

PG22 MK2 – Compact Handgun



The PG22 MK2 is built to be a relatively safe and practical attempt at a 3D printed firearm. Printed in plain old PLA, the PG22 uses a steel barrel and breechblock increasing strength where it matters without significantly increasing the cost or difficulty of assembly. This is a far cry from the pinnacle of printed firearms tech, but it's meant as a proof of concept of the potential added by incorporating key metal parts into an otherwise plastic gun.

Required Parts

- M3 Screw Kit
- Barrel Liner: [5/16" OD .22lr Rifled Barrel Liner](#)
- Spring: [Midwest Fastener #88241](#) or 2" x 1/4" spring of reasonable strength.
 - Diameter: 1/4"
 - Length: 2"
 - Nominal Size: SRM139
 - Type: Compression Spring
 - Wire Diameter: .026 WG

Features:

- Designed for long-term usage. No more of this plastic barrel garbage.
- Metal inserts for high-stress parts.
- Shallow Grip angle (To fit on smaller beds, more compact.)
- Important parts are easily replaceable. Sights could be adjusted by tweaking and reprinting.
- Less than 200 grams of material. Lightweight when finished.
- Cheap. Assembly requires only M3 screws, 3/4"x1/8" steel stock, 5/8" OD barrel liner, drill bit, and spring.

Print Settings

Global Settings

- Nozzle: 0.4mm
- Print Height: 0.3mm
- Material: PLA (Would probably work in PETG? Do not use ABS.)
- Orientation: See Image

Frame

- Shell
 - Walls: 2mm
 - Bottom: 10mm
- Infill
 - Density: 20-40%
 - Pattern: Cubic or Grid
 - (Alternatively, print 100%/lines for stronger print, but possible to warp and uses excessive plastic)
- Supports
 - Placement: Everywhere
 - Support Angle: 50 Degrees
 - Pattern: Zig-Zag
 - Density: 15-20%
 - Print with a large brim!
- Notes
 - Don't try to print too fast, you want it to be good. Even when using PLA, it helps to build in a warmer environment for strong layer adhesion. I put my printer inside a roll-top desk while printing.
 - The area behind the breech block is critical as it takes a large amount of force.

Striker, Trigger, Pulltab, Front Sight

- Shell
 - Walls: 0.8mm
 - Top/Bottom: 0.8mm
- Infill
 - Density: 100%
- Supports:
 - Placement: Everywhere
 - Support Angle: 50 Degrees
 - Pattern: Zig-Zag
 - Density: 15-20%
- Notes
 - May require light sanding to polish bearing surfaces.
 - Use 1/16" drill bit as firing pin. Just super-glue that mofo in there, and cut off at the right length (~4mm). Firing pin will need to be sharpened to a chisel tip.

Sights

- Shell
 - Walls: 0.8mm
 - Top/Bottom: 0.8mm
 - Pattern: Lines
- Infill
 - Density: 20%
- Supports:
 - None

Assembly after Printing

It's really not that difficult to figure out. There's like 4 parts. Here's the highlights:

Trigger

- Should be the first thing installed in the frame. Install screw after Striker is installed in forward position.

Striker

- Sand any sliding surfaces to remove rough finish for best operation. The fit will be slightly loose in the frame rails.
- Add 1/16" drill bit as the firing pin. Use glue or epoxy to secure in the striker. The pin should stick out around 4mm, but you should do a test fit to determine proper length before the final cut. Do not cut the final length until you have everything else assembled. The firing pin resting on the case of the .22 should leave around 1mm between the striker and the breechblock.

Sights

- Add the spring between the striker and the sights, and secure in place with two M3 screws.

Breech Block

- Use 3/4" x 1/8" steel stock
- Sand edges and test-fit the stock into the slot on the side of the gun. Make sure it fits flush with the right side. Initial fit should be tight. It will loosen after a few shots.
- Use the Metal_Template.stl as a template for the proper size to cut, and holes to drill for the breechblock.

Frame

- Finish frame by drilling the barrel to 5/16"
- Drill chamber into barrel liner for 22lr
- Set clearance by putting a 22 round in the chamber while fitting in place. Slide it back til it hits the breechblock. This will give the correct headspacing.
- Use JB Weld Epoxy (or other high-strength 12-24hr epoxy) to mount barrel in frame.
- Make sure to remove the 22 round so it doesn't get epoxied in accidentally. Clean excess epoxy before it sets.

Grips and Final Touches

- Use M3 Screws to attach the grips. Maximum screw length is 12mm.
- Test the gun by dry firing it.
- TEST FIRE THE GUN REMOTELY. Find a clamp or secure the gun, and fire with a string.

If The Gun Does Not Fire

- Inspect the casing. Ensure the primer is striking the case with enough force. Ensure the case does not rupture.
- If primer strikes are too light, try using Striker_LargeSpring.stl in the mods folder, and use a larger diameter spring.

Safety

- Inspect the condition of the gun during and after each session of usage. Discard any parts which show excessive wear.
- The gun is designed with an extremely large ejection port to vent gasses in the event of a case rupture. I have ruptured cases during prototyping, with no injuries or ill effects. Always wear safety glasses and ear protection when firing. You do not want ear or eye damage from vented gases in the case of cartridge failures.

Legality

- These plans are provided as-is. They should be treated as a novelty, and nothing more. These files are not an actual gun, they are CAD files depicting design of a handgun. They require skill and knowledge to make into a functional object.
- You are responsible for knowing the laws regarding firearms where you live. Before building, please read up on all applicable gun laws and decide for yourself whether or not you can legally build this where you live.