Toy Car & Truck Construction – Start to Finish



These instructions are a guide only; you must develop and use your own safe methods for selecting materials, cutting, sanding and finishing parts.

- The plans for the cars I make, and post for download are designed using 1.25" (~31.5 mm) wood for the body and 7/8" (~20 mm) wood for the fenders
- This dimension wood is primarily salvaged from cull 1x and 2x lumber that is ripped, flattened, laminated into sheets, and planed to desired thickness
- > Sources include shipping pallets and dunnage

STEP ONE (using CAD software):



- Start with a photo, scale it so the wheels in the print match the size wheels you intend to use.
- Using the photo, draw a line through the center of the front and back wheel.
- Measure the distance between the wheels. (model T chassis are all the same)
- Starting from one wheel center, measure points along the body, above and below the center line, and to the front & back.
- Use these measurements as coordinate points to draw lines, curves, and fillets.

To maintain alignment draw the fenders on top of the car body. When your drawing is finished, move the fender away from the body so it can easily be imported into Aspire separate from the body.

NOTE: measurements for toys must allow for extra thickness around openings to prevent breakage. The minimum thickness recommended for soft wood is 3/8" (0.375", ~ 10mm).

STEP TWO:



Import the vectors into Aspire or V-carve Pro and create the necessary toolpaths.

STEP THREE (cutout and prep for assembly):



• Cutout the parts on your CNC, remove tabs, round appropriate edges (preferably with a router table), and finish-sand the parts.

NOTE: part edges could be rounded on the CNC by using a plunge round-over bit. It would be necessary to create a reverse image drawing or layer, the use of guide pins to flip the part over and realign it.

Advance Preparation: Make two alignment dowels or use axle pegs to aid alignment while gluing. Light sand the dowels/pegs so the slip easily into the axle holes, but not too loose. Thoroughly wax the dowels/pegs so the glue will not stick to them.

NOTE: clean and wax the alignment dowels/pegs often. When using axle pegs It's a good idea to paint the top end so you will instantly know which ones are your tools.

STEP FOUR (assembly):



• Dry fit the fenders, using a pencil, mark the area on the back that does not get glue.



- Apply glue to the back of the fender then wipe off about 1/8" of glue around the fender to minimize squeeze out
- Using the dowel/peg tools align and clamp the fender to the car body. Once the clamps are in place remove the dowel/pegs and clamp the wheel spacer area too



- Using a plastic drinking straw, remove unwanted glue squeeze-out all around the top of the fenders. Any squeeze-out on the bottom of the car can be removed once the glue sets
- Repeat the process to install the second fender assembly



• With a brad point bit, drill an appropriate size hole for the radiator cap (I use a 3/16" axle peg)



• Apply glue to the hole, insert the axle peg 'radiator cap'



• Drill a 1/16" (.0625", ~ 1.5mm) hole into the axle hole for air and excess glue squeeze-out



ADVANCE PREPARATION: Make a wheel assembly spacer from a plastic coffee can lid. Punch or drill a hole then cut a slit from the edge to the hole.



- Dry fit the wheels by inserting the axle pegs into two wheels, hold them in place against the body, mark the axle pegs for cutting to length
- Cut the axel pegs to length and lightly sand the ends



• Using a round toothpick apply glue to the inside of the axle holes one at a time, insert each axle peg through the wheel, spacer, and tap firmly but carefully into place with the aid of a short dowel. Remove the spacer

WARNING: Be careful when inserting the axle pegs, only tap on the center of the pegs, and don't tap too hard causing the peg to go too far in; the outside edge are end grain can break off relatively easy.

NOTES: if you get too much glue in the axle hole it may take several taps with the dowel and hammer to remove the excess glue through the 1/16" hole. Don't stop until the axle peg is fully inserted or the glue will set and you won't be able to go any further.

STEP FIVE (finish):

Finish sand the car, removing any excess glue squeeze-out, brand the vehicle (if desired) then finish with a non-toxic mineral oil finish such as polymerized Tung oil, Olive oil, avocado oil, vegetable oil, and peanut oil.

SUGGESTION: Rather than paint the cars, use water based dye, most of which are non-toxic. Allow the dye to completely dry before applying the oil finish.



To apply the finish I use a non-stick cookie sheet, squirt the oil on all the inaccessible parts, including the axles and wheel wells, then using a small cotton rag I saturate the entire car, let it stand a few minutes then wipe off the excess oil with a dry piece of cotton rag.

NOTE: The excess oil in the cookie sheet can be poured back into the oil container.

To polymerize mineral oil you can use a few drops of Japan dryer**, apply heat, or just wait.

I prefer the heat method using a microwave oven but it could also be done in a conventional oven.

- Oxygen will polymerize mineral oil but it takes longer. Setting the part in a sunny window will also shorten the polymerization time.
- Microwave; heat the part until it is just too hot to touch then let it cool. Take the temperature up slowly until you determine how long it takes in your microwave; too long and it will turn your car into charcoal.
- Oven; try setting the temperature to about 180°F for about 10 minutes or until the part gets too hot to touch, a little bit higher temperature if the oil doesn't dry, but usually not over 240°F.

WARNING: Olive oil starts to smoke at about 320°F and it is a sign you are getting close to the dangerous flash point. The lowest temperature soft wood will burn, without the oil, is about 572°F so the oil will be your first and primary concern.

WARNING: OIL FINISHES ARE NOT STICKY!

WARNING: DO NOT USE ANY FINISH THAT SAY 'TUNG OIL FINISH', they are not an oil finish and most don't contain any Tung oil. These finishes will glue the wheels to the axles.

Most finishes that don't contain toxic ingredients become non-toxic once the solvent evaporates (common with polymerized Tung Oil). Check the label and MSDS before selecting your finishes for children's toys. **Remember even polymerized peanut oil can be deadly toxic to some people.**

**Japan dryer is a name that represents any number of chemical agents that cause polymerization of oils, commonly used in all types if paint. Know your dryer before you use it. Some chemical mixes can be hazardous even after evaporation.