

Brownells Bolt Forging Blocks give the gunsmith an alternative to welding new handles on Mauser rifle bolts when sporterizing them. For the gunsmith without advanced welding skills, but who has access to oxy-acetylene welding equipment, this is a relatively simple process.

Forging or bending bolt handles on sporterized military rifles involves two concepts; utility and esthetics. The bolt handle must be bent at the proper point and be shaped appropriately to clear the eyepiece end of a rifle scope. At the same time it should be shaped and polished to look good. This is one area where there are no absolute rules regarding handle shape and finishing. The gunsmith's sense of proportion and taste will come into play. Since the job involves mastering several skills, we strongly recommend that you obtain a few surplus Mauser bolts as practice pieces. Bolt bending is best done on straight handled bolts with full round knobs. Military turned down bolts with flattened knobs should have new handles welded on.



WARNING



Never attempt to disassemble or reassemble a firearm unless you are absolutely certain that it is empty and unloaded. Visually inspect the chamber, the magazine and firing mechanism to be absolutely certain that no ammunition remains in the firearm. Disassembly and reassembly should follow the manufacturer's instructions. If such instructions are not immediately available, contact the manufacturer to see if they are available. If they are not available at all, then you should consult other reference sources such as reference books or persons with sufficient knowledge. If such alternative sources are not available and you have a need to disassemble or reassemble the firearm, you should proceed basing your procedures on common sense and experience with similarly constructed firearms.

With regard to the use of these tools, the advice of Brownells Incorporated is general. If there is any question as to a specific application it would be best to seek out specific advice from other sources and not solely rely on the general advice and warnings given.

Inspection:

Strip the bolt completely. Clean the bolt and the action thoroughly. Examine the bolt and the action for cracks or other problems, such as an oversize or damaged firing pin hole or bolt face. If the barrel is not going to be replaced or the caliber changed at this time, check the headspace. If there are any problems with the bolt or the headspace, replace the bolt and/or correct the headspace before any further work is done. It's much better to scrap out a bolt or an action at this point than to discover a potential safety problem after extensive work has been done.

If the bolt face needs to be opened for use with magnum cartridges, the work should be done now. Also, make any necessary action modifications to facilitate feeding the new cartridge. This would also be an appropriate time to drill and tap the receiver for scope mounts and temporarily attach them and the scope to the action.

HOW TO USE

Preparation and Safety:

Since bending bolt handles involves heating the bolt handle to a bright red heat and use of a punch and hammer to change the shape of the handle, you will need a large, heavy bench vise, properly mounted to a heavy work bench. You will need an oxy-acetylene torch with a fairly large tip to quickly heat the bolt handle to a bright



Applying heat to the standard bolt handle.

red "forging" heat. Make absolutely certain that all flammable materials are removed from the work area, and that appropriate safety equipment is readily available, including safety/welding goggles for gas welding, heat resistant gloves, and a good fire extinguisher. The actual bending of the bolt handle should be done very quickly once the handle is at a forging heat, so it may be helpful to have the assistance of another person to hold the lighted torch while you do the forging work.

Mauser bolt handles are essentially square where the handle joins the bolt body. To properly bend the bolt handle, the underside of the square root has



Initial bolt forging with a ballpeen hammer.

to be rounded. For Model 98 Mausers, measure out from the bolt body on the bolt handle root about .180", and round the root from that point towards the knob, blending in the radius with the bolt handle shank. Small Ring Mausers (Models 93, 95, 96, etc.) which cock on closing, have a smaller diameter bolt body where the bolt handle is attached. Measure out about .230"

from the bolt body and round over the handle root from that point. Install a Brownells Bolt Heat Sink into the bolt body and use Brownells Heat Stop Paste liberally on the bolt's cocking cam notch to protect the bolt from overheating. Some gunsmiths also will pack extra Heat Stop Paste inside the bolt body and around the bolt forward of the blocks to help prevent overheating.

Place the bolt body in the Forging Blocks with the square root of the bolt handle engaged in the notch in the blocks. Center the bolt handle in the

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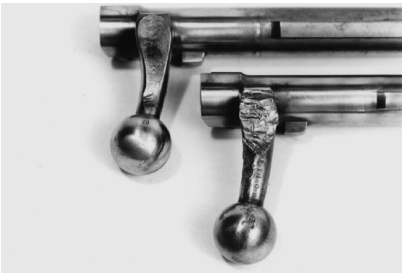
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INSTRUCTIONS

round groove in the right hand block. Clamp the Bolt Forging Blocks tightly in a heavy duty bench vise. The lips of the Bolt Forging Blocks should be resting firmly against the tops of the vise jaws. Have a bucket or large coffee can of water at the workbench to cool down the bolt after the handle is forged. We strongly recommend heavy duty, heat resistant gloves be worn and large slip jaw pliers be used when removing the bolt from the Blocks and for cooling down the bolt in the water.



**Top: Bolt handle modified with forging punch.
Bottom: Bolt handle modified with ballpeen hammer face.**

Forging the Bolt:

Important: Before heating and forging the bolt, do a “dry run”, manipulating the bolt from the Blocks to the water bucket, with gloves and pliers, just as though you had forged the bolt, so that you will not over-cool the newly forged handle and will be able to properly cool the cocking cam area of the bolt body.

Set up your oxy-acetylene torch with a large tip and a hard, “neutral” flame; you must heat the bolt handle quickly and work rapidly to minimize heat transfer to the bolt’s cocking cam surfaces and bolt body. Additionally, you must work while the steel is at a bright red heat. If it cools to a dark or black red, the steel is too cold to forge properly and you may crack or break the bolt handle when you hit it.

You must work fast enough that the bolt’s cocking cam surfaces do not change color past a light “straw”, or you may have softened the cocking cam to where the nose of the cocking piece may gall it. If this happens, you may want to send the bolt to a reputable heat treating firm with experience in gun work to be re-heat treated.

SAFETY NOTE: Unless you have a secure holder rigged for your lit welding torch, do this job with another person to hold the torch while you are handling the Forging Punch and hammer!

Heat the bolt handle shank from the top down, keeping the flame off of the handle ball to prevent scaling it. The entire shank should be glowing a bright orange-red clear to the bottom of the handle where it goes into the Bolt Forging Blocks. Be careful! Do not melt or burn the handle! Set the torch aside (or hand it to your assistant) and use your large hammer to hit the off side of the handle ball and start the bend into the forging groove in the right hand block. Get the bend about 15 degrees off of vertical, and then use the hammer and Forging Punch to move steel down into the forging groove.



Sweeping the bolt handle back about 15° from vertical.

You may have to switch from the Forging Punch to your ballpeen hammer to forge the handle root down into the groove. You should have a square corner at the handle root when viewed from the top of the Forging Blocks. Continue heating as necessary and forging the shank into the groove. Remember to forge the steel ONLY while it is at a red heat - **RE-HEAT AS NECESSARY!**

The lower end of the shank should angle upward from the top of the blocks enough that the bolt knob will clear the stock. For most stocks, this will mean that the underside of the handle will need to be about .150" to .200" above the round groove at the outer edge of the Forging Block. The bolt knob should angle back toward the trigger slightly for ease in grasping. How far back depends to some degree on your sense of esthetics and on the caliber of the rifle being built.

Moving steel into the groove with the Bolt Forging Punch.

A light recoiling caliber, such as .257 Roberts, can have the knob swept back closer to the trigger than would be desirable in a heavy recoiling rifle, such as a .338 Win. Mag. A heavy recoiling rifle should have its bolt handle almost straight down, or swept back only about 1/8" to 1/4" maximum.

After the bolt handle is forged to shape, the bolt must be cooled down to protect the heat treat of the locking lugs and the cocking cam. Turn off the torch and grab the bolt heat sink with your pliers as you open the vise jaws. If possible, have an assistant catch the bolt forging blocks in a metal bucket

partially filled with dry sand or kitty litter as you open the vise jaws. Be careful: the forging blocks are hot! Do not let the heated blocks hit the floor. This will cause serious damage.



Front view of finished M-98 bolt knob.

Slowly and carefully, put the bolt into the water, locking lugs first, with the bolt body held at an angle, until you can immerse the triangular cocking cam cut in the bolt body while keeping the bolt handle itself in the open air. **DO NOT**

drop the bolt into your bucket of water! Important: allow the bolt handle to cool slowly in the open air! Cooling it rapidly in the water will harden it, making the cleanup from forging very difficult.

Before proceeding to the next step, check the bolt in the action to see that it will clear the scope when it is in the “up” or open position. You may want to pad the exterior of the scope’s eyepiece with masking or Bedding Tape to prevent any chance of scratching the scope. Do not try to close the bolt in the action at this time!



Rear view of finished M-98 bolt knob.

Cleaning up the Handle:

Use files, a Dremel or Foredom hand grinder with sanding drums or mounted stones, a 1" x 42" belt sander, and hand and machine polishing as necessary to clean up scale, roughness and inconsistencies from the forging process.

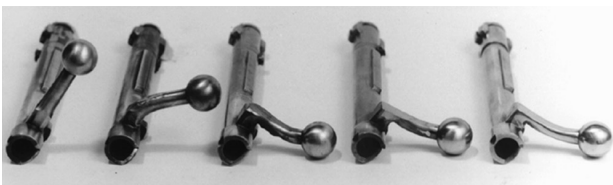


Cutout at rear of Small Ring Mauser bolt, after cleanup.

The handle shank should be no wider than the square root where it joins the bolt body. The forging process will have spread the handle shank wider than the root, so it will need to be trimmed in width to a pleasing contour. The area at the inside of the handle radius should remain flat, and not be rounded over in finishing. All corners should be crisp with the

edges broken slightly to prevent injury to the shooter in rapid fire manipulation of the bolt.

Small ring Mauser rifles, such as the Swedish '96 and Spanish '95 models, use a cutout in the handle root to stop the rotation of the bolt around the bolt shroud when opening the bolt in the gun. This cutout usually will deform when the bolt handle is forged. Use a Dremel Tool or Foredom hand grinder



M-98 bolt knobs showing progression from start to finish of the forging process.

with a small mounted stone or carbide cutter to re-shape the cutout so that the bolt can rotate to the unlocked position against the bolt shroud. Do not over cut! It’s a good idea, before you start the forging process on Small Ring Mauser bolts, to make a detailed sketch of the handle root cutout on your bolt so that you can restore it’s dimensions.

Reassemble the firearm according to the manufacturer’s instructions. Check for proper functioning using **ACTION PROVING DUMMIES**. Make sure **ALL SAFETY MECHANISMS** are fully functional as designed and approved by the manufacturer. If these tests prove satisfactory, test-fire the firearm with live ammunition in a **SAFE** and **APPROPRIATE** manner. **IMPORTANT!** Start the live ammunition tests by first loading an **ACTION PROVING DUMMY**, then a live round, into the magazine. Only after several tests have been conducted in this manner should additional rounds be placed in the magazine and fired.