



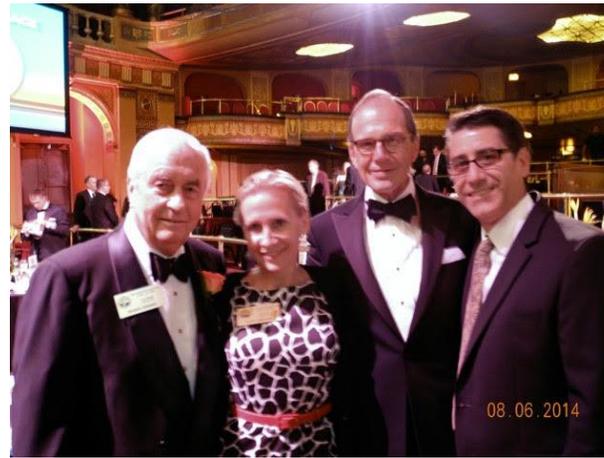
Slot Car Track Design Input

Please read this [first](#) before filling out a Request for Quote.

Effort = Results

I was lucky to be the SRT Motorsports Powertrain Engineering Manager, and work with Penske Racing on their NASCAR programs.

- Won the Nationwide Series Championship in 2010 with Brad Keselowski in the Discount Tire Dodge Challenger.
- Won the Sprint Cup Series Championship in 2012 with Brad Keselowski in the Miller High Life Dodge Charger.



Effort = Results is Roger Penske's mantra

Like everything in life, the amount of **Effort** you put in will pay dividends in the **Results**.

- Building a CNC routed slot car track is no different.
- Great design will only come from a collaborative effort.
 - Looking for your creative input.
 - Expect that it will take a number of iterations, (8 – 10 is typical), we want to reduce this to 3.

Available Space

No matter what the available space, a fun slot car track can be designed to fit.

You will have to decide how your available space is utilized.

- Do you leave more or less room for people to get around the perimeter of the track?
 - A minimum of 2.5 feet to the nearest wall is recommended.
- How much room will you have for pit tables and people to stand/sit or eat when you host a race?
 - A track that takes up more than half of the room leaves little space for people, especially if you have an active Slot Car Club.
 - I have had as many as 24 people show up for a race. Although typical attendance is 14 – 16 people.



Available Space

You will have to decide how your available space is utilized.

- Is your space mainly filled with track and run-off areas, or do you leave room for scenery, accessories, etc.?
 - My layout is mainly a RACE TRACK, with generous run-off areas, (image below left).
 - However, many people like the appeal of a Dave Beattie (Slot Mods) track, which emphasizes beautiful scenery elements. I love his craftsmanship!



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Available Space

A routed slot car track from ½” MDF is relatively heavy. However, the table doesn’t need to be supported on multiple sides for stability. Its sheer weight will make it relatively stable, if the sub-structure is stiff.

- Often the best (most accessible) layouts are peninsula style, where they are fixed on one end, (blue wall).
- The table has to be relatively sturdy, I used an open grid of 4’ x 4’ squares made from 2” x 4” wood, supported every 8’ by wooden legs with thread insert adjustable feet to make the table perfectly level.



Note: The 2’ x 4’ grid is doubled down the center.

2’ x 4’ legs are on each side of the grid, spaced 8’ apart. I also added a few extra legs in other locations for added support, as sometimes you have to crawl on top of the track to work on scenery.

Available Space

If the table top is kept relatively low at 30" (typical counter top height is 36"), most people can reach 4' across the table.

- Thus the race track table could be 8' wide, if reachable from both sides.
- If your track design is wider than 8' then you need a "Marshal" positioned within the track.
 - Mike Stott of Clover Leaf Racing was our Marshal and Quick Slicks Vendor for our Group C race.
- Pick a spot for the Start/Finish line where it is relatively easy to reach as well.



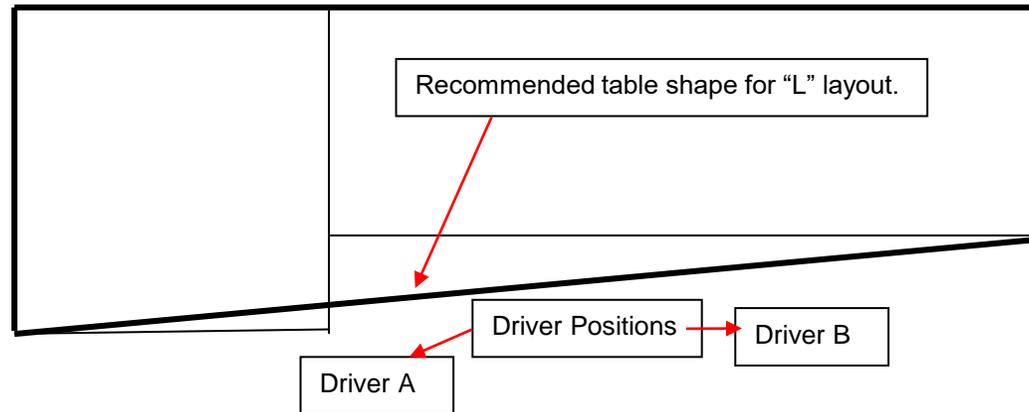
Just too creepy of an image to leave out!
Covid compliant Marshal attending to a vintage Trans Am pile-up.

Available Space

If the layout requires an “L” shaped table, make the edge where the Drivers stand straight or convex.

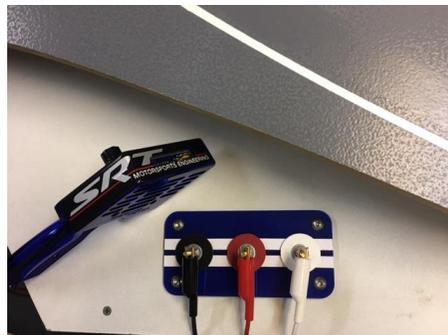
- Otherwise Driver B will have an obstructed view of the left side of the track by Driver A’s fat belly.

Talladega Tip #7. Don't wrap the layout around you, it makes for blind spots.



I like having Driving Stations on both sides of the table.

- Gives a different perspective on the track.
- Spreads Drivers out so they are not in each other’s line-of-sight.



Available Space

Plan space around the edge and under your layout for storing of cars, scenery supplies, tools and such.

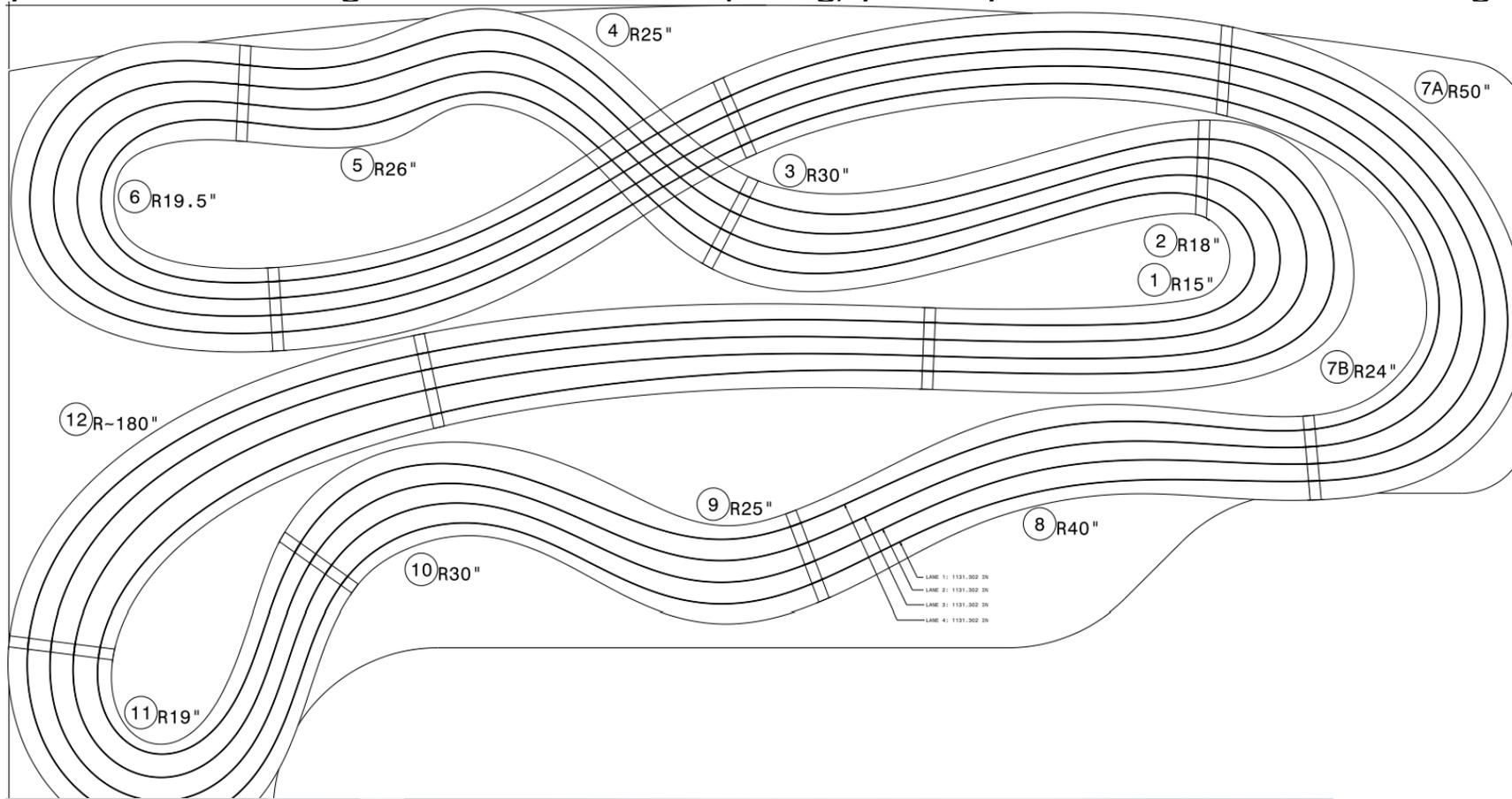
- A garage for storing or displaying cars or dioramas can be a nice space filler.



Track Design

There are 4 primary reasons for designing your own track:

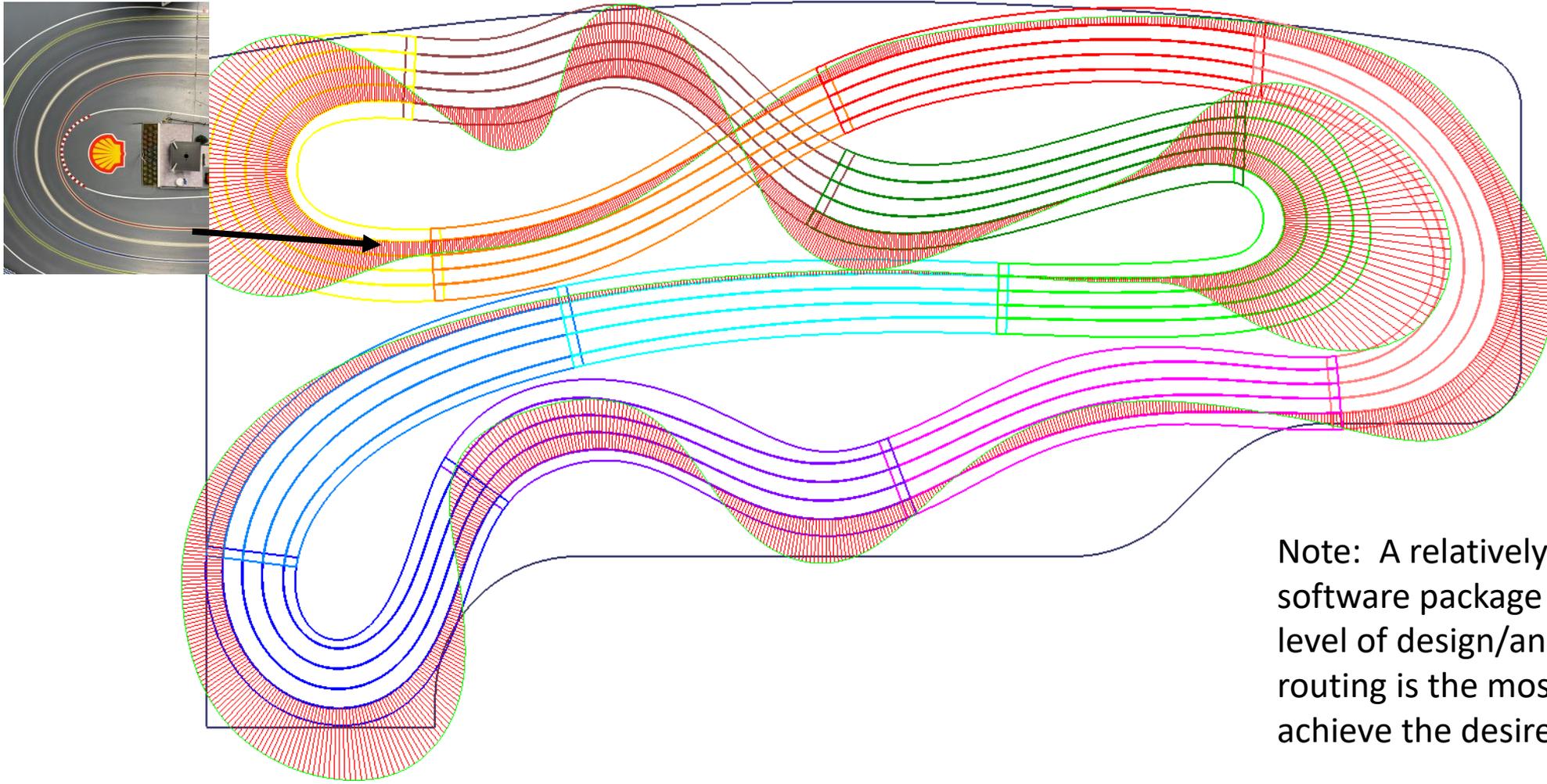
1. Have very large radii turns, much larger than what are available in plastic track.
2. Sculpt a course that has “racing lines” for a more realistic appearance than possible with plastic track.
3. Incorporate variable lane spacing.
 - Greater spacing on tight corners so cars can drift without de-slotting an adjacent car.
 - If you choose NOT to go with variable lane spacing, you may want to consider something wider than 3”.



Track Design

There are 4 primary reasons for designing your own track:

4. Eliminate the mathematical “Jerk” that occurs at the junction between a straight and curve.
 - Lines of rate of change of curvature shown below for Red lane #1.
 - This is what gives the track the smooth, racing line appearance, (see inset image).



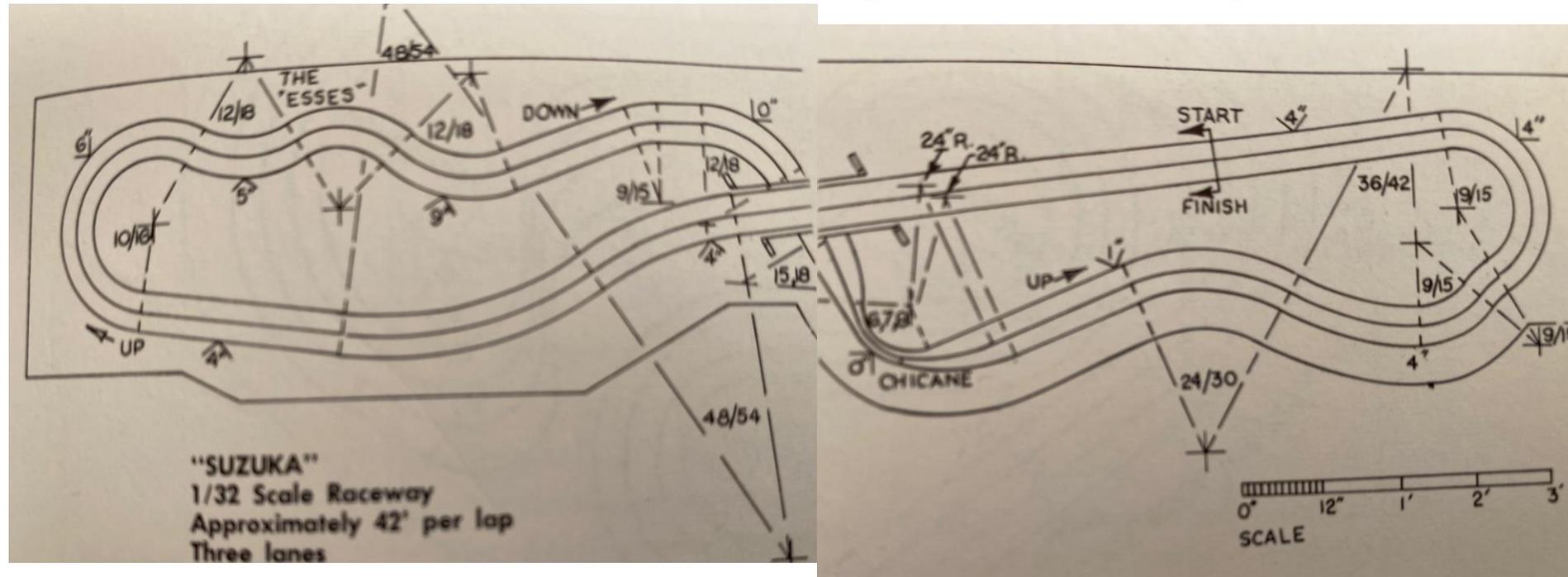
Note: A relatively “high end” CAD software package is required for this level of design/analysis, and CNC routing is the most precise way to achieve the desired finished result!

Track Design

OK, hope you are getting excited to design your own “swoopy” track!

First read the track design sections on the CNC Track Design website.

- Talledega Tip #6: Slot car layouts that are suppose to be scale models of real race tracks usually stink.
- About the only real race track that translates to a good slot car track is Suzuka.
 - Has a cross-over so equal lane lengths can be achieved.
 - The best hand routed version is a 3 lane, shown in Robert Schleicher’s 1967 Model Road Racing Handbook, reference page 243. Note the track is designed on 3” lane spacing.



Radius example: 12/18 means 12/15/18” Radii.

Cost

My basic rate is \$80.00/Hr. I work in 15 minute increments, (or \$20.00/increments).

- This includes e-mails, phone calls, as well as track design & prep.

So back to Effort = Results, your effort and planning can save you money!

- For example: If you send me 3 emails I will be charging you \$20.00 to respond to each email or \$60.00! However, if you combine 3 topics into 1 email, I will only charge you \$20.00 to address the 3 topics.
- If you make 5 incremental changes to your track design, your cost will likely be \$400.00 above the quoted cost, assuming that each one takes an hour. However, if you provide sketches or a list of features up front, before we start design, the “cost” would be significantly reduced and included in the quote. It is like building a house, every change that you make while the work is in progress is a “tear-up” or additional feature and will be added to the quoted cost.
 - **Included in the cost of your quote are 10 emails, and 3 incremental changes. In the example above, 3 changes are expected and included in the quote, and requesting 5 more would be a total of 8. Think 8 sounds excessive? Believe it or not, but this is typical!**
- Cool but complex design features like the Le Mans start grid, (shown at right), are an extra cost due to the effort it takes to get the lane lengths to balance.



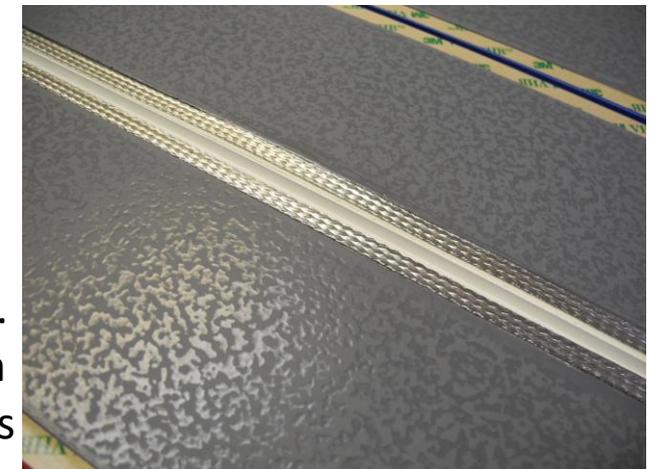
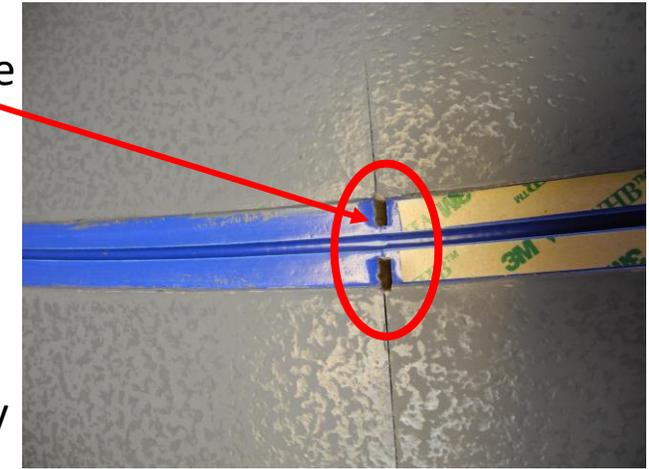
Cost

- I have the highest quality MDF delivered, straight from the supplier. I use cabinet grade MDF, so it is twice as expensive than the Home Depot offerings and will have sharper edges after routing.
 - We use CARB compliant MDF for our California Customers. It is a no cost option for all Customers. However, it does not cut quite as sharp as the best MDF which has Formaldehyde as an ingredient. If you don't opt for the NAF (No Added Formaldehyde), then I recommend sealing the entire surface of the MDF, including the edges.
- I am assuming that most of you would prefer to route the "gain" (the recess that the braid sits in on either side of the groove). I can do that for you but it will likely add \$1050 +/- \$300 to the cost of the track, (note: This is a 2 Man operation, so my cost is \$100/hr which includes a Helper.). Slot Car Corner makes a special routing bit for the gain. The trick is to get the depth set properly so the braid is flush with the track surface, (which is difficult to do because variations in the MDF hardness cause the depth to vary slightly). Generally speaking, if you take care and support the MDF sheet well, you can control the depth of the gain within +/- 0.005".



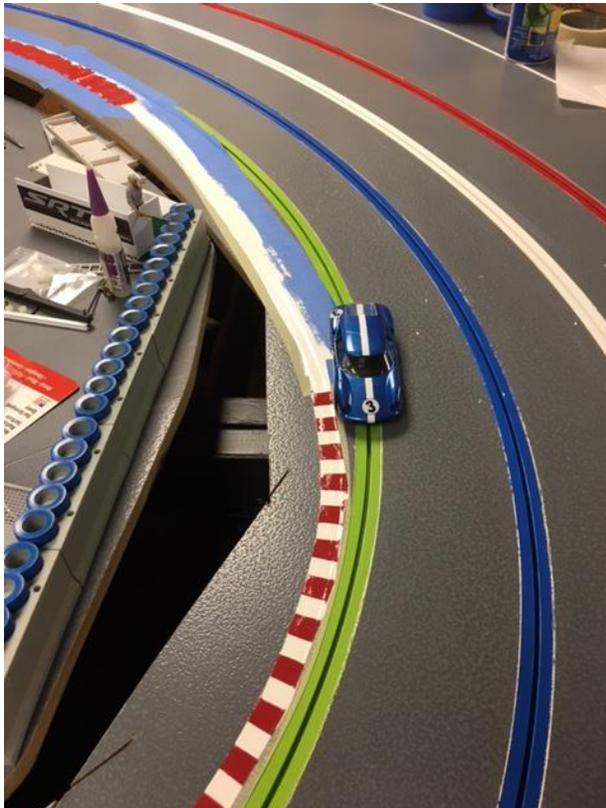
Cost

- Another painful operation is filing the edge of each groove for the braid to roll over the edge where the sheets butt together. I use a small flat file to hand radius the edge before painting. So if you want me to paint your track, this is included. Note it is also a “prep – ready for paint” option.
- Painting is a major expense due to the time and prep involved. I do 2 coats of oil based white sealer/primer followed by a sprayed enamel color coat. There is quite a bit of sanding involved to get the desired surface finish ($R_a < 1.0 \mu\text{m}$ typical). Basically the peaks are removed from the primer with 400 wet sanding. Then again on the color coat. Then the gain and groove are hand brushed with 2 coats of enamel. Expect your quote to increase starting from \$3200 if I paint it. If I had painted the 3 lane Suzuka in the sample quote, it would have been \$3500. Do NOT use cheap latex paint if you do it yourself! I use the best available paints from Sherwin Williams.
- **Note:** I did extensive (static grip) tests on MDF using different paint/prep techniques. See Track Paint and Surface Finish button under Helpful Links on the CNC Track Design webpage. I was able to get some remarkable grip results! Why is grip important? It is the great equalizer for tire compound, car prep, and driving technique. It helps to keep the racing close, which makes it way more fun! (We are talking about non-magnetic braid.)



Final Painting and Assembly

- Note the pin stripe along the edge of the track can only be applied once the track is assembled. I also painted FIA “kerbing” at the apex of the inner lane. I painted thick multiple coats of red over the white to leave a “rumble” strip effect. Note how ugly it looked in process (bottom left) vs. the finished result (bottom right). The cars make an audible noise over the FIA kerbs which is really cool!
 - I only used kerbing on the inner apex, to slow the car down on the inside lane, again to help keep the racing close.



Request for Quote

OK, now you should feel relatively informed about what will consist on the quote. At a minimum I will be working with you to design a 1/32 scale slot car track in Siemens NX. If you accept the terms of the quote, you will be paying 50% up front, and the remainder (including up charges if you go beyond the allotted design changes (3) or emails (10)) when we have finished CNC routing your track.

Of course I can handle additional steps like routing the gain, preparing for paint, and even painting, (although painting is best done on-site to avoid scratching during shipping/handling).

Things such as building the base to mount the track, assembling the track, installing the braid and wiring, pin striping the edge, adding kerbing/barriers/borders, and even scenery is assumed to be on-site only and carries a \$100/Hr rate. I'm sure most of you are quite comfortable with handling this work yourself. Adding scenery is quite fun, (although a tremendous time consumer). Woodland Scenics makes products that are almost fool proof!



Sample Quote



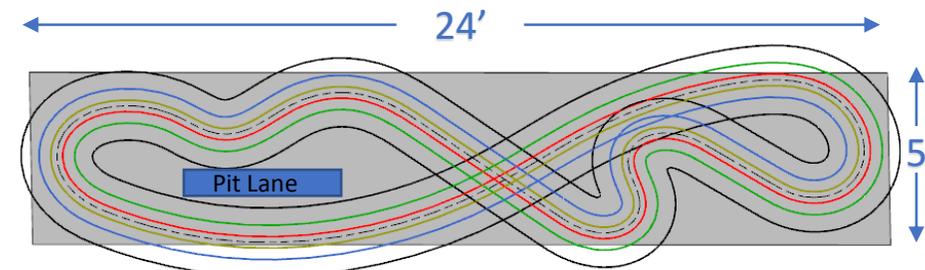
RFQ to CNC Track Design	Date: 12/3/2020
1/32 Slot Car Track	Customer: Dean
	Address: xxxxx Commerce Center Dr.
	City/State/Zip: Laguna Hills, CA 92653
Dodgekid2@gmail.com	email: Dean.xxxxxx@yahoo.com
	Phone: (949) xxx-xxxx

CNC Track Design	Customer		Deliverable
	Responsible	Must supply dimensions of room.	Prefer a scanned sketch with dimensions
Consult	Support	Could supply approximate size of table for track	Prefer a scanned sketch with dimensions
	Inform	Space utilized for track and runoffs or space for scenery	<input checked="" type="checkbox"/> Mainly Track and runoff areas
			<input type="checkbox"/> Protect space for scenery/accessories
	Responsible	Number of lanes	3 (Choose between 2, 3 or 4)
	Responsible	Special features	<input type="checkbox"/> Variable lane spacing, Yes or No
			<input type="checkbox"/> Pit lane with Le Mans start
			<input checked="" type="checkbox"/> Recommend Start/Finish Line
			<input checked="" type="checkbox"/> Recommend Driver and Marshal positions
Responsible	Approve	Design layout using Unigraphics NX	Deliver .dxf files

Options			
Responsible	Approve	Procure MDF	<input checked="" type="checkbox"/> Determine number of 4' x 8' sheets required
Responsible	Approve	CNC sheets of MDF	<input checked="" type="checkbox"/> Grooves and perimeter CNC routed
Responsible	Approve	Route gain	<input checked="" type="checkbox"/> Gain routed within +/- 0.005" of track surface
Responsible	Approve	Radius gain at edge of sheet	<input checked="" type="checkbox"/> Prep ready for paint
Responsible	Approve	2 coats oil based primer including gain and groove	Finish sand, Ra < 1.0 um
Responsible	Approve	Spray enamel surface color coat	Finish sand, Ra < 1.0 um
Responsible	Approve	2 coats oil based lane colors, including gain and groove	Ready for mounting and braiding

Timeline/Shipping			
Support	Inform	2 months from design approval typical, spreads out payments	<input type="checkbox"/> 8 Desired timing (weeks from design approval)
	Responsible	CNC routed sheets banded to pallet	<input type="checkbox"/> Customer pick-up
	Responsible		<input checked="" type="checkbox"/> Ship via truck (freight)

Comments	
This is for a business, used primarily when people rent the party room, so the finished project will not have much scenery. I like the 3 lane Suzuka example that you showed, but a CNC version with less squeeze in the hairpin.	
A narrow "static pit lane" would be nice to place the cars when they are not running. Does not need to be a Le Mans start.	
It will be mounted up along a wall, so would like to keep the table 4' wide. Will have Marshalling open on each end, (3 sides).	
I can build the table, mount it with elevation change, wire it, etc.	
I can paint it myself, just want it delivered ready for paint and assembly.	
Thanks, Dean	



Shown is a 4 lane, which was investigated but rejected because it was too wide for even a 5' wide table (grey box).

Cost Breakdown of Quote:

In this case, after detailed discussions with Dean (Customer), the track was lengthened to 24', the chicane was designed with 4" lane spacing, (like rest of track to avoid crashes), and the apex of two RH turns were tightened up slightly to equalize the lane length. 7 sheets of MDF were used to route the track. Only 1 extra email (above the allotted 10) was necessary, because Dean put a lot of thought into how this track would be used and was able to correspond concisely.

So Dean is looking at \$2980* plus shipping for a 3 lane custom CNC routed track, ready for paint and assembly. FYI - The design was approximately half of the total cost. The Customer is responsible for either picking up the track, (which will be captured within the 4' x 8' sheets), or arrange for truck freight.

* Price subject to size, options and material costs.

Personal Information

We will keep the absolute minimal amount of your Personal Information on our computers!

Obviously some information will need to transpire just to communicate. This is being protected by a service.

Internal design work is VPN encrypted.

All efforts will be made to create a paper file of your records, to minimize what is retained on the computer(s).

Nothing you give us will ever be sold or transferred for marketing purposes.

We will strive to minimize email correspondence, and be as concise as possible.

I will be your point of contact:
Patrick Baer
Email: Dodgekid2@gmail.com

