

MechaniCoasters

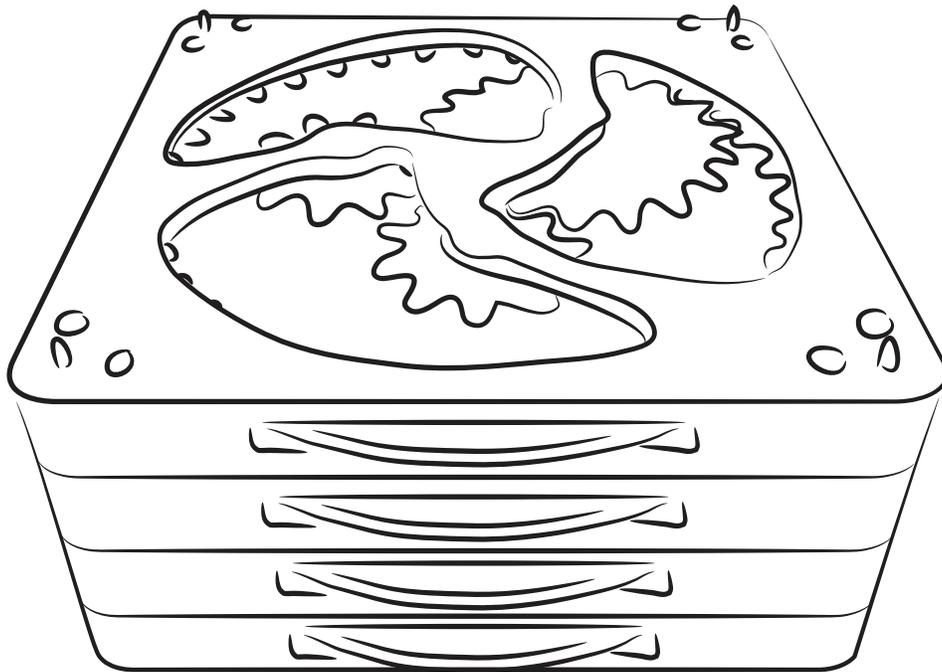
tabletop kinetic sculptures

sample

Important information:

McMaster Carr, a supplier whose part numbers are referenced throughout this document, can only ship within the United States. Builders outside of the U.S. must find an alternate supplier for the required hardware.

Hardware part numbers and availability are subject to change.
Verify that all hardware or equivalents are obtainable prior to purchasing these plans.



design by Derek Hugger



WARNING!

MechaniCoasters are not toys. They contain small pieces that could be hazardous to small children.

MechaniCoasters must only be placed in locations where the people who can access them understand how to properly use them.

The Basics

Contents

These plans include all the information required to build MechaniCoasters. They provide an outline of the build process, tips for an accurate and successful build, lists of required tools and off-the-shelf components, a complete parts list, full scale patterns for all plywood parts, and step-by-step assembly instructions.

Before Building

Read and understand all instructions before building. Failure to do so will lead to increased frustration levels, lengthened build times, wasted material, and other vexing occurrences.

Build Process

Always wear eye protection and any other necessary personal protective gear. Read, understand, and abide by all manufacturer instructions and warnings for all tools used.

1. Use a light duty/general purpose spray adhesive to temporarily bond the patterns to plywood. Apply the adhesive evenly and sparingly.
2. Drill the holes first, and then cut out the parts. Hole alignment between parts is critical to proper function and assembly, so care must be taken to drill the holes accurately. Take time to cut out the parts accurately. An accurately cut part will require less sanding and less modification later.
3. Remove the patterns from the cut plywood parts, and then sand the parts to remove rough edges and any residual adhesive.
4. Following the assembly instructions, build each MechaniCoaster. Glue each Spacer to its respective Lower Frame, and then assemble the rest of each coaster.
5. If desired, disassemble each MechaniCoaster to finish its components. Note that stain and other finish options can affect the thickness of parts and may also affect friction levels between moving parts.

Notes

When printing the patterns, always print at 100% scale. Do not use the “scale to fit page” option.

MechaniCoasters contain moving wooden parts as well as parts that stack onto one another. As such, using a quality, flat Baltic birch plywood is very important. Cheaper, lower quality plywood, such as types often found at home improvement stores like Home Depot, can be warped and knotted.

Changing humidity levels can cause wood parts to swell and move. Some binding or changes in friction levels may occur with changes in humidity. As humidity levels return to normal, so too should the mechanism’s performance.

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Tools

Power Tools

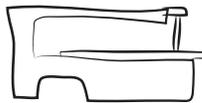
General

Drivers

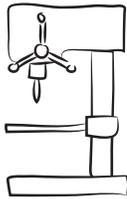
Required



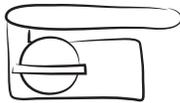
bandsaw



scroll saw



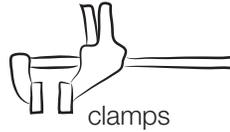
drill press



belt/disc sander



drill bits
1/16", 5/64", 3/32"



clamps



precision files



phillips #1

Supplies



sandpaper



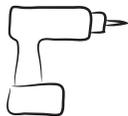
spray adhesive



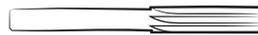
wood glue

Recommended

(but not required)



drill



reamer
0.0650"



cnc router*

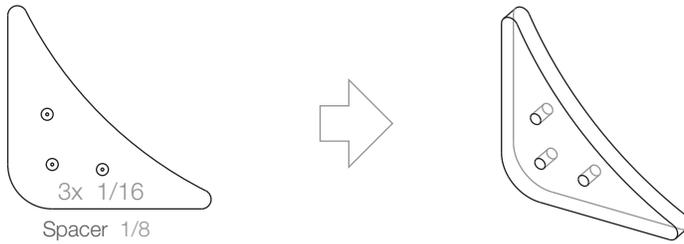
* A CNC router is an optional replacement for the bandsaw and scroll saw for cutting the plywood parts.

Tips + Tactics

Pattern Syntax

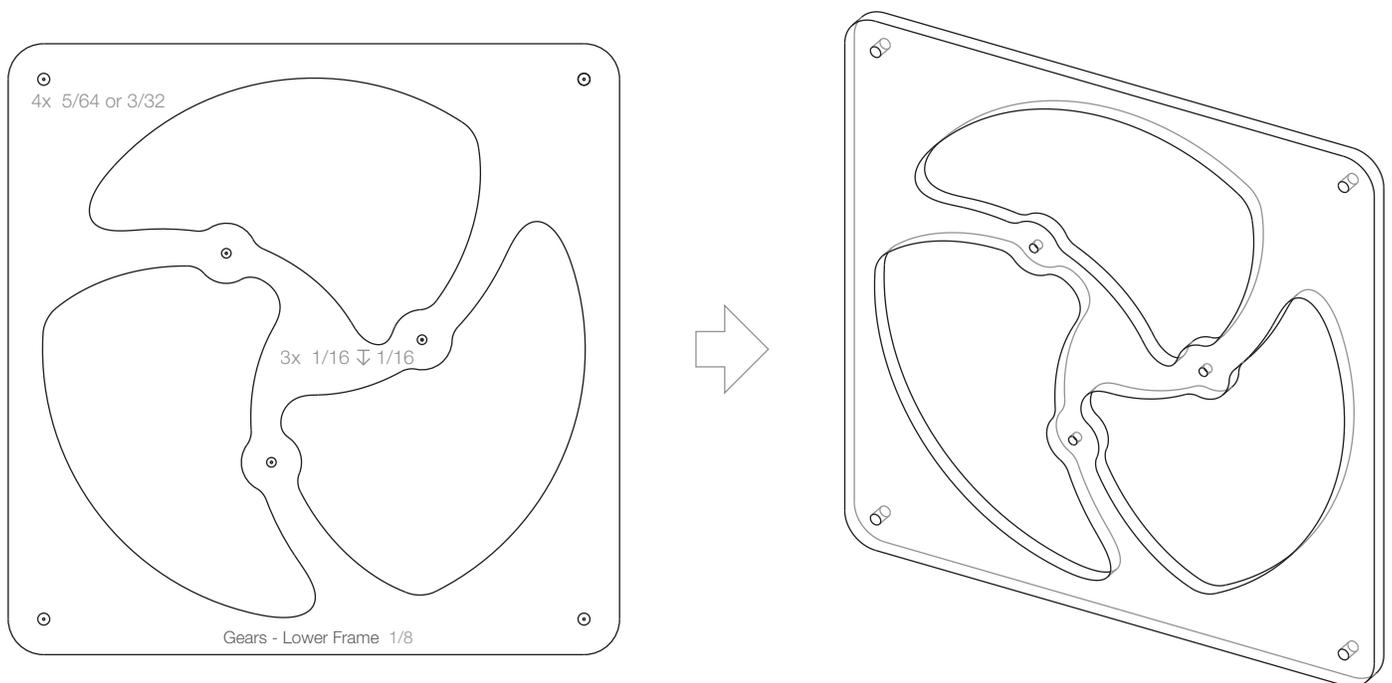
Patterns are labeled with a part name followed by a thickness dimension.

Example: Spacer is cut from 1/8" plywood. It also has three holes to be drilled thru with a 1/16" bit.



A \Downarrow symbol indicates a hole drilled to a certain depth. In these cases, it is important to NOT drill completely through the wood. When "or" is used with two hole dimensions, the smaller value is preferred, but the larger value may be drilled if necessary.

Example: Gears - Lower Frame has three holes that are 1/16" deep, drilled with a 1/16" bit. It also contains four holes that are to be drilled with a 5/64" bit. The holes may be drilled out to 3/32" if alignment issues arise during assembly.



When a part name is followed by "(bottom)", this indicates the part is shown from its bottom side.

Example: Gears - Upper Frame

Parts + Assemblies List

Type	Description	Qty
Hardware	1/4" Pin	9
Hardware	7/16" Pin	16
Hardware	Screw	16
1/8" Plywood	Spacer	16
1/8" Plywood	Gears - Lower Frame	1
1/8" Plywood	Gears - Upper Frame	1
1/8" Plywood	Gears - Ring Gear	1
1/8" Plywood	Gears - Large Gear	1
1/8" Plywood	Gears - Small Gear	2
1/8" Plywood	Planetary - Lower Frame	1
1/8" Plywood	Planetary - Upper Frame	1
1/8" Plywood	Planetary - Ring Gear	1
1/8" Plywood	Planetary - Large Gear	1
1/8" Plywood	Planetary - Small Gear	3
1/8" Plywood	Ratchet - Lower Frame	1
1/8" Plywood	Ratchet - Upper Frame	1
1/8" Plywood	Ratchet - Ring	1
1/8" Plywood	Ratchet - Spiral	1
1/8" Plywood	Twirl - Lower Frame	1
1/8" Plywood	Twirl - Upper Frame	1
1/8" Plywood	Twirl - Spinner	1
1/16" Acrylic	Cover	4
Assembly	Gears Asm	1
Assembly	Planetary Asm	1
Assembly	Ratchet Asm	1
Assembly	Twirl Asm	1

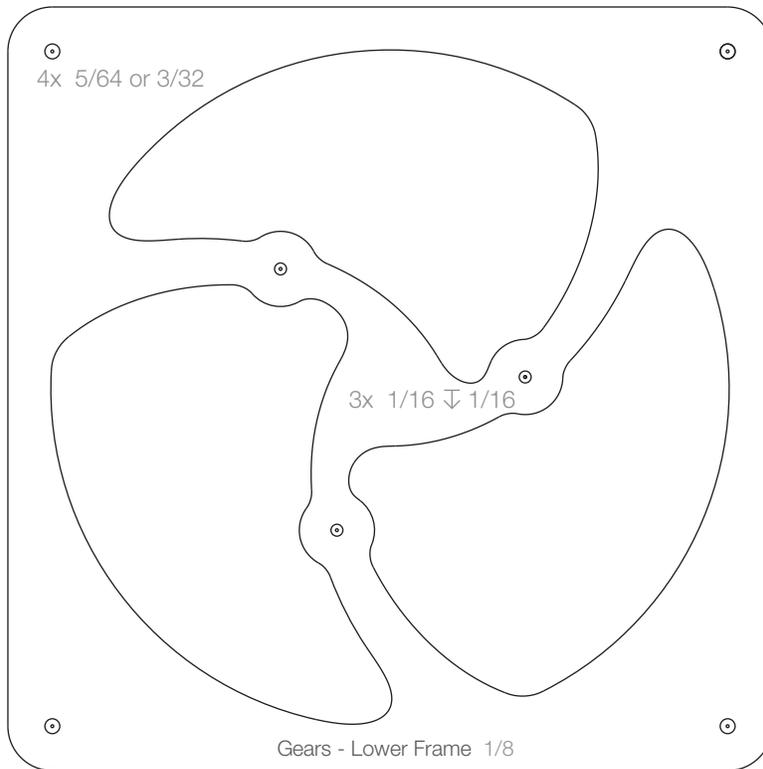
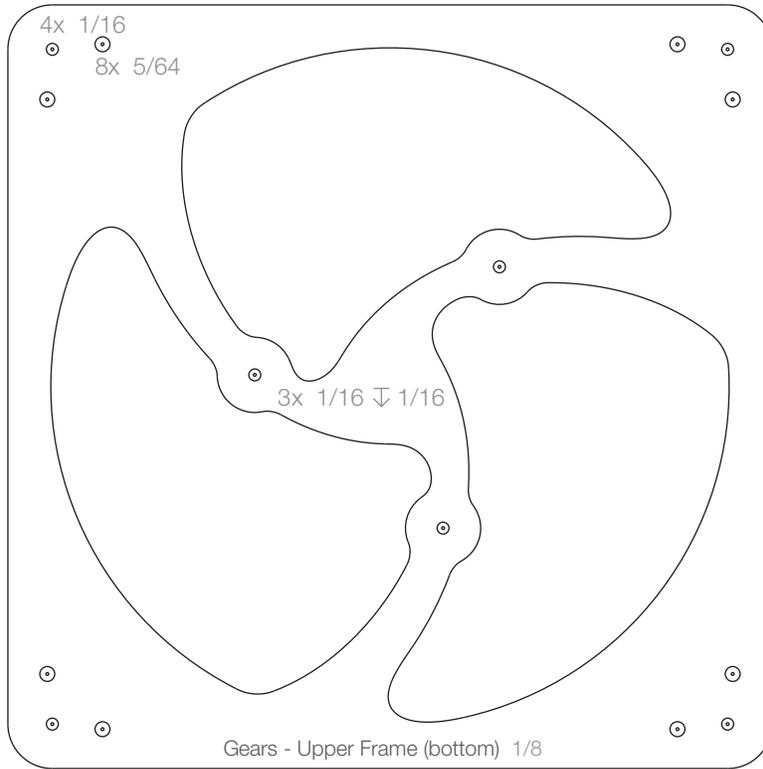
If using a CNC machine or 3D printer, the following parts are OPTIONAL replacements for all Spacers and Lower Frames:

1/4" Plywood	Gears - Lower Frame Asm	1
1/4" Plywood	Planetary- Lower Frame Asm	1
1/4" Plywood	Ratchet - Lower Frame Asm	1
1/4" Plywood	Twirl - Lower Frame Asm	1

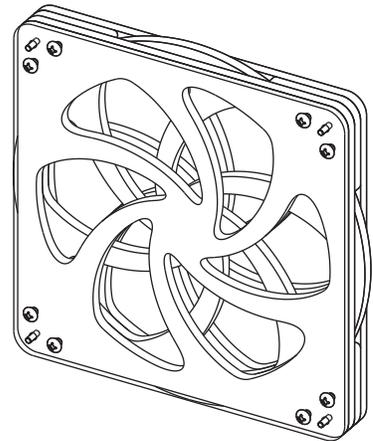
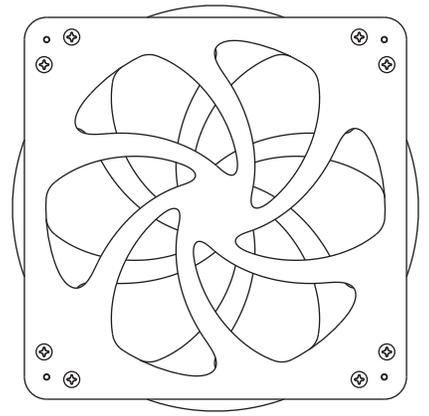
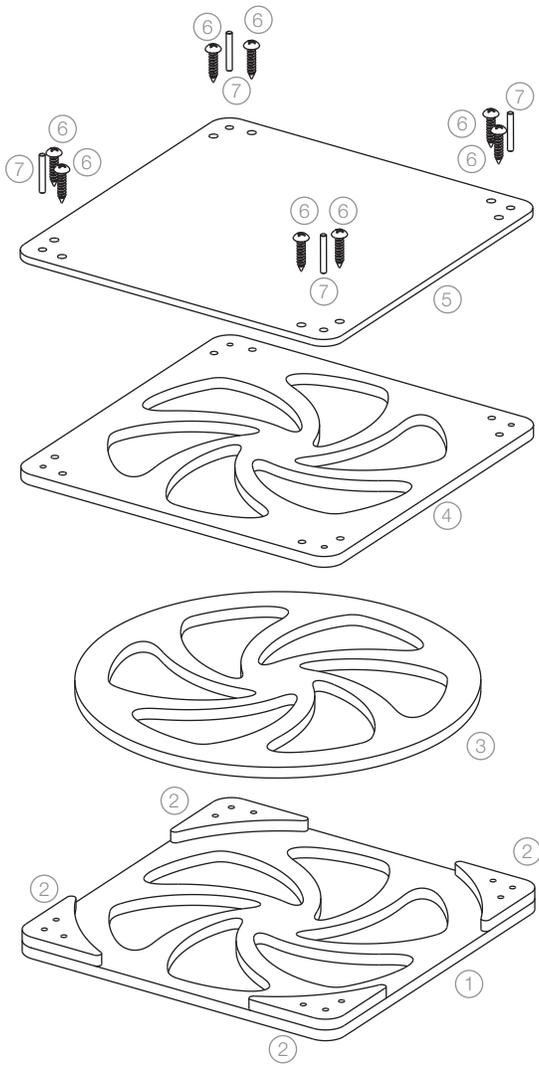
Hardware

Description	Qty	McMaster Carr P/N *
Screw #2 x 3/8" Pan Head Self Tapping Screw	16	92470A097
1/4" Pin 1/16" Diameter Stainless Steel Dowel Pin	9	90145A415
7/16" Pin 1/16" Diameter Stainless Steel Dowel Pin	16	90145A418

* Part numbers referenced are from www.mcmaster.com.



Twirl Assembly



1	Twirl - Lower Frame	1x
2	Spacer	4x
3	Twirl - Spinner	1x
4	Twirl- Upper Frame	1x
5	Cover	1x
6	Screw	8x
7	7/16" Pin	4x