

# a PART of the story

## Drive frames

by Jim Coffee • San Diego, California, USA • Images by the author

### The technology: 3D printing

### The purpose: To hold pulleys and a belt and motor

Have you ever wanted a reliable assistant to work with you? Consider a 3D printer! The mini carnival that is mounted to the front of my street organ presently consists of three modules: a carousel, a ferris wheel, and, most recently, the seal module (**photo 1**), which includes a seal spinning a ball on its nose, three dogs wagging their tails, a pig rotating its tail, a nosy carnival manager, an electric motor, and a random-motion generator.

These components are all mounted on a 3D-printed drive frame. Smooth, reliable, and quiet operation was essential. Mounted into the drive frame are ball bearings to hold stainless-steel shafts. Mounted to the shafts are pulleys, pin cams, cam followers, the seal-wiggle mechanism, and a magnet (**photo 2**).

The drive frame is lightweight, made to close tolerances, and sturdy. I 3D printed nine versions of this frame (**photo 3**), each subsequent frame being better, until the last version, which was perfect.

FreeCAD was the design software I used. First, the shapes were assembled in the CAD software. Then the size of the shapes were controlled by changing the numbers on a

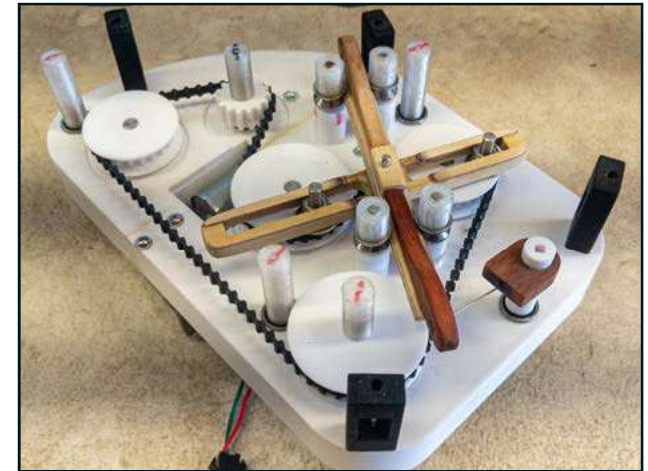


1. The seal module is a stand-alone unit that will operate by itself. You can see the drive frame beneath the top deck.

related spreadsheet (parametric).

The drive frame was then printed on a Prusa Mini 3D printer using PETG filament. The print was larger than the printer's capacity, so it was printed in two parts. The two halves were then epoxied together. I enjoy the 3D printing process because it allows high-tolerance parts to be created while I do other things.

To learn more about 3D printing, search Google for one or more of these keywords: "3D printing for the beginner," "3D printing tutorials," and "what is 3D printing." You are encouraged to use the [Automata Magazine forum](#). 



2. The final drive frame. After about 12 hours of operation, the machine was converted from a smooth, poly, round belt to a timing belt, to avoid cold-weather slippage.



3. One of the great things about 3D printing is the ability to easily modify parts. This image shows nine iterations as I sought the perfect drive frame.