# DREMEL®

ALL★STAR Derby Design CONTEST

## Building a Derby Car

**Safety Note:** Dremel tools and accessories are not intended for use by children under the age of 18.

Derby car races are great projects for Scouting, youth, church, club, camp and civic groups of all ages. Even young people can build great-looking cars that win races, with adult help and supervision. Read all race rules, assembly instructions and safety information before proceeding.

## Most Commonly Used Racing Specifications

1. Maximum car size, including wheels, is 7" long, 2 3/4" wide.
2. Minimum width between wheels is 1 3/4".
3. Minimum ground clearance between car and track is 3/8".
4. Maximum car weight is 5 oz. (142 g.). Metal or wood may be added.
5. No wheel bearings, bushings, springs, starting devices, loose or moving weights, or parts are allowed.

Cars that do not meet specifications may be disqualified. Local rules may vary. Wheels and axles should be the same on all cars in a race.

Remember as you build your car, most local derby officials present craftsmanship awards for the best-looking car entries!

## Car Assembly

### Step 1: Design the Car Body

You can use photographs of your favorite cars for inspiration to make your own pattern. Draw or trace the pattern on all sides of the wood block **(Step 1)**. Plan for the location of parts that get attached to the car such as spoilers, fenders, windshields and decals.

### Step 2: Shape and Sand the Car Body

Use a Dremel scroll saw, or a coping saw to quickly remove large areas of wood. **(Step 2a)** Next, shape the car with a Dremel high speed rotary tool and the 1/2" or 1/4" sanding band included in the Dremel Derby Accessory Kit. **(Step 2b)** Cut any square edges or grooves in the body with the #194 high speed cutting bit also included in the Dremel Derby Accessory Kit. Maintain the shape of the car design by following the outline of the car drawn on the wood block.

Sand the body smooth by hand with medium and then fine sandpaper. You may wish to recess an area for in body for the weights at this time (see Step 6: Weights).

### Step 3: Prime and Paint the Car

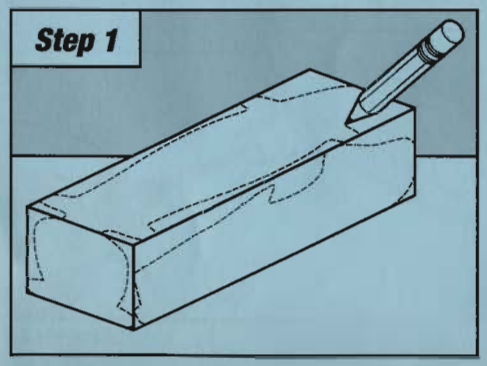
Primer paint soaks into the wood and prepares it for a smooth paint finish. Apply several coats of primer paint and allow to dry thoroughly. Sand the entire car with fine sandpaper between coats. Apply two coats of fast-drying paint in the color of your choice. Allow to dry and sand lightly between coats. Paint the final coat and let dry thoroughly. **(Step 3)**

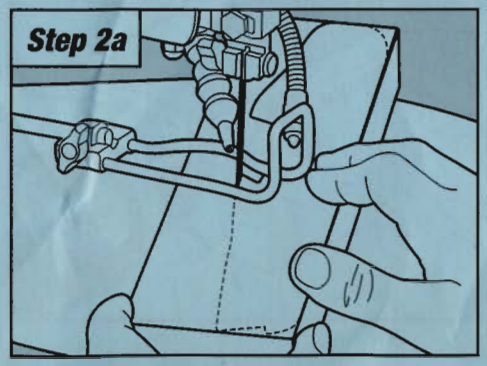
### Step 4: Apply Finishing Touches

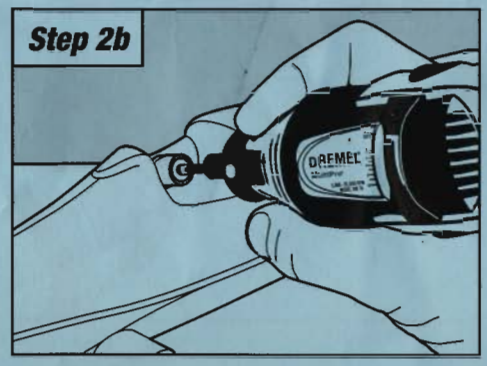
You can apply any hand-painted pinstripes or decals to your car at this time.

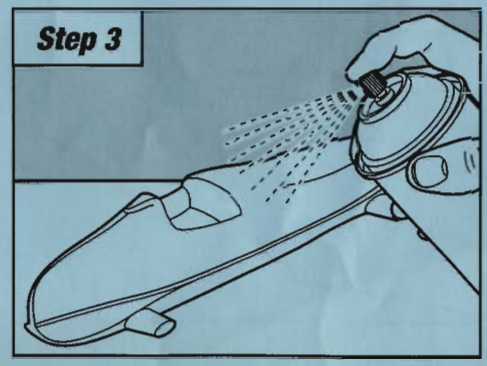
### Step 5: Gloss Finish

Apply two or three coats of gloss finish. Allow to dry between coats.



# Racing Tips

## Step 6: Weights

The heavier your car, the faster it will go. Add weights to make your car weigh the maximum amount that race rules allow. It is best if your weight is adjustable. Then, if your car is too heavy, you can remove weight at the official weigh-in. If your car is too heavy, race officials will disqualify it.

You may prefer to countersink the weight into the bottom of the car.

To do this, turn the car on its top. Trace around the weight. Use a Dremel rotary tool with the Multipurpose cutting guide (sold separately) and the #194 cutting bit included in the Dremel Derby Accessory Kit to rout out a space for the weights. Make multiple passes of 1/16" deep to achieve the desired depth. **(Step 6)** Test-fit the weight and then insert with two screws. You can also use a Dremel rotary tool with the (#335) plunge router attachment (sold separately) and a (#650, #652, or #654) straight router bit (sold separately) to countersink the weights.

## Step 7: Fine-tune Axles and Wheels

Nail-type axles often have a burr on the nail head that can catch the wheel and keep it from spinning smoothly. These burrs need to be removed. To remove the burr, put the pointed end of the nail into the Dremel rotary tool and tighten the collet nut. Secure fine metal file in a vice. Turn on the Dremel tool and set the speed no faster than 15,000 rpm. With about 5/8" sticking out of the tool, place the underside of the nail head against the fine metal file to file any burrs. Repeat on all nails as needed.

Wheels mounted on polished axles spin faster. To polish the axle, put the pointed end of the nail into a vice to secure it. Put the #401 mandrel with a #414 Felt Polishing Wheel into a Dremel rotary tool. Use #421 polishing compound on the felt polishing wheel to put a smooth finish on the nail where the wheel makes contact with the axel. **(Step 7a)**

Smooth wheels make a smooth running derby car. To sand your wheels smooth, mount the wheel on a wheel spinning mandrel made for derby car wheels available at most hobby stores. Put the mandrel into the Dremel rotary tool and tighten the collet nut. Wrap a piece of medium grit sandpaper around a wooden block and secure in a vice. Turn on the Dremel tool and set the speed no faster than 15,000 rpm. Gently place the wheel held by the Dremel tool on the sand paper block as the wheel rotates to sand away any imperfections out of the wheel until smooth. Repeat on all wheels. **(Step 7b)**

## Step 8: Lubrication

Put dry lubricant inside the wheel where the nail (axle) enters the wheel. Use only dry graphite or dry white Teflon lubricant. Put the nail into the wheel and tap the nail into the axle slots or hole on the car body. Be certain wheels spin freely.

**Note:** Most race rules do not allow the use of liquid lubricants. Liquid lubricants may also damage the plastic wheels.

## Step 9: Attaching the Wheels

Sometime your car design calls for moving the location of the wheels on the car body. To do this, you will need the #664 drill bit and the #481 collet included in the Dremel Derby Accessory Kit. Put the collet and drill bit into a Dremel rotary tool and drill a 3/32" hole for the axle where needed. Be sure to make your hole perpendicular to the body of the car. **(Step 9)** The Dremel #212 drill press or #220 Work Station (both sold separately) will help you drill accurate holes.

With the wheels on their axles, tap the nails into the car body gently with a tack hammer. All wheels must clear the car body and spin freely. Place the car on a flat surface and adjust the nails so that all wheels touch the surface.

## A Word About Safety

Check and secure sanding band accessories before each use. Maximum operating speed is 35,000 rpm.

***Visit www.Dremel.com for more information on Dremel derby car assembly, Dremel tools, attachments and accessories.***

**ACCESSORIES INCLUDED IN THE DREMEL DERBY ACCESSORY KIT 683-01:**

| | | |
|---|---|---|
| 481 | 3/32" Collet | 1 |
| 664 | 3/32" Drill bit | 1 |
| 194 | 1/8" High Speed Cutter | 1 |
| 407 | 1/2" 60 Grit Sanding Band | 1 |
| 408 | 1/2" 60 Grit Sanding Band | 2 |
| 432 | 1/2" 120 Grit Sanding Band | 2 |
| 430 | 1/4" 60 Grit Sanding Band | 1 |
| 431 | 1/4" 60 Grit Sanding Band | 2 |
| 438 | 1/4" 120 Grit Sanding Band | 2 |
| 414 | 1/2" Felt Polishing Wheel | 2 |
| 421 | Polishing Compound | 1 |
| 401 | Mandrel | 1 |

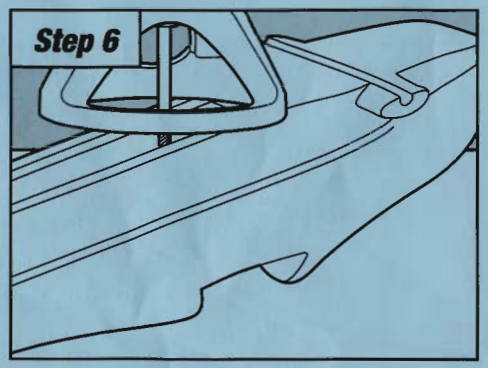
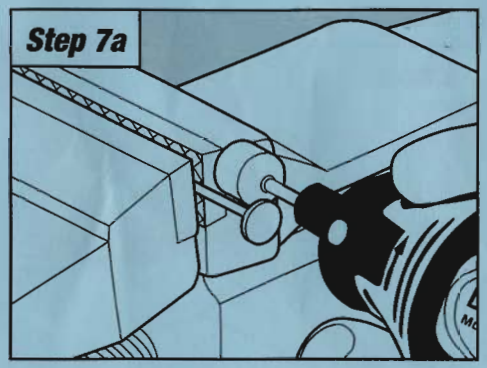
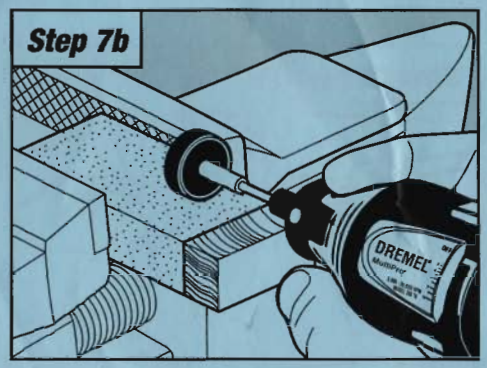
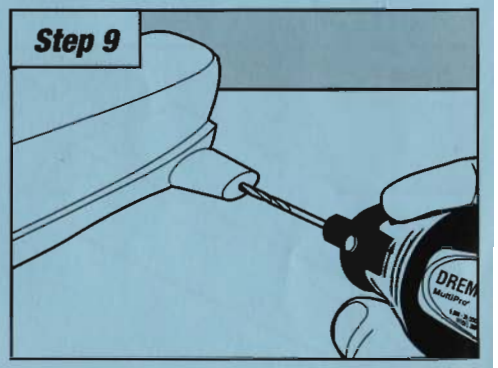
In addition to the rotary tool, Dremel offers a variety of tools, attachments and accessories that make derby car building easier.

**TOOLS**

| | |
|---|---|
| 8000-01 | Lithium-ion Cordless rotary tool |
| 1680 | Scroll saw |
| 1800 | Scroll Station |
| 6000-01 | Contour Sander |

**ROTARY TOOL ATTACHMENTS**

| | |
|---|---|
| MS400 | XPR MultiSaw |
| 335 | Plunge router |
| 231 | Shaper/router table |
| 565 | Multipurpose cutting kit |
| 670 | Mini saw |
| 225 | Flex shaft |
| 2217 | Tool Holder |
| 2214 | D-vise |
| 220 | Work Station |

**ACCESSORIES**

High speed cutting bits
Router bits
Cutting bits, blades, and wheels
Polishing wheels and compound
Sanding bands and flapwheels
801 Carbide shaping wheel
Drill bits and mandrels
Accessory kits