



Dollies, Wheelchairs, and Wagons

How to bring smooth, horizontal camera motion into your productions.

One important ingredient in feature-film production values is camera motion. We don't mean tilts, pans, and zooms. We mean moving the camera smoothly with a dolly, crane, or other device such as a Steadicam. The change in perspective that this motion creates gives the viewer artificial depth perception in an essentially 2D medium. Used well, camera motion adds a lot to the quality and feel of the production.

Most of our projects aren't blessed with a Hollywood budget, but they still require the quality feel that we see on the big screen. Don't despair—there are a lot of ways to reach the goal. This month, we'll deal with the dolly: The key tool that creates horizontal movement.

The dollies most commonly used in TV and film production are made either by J.L. Fischer or Chapman/Leonard. They're a pleasure to use—heavy, maneuverable, and expensive. Renting one runs \$250–\$300 a day in most markets. A Premier Phantom dolly is even better, but costs almost \$25,000 to buy. You can also use lower-cost options, including building your own dolly.

Dolly choices

There are numerous lower-cost options, including the Microdolly basic kit (\$2595), the Losmandy Spider Dolly (\$995 and up), the Cinekinetic Pocket Dolly (\$475), and the ProMax Tracking Dolly (\$399). Bogen sells several wheeled dollies for its Manfrotto tripods that are designed to let you move a tripod and camera to a new shooting position rather than produce smooth moves while you're shooting. The wheel sets cost around \$140 to \$300, and are great if you're working on a smooth floor and only need a fairly simple move.

In a previous column, we mentioned another low-cost dolly option: a wheelchair. Sit in the chair and hold your breath while someone with a steady hand pushes you. You can produce some pretty smooth moves this way, though it may take several passes to get a really smooth shot. But that's okay—John always makes several passes to get a shot right even when he's using a track dolly.

Shooting from a wheelchair is a time-honored technique. The DP Ellen Kuras used a wheelchair as a dolly for several scenes in the recent film *Eternal Sunshine of the Spotless Mind*.



John Jackman trucks left with his portable skateboard-wheel dolly running on PVC pipe. On uneven ground, wood wedges or chocks under the track ensure even support for the pipe.

Although you can produce some pretty great moves this way, there are some limitations: Your height options are fairly narrow, and you need a pretty smooth surface to roll on.

When shooting a documentary in New Mexico about a cross-country bicycle ride, Bruce actually used a 26-foot RV as a dolly. Most of the credit goes to Bill Schreck, who was at the time Bruce's audio guy. Bill, Bruce, and producer Mike Smith rented the RV in Albuquerque, then made their way to the local lumberyard.

Under Bill's direction, they bought two 4-foot squares of $\frac{3}{4}$ -inch plywood, some iron brackets, and about 75 feet of steel cable and attachments. For rigidity, they screwed together the two squares of plywood, added the brackets, and attached them to the rear bumper of the RV. They

attached the cables to the outside edge of the wood, ran the cables over the RV's roof (padded with carpet scraps), and looped the cables around the front bumper. Bruce wore a harness when he was on the platform.

You'd think that this would make for a jarring, jolting ride, but that wasn't the case. Even with the tripod chained to the platform, Bruce says the ride was smooth at the 12–15 mph they were traveling. Luckily, the New Mexico troopers didn't notice them till the last day of the shoot. They never even considered whether this stunt was legal—which it wasn't. The trooper was amused enough that he kindly refrained from writing a ticket.

The type of dolly you need, and hence the type of wheels the dolly must have, depends on the surface the wheels will



The key component of many low-cost dollies are skateboard wheels bolted at an angle. On Jackman's dolly, an aluminum angle holds the opposing wheels at a 90-degree angle, helping them lock around a 2-inch PVC pipe.

roll over and the type of motion you want. The film business taps into a whole assortment of specialized dollies—such as the doorway dolly, which is designed to fit through a standard doorway—to meet specific needs. For our purposes, we'll discuss two main categories: the soft-tire dolly and the track dolly.

A soft-tire dolly works for general use on hard, fairly smooth surfaces. The simplest form of soft-tire dolly is the so-called Western dolly, with a wooden platform, wheels, and inflatable tires with an 8-inch to 10-inch diameter, and a pull handle.

The inflatable tires let the unit work on a variety of surfaces, even those that aren't perfectly smooth. The tires are the same as the ones used on a wheelbarrow or heavy-duty package truck. You can get these tires and wheels at any well-stocked hardware store or equipment supply house. Some farm and garden equipment supply houses have large wagons with these tires that could be used as a dolly just as they are. You can even steer these wagons.

Build your own

If you are handy with tools, you can build your own dolly. After all, it isn't rocket science—a dolly is just a wheeled platform that lets you move your camera smoothly in a (usually) straight line. So what's to stop you from building a platform, putting wheels on it, and trucking left?

To build a functional Western dolly, cut a piece of 3/4-inch plywood to 3 x 4 feet,

frame it with 2 x 4 pine, drill holes and bolts on wheels so the dolly moves along its 4-foot length. See the "Build a Western Dolly" sidebar for details.

Western dollies are usually pulled, so you really don't even have to come up with a handle. Just drill a hole in one end, tie on a piece of heavy rope, and you have a great way to pull your platform. If you want to make a handle to push or pull, you can use 1/2-inch steel pipe or use the handle off a kid's wagon. Do not, under any circumstances, steal or even borrow the handle from a child's wagon. Remember, this is a person who will take care of you when you're old and feeble. You don't want him or her nursing bitter grudges.

A track dolly creates smooth, repeatable moves. Although high-end versions run on metal tracks that can be laid out in complicated curves, we're going to keep our track straight and simple. Most of the lower-end track dollies use skateboard wheels and run on tubing of some sort rather than on a steel track.

The trick to making a track dolly is to position sets of skateboard wheels at 90-degree angles so that they center themselves around your tubular track. In our example, that track is 1 1/2-inch or 2-inch PVC pipe. The easiest way to mount the wheels in this fashion is to bolt them to a long piece of aluminum angle, and then bolt the angle to your platform. The platform can be 3/4-inch plywood, or it can be a platform that folds up for easy transport.

Build a Western Dolly

Parts List

- 4 pneumatic hub and tire assemblies
- 4 hex bolts, 5 1/2-inch long and either 1/2- or 3/4-inch diameter (depends on wheel hub bore size)
- 16 washers to fit bolts
- 12 hex nuts to fit bolts
- 2 straight and clear 8-foot 2 x 4 pine studs
- 1 4 x 4 x 3/4-inch plywood handy panel
- 3-inch common nails
- 2 1/2-inch deck screws
- Wood glue

Wheels

You can use practically any pneumatic hub and tire combination you can get a good deal on. You can find these at any farm, hardware, or home improvement store.

Here are two examples:

Northern Tool

Wheelbarrow Tire SKU #1210, \$9.99
This wheel has a 1/2-inch hub bore and 15.5-inch diameter tire.
www.northerntool.com

Home Depot

Hand Truck Wheel SKU# 429494, \$12.97
This wheel has a 3/8-inch hub bore and 10-inch diameter tire.
www.homedepot.com

Assembly

Cut the plywood panel down to 3 x 3 feet. Cut the 2 x 4 studs to create two pieces that are 36 inches long and two that are 33 inches long. Nail these into a 3 x 3 square frame. Apply glue to top and use deck screws to screw plywood to frame.

Drill 1/2- or 3/4-inch holes (as appropriate) through the 36-inch 2 x 4 sides, 8 inches from the ends.

Mount wheel assemblies to the wood using hex bolts. This is important: The wheel bearing must be loose and free to operate. Place a washer on the bolt and pass the bolt through the wheel hub. Put another washer on the bolt, and run a nut up to the wheel but do not tighten; there should be a little play.

Now place another washer on the bolt, insert in the hole of the 2 x 4, put on another washer, and run the last nut onto the bolt. This bolt should be tightened firmly until the washer bites into the wood, making sure that the wheel hub still has some play.

You can add a rope to pull with or fashion a handle out of 1/2-inch pipe. All together, the parts for this dolly should cost under \$75. ■