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EDITION

PRECISION ARMS WORKSHOP

AND THE AMERICAN GUNSMITH ARCHIVE

A TECHNICAL JOURNAL OF CRAFT, REPAIR & RESTORATION

022

ARCHIVE ISSUE NUMBER

INSIDE THE ARCHIVE

3D PRINTING FOR GUNSMITHS

JUDE AUCTION • REMINGTON R1 REPAIR • BEWARE OF THAT OLD MUZZLELOADER! • CASE ANNEALING

ORIGINAL METHODS. MODERN ACCESS.

ARCHIVE EDITION 218

DIGITAL ARCHIVE EDITION

Preserved for the bench.

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FROM THE ARCHIVE

Jude Auction

BY AMERICAN GUNSMITH EDITORS FEBRUARY 2022

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Matt Staser is hosting a March Jude Children's Hospital online at Bids For The Kids. com. The Average Hunter St. Jude Auction is a yearly auction hosted online every March for the sole purpose of raising money for St. Jude.

Filled with items from the hunting, fishing, automotive, and all of the outdoors industry, this auction draws an audience and bidders from all over North America via the @averagehunter social following covering nearly 200,000 followers as well as paid advertising and promoting the sponsors via their social media. Larger high-end donations will get their own raffle with extra advertising.

Platinum Donor for those donating over \$300 in products receive the brand's logo highlighted on the many advertising banners created that will be used to promote this auction. These donors also get a platinum sponsor banner on a featured auction image as well as listed as a Platinum sponsor on the site. Gold Donor for over \$150 in donations will get that logo streaming on the website and a gold sponsor banner on the featured auction image.

Auction listings will be added to the website as soon as they are confirmed so that product and brand will get maximum exposure the sooner a company or sponsor is able to confirm their donation. As this is an unfunded event, all the proceeds of the auction will also pay for the shipping of the items to the winners which takes away from the funds that would be able to donate. Documentation is available providing all non-profit 501c3 information for tax needs.

Please review the website at BidsForTheKids.com and look over the Past Auctions in the tab at the top of the page to see what all have been donated in the past. Visit them online at AverageHunter.com, BidsForTheKids.com, Twitter.com/AverageHunter, Instagram/Average Hunter, or Facebook. com/Average Hunter.

ORIGINAL SOURCE PAGE

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MAINTENANCE & REPAIR

Remington R1 Repair

The product of recent work I performed with a focus on practical safety issues, here's how I brought a Remington Model 1911 R1 up to safety specifications.

BY ROBERT K. CAMPBELL FEBRUARY 2022

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I was once in the car business and repaired some very interesting vehicles.

While I worked with many excellent people, I learned much from dealing with the other types. One was always in panic mode. He would bring in a vehicle with two doors knocked off and a bent support and wanted the work done quick and cheap. I once called another fly-by-night operator and told him I could not replace a cracked windshield because his support column (pillar) was bent.

He replied that was okay because the windshield was in it— yeah, that's why it broke. So anew one went in with a pretty good gap between the roof support and the glass. And so on. Thank God it was illegal to sell a broken welded chassis or they would have done that as well. I was young, needed the work, and did the impossible on the cheap. It doesn't work out to try to please everyone. Always be thankful for the good customers! As gunsmiths we have the same type of customers.

They want the work done on the cheap but still fast and with impeccable quality. One customer simply cannot judge quality and brings in rough old guns wanting them brought up to great shooting and like-new

looking condition. He purchased a worn Smith & Wesson for \$500 because that model is bringing \$800 but his repair bill with parts and labor will be \$400 and it will still be a hard used gun.

Then there is the gun shop employee who just doesn't realize that people take the good scopes off their rifles when traded in almost without exception and the scope will be cocked sideways and perhaps the reticle is broken. Or, one customer I had with an early Colt Double Eagle with a blown barrel. He was too cheap to order another barrel and get his money for this rarity. And so forth. People able to assay quality and who know about mechanics seldom call me.

Another takes in broken guns for a pittance and saves them for me. Even if he gave them to me I could not make money on them, even though I enjoy the work and enjoy teaching. The subject of this article is a Remington R1 that had the potential of being as dangerous as a coiled rattlesnake. I took in one of these pistols and it brought forth more than a little ire. This R1 wasn't a bad looking gun but it had seen some use.

The shopkeep asked me about it because the hammer fell when the slide was dropped on an empty chamber and he did not catch this until the gun was already purchased and logged in. I was called in to look it over. The Remington featured a high polished stainless steel slide lock, beaver-tail, and hammer. The barrel bushing was well fitted. What surprised me was the barrel crown is actually very nicely done and well polished. This is all simple enough machine work. The problem was the trigger.

The RCBS registering trigger pull gauge showed the 1911's trigger broke at 3.5 pounds. This is a very light trigger by my standards, too light for carry and too light for the average shooter. Not surprisingly, when the slide was dropped on an empty chamber the hammer flew forward and was not stopped by the half cock notch. This is a dangerous situation and did not occur in the shop when we tested the Remington with a snap cap.

I warned the shopkeep that this is an unsafe pistol and advised him to not sell it to someone unaware of

REMINGTON R1 REPAIR CONTINUED

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the issue and unable to fix it unless he wanted a lawsuit. He instead decided it was in his best interest to sell it to me, especially because I offered to sell it back to him for his retail after repairs. Making Repairs I tested the trigger several times but did not take the gun down. Instead, I decided to begin with a test fire. At the range, I loaded one round in the magazine, inserted it into the pistol at slide lock, and dropped the slide. Sure enough, the gun fired.

Even though I was at the range with my ear muffs on and expected this could happen, I was still startled. Why was Iso jumpy?

Simply because I knew something was wrong. It is one thing to hear a train and another to hear one bearing down on you. Having the disappointing results I expected, I packed the pistol up. I had wished to check the Far feed and accuracy potential before determining how good a trigger set I would fit and hoped the followthrough failure of the hammer wasn't too bad but that was not the case.

Given that I couldn't sell it as-is and couldn't initiate a test to determine how well this R1 performed, I either had to go into the repair, sell the parts, or scrap the gun entirely. Of

course, this isn't a cheap pistol. I emailed my shopkeep friend to inform him that whoever brought this pistol in sure doesn't care about the safety of others as there is no way they could have fired it and not been aware of the problem. I take such things seriously.

If I had a problem with a Mauser rifle, my shopkeep friend is the first I would consult with as his knowledge is more vast on that subject than mine. On the 1911, he calls me. When I took the pistol apart I found the hammer hook was ground down and nearly worthless. The hammer hook should be

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0.018-0.020" high. This height allows good sear engagement which is critical to function and safety. There are many tools and fixtures that allow you to perform a trigger job on the 1911. Many craftsmen have been doing such work for decades. As for myself I no longer perform such work even on my own guns. I buy trigger sets from top of the line makers such as Wilson Combat or Nighthawk and drop them in. The result is atop grade factory trigger.

Fortunately, I had on hand a trigger set from a Springfield Loaded Model. A few months ago I fitted anew Nighthawk Custom trigger to the Springfield and I saved the Springfield

parts. There was nothing wrong with the parts, I simply did an upgrade. I retrieved them from the parts bin and looked them over. The rest is history as the installation was effortless. They lined up and went in without any type of problem. The trigger is smooth. While the break isn't 3.5 pounds, it is smooth, consistent, reliable, and safe!

This brings us to another point concerning parts. It is good to keep quality parts on hand when you complete an upgrade. The Springfield 1911 parts certainly paid off and I was glad I saved them. Since my sons will inherit this mess sometime and one of them is more talented than I on building guns I care-

fully dropped the unused 1911 parts from this pistol into a bin marked "JUNK." I would throw them away but this bin contains a lot of valuable photographic material.

From another save not long ago, I fitted a Wilson Combat AR-15 trigger in a Springfield Saint which resulted in a superb trigger. I saved the old parts. Sure enough, an entry-level AR came into the shop with an eight pound trigger, so the saved Springfield Saint trigger group went in. While it isn't Wilson Combat smooth, the result is a much better trigger. It is all in a day's work. AG

FROM THE ARCHIVE

Beware Of That Old Muzzleloader!

Muzzleloaders left for long storage or as wall hangers may pose risks. Here's how to restore them while remaining safe.

BY PAUL MAZAN FEBRUARY 2022

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Just because it has been hanging over the mantelpiece for as long as you can remember does not mean it is safe! We all know that the first thing we must do when we pick up any firearm is to personally check that it is unloaded. In most cases that is easy enough. You just open the action and verify that the chamber is empty and that the hole goes all the way through to the muzzle with no obstructions. However, that doesn't work so well with muzzleloaders.

Because they are slow to load many originals were loaded and kept by the back door just needing to be primed or capped in order to be ready to shoot. As these have passed from generation to generation, owners of many of these old guns have never checked to see if they are still loaded. A ramrod with a wad puller attached is used to remove the overshot wadding. A sheet of wax paper was used as wadding and here it is being drawn from the barrel.

I recently ran into this very situation with an old flintlock musket I purchased. The easiest and fastest way to determine if a muzzleloader is loaded is to drop the ramrod down the barrel and hope to hear a metallic clank as the tip of the ramrod impacts the breech face. You can then mark the point where the ramrod exits the muzzle, remove the ramrod, and lay it alongside the barrel.

The ramrod should extend along the barrel all the way to where the breech plug is located just behind the flash hole or, in the case of a percussion firearm, the drum. If there is no metallic clang and the ramrod laid alongside the barrel stops several inches ahead of the flash hole or drum, you are the "lucky" owner of a firearm that may have been loaded many years ago and is patiently waiting for the opportunity to go off! The muzzleloader I purchased had been loaded and left that way for years.

When I dropped the ramrod down the bore, rather than a metallic clank the ramrod landed with a soft thump. When laid alongside the barrel it showed the rod had stopped four inches ahead of the breech plug. Since this was a musket, I assumed what I had hit was an overshot wad. I attempted to remove whatever it was using a wad puller on the end of my ramrod. I found and removed a crumpled up sheet of wax paper used as the overshot wad.

A charge of shot and then another wax paper wad was between the shot and the powder. This led me to research the age of wax paper to see if that could help me determine how long the gun has been sitting around loaded. Wax paper in one form or another has been around since the Middle Ages. It was widely used in the 19th century but before 1926 it was only available in cut sheets from the

BEWARE OF THAT OLD MUZZLELOADER! CONTINUED

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Wax paper was used as both over shot and over powder wadding along with a load of mixed size shot and a charge of blackpowder. This gun had been loaded almost 100 years ago and has changed hands any number of times without its owners being aware of its being loaded. butcher shop. Then in 1926, Cut- Rite Wax Paper was introduced in rolls with the metal cutting edge on the box and it became available in stores.

Since the wax paper used as wadding in this gun has straight cut edges rather than the serrated type of edge used on the cutting strip used on the boxes, it is reasonable to conclude that this gun was loaded before 1926. So, it has been passed around from owner to owner for nearly 100 years loaded and fully capable of going off, just needing a spark introduced to the powder. Could it really go off? After nearly 100 years in unknown conditions, was the powder still viable?

I didn't think that was a question I would Removed from the stock the lock is ready to be disassembled and cleaned. be able to an-

swer because after pulling the load I had to break up the powder that had been compressed into a solid mass. After removing as much as I could I sprayed oil down the barrel to kill whatever residue remained. I thought that was the end of it but while trying to pull the breachplug and being unable to unscrew it, I resorted to heating it with a propane torch.

The oil left in the barrel eventually boiled away and, much to my surprise, the powder residue ignited. It was little more than a puff of smoke and a poof from the flash hole but even after 100 years and a soaking in oil the powder still was able to teach this old hand a lesson on the durability of blackpowder. With the barrel cleared it was time to start restoring this old musket. In this case, as with all antique firearms, care should be taken with any restoration work done.

The idea is to remove surface dirt and rust, not to refinish the gun to look like new. Such a gun is apiece of history with a story to tell and the bumps and bruises of several lifetimes of honest use. We don't want to erase

those features, we just want to stop any further deterioration of the wood and metal. Disassembly showed a lot of dirt and oil accumulated under the barrel and in the mortise for the lock as well as a few cracks in the wood.

The stock was washed in hot water and Dawn detergent to remove the old dirt and oil from the surface. After giving it 24 hours to dry, a waterproof wood glue was used to mend the cracks. The barrel was scrubbed with oil and steel wool on the outside to remove the surface rust. The bore was scrubbed with Brownells Rust Preventative No. 2 and a shotgun bore brush driven by an electric drill and worked up and down the bore. An old T-shirt provided large patches to remove the oil and rust residue.

The final part to be worked on was the lock itself. It is a large old musket lock that reminds me of the locks on European muskets, however, the lock is unmarked, there are no sling swivels on the gun, and the side plates are typical of what are called "New England Militia

BEWARE OF THAT OLD MUZZLELOADER! CONTINUED

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The lock is totally disassembled and carefully cleaned by hand with Brownells Rust Preventative No. 2, steel wool, and wire brushes. The only markings on the gun are the initials "HW" on the stock and a number "7" stamped on the underside of the barrel. Muskets". There are no markings on the gun except for a small "HW" stamped in the grip area of the stock and a number "7" stamped on the underside of the barrel. These features would suggest the gun was made circa 1820s.

The lock was disassembled so the surface rust could be removed using oil and steel wool and carefully reassembled. I was surprised to find that the pan was made of brass. I had never seen this feature before. The brass With the surface rust removed and a

light coat of boiled linseed oil on the stock the musket is clean, unloaded, and restored to shootable condition.

Brass inlays under the lock screws give this old musket a touch of class. trigger guard and buttplate were not cleaned or polished as the patina accumulated over the years cannot be easily duplicated. The stock then got a thin coat of boiled linseed oil cut in a one to one ratio with turpentine to accelerate drying. The rear barrel loop was missing so I fabricated one to fit the dovetail in the barrel.

When reassembled it will be interesting to see how well we can make it shoot with around ball and a light charge of blackpowder. Collectors will bemoan any work done

on the gun as they insist that it lowers the value. I have been told to simply leave an antique firearm as found. However, the firearm in question was not in a condition that any serious collector would want it. I have a simple rule of thumb: If I can afford it, it has little to no collector interest.

True collectibles in good condition are simply way out of my price range. Since retiring, I buy derelict firearms with the intention of stopping further deterioration, repairing them, and bring them back into shootable condition. I enjoy the challenge and find great satisfaction in bringing a small piece of history back to life so it can share its story and be enjoyed by future generations of shooters. AG

FROM THE ARCHIVE

3D Printing for Gunsmiths

An overview of 3D printing for gunsmiths, how to get started, and making an example project for your gun room.

BY BRYCE DUNN FEBRUARY 2022

ORIGINAL PP. 9-14

I first started 3D printing over ten years ago on October 25, 2011 with one of the earliest consumer machines, a Solidoodle 1. At the time, I wasn't a gunsmith. I started as an airsmith by modifying airsoft guns and I bought the printer to make airsoft gun parts. About a year later I started learning gunsmithing and began the quest for a durable printed AR lower, which is still an elusive goal. Here are the fundamentals. A 3D printer works like a hot glue gun if it were being moved around by a robot arm.

It squirts out semi-molten plastic which is fed into it in wire form like a MIG welder. This plastic wire is called filament and it resembles weed trimmer line. You can buy filaments made from many types of plastic and even blends of different plastics and composites made of plastic plus additives or fillers. You can also make your own with a do-it-yourself extrusion machine and some people have had success just using trimmer line, which is nylon.

A 3D printer works by adding layer by layer, with each layer being across-section of the part at a particular height, hence why this is also called additive manufacturing. The 3D printer "draws" this cross-section onto the build plate (also called the bed) and then moves the bed down one layer and draws the next layer. This process is repeated until the entire part has been finished, from bottom to top. This process is called Fused Deposition Modeling, or FDM.

There are other kinds of printing processes, with SLA (Stereolithography) being the second most widely used behind FDM. SLA printers are also called resin printers because they use UV light to cure a liquid resin like your dentist uses. FDM is the cheapest and easiest process, so it will be the focus of this article. Printer Hardware We'll start with the hotend, which is the nozzle, heater block, heater cartridge, and thermistor.

The heater is driven by a 12 volt or 24 volt heater cartridge to melt the filament just before it reaches the nozzle. On the cold end is the heatsink and fan that prevents heat from creeping up the filament path and melting the filament too soon. The heat break is a threaded pipe made of a low heat transfer material like stainless steel or titanium. This connects the hot and cold sides and slows down the transfer of heat. The extruder is a stepper motor driven hob gear and sprung idler pulley.

Filament is pinched between the gear and idler so it can be pulled off the spool and pushed into the hotend. There are direct extruders and Bowden extruders. Direct extruders are mounted on top of the hotend while Bowden extruders are remote mounted and push filament to the hotend through a Teflon tube. The motion system, also called the gantry or "kinematics", is the linear bearings, rods, rails, stepper motors, lead screws, and belts/pulleys that drive each axis of motion.

Usually, the X and Y axis are belt driven while the build plate/bed (Z axis) is moved up and down on lead screws. The bed is where the first layer is deposited and most models are heated from underneath. The part fan cools the freshly extruded plastic; too much cooling makes the print weaker while not enough allows the resolution to become reduced because fine details will droop. On the software side, the file formats for printed parts are usually .stl, or .obj.

The STL file format was native to stereolithography computer aided design software and has since spawned several backronyms such as "Standard Triangle Language" and "Standard Tessellation Language" while OBJ is stands for object. You need a program called a slicer, which slices the part file into layers and generates the G-code the printer needs to draw each layer.

This is the same G-code used by computer numerical controlled machines, the only difference is where S#### would be spindle speed on a mill, for a 3D printer it is hotend temperature. The bed is also heated, which helps ensure first layer adhesion. If the first layer fails, the whole print fails. All printer software uses the metric system, millimeters for movement and degrees Celsius for the bed and hotend. The type

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of plastic filament you use determines the print temperatures. For most prints the default slicer settings will be okay, but be sure to select the right material because the default settings differ between materials. Also related to software is the design aspects of 3D printing. You don't have to learn a CAD program to print, however, it helps you to understand the structure of the part you are printing, as well as allows you to modify parts or create your own.

When I started, the best free program was Sketch Up, so that's what I learned and still use. It is probably the easiest to learn. To use Sketch Up, you just draw a 2D profile of your part, extrude that profile into a 3D shape, then start modifying with things like radiuses or filleted edges, holes, grooves, etc. You can even add engraved or raised text to a part.

Today, a better CAD program is Fusion360, but be warned, Autodesk has a history of abruptly jacking up the price on cheap or

free programs, switching to a subscription license model, or just abandoning some of their past programs just as they became popular. Even Sketch Up has switched to subscription or cloud based services, but you can still find standalone, offline installers for their older versions (2018 and earlier).

Getting Started This might all sound pretty complicated but running the printer is easy once you get the workflow memorized. The first step is to select the STL or OBJ file of the thing you want to print. You can download a file made by someone else, possibly for free, or design your own part and save it as a suitable file. Open that file with a slicer program like Slic3r, Cura, or Simplify3D.

Position the part where you want it on the build plate, then open the settings menu to select the material you want to use, and click "slice". This will generate a G-code file. Save this to your desktop, then put it on a micro SD card or other suitable stor-

age device. Make sure the print bed is leveled, use the manual controls on the printer to bring it up to temperature, then pull some filament off the spool and load it into the extruder.

The extruder arm is spring loaded; hold it open and feed the filament in by hand until you feel it reach the nozzle and start melting. Keep pushing some filament in and watch it extrude to make sure the nozzle isn't clogged. Spray some cheap hairspray or rub a glue stick onto the bed as this helps the first layer stick. For most printers all that's left is to insert the SD card, select the G-code file you saved on it, and hit print.

Some older printers are fed G-code from a computer connected over USB (Universal Serial Bus). Watch the 3D printer print the first layer and make sure there aren't any problems. Once you see

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the second layer properly fuse to the first, it's hands-off from there, however, you should stay in the room and keep an eye on it while you work on something else. There is a remote chance of a fire hazard. If the print comes off the bed and sticks to the nozzle or if a heater wire shorts, it can catch on fire. Filament Types PLA (Poly Lactic Acid) is the cheapest and most common filament. It is the lowest temperature printing material at 190-210C.

It doesn't need a heated bed because it doesn't warp, making it the best choice for fine details if you use a greater than 50% speed on part cooling fan. It's one of the highest tensile strength materials and is very stiff, but it can also be brittle. PLA parts usually fail by cracking. Its major flaw is service temperature. One of my first majorly printed gunsmithing projects was a Groza bullpup AK conversion kit for an AMD-65. It had lots of printed parts in direct contact with the barrel, trunnion, and gas tube.

These held up great during shooting, even after a few mag dumps, but softened and warped in my truck on a hot day. Almost no consumer products are made of PLA. ABS (Acrylonitrile Butadiene Styrene) is the second most common material. On paper it is weaker than PLA, however, it has better impact resistance and is not as brittle, so in practice the parts seem to be stronger. It prints at higher temperatures (225-245C) and requires a heated bed at 60-80C.

It also needs an enclosed printing chamber because the parts will warp and lift off the bed in room temperature air. To avoid warping they need to be cooled down slowly after the printer is finished. It's usually okay to just leave the door closed and let the chamber cool down. Lego bricks and many other consumer products are made of ABS. An alternate version is called ASA (Acrylonitrile Styrene Acrylate or Acrylic Styrene Acrylonitrile) which is better for outdoor use because it is more UV resistant.

PETG (Poly Ethylene Tetraphthalate-Glycol modified) is the third most common filament and its properties are a middle ground between PLA and ABS. It prints around the same temperatures as ABS but doesn't warp as badly so it doesn't need an enclosure, only a heated bed. This material is similar to the types of clear Polyethylene used in water bottles. Nylon is a more advanced material. It prints at 240-260C with a heated bed set above 80C. It warps like ABS and also requires an enclosure.

Like PETG, Nylon is an excellent all-around material but with much higher strength. It has the tensile strength of PLA and the impact resistance of ABS but its major flaw is low stiffness, being lower than PLA but higher than ABS. This can be eliminated with fiber fillers like carbon fiber or glass fiber, both types are available as composite nylon filament. Glass filled Nylon is the material of choice for most polymer framed pistols and gun accessories like grips, handguards, and stocks.

PC (Poly Carbonate) is a very advanced material with properties similar to ABS but much stronger. PC requires a very high temperature printer, printing at over 280C in the nozzle, an over 100C bed, and needing an actively heated enclosure. The previous mention of heated enclosures were passively heated by the bed heater. Polycarbonate is used to make Blu-ray discs, safety glasses, car headlight housings, and electrical equipment due to its high service temperature and insulating and flame retardant properties.

TPE (Thermo Plastic Elastomer) is used to print flexible parts, like recoil pads for a rifle stock. It can be difficult to print with and can't be printed on a Bowden extruder type printer. Its nozzle and bed temperatures vary widely because there are many different chemical formulations of TPE, but what they all have in common is they have to be printed slowly and with a lot of cooling fan speed (>75%).

I'm not sure what consumer products are TPE versus regular rubber but TPE filament feels a lot like a rubber band. PVA (Poly Vinyl Alcohol) is used as a support material in dual extruder printers because it melts in plain water. This makes cleanup of complex prints much easier, because the alternative is to print supports (like scaffolding) of the same material as the part, which bond to the part and have to be filed or Dremeled off. PVA is the main ingredient in Elmer's glue.

3D PRINTING FOR GUNSMITHS CONTINUED

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On to blended or alloy filaments. These combine two chemically-compatible polymers to form an alloy with combined properties. The two that are most common in printing are PC blends and a new type of filament that manufacturers refer to as PLA Plus, Tough PLA, or impact modified PLA. The PC blends are usually PC-ABS, but the Polymaker brand doesn't specify the other polymer.

They deserve specific mention because their line of PC blends are the strongest materials I have tested and they print at lower temperatures, meaning they can be printed on cheaper printers. The PLA Plus style blends are also mostly unspecified, but I believe they are blended with ABS or PETG. They sacrifice some tensile strength and stiffness for higher service temperature and better impact resistance. Some of them also warp, so a heated bed and enclosure are needed.

There are two main types of composite filaments: fiber filled and powder filled. Both can be made with any type of plastic, however, powder-filled composites are usually PLA and the most common carbon or glass fiber filled filaments are nylons. Fiber-filled composites have much greater stiffness and slightly greater tensile strength. Powder additives may include sawdust, powdered minerals, and metal powders. They are usually added for aesthetic purposes, which is why PLA is the main plastic of choice.

You can find composite PLA filaments that look like many different kinds of wood, stone, magnetic iron, stainless steel, bronze, copper, brass, aluminum, and even bismuth/tungsten, which is used for printable radiation shielding. I've printed handguards with wood PLA that are hard to tell apart from real wood, especially if you orient the print so the layer lines look like wood grain, and then sand and stain it. Your First Printer Should you buy a printer?

A gunsmith has a lot of uses for a 3D printer, even if not the obvious "print a gun". You can do customized grip panels, 1913 rails, or M-Lok accessories, stocks, handguards, cheek risers, magazine extensions or base plates, AR or AK pistol grips, even recoil pads and elastic buffers. You can also prototype your own designs and make special tooling, jigs, and fixtures. I would not advise printing whole guns or receivers for customers, although it's not illegal as the media would have you believe.

If you are an FFL 07 Manufacturer, serialize the receiver on an inset metal plate and record it like any build. The problem is liability and customer satisfaction. Using current technology, 3D printed receivers just won't last as long as a traditional metal gun and might break at a bad time. Another good reason to buy a 3D printer is they have gotten much cheaper. When I bought my first one in 2011 it was \$1,400 and filament was \$60 per kilogram.

Today, you can get a decent machine for just under \$200 on Amazon and some filaments are as cheap as \$15/kg. The most popular printer right now is the Creality Ender-3. I bought one recently and have been using it to print samples for filament testing. That way I know whether or not a certain filament can be printed by the majority of the printer community, who use cheap printers similar to the Ender-3. Just like any industry, printer filament manufacturers are known to exaggerate in their marketing materials.

For the most part you're not going to find a bad filament and they all print okay, but some of us are looking for the absolute strongest material we can print with. Because of this I started a side project to independently test as many high strength filaments as I can. If you want to support my testing efforts and see the results, check out my Patreon page at [Patreon.com/Print-Science](https://www.patreon.com/Print-Science). 3D Project

Example Additive manufacturing is a useful and increasingly accessible method for making tools and parts.

There are a lot of things you can build with a 3D printer. Here's how I designed and made 3D printed firearm wall hooks. These wall hooks for guns I recently made are a prime example. You could spend anywhere from \$15-50 on a pair of metal hooks, or, if you have a printer, you can make some for less than \$2. Whenever I want an item and think that it could be made with a 3D printer, the first thing I do is check [Thingiverse.com](https://www.thingiverse.com) to make sure somebody else hasn't already designed it or something similar.

Thingiverse is a wonderful resource for many different types of 3D printing projects. While firearm parts and accessories are officially against their rules, you can still find tons of stuff like AR or AK grips, Picatinny, Key Mod, M-Lok rail accessories, and even bipods and stocks. These are usually labeled as "airsoft" parts. There are other websites to look for files as well. [GrabCAD.com](https://www.grabcad.com), [Yeggi.com](https://www.yeggi.com), [STLFinder.com](https://www.stlfinder.com), and [Cults3D.com](https://www.cults3d.com) are good sites to search for projects.

GrabCAD isn't necessarily geared towards printable models but there are thousands of them on there. Yeggi and STLFinder are search engines that aggregate the 3D models available from many sources. Cults3D is the closest to Thingiverse because it has exclusively printable 3D models. The main difference is Cults allows artists, engineers, and designers to charge for their models, so sometimes you find some cooler stuff on Cults.

So I searched "gun wall hooks" and many variations thereof (hanger, mount, holder, etc.) on Thingiverse and found about a dozen models.

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I printed these in ASA, which is around 4.8 cents per gram, so \$1.66. Some of those were direct wall mount, others for pegboard or Open Armory system, some square, some curved, however, none of them were particularly of interest me. I was looking for something that looks cool, minimizes material usage, and is strong enough to hold heavier guns. So I decided to design my own. I did a little research on the shape of wall hooks.

If you look at some skeletonized designs they resemble what you'd see in a roof truss, with the long sections that form the perimeters being reinforced by a crossmember at the spot where they would most likely buckle. What's different with my design is the crossmembers are replaced with circles, also called hoop reinforcements. If you load the center

of an arch, it transfers that load to the edges. A circle is just an infinite arch, so the load is transferred to every other point the circle touches.

This is stronger and uses less material than the normal truss type reinforcement. The curve on the front face of the hook works the same way; in order for the hook to flex forwards, the curved part would need to either buckle inwards towards the circles or outwards. Either way it is reinforced by the circles, as they would have to stretch or collapse before the hook can fail. If this were milled from aluminum or cut from wood, it would just look like a hook with holes in it.

However, these were printed with no walls so you can see the internal honeycomb structure, which is unique to 3D printing. Printers can make parts that have solid perimeters, tops, and bottoms (also called shells) and internal infill patterns of varying density. These hooks were printed with 35% infill in the full honeycomb pattern. The honeycomb pattern has a line every 120° and these lines zig-zag at 60° and align on top of each other to form hexagon cells.

Fast honeycomb skips one line on every other layer, while full honeycomb prints a fully enclosed hexagon cell on every layer and doubles one of the zig-zag lines side-by-side so that every single width line in a layer is sandwiched above and below by a double width line, making it very strong.

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At bottom, grid infill. On right, triangle infill. Other infill patterns include rectilinear, grid, and triangle. Rectilinear is a tight grid pattern with lines that alternate 90° every layer, so up-down lines on layer one and sideways lines on layer two. This is fast but weak as they only bond at the vertices. Grid is a little better as it is a larger pattern of squares that are filled in more solidly, similar to full honeycomb. Triangle is probably the best compromise between speed and strength.

It lays a solid line every 120°, every layer, and they fuse very well at the points where they overlap as well as along each line. Also, all these patterns can be manipulated by adding

solid layers every so often and by doubling up layers. Solid layers are sort of like firewalls in a building; they enclose parts of the model's internal structure with solid bulkheads and can be added at different layer intervals at around every 50 layers or so.

Doubling means printing two or more layers of perimeters or shells before the printer lays down the infill. If your layer height is set to 0.1mm and the interval set at two layers, the printer will print two layers of perimeters before it starts to print the infill. When it does it will print the infill at double the layer height (0.2mm) to make up for the skipped layer. This makes the infill stronger and saves

print time, while still allowing for fine detail resolution on the outer skin (or shell) of the model.

As for the wall hooks, they can be printed with any settings you want. I only omitted the outer shells to show off the infill pattern and to prove their strength. So far they have held up a SPAS-12 shotgun weighing 11 pounds with no problems. If you print them with enclosed walls they will be even stronger—just be sure to use good drywall screws! You can see this design at [Thingiverse.com/thing:4910792](https://www.thingiverse.com/thing/4910792) and my other designs at [Thingiverse.com/ giterdunn](https://www.thingiverse.com/giterdunn). AG

METALWORKING

Case Annealing

Here's a simple and inexpensive project to anneal brass cases and prevent the necks from cracking when reloading.

BY GLEN CALVERT FEBRUARY 2022

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Many years ago, when I competed in High Power rifle matches with an AR-15, 5.56 ammo was cheap and plentiful. Even though I was not reloading, I picked up my brass after each string of fire and saved it. Over time, I had accumulated several thousand cases. I ended up selling most of it to a local gun store for a few pennies per case. Fast forward several years. I switched from High Power to long range Benchrest with the AR and a few bolt guns.

I replaced the barrel on my AR-15 with one chambered in 223 Wylde to improve its accuracy. I started reloading to save money and try different powder and bullet combinations. When I started reloading for these rifles, I found that there were quite a few with cracked necks. Realizing that it was time to start annealing the brass, I looked to the Internet for help. The case neck and shoulder are work hardened with repeated firing and reloading and become brittle.

They need to be annealed to make the brass more ductile. This is a 308 Winchester case; I don't recommend doing this with 223 Remington brass. The cases should not be annealed any further along the length than roughly 0.3" down from the shoulder. Annealing the full length of the case significantly weakens the case head and primer pocket which can result in catastrophic failure. YouTube has many videos on how to anneal cases and there are several commercial and homebuilt devices to do it.

There are two means of heating the brass: propane torches and induction heating. Propane torches are inexpensive and are more commonly used. There are two basic categories of devices, I'll call them vertical spinners and horizontal spinners. The commercial versions are typically horizontal spinners that index the cases automatically while the home-built ones are vertical spinners where the cases are gravity fed into a rotating drum.

Some of the home-built spinners are quite ingenious and allow high volume annealing. I wasn't interested in high volume use and decided to build my own, simplified horizontal-type design. In my design, the case is placed in an arm that is manually rotated about 60 degrees to put the case into the flame, where it spins on a small turntable. The arm is then rotated another 20 degrees where the annealed case drops off the rear edge into a collection pan.

The major items I had to purchase were a low cost 12 VDC (Direct Current Voltage) motor (\$13), a mounting bracket with hardware (\$9), and a power supply (\$10), all from Amazon. Amazon makes things easier sometimes by showing additional parts that can be used with the primary purchase, such as the mounting bracket designed for the motor. I had most of the remaining material in my shop, including a piece of 3/4" square aluminum tubing to make the arm. I had some plywood

CASE ANNEALING CONTINUED

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Brass nut has a 6 mm inside diameter. left-over from a previous project plus some other various bits and pieces needed. I purchased a few “nuts and bolts” type items as well. This article is not intended to give a detailed plan for the project as the concept is simple and can be adapted as needed. Assembly Details The motor brand I used is Greartisan and it has a small gearbox on the end of the motor with an output speed of 50 revolutions per minute.

There are several versions available with output speeds ranging from 5 rpm to 300 rpm. I figured that 50 rpm would be okay but don't think the rotation speed is critical. The mounting bracket comes with the screws to attach the bracket to the motor and a small brass nut that is 0.45" in diameter (across the flats) which is large enough to for the case heads.

The nut has a 6 mm bore diameter that matches the mo- The white connector came with the adapter, I purchased the bulkhead

style connector separately. tor shaft diameter. The set screws to secure the nut to the motor shaft are included as well. The 110 VAC (Alternating Current Voltage) to 12 VDC power adapter is rated at 2 amps and should be more than adequate for such a low torque application. The power adapter came with a female socket but it wasn't a bulkhead type so I purchased one of those.

I BUILT THE FRAME FROM 3/8" AND 1/2" PLYWOOD. IT IS 10" WIDE, 9" HIGH,

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and 6" deep. Again, these are rather arbitrary dimensions, they can be whatever works best for the user. Some may question the use of wood but since the flame is well above the top surface, I wasn't concerned. This was a proof-of-concept design; it would likely need changes and wood is easier to work with than metal. The only critical dimensions are making sure the hole in the top of the frame is aligned with the motor shaft.

With the motor on the mounting bracket, I determined where I wanted it relative to the top of the frame. I installed the motor on the rear panel and measured where the corresponding hole in the top of the frame needed to be. I made that hole slightly larger than the nut diameter. I mounted the motor to the

frame with the brass nut bottomed out on the motor shaft and the top of the nut slightly below the top of the frame.

I glued a piece of 400 grit sandpaper to the top of the nut to give the case head a little more traction. I then raised the nut so it was flush with the top and tightened the set screws. I added a front mounted switch to control the motor. I drilled 0.40" diameter holes through one end of the arm for .223 cases and 0.49" holes in the other end for 308 Winchester or 6.5mm Creedmoor cases. These hole sizes are not critical, they just provide a pilot for the cases to rotate within.

I added a hole for a pivot pin half-way between the other two holes. This allows me to anneal either size case simply by swinging

the arm 180°. The pivot pin is a 0.25" outside diameter x 1.0" long screw post with internal threads on one end. It was too long so I added a spacer on top of the arm to take up the excess clearance. There wasn't enough thread depth to allow shortening the post and the arm is a nominal 0.75" but measures 0.77" which is just a bit too large for a 0.75" long post.

The threaded end sets on a fender washer on top of the frame and is retained by a bolt installed from underneath. Out of curiosity, I put a 223 Remington case in the .308 hole. It rotated fine, just had a slight orbit, which shouldn't be a problem.

CASE ANNEALING CONTINUED

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I installed a 3" U-bolt (3/8" thread) on the propane cylinder and added thread connectors and 3" long bolts to level the torch nozzle horizontally at the shoulder of a .223 case. This determined the height of the frame at 9". Backing out the bolts raises the nozzle to accommodate the taller .308/6.5 cases. The type of nozzle used will affect the height required.

I made a spacer that butts up to the side of the frame and I push the legs of the torch against the spacer to set a constant distance to the cases being annealed. When the frame was completed, I stained and sealed the surfaces. Color change is the most obvious means of telling when the brass has been annealed. Temperature indicating paint such as Tempilaq can be used but should be applied

to the inside of the neck where it won't be burnt away by the flame. This typically requires paint rated for 600 or 650 degrees.

Similarly, 400 degree paint can be applied on the outside of the case about halfway between the shoulder and case head to prevent over-annealing. When the paint melts, you know you have reached the indicated temperature. I found that the color change is obvious and is a suitable means of determining when the correct temp has been reached. In the photos of the .223 and 6.5 cases, I marked the end of the heat affected zones with a felt tip to make it easier to see the differences.

If the brass starts to glow, it's been overheated and should not be used. After I determined the amount of time needed for the col-

or change (typically five or six seconds) with a few sample pieces, I used a simple timer to tell me when to index the cases through the flame. I found that it is easier to see the color change if I tumble the brass beforehand to give a uniform surface finish. Turning off the light directly over my bench also helps.

The amount of time required to get the correct annealing depends on the torch nozzle, shape of the flame, distance to the case, etc. I can cycle a case through the process about every 8 or 9 seconds. I annealed 100 cases in 15 minutes, then full-length sized them. None were cracked. This turned out to be a fun and interesting project. It didn't cost much and it provided a consistent method of annealing cases which



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Annealing for five seconds appears to be the correct amount of time for this method. 5mm Creedmoor cases, left to right, cases annealed for six seconds, eight seconds, and ten seconds. Annealing for eight and ten

seconds is too long. should increase the number of times they could be reloaded. Unfortunately, the shortage of reloading components, especially primers, has prevented me from doing any loading lately. AG

MAINTENANCE & REPAIR

Repairing Firearms With Unusual Issues

Firearms are durable mechanical devices. So when they start having unusual issues, the problem can be difficult to diagnose. Here's how I handled one such problem pistol.

BY MICHAEL PRIEGO FEBRUARY 2022

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Firearms are capable of withstanding a substantial amount of abuse and neglect. The question with a firearm having an unusual issue is to figure out to what amount of compounding issues will push the firearm past its tolerances. Here we'll look at one such problem pistol I worked on. I examined and repaired a Taurus G3 chambered in 9mm. From what my client told me, this firearm had been used for many different applications and has withstood different elements and conditions.

Despite this, the pistol had a few problems that the standard first response of take down and cleaning was incapable of solving. The first issue addressed was the consistent jamming once the firearm had been fired. I was able to place the firearm back into battery once the jam has been cleared, however, the issue remained consistent after a few test ejections with snap caps. To address this issue, I conducted a complete take down and an extreme cleaning of every part of the firearm.

This provided a clearer visual of the parts that maybe experiencing more friction and wear than normal. This requires typical cleaning items such as cotton swabs,

your preferred cleaner/ degreaser, small rasp files, and performance oil. To repair the friction issue I used a small flat rasp file to create an even surface so that the slide glides across the top of the rail. Keeping a straight and even stroke allowed the rail to be even and straight.

I did this the same way for each rail so that the all of them provide a consistent amount of material to guide the slide dur- Over time, the rails are capable of causing a high amount of friction where the slide travels reward during operation. This issue can typically be caused by a build up of oils, carbon, and debris. ing operation. Don't use a tremendous amount of force when using the file on the rails; simply apply the file to remove any minor defects that maybe causing issues during operation.

I then tested the fit of the slide and added a small amount of Prussian blue dye paste to the rails of the grip module to ensure that sufficient contact was being made. Once the rails have been filed down and the slide was capable of



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Birchwood Casey Cleaner-Degreaser helps remove all types of debris and oils, cotton swabs help in the application of degreaser and the removal of carbon build up from hard to reach places, and a small flat rasp file to assist in removing some material to create a level surface. Far The next part to inspect is the slide for any unusual wear and that could cause a safety issue for the user. Most of the wear and friction that is caused by normal use should be even and consistent on both sides of the rails and slide.

An uneven amount of wear will show that there could be high pressure and force causing the slide to slightly twist and cause the minimal bending on the rails. moving properly, I cleaned off the build up of dye and metal shavings. This is likely to accumulate in smaller areas where such debris can cause issues with smaller springs, ejections, and any moving parts. I have always used a degreaser from Birchwood Casey as their product is clean and simple to use with the cotton swab that is attached to the cap.

This makes it easy to apply, especially in tight areas that require very little application during the process. Once the degreaser is applied in the areas that have had material and oil built up, I used smaller cotton swabs to

remove the debris that has been loosened by the degreaser. I then wiped down all of the parts that have been cleaned and degreased, finishing by oiling to lubricate the firearm for functional testing.

I used a small amount of Hoppe's Black, a high-performance precision oil, on the rails of the firearm, just enough to allow a light amount of lubrication and removal of heat caused by friction during operation. With a light amount of oil applied to the rails and everything reinstalled, I tested functionality of the firearm to observe if it was capable of fully completing the ejection cycle. Diligent cleaning and a small amount of judicial filing along with fit checks using marking dye had this job done right.

The firearm was complete and functional with minimal down time, returning the job with totally clean parts and minimal delay to my client. AG Far The dye can be applied with nitrile gloves or by a cotton swab. I prefer the swab due to the different sizes that they come in and the way they can be apply small amounts depending on how much is needed. Utilizing the dye allows a perfect view of exactly where the areas of contact are being made during the firearm's operation.

FROM THE ARCHIVE

The ABCs of Digital Marketing

An expert in business and technology consulting shares how to get your shop started in marketing online.

BY LISA APOLINSKI FEBRUARY 2022

ORIGINAL PP. 22

According to the Harvard Business Review, and the post-COVID CMO survey, social media marketing spending saw a 74 percent lift in 2020. In addition, traditional marketing activity was projected to decline during the same time period. Digital marketing is becoming more of the budget focus for companies, and rightly so. With the pandemic, the importance of having a digital focus has come sharply into view for many organizations. These same companies are looking to expand their digital growth.

When it comes to digital growth, there is no “silver bullet” to achieve the growth companies want or need in a post-pandemic world. If digital growth was easy to achieve in the digital space, everyone would do it and do it well. Anyone who tells companies that digital growth should be easy do not understand that proper digital growth requires long-term strategy. Digital growth combines patience and commitment in order to develop strong relationships.

These strong relationships provide the foundation for trust in your brand and, in turn, engagement. Trust is not something that can be faked and prospects cannot be rushed into giving their trust to your organization without some work. This translates into a much longer focus and investment in that digital engagement and growth. To understand why digital growth is a long game, you need to revisit your A, B, Cs. A is for Aspiration: What is the purpose of your organization?

What impact are you hoping to have on your clients, your employees and your community? Many companies skip right over this key initial step to understand, document and share the organization’s aspirations. This is not about sharing features and benefits of the company’s products and services. This is about sharing your company’s values and what feeds your passion, your

purpose and your plans for how you serve clients in the future. That share has to be consistent and long term as a reminder of why your company exists).

She works with companies to develop and share their message using digital assets. Her latest book, *Persuade With A Digital Content Story*, is available at Amazon.com. It exists, to clients, vendors and employees (really anyone who interacts and supports the brand). People who get your organization’s aspirations are more likely to align with them and go the extra mile to provide support. **B is for Belief:** Does your company practice integrity and transparency in communication and customer service?

Has your digital engagement created a consistent message and a sense of trust in your word? Trust is a key component in your digital growth strategy. And because most prospects have an inherent distrust of what they are told online, there is a steep uphill battle to gain their trust. Keeping that trust and providing leadership and value are just as hard to maintain. This can be thought of as providing water so the seeds of what your company has planted are able to take root and grow with your audience.

Your company cannot phone this in or think that gaining the trust of your audience can be done overnight. Trust in your brand and word takes time. **C is for Connection:** Connection is very different from selling. When you focus on creating connection in your network and with your prospects and clients, you are creating something that lives beyond your interactions. Connection can happen in any and all digital communications.

Connection prioritizes how your company can serve others and how your company provides value in every interaction. Connection helps to strengthen the

RESTORATION

Reader Forum

BY AMERICAN GUNSMITH EDITORS FEBRUARY 2022

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Firearms Guide The Firearms Guide 12th Edition (FirearmsGuide.com) from Impressum Media Inc. is a huge reference for all things gun. The Guide presents over 80,000 antique and modern firearms, air guns, and ammunition from 1,500 manufacturers in 62 countries. It also includes a value guide that presents antique and modern guns with gun values based off of the 100%- 30% condition ratings and a library with 18,500 printable gun schematics, blueprints, and manuals.

American Gunsmith readers receive 15% off of the purchase of the Firearms Guide Combo Flash Drive and One Year Online Edition for \$85 instead of \$100 or 20% off the Flash Drive and Two Year Online Edition Combo for \$99 instead of \$120. Use coupon code: AMERICANGUNSMITH (all caps). want to have digital engagement in faster terms, the idea of going slower in communication and digital engagement may seem counter-intuitive.

However, digital engagement is similar to face-to-face engagement in that this is a person-to-person connection between someone in your organization and someone online. With a focus on how you can create and build relationships, you are adding to the long-term growth of your company. Relationships, in order to stand the test of time, need time to grow. Relationships in the digital space are no different.

Those relationships, even though they are online, still require the Impressum Media also offers wholesale pricing for reselling in your store. Click on the WHOLE- SALE link in the lower left-hand corner of the page for details. This provides a wholesale discount with free shipping to your store.

Trigger'd Expo Event The 2022 Trigger'd Expo Event (TriggerdExpo.com) is scheduled March 23-25 at the GTI Training Facility in Barnwell, South Carolina and is an exclusive content-generating event with dedicated photo and video resource generators for media, buyers, and influencers to experience a digital e-show open to the world. The main goals of this event are content generation, influencer connection, new product launch, and networking.

This event will feature demonstrations, competitions, online silent auctions, online giveaways, live feeds, and industry celebrities. There are 40 demonstration blocks scheduled during the three day event. These blocks are broadcasted and recorded with the company's representatives answering questions. Each vendor will be provided passes for their representatives and will have access to all registered time and investment to gain roots to grow properly.

Using the A, B, Cs of digital growth can help your company be set up digital engagement success, which translates to digital growth. But make sure you invest in actions that promote that long term

digital growth. And that digital growth cannot be achieved with a silver bullet. My company, 3 Dog Write (3Dog- Write.com), helps businesses with their marketing needs.

I also provide more details on this topic in Persuade With A Digital Content Story, available at Amazon.com/ Persuade-Digital-Content-Story and on my website. AG attendees, buy groups, and online registrations. Joint market sharing will be available between all companies, social media influencers, and marketing teams.

Gunsmith Surprises Concerning the 1911 work covered in the November issue ("Gunsmith Surprises" by Charlie Briggs), it was great but the Series 80 guns that I have worked on always use that narrower grip safety pusher. I only use Stan Chen replacement grip safeties and they always need to be fitted. I have never had one fit out of the box. I do have a SIG 1900 that I discovered; after owning it for five years and shooting it a lot, it had a grip safety that never worked.

I always took it to the range, put in a magazine and racked it, and started shooting. This was my first experience at fixing this issue using all stainless parts. I just TIG welded a little nob on the end of the pusher and went to work fitting it. It took around an hour but I learned a lot. John Douglas Thomson, AIA Torrance, CA Charlie Briggs responds. Thank you for your comments and for

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reading. Over the years I have added beavertail safeties to Colts, Llamas, Springfield, Caspian, Essex, and others, but have not yet used the Stan Chen products but they seem to be a quality product. While I've often had to modify the business end of many of the safeties, this was the first one that required thinning. However, like your SIG, these little "educational moments" are part of what I like about gunsmithing. Like Forrest Gump's box of chocolates, you never know what you're going to get.

Smith & Wesson Victory About a year ago I contacted the editor asking for an article on the Smith & Wesson Victory semi-automatic rimfire pistol and the December issue of American Gunsmith had just such an article. To this point it was the most in-depth source of information that I have come across on the Victory. Mr. Campbell should be commended for such a fine piece of work! I am heading out to the range to evaluate the use of STP on the gun.

My guess is that it will contribute to an even more positive level of reliability for my Victory. Over the course of the past couple years of shooting and working on my own and other S&W Victory pistols shot by my fellow competitive shooters, I

have learned a few tricks (the hard way) to make these guns more reliable and accurate. I am a retired police officer with over 40 years behind the badge and a USAF veteran.

In 2021, I won the Colorado State NRA Action Pistol Championship in both rimfire and centerfire divisions as well as winning first place in the Expert classification at the Bianchi Cup (NRA Action Pistol Nationals) among other wins in Colorado and Wyoming. I'm working on my first article for American Gunsmith to share what I've learned. We all thank you for the kind words and congratulations on the great shooting! We're always interested in publishing and sharing gunsmith knowledge with our readers.

Silencer Co Glock Barrel I have a Glock 17 in my shop that the customer wants to put a Silencer Co (SilencerCo.com, extended barrel in with a compensator. The pistol functions fine with the original barrel and captured double spring guide rod, however, it won't function with the longer barrel and compensator installed. With the aftermarket barrel, the pistol will not cycle; it either stove pipes or the case just doesn't clear the chamber.

I tried anew set of Wolff Springs and then fit them with anew guide rod and adapter in it. I even tried cutting the 17 pound spring down until it is so short and weak it won't close the slide into battery and the pistol still won't cycle correctly with the new barrel. It's very close to working correctly but still won't. Kenneth W Wright RK Campbell responds. I cannot recall seeing a Glock 17 malfunction and the pistol has a deserved reputation for reliability.

I'm also not aware of any issues with Silencer Co barrels. The first thing I would do is return the pistol to stock configuration and check function with the original factory parts, just to be sure. If that proves reliable (I'm guessing that it will be) then the pistol should be fine with a drop in barrel designed for that model. Given that it isn't, I'd contact the barrel manufacturer. Perhaps they let a barrel that is out of spec slip past quality control and a replacement will do the trick.

If none of this works, you're starting over. If a different aftermarket manufacturer doesn't offer a suitable alternative, you're potentially looking at a custom fitting job as the only fix. AG Alex Ragulsky

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