CIMES 10 kW Conical Magnetic Rotary Motor Garage / Shop Build Guide – Version 1.0

Date: March 2026

Important Disclaimer & Safety First

This guide is based on 7 full multi-physics simulation campaigns that validated the patented design (US Patent 11,799,400 B2). **It has NOT yet been physically built and tested at scale.** You are building an experimental device containing extremely powerful neodymium magnets and rotating machinery.

WARNING: N52 neodymium magnets can cause severe pinch injuries, crush fingers, shatter violently, and fly at high speed. They can erase credit cards, damage electronics, and interfere with pacemakers. Rotating parts can cause amputation or death if not balanced and guarded.

- Always wear safety glasses, heavy leather gloves, and steel-toe boots.
- Work with a partner when handling magnets.
- Keep magnets at least 3 ft from electronics, tools, and each other until mounted.
- Never machine, drill, or grind magnets — they are brittle and can explode.
- Build at your own risk. Start with the recommended smaller 2–3 kW proof-of-concept version if you are new to this.

Full CAD STEP files, optimized magnet stagger templates, and 3D-printable jigs will be added to the website soon.

Tools & Equipment Needed

- Lathe (or CNC mill) capable of 28° taper turning
- Vertical mill or accurate drill press
- 3D printer (for jigs) or CNC router
- Precision angle gauge or sine bar
- Epoxy (JB Weld or Devcon 2-ton) + mixing tools
- Torque wrench, dial indicator, balancing stand
- Safety gear (gloves, glasses, apron)
- Non-magnetic tools (brass/aluminum) for magnet handling

Bill of Materials (Approximate – 2026 prices)

CIMES 10 kW Motor – Full Bill of Materials

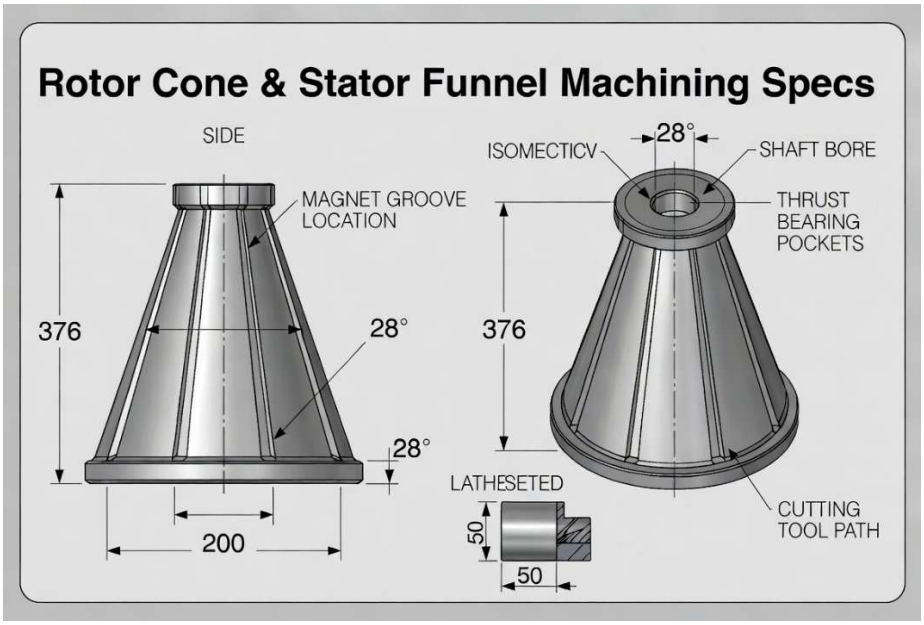
Item	Quantity	Description/Spec	Approx Cost	Source Suggestion
120 N52 50x25x10mm magnets	120	N52 N52 50x25x10mm	$2,600	
Aluminum stock for stator cones	120	Rotor stator stot & stator cones	$2,400	
Elut fal shaft	1	Night alumi·fut kN stator cones	$1,400	
Steel shaft	1	Steel shaft	$1,600	
Flywheel	1	Compression 15Y.0 & screw	$4,200	
Thrust bearings	1	Digns/hardware	$3,400	
Compression plate & Screw	1	Epxy	$1,200	
Epxy	120	Coxy	$1,400	
Jigs/hardware	1	Colld epxy	$3,800	
			Grand Total (USD)	$3,800

Total estimated cost: $3,600 – $4,200 (depending on local machining rates).

Step 1: Fabricate the Rotor Cone & Stator Funnel

- Material: 6061-T6 aluminum (or 7075 for higher strength)
- Rotor: Frustum cone – base radius 200 mm, 28° half-angle, height ≈ 376 mm
- Stator: Matching funnel (slightly larger ID to allow 5–15 mm compression gap)
- Machine on lathe with compound rest set to 28°.
- Cut three circumferential grooves (10 mm wide × 10 mm deep) for the magnet layers.
- Drill central shaft bore (25 mm) and thrust-bearing pockets.

Figure 1 – Cone Machining Diagram & Jig



Step 2: Prepare Magnet Mounting Jigs

Download the optimized irregular stagger template from simulationchallenge.com (40 positions per layer with ~19 % irregularity to eliminate torque ripple). 3D-print or CNC the three circular jigs (one per layer) that hold magnets at the exact angles while gluing.

Figure 2 – Magnet Placement Jig & Stagger Template

Step 3: Install the 120 N52 Magnets (Most Critical Step)

- Work on one layer at a time.
- Apply thin layer of JB Weld inside each groove.
- Use non-magnetic tweezers and the jig to press magnets into place — **polarity must alternate correctly per the template**.
- Clamp lightly and let cure 24 hours per layer.
- Repeat for all three layers on rotor and stator.
- **Never let loose magnets snap together** — use the jig or wooden spacers.

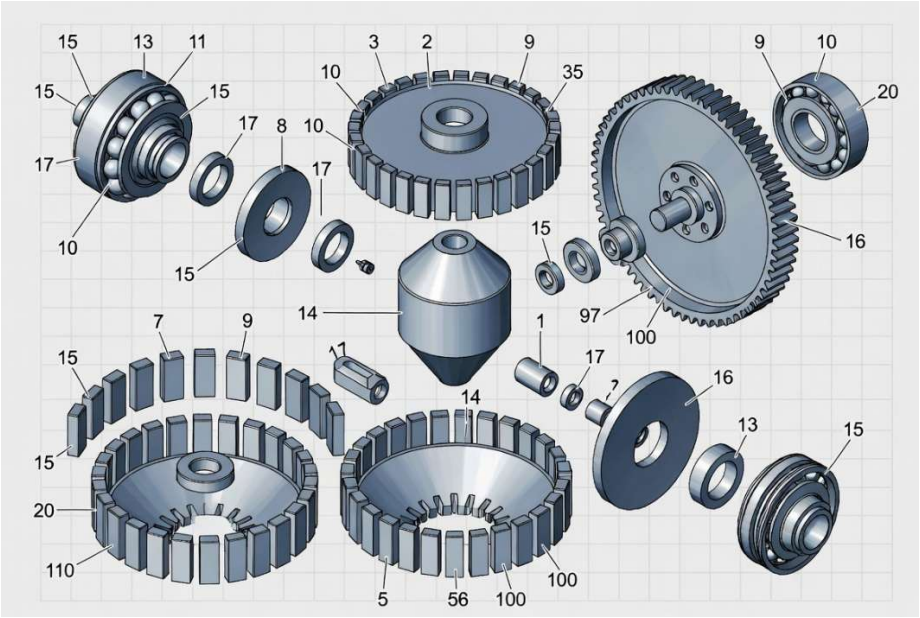
Step 4: Assemble Shaft, Bearings & Flywheel

- Install 25 mm precision shaft through rotor cone.
- Press hybrid ceramic thrust bearings at both ends.
- Bolt 5 kg·m² steel flywheel to the output end (balance to <0.5 g·cm).
- Add axial tip magnets (small ring) for passive levitation.

Step 5: Build the Axial Compression Mechanism

- Threaded compression plate on stator base with 4 M12 lead screws.
- Handwheel or small electric actuator to adjust gap from 15 mm (low torque) to 5 mm (full power).
- 59 J of input energy gives full 118 Nm output.

Figure 3 – Complete Exploded Assembly View



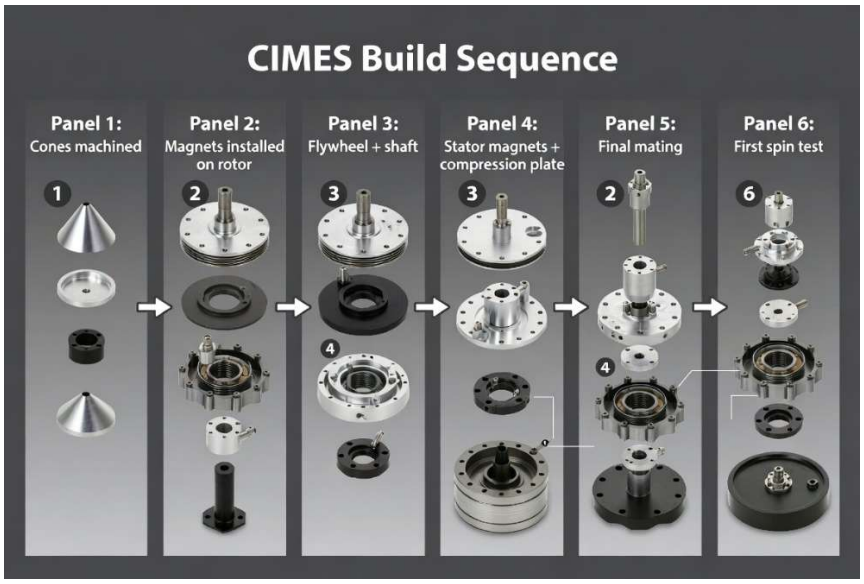
Step 6: Final Assembly & Balancing

- Slide rotor into stator funnel.
- Attach compression plate and adjust to 11 mm nominal gap.
- Mount entire unit on a sturdy non-magnetic base.
- Spin by hand first — check for binding and balance with dial indicator.

Step 7: Initial Testing & Commissioning

- Start with 15 mm gap (low torque).
- Spin up slowly with a cordless drill or small motor.
- Gradually compress while monitoring RPM and temperature.
- Couple to a standard alternator or generator head when confident.
- Expected performance (from simulations): 118 Nm @ 11 mm, <8.5 % ripple with flywheel, <80 °C at 10 kW continuous.

Figure 4 – Step-by-Step Assembly Sequence (6-Panel)



Troubleshooting & Maintenance

- High ripple → double-check stagger pattern.
- Overheating → add forced-air fan or reduce duty cycle.
- Binding → increase gap or check alignment.
- Magnets loose → re-epoxy with fresh JB Weld.

Next Steps

- Couple to a 10 kW alternator for real power generation.
- Add solar-hybrid controller for off-grid use.
- Scale up or down using the r^3 torque law.
- Share your build photos/videos on the website!

Download full CAD files, jig STL files, and updated BOM spreadsheet at www.simulationchallenge.com (coming soon – sign up for notifications).