The Ti Crown Jewel

SHOT PEENING - WHY DO WE DO IT?

Shot peening has 3 major benefits in the crafting of titanium bicycle frames.

- ***Fatigue life is enhanced significantly, increasing the useful life of the frame.***
- ***The frame is stress relieved so that all of the component parts may work together.***
- ***Surface hardness is enhanced, increasing resistance to scratches.***

Shot peening is a cold working process in which the frame is bombarded with small spherical media called shot. Shot act like tiny ball peen hammers and create a uniform dimpled texture on the surface of the frame. This imparts an even layer of compressively stressed material.

The processes of butting and welding titanium tubes to make a bike frame are known to effect the fatigue properties of titanium. Both welding and butting generate significant heat which tend to induce tensile stresses into the frame. Tensile stresses make the material want to pull itself apart. This is a bad property to impart to a bicycle frame as any minor notch or micro crack in the frame will want to propagate and further compromise the material. The induced tensile stresses are most concentrated in the heat affected zone (the area of the welds). Thus, strength is compromised precisely where you would like it to be greatest.

Shot peening of a welded titanium joint substantially increases both fatigue strength and fatigue life as compared to the same joint which is not shot peened. Shot peening imparts what is called residual compressive stress which does away with the residual tensile stress which is induced in the process of grinding and welding. Typically, fatigue strength of a welded titanium joint after shot peening is more than twice that without shot peening. Fatigue life is enhanced by shot peening to an even greater degree.

By shot peening the frame after it is welded together, we are able to relieve the stresses in the material, imparting compressive qualities which are known to reduce micro cracking and enhance fatigue life. Without stress relieving the frame, each of the tubes will retain tensile stresses which tend to conflict with one another. Stress relieving allows the component tubes of the frame to work together as designed, acting as a unified structure rather than a collection of competing parts.

The shot peening process work hardens the surface of the tube while giving it a finely textured surface. These two properties together create an attractive finish that is highly resistant to scratches. If scratched, the scratch is harder to see because the surface is textured and will not show an uninterrupted line. The textured surface glitters in the sun in a manner similar to that of a pearl paint job.