

# Heat Treating And Tempering

This heat treating process is very crucial to achieve maximum hardness. For heat treating, I use an oxy-acetylene torch with a 1" diameter heating tip.

First, setup the part to be heat treated. Everything needs to be at your finger tips; have your oil, torch, and tongs all within turning distance from you, and have at least 5 gallons of oil ready. Burnt motor oil or used transmission fluid works great, or you can purchase quenching oil.

Ignite the torch using a neutral flame, 60psi oxygen - 12psi acetylene. Hold the part for heat treating with your tongs, and begin applying heat to the part. Hold the flame about 6" away from the part, moving the torch up and down, around the top and bottom. Continue doing this until your part is a uniform color. This will take a few minutes; the color you're looking for is between red and bright red: 1400° -1500° (a temperature color chart is included with these instructions). Once the part is the right color, immediately quench it in the oil. Dip it about halfway down in the bucket, using a swirling and up-and-down action, keeping the part moving in cool oil. This is crucial, do not hold the part in one place, keep doing this in the oil for at least 2 minutes. When you pull the part from the oil it should stay wet. If it doesn't, submerge it again until it stays wet when pulled from the oil.

After the part is cool enough to handle, check the hardness with a file. The file should not scratch it. Check several places with the file, because some places might be harder than others. If that's the case, then repeat the heat treating process all over again. I do this 2-3 times on thicker heavier pieces to ensure maximum hardness. Next, temper the steel by cleaning off all the scale created by the heat treating, right down to the bare metal. I de-scale with 50-50 muriatic acid and water. This is a very simple process, use only a plastic container for this in the great outdoors.

Once you have the part clean, ignite your torch back up and heat the part to a light straw-looking color, quench in oil again using the same actions as described above, then let the part finish cooling by laying it down on something flat. You have now taken the brittleness out of the steel, you're done!

It's ready for grinding.