SBN/QPQ Process and Why We Use it

Early on in the process of designing lever guns for the 500 S&W Magnum, Big Horn Armory staff decided to use 17-4PH stainless steel (SS) for the main parts and 416 SS for the barrel. The reasons for using stainless steel for its anti-corrosion properties are straightforward. These steels also had to have properties of being tougher and stronger than most tool steels in common use for firearms.

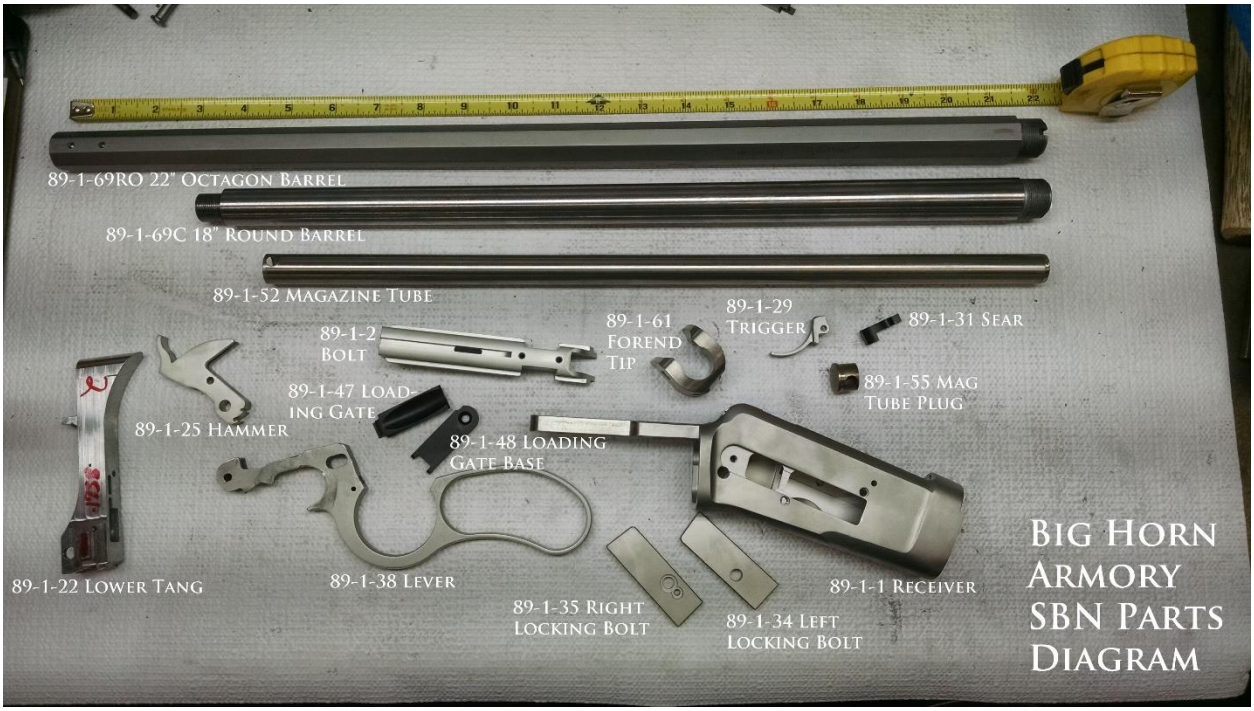
We knew that along with these good properties there is one bad property, galling. Galling is a condition where two metals subjected to heat, friction, and pressure will weld together. Lack of lubrication is the typical cause of this, but we discovered that sometimes even well-lubricated stainless steels will gall if the pressure and heat are high enough or if the surface has been rubbed together enough times.

We had a well-used prototype with adequate lube seize spontaneously between the locking bolt and the bolt. We had to beat it to pieces, essentially destroying the parts.

We investigated various ways of eliminating galling, coatings like Cerakote®, Nickel-Boron, and others worked well to eliminate galling, but added thickness to the parts and messed up our tolerances. Color Case Hardening was tried, but instead of the colors and patterns that would appear when using carbon tool steels, we got a dull, lifeless finish.

We heard about Salt Bath Nitriding (SBN) and the Quench/Polish/Quench (QPQ) procedure. Systematic nitriding has been around since the 1920s. Nitrogen and carbon are diffused into the surface of the steel, hardening it just like Color Case Hardening. It also turns the surface a uniform black when the QPQ process is used and leaves the original dimensions intact.

This was ideal for our guns, as the hardened surface reached up to Rc82, which is harder than most tooling. Galling was eliminated and the surface was virtually impervious to normal wear. The hard surface also added lubricity to the metal making it work more smoothly when rubbing against other surfaces.



We started using SBN/QPQ on the receivers and it worked like a charm. Adding all of the internal wear parts, like hammers, bolts, locking bolts, levers, and carriers just made everything work better. We tried the same process on our barrels and discovered that the inside of the nitrided bore pretty much did not wear out. We have one gun that has over 3,500 rounds through it and the bore looks brand new.

The added lubricity also increased the muzzle velocities by two to three percent. The only downside to SBN/QPQ is that the surface is hard on carbide tooling, so all machining should be done before the nitriding process.