PUT SOME Spring IN YOUR Toys

Richard Dlugo

I'm a grandfather, now retired after spending many years as a music teacher, band and choir director, and computer teacher. Back in the 1970s and '80s, I also made wooden toy trains, cars, trucks, and puzzles. After a long period of inactivity, I rekindled my interest in the lathe when I saw a local chapter's demonstration.

Now, I make each of my grandchildren a special toy for all their birthdays, beginning with an animated pull toy. The earliest toy was a simple wobbling duck with only the wheels turned on the lathe. But as more grandchildren came into the world, subsequent toys had new features and more turning. I learned how make and use cams, springs, and wooden gears to add animation.

I'll show you how to make the wobbling penguins pictured above. The penguin family rides together on three separate but connected wheeled platforms. Offset axles and springs give the birds a cute wobble as the child pulls the toy around. The icy blue color and silver highlights go well with the penguins' attire.

Roosts and birds

Cut three bases, each 3" (8cm) square and ⅞" (22mm) thick (*Figure 1*). I prefer to use maple for wood toys because of its strength and smooth grain. Kids give these toys a workout, and maple stands up to their play. The smooth grain also works well when it comes to painting.

Drill through the sides for the axles and in the top to mount the penguins. Also drill the holes for the coupler dowels and locking pins, as shown in the drawing. Round over all the corners with a 3/16" (5mm) roundover router bit.

Cut blanks about 2" (5cm) longer than the height of the penguins (*Figures 2–4*). After truing up a blank between centers, turn a tenon at both ends and use one to hold the blank in a scroll chuck. This will be the top of the penguin.

Mark layout lines on the blank for the hat, head, scarf, and feet. The diagrams and photos show the size and shape of the penguins. Of course, feel free to modify the design as you see fit.

Drill a 7/16" (11mm) hole ¾" (19mm) deep (measured from the bottom of the penguin) for the spring that helps the penguin wobble (*Photo 1*).

Reverse the blank in the chuck, so that the penguin's head is at the tailstock end. To keep things aligned and secure, advance the tailstock and create a small nub at the end. You'll remove the nub with light cuts before you part off the toy.

Begin turning the penguin. You can rough-turn at first and then go back and clean it up when you've finished the rough layout. When placing the layout lines, leave enough room between the chuck and the bottom of the penguin so you can part off the figure and give the bottom a slight domed shape (*Photos 2, 3*). I use a sharp parting tool for this cut. If you use a detail gouge, make this part of the turning wider to accommodate the gouge.

Drill holes in the completed figure for the wings and beak (*Photo 4*). ▸

Penguin bases

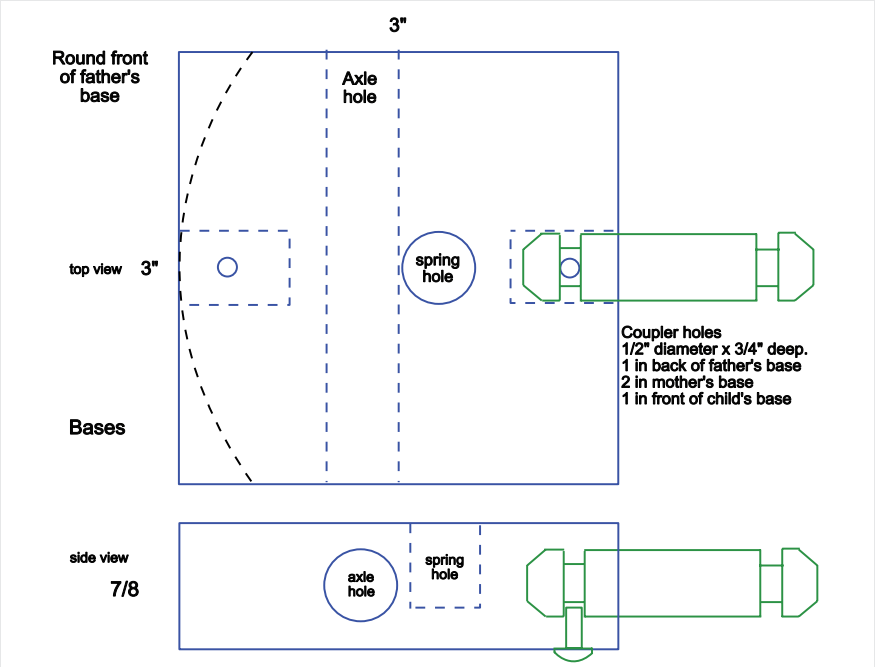
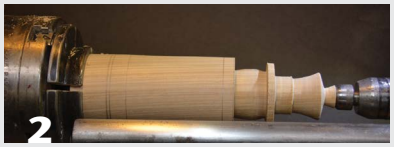


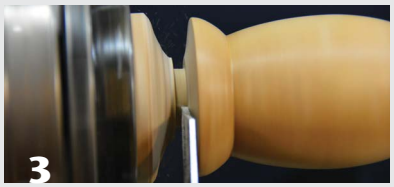
Figure 1. The plan for the penguin bases.

Turn the penguins

Mark the blank with key diameters and drill a hole in the bottom end for the animating spring.

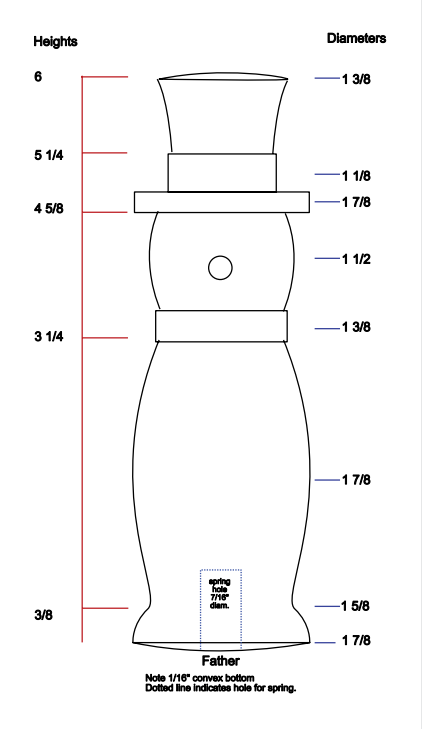


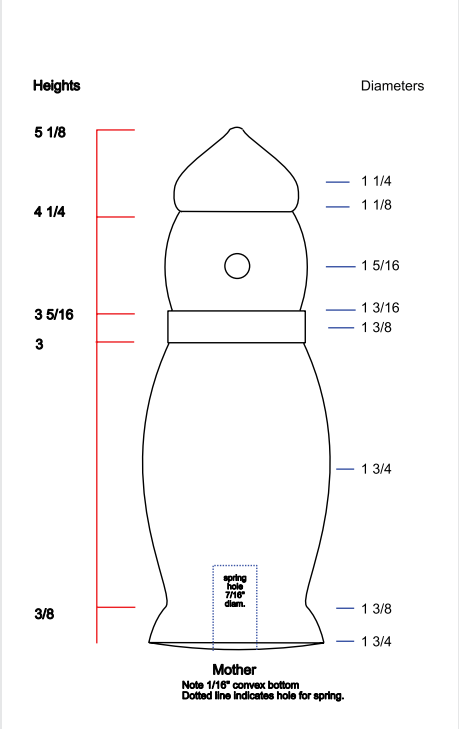
Reverse the blank and begin shaping the penguin, head first.

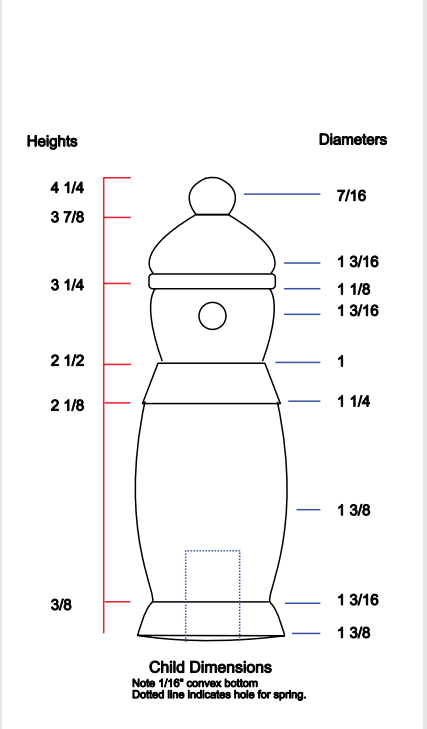


When parting off the figure, make the base slightly convex, or dome-shaped. The bottom need not be flat since the penguin will be mounted on a spring.

All in the family







Figures 2–4. The basic measurements for turning a family of penguins.

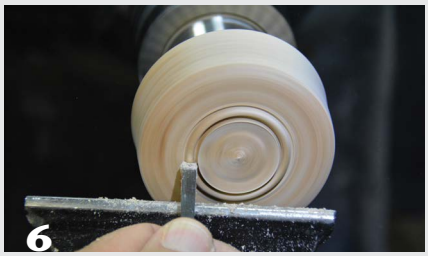
Drill for beak and wings

Drill the turned penguin with holes for the beak and wings.

Add color

Paint the figures with airbrush or hobby paint before assembling the toy. Apply a nontoxic finish.

Wobbly wheels



Mount the wheel blank on a screw chuck to turn it to size and shape the outside.

Plug the screw-chuck hole with a dowel and drill the axle hole off center.

Keep the offset axle holes 180 degrees apart, so the toy will wobble when rolled.

A couple of couplers

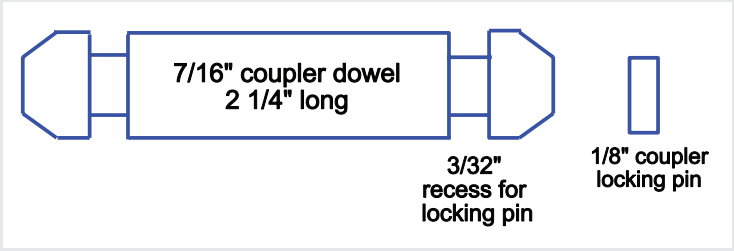
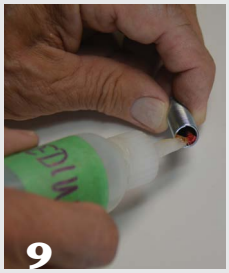


Figure 5. Two wooden couplers connect the three bases, and the locking pins hold the couplers in place.

Springs animate the penguins



Attach a restraining cord inside the springs with a dab of cyanoacrylate glue.

Mask off the base of a penguin and attach the spring with epoxy.

When attaching the spring to the base, leave a ⅛" gap so the bird can wobble.

I highly recommend painting everything before assembly. If you have not used an airbrush, this is a perfect project to try one. If you're not into airbrushing, you can use brushes and nontoxic hobby paint to create your penguin personalities (*Photo 5*). After airbrushing, I finish the piece with three to five coats of low VOC lacquer.

Wheels, axles, couplers

Cut the wheels from maple stock 1" (25mm) thick. The wheels are 2⅜" (6cm) in diameter. I hold the blank with a screw chuck (*Photo 6*). Once I've finished the wheel, I plug the hole with a piece of dowel.

In order to make the penguins wobble when the toy is pulled, drill the axle hole in the wheels ⅛" (3mm) off center (*Photo 7*). Make the hole about ¾" deep. When you attach the wheels to the base, make sure the offsets are 180 degrees from each other (*Photo 8*). That way, as the wheels turn, the platform will rock from side to side and the

spring action under the penguins will facilitate the wobble.

You can turn the axles yourself from oak, maple, or other strong wood. The dowels are 4½" (11cm) long and cut from 7/16" (11mm) stock. Or, you can buy hardwood dowels. Avoid the softwood dowels found at some hardware and big-box stores because they just won't stand up to the punishment these toys may take.

The couplers are simple 7/16" hardwood dowels with a recess turned in each end for a locking pin (or a plain dowel) glued in from the underside of the base (*Figure 5*). The recess in the coupler pins is 3/32" (2.5mm) deep and a bit over ⅛" (3mm) wide. I use dowels so the bases can freely rock left and right. A small amount of play between the hole diameter and the diameter of the coupler dowel allows the bases to turn a bit left and right as the toy is pulled.

Animate the birds

Use springs to animate the penguins' natural wobble. A 7/16"-diameter spring inserted in the holes in the birds lets them stand upright when at rest but able to wobble as the base rocks. To prevent the spring from being damaged by an aggressive pull from a child, insert a piece of nylon cord and hold it in place with an epoxied plug at each end of the springs.

Cut three lengths of spring about 1½" (38mm) long. Cover the penguins and bases with blue tape to protect them from glue drips. To hold the cord in place so it doesn't move around while you apply the epoxy, use a small dab of cyanoacrylate (CA) adhesive to attach it to the ends of the spring (*Photo 9*). Leave a smidgen of slack on the cord within the spring. The cord limits the action of the spring: you should not be able to pull the spring apart more than ⅛". Be sure to not close the opening in the end of the spring so the epoxy can enter the spring.

Mix a bit of five-minute epoxy. Hold the penguin upside down and fill the hole about halfway deep with epoxy. Insert the spring and set the penguin upside down until the adhesive hardens (*Photo 10*). Repeat the procedure to glue the other end of the spring into the base. Do a dry fit first to be sure there isn't a lot of excess spring showing. The penguin's bottom should sit just ⅛" above the base (*Photo 11*). Leave a gap between the epoxy plugs inside the spring and the hole opening; otherwise, the bird won't animate. Don't fill the holes too deep.

I cut the wings on a jigsaw from ¼"-(6mm-) thick maple stock (*Figure 6*). They were shaped as in the diagram and slightly sculpted with my rotary sander. Turn six small pegs to hold the wings on the penguin bodies.

Turn the beaks about ¼" in diameter and about 1½" long. You can do a little shaping by sanding. Color them with a marker and glue the beaks and wings in place (*Photo 12*).

Assemble the toy

For the most part, assembly is pretty straightforward. However, the key to successful wobbling is to glue the springs into the bases before you attach the wheels.

Choose a colorful pull cord that won't unravel with pulling and twisting. Tie a knot in the pulling end for a grip and tie the other end to a brass eye screw in the base. Drip a few drops of white glue on the knots to keep them from unraveling.

I hope you enjoy making one of these toys and see the delight as a child plays with it. Don't be worried if the kids scratch it up. That means they love what you made them. ■

Richard Dlugo began turning in the 1970s to fulfill a need for wooden toy parts. In the last ten years, he has become very active as an artistic turner. You can view his other toys at richarddlugo.com/toys. He is most grateful for the sharing of ideas, inspirations, and techniques between woodturners at all levels. This article is meant to give back some of that sharing. You can reach Richard at richard@richarddlugo.com.

Finishing touches

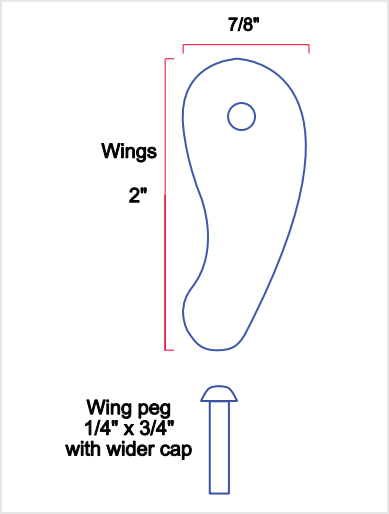


Figure 6. Shape the wings from thin hardwood stock and turn small pegs to hold them in place.

The wings and beak add the finishing touches.

You read the article—now see the video!

This article has an accompanying online video in which Richard Dlugo further explains and demonstrates this project. To view the video, visit tiny.cc/PullToys or scan the QR code with your mobile device.