

3. Small Cars and Trucks

Several designs of small toy vehicles are pictured below. These toys vary in length from 3 1/2" to 5". The steps to make the green car in Figure 3-1 are given in this chapter. This is an easy toy to make and one that requires very few tools.



Figure 3-1. Small Green Car

Figure 3-2. Other Designs



There are an unlimited number of designs for small toy cars and trucks. The procedures presented in this chapter to make the green car can be used to make a variety of vehicles, such as the ones shown in Figure 3-2, or others of your own design. The only change would be the shape of the body. Variations in placing and attaching the wheels are described at the end of this chapter.

Materials and Tools

The wood cut list and other parts needed to make the small green car are given below, followed by the parts explosion (Figure 3-3). An actual size drawing that can be used as a template for making the car is in Figure 3-4.

Wood Cut List

Part	Material	Size (thickness, width, length)	Qty
Body	Any hardwood	3/4" to 1 1/2" x 2 1/2" x 5"	1
Axles	Dowel	1/4" diameter x 3" long (cut-to-fit)	2

Other Parts

Part	Material	Dimensions	Qty
Wheels	Any hardwood	1" diameter with 1/4" center hole	4
Washers	Plastic or steel	1/4"	4

Tools Required

- Basic tools and supplies (see Chapter 2, pp. 14-15)
- 9/32" drill bit

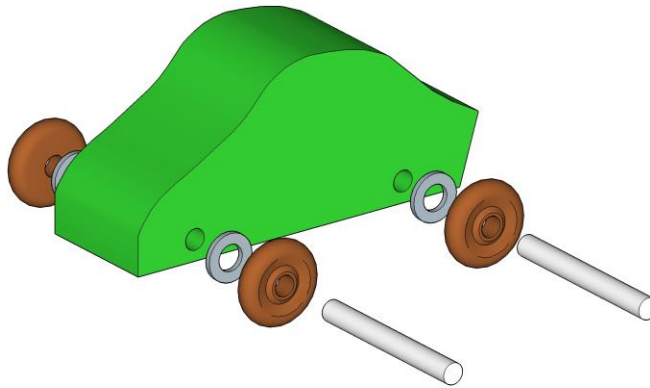


Figure 3-3. Car Parts Explosion

Plans and Steps

Car Body

1 – Wood block. Begin with a rectangular block of wood 2 1/2" wide by 5" in length. The block should be at least 3/4" thick. If available, thicker stock (up to 1 1/2" thick) will make the car more realistic.

The width and length dimensions of the block of wood are a bit greater than the final dimensions of the car to facilitate the transfer of the outline of the car onto the block.

Draw the outline of the car on the block using Figure 3-4 as a template by placing the bottom of the template along one straight edge of the block. Using a nail or center punch, mark the location of the two holes for the wheel axles, located 5/16" above the bottom of the car.

2 – Axle holes. Drill holes for the axles using a 9/32" drill bit. For best results, drill from one side completely through the body to make the two holes (one on each side) for the front wheels. Then repeat for the rear wheels.

This is a critical step. It is important that the drill bit be perpendicular to the side of the car body. Clamping the bottom of the car against a fence will help to insure accuracy. The 1/4" axles should rotate freely in these holes.

Rotating Axles

See Chapter 2 (p. 18) on sizing holes for rotating parts.

3 – Shape. Rough cut out the car's body within 1/32" to 1/16" from the outline on the blank. Sand to the outline, then round over the edges to a 3/16" to 1/4" radius, using a wood rasp and sandpaper, or router.

Router Safety

DO NOT USE a router to round over edges of toy parts **UNLESS** the router is stationary, that is, attached to a router table. See Ch. 18., p. 158.

4 – Sand. Next sand the entire shape, using progressively finer sandpaper up to 150 grit sandpaper.

5 – Seal, paint (optional), and clear finish. Finishes should be applied to the body and the wheels before assembly. First seal all parts except the dowel axle with de-waxed shellac. When dry, lightly sand with a foam sanding pad to remove any raised grain.

Next apply paint and one or two coats of water-based polyurethane. Or skip the paint and just use polyurethane, letting the car be the natural color of the wood. Lightly sand between coats of polyurethane.

More on Finishing

See Chapter 21, p. 183

6 – Ream out holes if necessary. Finish often gets into the 1/4" center holes of wheels. It might be necessary to use a 1/4" drill bit to ream out the wheel holes before gluing the dowel (axle) into the hole.

Reaming Out Holes

See Chapter 19, p. 169.

Assemble

1 – Glue one wheel. Test that the 3" dowel being used for the wheel axle is a good fit in one of the car wheels.

Glue Joints

See Chapter 2 (p. 19) on testing and adjusting holes for good glue joints between dowels and wheels.

Put glue in the hole of the wheel using a toothpick or nail. Smear the glue around the inside of the hole. Don't use too much glue and wipe off any glue that has gotten on the inside surface of the wheel.

Insert the 3" dowel into the wheel, pushing it through until it is flush with the outside edge of the 1/4" hole in the wheel. Wipe off any excess glue pushed to the outside of the wheel.

Repeat this step using the second axle (dowel) and another wheel.

Wheels have now been attached to one side of the front and rear axles of the car. Allow the glue in these wheel-axle assemblies to set for about 15 minutes.

2 – Dry assemble⁷. On one of the wheel-axle assemblies put a washer on the dowel up against the wheel and insert the dowel into one of the axle holes in the car.

Between the washer and the body of the car insert a spacer that is about 1/32" thick.⁸

On the other side of the car put a washer on the 1/4" axle and a spacer, then slide a second wheel onto the axle so that the wheel, washer, and spacer are up against the second side of the car.

Place a mark where the dowel is flush with the outside of the second wheel that has yet to be glued to the axle. This will show how much needs to be trimmed off this dowel.

Repeat this step with the other wheel-axle assembly.

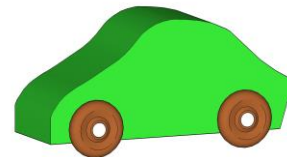
Before disassembling for gluing, test that the axles with wheels attached rotate freely. If not, ream out or increase the size of the axle holes in the car.

3 – Glue second wheel. Remove the second wheel, washers and spacers from one of the wheel-axle assemblies. Trim the dowel to the location marked. Reassemble, making sure to have a washer and spacer on each side of the car's body.

Put glue in the center hole of the second wheel, wiping off any glue that has gotten on the inside of the wheel, and push it onto the axle until the end of the axle is flush with the outside edge of the hole in the center of the second wheel. Wipe off the glue pushed to the outside of the wheel, remove the spacers, and test once again that the axle with two wheels attached rotates freely. (If not, disassemble quickly before the glue dries and make corrections.)

Repeat this step with the second wheel-axle assembly. Allow the glue to set for 15 minutes.

The car is ready to drive.



⁷ To "dry assemble" means to assemble parts without glue to test that the parts fit properly.

⁸ The plastic clip used to seal the bag of a loaf of bread makes an ideal spacer. A piece of cardboard from a cereal box will also work.

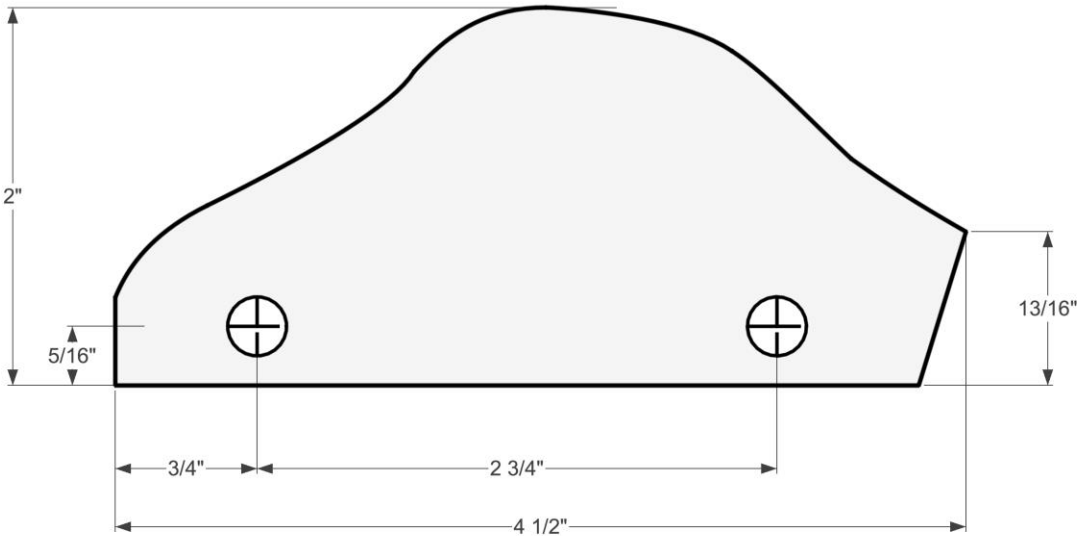


Figure 3-4. Car Template



Figure 3-5. Fenders and Axle Pegs for Axles

3. Small Cars and Trucks

Variation 1

A slight variation to the design and procedure given above is to drill holes for the wheels in the side of the vehicle to create fenders. See for example the tow truck and minivan in Figure 3-5. This will only work if the body of the car or truck is at least 1 1/2" thick. To drill the holes for the fenders, use the following steps:

1. Instead of creating the axle hole with a 9/32" drill bit, use the smallest diameter drill bit that is long enough to drill a "centering" hole through the body for the front wheels and the rear wheels of the vehicle. Try to make this hole no greater than 1/8" in diameter.
2. Using the centering hole as a guide, drill a

1 1/4" hole on each side of the front and rear of the car. A Forstner bit is best for this operation. This hole should be 1/4" to 5/16" deep, depending on the thickness of the wheel.

Types of Drill Bits

See Chapter 19, pp. 166-67.

3. Now using the centering hole as a guide, complete the axle hole through the body using a 9/32" drill bit.
4. Follow the gluing instructions given previously.

Variation 2

An axle peg can be glued into the vehicle body instead of using a through 1/4" dowel for an axle. See for example the tow truck in Figure 3-5 or two of the convertibles in Figure 3-2.

The procedure follows:

1. Use a 15/64" bit to drill the front and rear through axle holes for wheels with a 1/4" center hole.
2. Now, instead of using a 1/4" dowel for the axle, use a 7/32" or 15/64" axle peg. The tenon might need to be sanded to make a good glue joint.
3. Depending on the thickness of the car body, the axle peg tenon may need to be shortened. The length of the tenon should be no greater than half the sum of the thickness of the car body and the two wheels.

4. Each of the four wheels will be glued into the body separately with an axle peg. Use the following procedure:

Put glue into a hole in the car body, making sure to wipe off any excess glue that comes out of the hole onto the side of the car.

Next insert the axle peg with the wheel, washer, and spacer into the hole up against the car body. Repeat with the other three wheels. Do not use too much glue. Be careful to avoid glue squeezing out of the hole in the car body and sticking to the spacer, washer, or wheel.

5. For wheels with a 3/8" center hole, drill an 11/32" hole in the vehicle body, use an 11/32" axle peg, and follow the procedure described in steps 1 – 4.