDEA Group CAD Designer a professional wage. In general, most people appreciate this and we can finish the design in a couple of weeks. On maybe half of the tracks I can offer a discount because we fit it on less sheets than quoted. I am always a little conservative, and try to minimize the number of joints in the final layout, thus tend to bias the quote on the high side for sheet usage.

Why do you need a 50% deposit to start?

Generally, every track is a custom design. If the Customer decides not to go through with the project, (due to any reason), I still need to pay people for the work that was done. Fortunately, this has never happened.

Do people freak out over the cost?

I have done enough of these to where I can give them a pretty close ballpark before we get to the contract stage. The cost weeds out about 75% of potential customers. You know building a good sized slot car layout is not cheap, whether you do it in plastic with Carrera track or commission us to do it in wood. You have to be realistic about this. If your budget is \$1000 and you want a 4 lane track, just the power supply and decent controllers from Professor Motor are going to eat up 2/3 of that, before you even start on the track!

Funny thing is I designed a 20' x 6' Suzuka, which is a very sophisticated layout with some variable lane spacing and slight momentum compensation, and offering at a "standard kit" price, (which is about a 50% discount), and I've sold ZERO of them. The people that hire my services want something custom to match their space and ideas, and price is not the primary factor.

So you are talking about \$2000 for a standard 3-Lane CNC routed track kit like Suzuka and a little over a \$1000 in hardware like braid, power supply controllers and wiring and some basic lumber to construct the platform, and whatever on paint and scenery. Pretty cheap hobby to share with your friends. These days any sort of hobby is a big expense. You'll spend more than that for a jet ski to tote a friend or two around the lake. Don't get me started on the cost of snowmobiles, or side-by-sides!

So how much do big tracks cost?

Custom tracks are 50% more and big custom tracks are 2 or 3 times more. The more turns and linear feet, the more design time and the more it costs. It is time and materials. Most of my customers specify a 3-Lane track with 1/32 scale lane spacing of 3" width and 4" skid aprons, which results in a track width of 14". This gives us a little bit of room to play in a 8' wide x 16' or 24' long space. Often, we cheat a little and hang part of the layout off parts of the dedicated space. My track (Thunder Road shown on page 1), is 8' wide on the end closest to the camera and 12.5' wide at the far end (blue wall) and 24' long. If you wanted something similar with full variable lane spacing, you are talking about a very expensive track because it is like designing 4 separate tracks and then we have to put it all together and get the lane lengths equal. It is not really 4 times more expensive, but it would be over twice as expensive as a uniform lane spacing track. Also the number of sheets of MDF plays into the cost, because each sheet is more time to design for manufacturing, and of course each sheet is not cheap.

Why do you use MDF, are there other (cheaper) alternatives?

I'm glad you are asking about MDF, because it is the most poorly marked and controlled material. The "Quality" of Medium Density Fiberboard is a function of the wood species, fiber size, binders, density and consistency. When you read the stats put out by the manufacturers, you think, "Wow, this is going to be great stuff". Then you get it and it leaves a fuzzy edge after routing. I've tried all kinds of MDF and can make some general statements:

- The MDF at the big box stores is the worst! Has the worst finish, largest fiber fragments, no doubt the least amount of resin, and leaves a fuzzy edge no matter how slow you cut it. They order the cheapest crap that they can make the most profit from, period.
- MDF from boutique lumber yards where you think you are getting cabinet grade are totally hit or miss. Since there is rarely any identification on the MDF, you don't know what or from which mill you are getting. These lumber yards don't know half the time either, and even if they did, I'm not sure I'd believe the sales literature.
- I get my MDF from a wood broker who buys from a specific mill and it comes on a rail shipment every 2 or 3 months. Used to be every 2 weeks before Covid. Yes, it is the most expensive, but is a superior product. Super refined compared to the rest. Heavy as hell, because it has way more resin, which is why it cuts so nice.

You can't buy inferior products and expect a professional outcome. Same goes with paint, brushes or rollers, all that stuff. I give my customers recommended products and part numbers, a complete Bill of Materials, assembly and painting instructions when they buy a track.

Back to the question of using something other than MDF, I looked into laminates, which are attractive from a potential "no finish" standpoint, but they are very stiff. Stiffer than the 1/2" thick high resin MDF that I use. Thus, no good for slot car tracks where you want to manipulate hills and slight banking into the layout.

Plywood and particle board are just too rough. You want a super smooth finish for the most grip with a silicone tire. The MDF I use is super smooth. You will do plenty of sanding to get the oil based primer and finish coats smooth. If someone has a better idea, I'd be open to trying it.

OK, so I am starting to get a picture about all that goes into a CNC Track Design. What else would you like to tell us about?

We also understand how and where to make compensations for elevation and banking, so we are essentially designing in a flat 2D plane, and you are going to manipulate this into a 3D art form with rolling hills and slight (up to 4 degrees of) banking. We then create the manufacturing files, and I work with a local programmer who CNC routes the 4' x 8' sheets of MDF. He worked in a government R&D lab, and is super brilliant. The tolerance on this is ridiculously tight. **I mean there is absolutely NO WAY a human hand and conventional router could come anywhere near replicating what we do!** We can make the lane lengths exactly uniform, or to whatever the customer wants.

For example, we did a 1/24 scale equal lane length version of Riverside, but the customer didn't like it, so we did what he asked and we were still able to keep the lap length difference between the lanes below 9", (would have been a 33" lane length difference with 5.25" uniform lane spacing, which was the original directive). The design was made to have better momentum on the outside lane, so the lap times will be more similar. No one wants to run a lane where they know they have "NO CHANCE" of winning unless the other person(s) crash. The design turned out really cool where the cars are taking a racing line, apexing the turns and coming together and spreading apart. I can't wait to take a lap!

So how long does it typically take to put one of these track layouts together?

My experience is a year. Now that may include getting the room ready, which is what I recommend because it is much easier to work in an empty room than around the track. Some people take longer. The first track we made is still not done, and we've been in business for a year and a half.

We do offer more services, but most people can build the platform, assemble the sections of track, and paint their layout. Painting is a big chore, and I charge a fair amount because it is so labor intensive. Paying me to paint your track could very well double the cost! I am a Psycho and shoot for specific surface finish, so it is a lot of sanding between coats. Again, it is just a time for labor expense. Some people don't have the time, and have the budget.

Most people can do the track build, however I get a surprising number of finished track requests. Again, some just don't have the time, or are worried that they will bungle the scenery. The artisan labor hours are significant, and will easily add a 10 times cost factor. It is not just me, have Slot Mods quote a track for you! Finished tracks are not really my business model, and that is when the quotes get expensive. You are better off commissioning a Slot Mods track, they do beautiful work! I cater to people that want to finish it themselves, take pride in modeling, and consider building the track as part of the hobby. Also, quite a few people just want a track with no scenery.

I encourage all of my customers to pick-up their track from Detroit. They can see how mine is built, and that answers a lot of questions and hopefully avoids any mistakes. I supply a build document that has a recommended build procedure and Bill of Materials to complete the layout. At CNC Track Design, we want you to have an error free, satisfying build experience.

What I really don't do is old-time commercial style big bank turn layouts. Those require fixturing and can't really be sold as a "kit". There are a couple of other folks that build those types of finished tracks.

What part of the assembly takes the most “skill”?

The braiding requires a little skill and is definitely a 2-Man job. One person taking the braid off the roll and wipes it with a 98% isopropyl alcohol soaked clean rag (to remove oxidation), and the other person gently laying it up against the gain without inducing any twist or strain. I like to lay the tape first, (not attempt to lay the tape and braid together). Each job is difficult enough to do well, so don't want to try to do both together all at once.

Can you show us some of your customer tracks?

I'd rather not. Everything related to our customers is kept in strict confidence. I have a couple of customers who have said they will let us post images of their tracks when they are done, but I don't have anything to show now. Also, I would like every track to be unique, (with the exception of the standard kits, of course). I don't want people looking at pictures and saying, “make me one just like that!” I would rather it be more collaborative, and creative. I am constantly impressed by the ideas that people bring and the vision that they have for their track. Our customers have been great!

What is the smallest track you've designed?

Smallest was 3-Lanes at 44.5' lap length. For reference, the 3-Lane Suzuka standard kit track is 50.4" lap length in a 6' x 20' space. Small tracks typically don't scale well from a cost standpoint, (meaning cost/lap length is high). So a 4' x 8' layout is not your friend, (plus they would be disappointing to race on). We are working on our second kit track and it should have a similar cost and lap length to Suzuka, but will fit in a smaller space. A lot of potential customers have a spare bedroom that can be converted into a hobby cave, but not a whole basement or bonus room, like many of the larger tracks require.

Also want to note that these routed MDF tracks are heavy! They are not something that you can easily take down if you need the space for other purposes. If you want a temporary track, build a Carrera plastic track. My most appreciative customers are ones that were used to racing on Scalextric. They are totally blown away after one lap on a CNC Track Design routed layout! As one customer called it, “smooth as butter x 3!”.

What is the biggest track you've designed?

It fit in a 20' x 30' space, required 23 sheets of MDF, and is over 155' lap length. I have a customer that would like to do an even bigger one, but he has to finish his warehouse first. I have a few guys that are building/buying new homes and are queuing up for a track. Cracks me up – I thought I was the only Psycho that had “size of basement for future slot car track” high on my list when looking for a house!

If I need help getting started (assembling the layout), what is your rate?

You may cry at my labor rate (\$100/hour and 0.625/mile) for remote work, but you and I will get a lot done in a short amount of time, and it won't be stupid money. The \$100/hour helps to cover my hotel and food expenses. Then you will be well on your way to finishing your layout.



Typical build in process, 2-Lane Riverside for 1/24 or 1/32 scale cars, fully variable lane spacing, 89.4' average lap length. Working on assembling the track sections, setting elevations and slight banking of turns. Customer plans to have full scenery when completed. Race Track Scenics is making some neat laser cut wood structures for Riverside (tower at right).

Why do you charge so much?

The design tools we use are very expensive, not some student CAD package. I have to pay professional wages, and I use the best materials. I supply additional documents to help you achieve professional results.

Again, most of my customers are older. If you were to route something similar by hand, even a smaller track like Suzuka would take 2 weeks to lay it out and create the guide, and route. The manual labor is hard on your body (especially your back). When I show the cut-out sections of Suzuka to my friends they feel it is a bargain. There is NO WAY a hand routed layout will turn out as smooth as one of our CNC Track Design layouts! When you put in all of the time to build a wood slot car layout, you want it to be the best possible, and it will only be as good as the design and routing.



CNC routing example from the Suzuka kit track using California compliant MDF, (not my favorite stuff to work with). Slot.it Group C cars in the hairpin, (shown with optional routing of gains). The computer generated lanes are CNC routed to extreme precision. You can see how the progressive rate of change of curvature has a trajectory more like how a real Race Car Driver navigates a corner. Thus, your slot car will drive more like a real car!

Is this your full-time business?

Heck no! My full-time business is Motorsports Engineering, consulting on engines. That is my background. I was a powertrain Engineer for Chrysler/FCA for almost 35 years. About half of that time I was lucky to be involved in Motorsports. If I had to count on CNC Track Design for income, I'd be eating beans and 3 year old Hostess fruit pies, (that is about how long they will sit on a shelf before being discounted, right?)!