

Wood Gear Clock Building



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What do I need?

- Patience.... Lots of patience
- Good clock plan
 - Start simple
- Drill press
- Scroll saw
- Disk sander
- Band saw (optional but very helpful)

Getting Started

- Accurate copies of the clock plan
 - Spares for when you make mistakes
 - Make sure copy scales perfectly
- Clean work area with lots of space
- Very good lighting
- Familiarize yourself with the parts of the clock and how they fit together

Materials

- Baltic Birch plywood for gears
 - Very easy to work with
 - Less tendency for teeth to break
- Hardwood for frame
- Repositionable spray adhesive
 - 3M 75
- Fine tooth blades
- Good drill bits

Cutting the gears

- Round gears are critical!
- Two methods
 - Larger gears
 - Glue pattern to wood
 - Mark exact center of arbor hole with sharp pick, then drill hole
 - Use disk sander to sand gear diameter to just beyond the edge of the teeth (1/8 inch)
 - Small gears
 - Drill arbor hole
 - Use disk sander to make gear blank just larger than gear diameter
 - Very carefully attach pattern

Cutting the gears



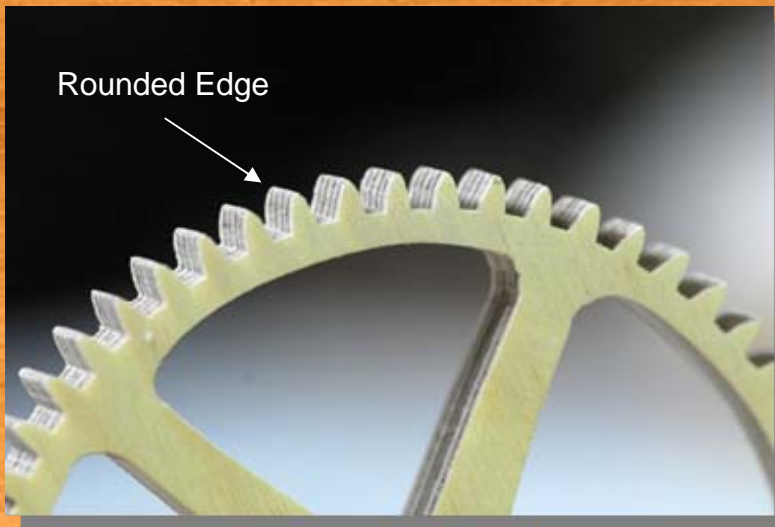
Cutting the gears

- Cut inside contours first
- Drill any remaining holes
- Very carefully cut the teeth
 - Cut just so the line disappears
 - Take your time



Cutting the gears

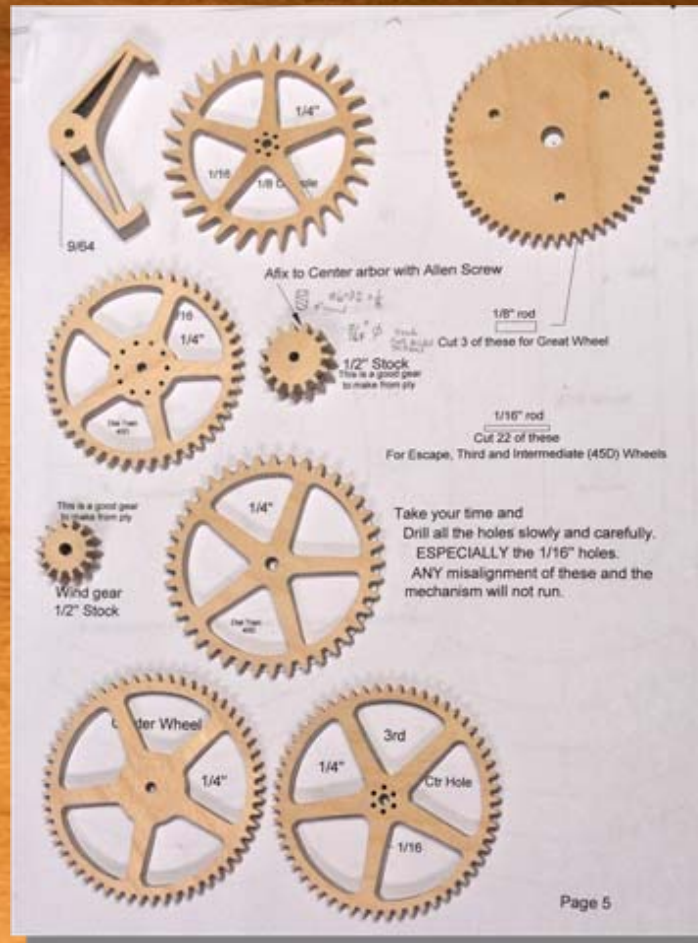
- Sand gear teeth down to exact diameter on disk sander
- Round each tooth over to avoid hard edge



Cutting the gears

- Escape wheel is the most critical
 - Very little tolerance for error
- Cutting small pinion gears
 - Good support under the gear on the saw
 - Take your time

Cutting the gears



Arbors and Spacers

- Steel arbors and brass tube spacers
 - Hobby shops an excellent source
- Cut arbors to length
- Chuck them in the drill press and polish at high speed
 - Fine grit sandpaper (e.g. 800)
 - Polishing compound
 - Paper grocery bag
- Polish half, turn around in the press and polish the other half
- Round off edges of arbor

Building the Frame

- Area of the most creativity
- Variety of woods
- Drilling arbor holes
 - Critical step
 - If possible, attach front and back frame together to drill holes so they line up perfectly
- Arbors and frame must be at right angles

Building the Frame



Assembling the Clock

- **This process is absolutely critical!**
- Start with the great wheel (weight wheel)
 - Make sure it runs smoothly in the frame by itself
- Remove great wheel and insert next wheel
 - Check for smooth running
- Put both wheels back in frame and see that they run smoothly together
 - You should be able to blow on one of the gears to make the other one turn
- Find any spots that bind and correct them

Assembling the Clock

- When you have them running smoothly, put a timing pencil mark on the back of the gears where they meet
- Move on to the next pair of gears that mesh
- The closer in the movement you work toward the escapement, the less forgiving friction becomes

Assembling the Clock

- When all of the wheels have been processed in this way, install all of the them in the frame using the timing marks made earlier
- Check for smooth operation of the entire movement
- Fix any spots that bind
- This is the greatest opportunity for patience

Assembling the Clock



Running the Clock

- Mount the clock where you can easily work on it
- Apply weight and attach pendulum
- Adjust the pallet for even “tick tock”
- Don’t panic when your clock stops
 - Find the areas where there is a bind or excessive friction
 - Start at the escapement and work backwards
- More / less weight may be needed for good running

Finishing the Clock

- Keep finish off of any surfaces that run together
 - Arbor holes
 - Gear teeth
- I typically don't finish the gears
- Danish Oil on frame

Miscellaneous Tips

- Cut pendulum longer than is necessary
 - It's easy to shorten... not so easy to lengthen
- Wood shrinks and expands
 - Clocks may not run on humid days
- Weight cord
 - Kevlar fishing string works great
- Graphite powder to lubricate arbor holes
- Did I mention patience?

Sources of Clock Plans

- Clayton Boyer's Clocks
 - <http://lisaboyer.com/Claytonsite/Claytonsite1.htm>
- Marc Tovar's Wooden Clockworks
 - <http://wooden-clockworks.com/>
- The Clock Mechanics
 - <http://www.clockplans.com/>

Questions?