

## Finishes on Steel

By Allen Elishewitz

I have often heard customers ask why some of their ATS-34 blades would rust and some would not. I usually answer that it is because of the different finishes on the blades. The ATS-34 is a stainless steel but it will still rust. Stainless steel does not mean it will not rust, it just means that it is stain resistant. Different finishes on a blade, however, can affect the rate of rusting.

For example, consider three ATS-34 steel blades: one is sandblasted, one is satin finish and the third is mirror finish. The first to rust will be the sandblasted blade, the second will be the satin finish and the last will be the mirror finish. Why would the same steel with three different finishes rust at three different rates? The surface of the steel is almost like skin, it has pores. The least amount of pores in the steel will allow more light to reflect off of it. Deeper and more numerous pores on the surface will absorb more light. If a material is sand-blasted, it creates a lot of pores onto the steel that allow more light to be absorbed into the steel than reflected out. At the same time, it absorbs a lot of moisture and traps it into its pores. This is why oxidation occurs on the surface of the steel. When light reflects off the steel in finishes such as satin or mirror finish, the pores are smaller so moisture is not trapped into the steel. The finer the finish is, the more it protects the steel against corrosion or rust.

A sandblast finish is when the blade is blasted with sand, bead-blast is when it is blasted with glass beads or aluminum oxide beads. With these finishes, the different medias reflect a different rate of rusting. The rate of rusting occurs fastest for the coarsest finish. Since glass is very fine, its finish will tend to rust slowest. However, when lubricant is applied on the surface to protect the steel, the sandblasted finish tends to rust slower than the glass finish. This is because the pores on the steel are much larger so they are able to trap more oil onto the surface of the steel. This in turn protects the steel longer than the finer finish. You can tailor your knife around different finishes: For filet knives that will be around a lot of corrosive salt water, use a mirror finish to close the pores. For military or utility applications, satin or bead-blasted finish would be best.