Technical Bulletin

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CERAMIC BEAD BLASTING VERSUS GLASS BEAD BLASTING

There are a variety of surface treatments available for stainless steel after machining. Apart from restoring the corrosion resistance of the stainless steel, surface treatment may also be done in order to achieve a certain finish. In this technical bulletin, we shall examine the beadblasting of stainless steel as a surface treatment process.

Ceramic bead blasting cabin

With beadblasting, one can achieve an even, uniform satin finish. The surface treatment is chosen mainly for its aesthetic and cosmetic value. The results of beadblasting depend largely on the medium that is used for blasting (shape, hardness and size of the particles) and the skill of the personnel (angle of blasting and distance between the blasting gun and the surface). Beadblasting is done by firing the beads with pressure on the stainless steel surface at a specific angle. A very minute quantity of the stainless steel surface will be removed hereby (see Fig. 1). Contamination on the surface will also be removed and since the blasting medium is normally reused, the blasting grit may be contaminated hereby. Contamination of the beads by embedded iron particles is removed through magnetic cleaning. It is however much better to chemically treat the stainless steel before beadblasting. Degreasing with an alkaline solution will ensure a grease-free surface. A pickling process will then be carried out. The pickling process will remove all the thermal oxides after the welding, as well as embedded iron contamination. This has two advantages: the corrosion resistance of the stainless steel is ensured before the beadblasting treatment, and the blasting grit is not contaminated, thereby increasing its lifetime cycle.

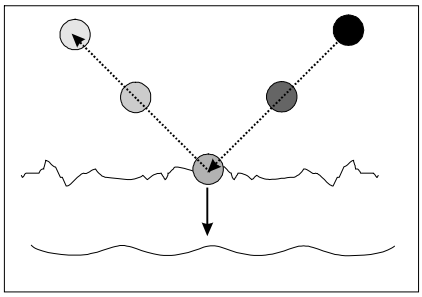
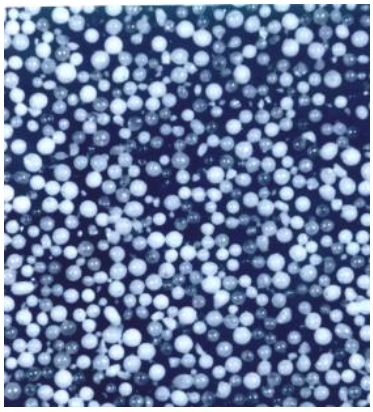


Fig. 1: Image of the surface structure before and after bead blasting

The stainless steel surface shall however, after beadblasting, as after all mechanical treatments, be highly reactive and a chemical passivation will often be required in such cases to fully restore the chromium oxide layer.

The quality of the blasting medium is very important from the point of view of the end result. The blasting media most often used are ceramic and glass beads. A very important difference between these two media is the breakage percentage. Due to the reuse of the beads, glass beads may suffer damage in due course and the round beads become increasingly more angular. Even splinters may be formed. Splinters have a completely different impact in comparison to round beads. This difference in impact will have certain effects on stainless steel surfaces. The roughness will increase and splinters of the beads may be blasted into the surface. These effects have a negative impact on the corrosion resistance of stainless steel and chance of adhesion of dirt is increased due to the increase in roughness.



Ceramic beads (greatly magnified here) have a very low breakage percentage and retain their round shape

In the case of ceramic beads, the breakage percentage is many times lower than in the case of glass beads. Due to low breakage percentage, the roughness of the treated stainless steel will lessen and be more constant in comparison to treatment with glass beads.

The effect on surface roughness after treatment is an important factor whenever stainless steel is used in applications with higher exposure to corrosion under atmospheric conditions (outdoor applications). Due to a lower surface roughness, the chance of adhesion of contamination will reduce and the cleaning characteristics of the stainless steel will increase. Ceramic beads produce a significantly lower surface roughness in comparison to glass beadblasting and is more suitable for critical applications.

Example of outdoor applications: ceramic blasting of a stainless steel bridge railing

Table: Roughness (Ra) after specific surface treatment
assuming a cold-rolled 2B stainless steel sheet

Ceramic bead blasting	0.8 – 2.0 µm
Glass bead blasting	1.5 – 3.0 µm
Pickling	appr. 0.5 µm
Mechanical polishing	5.0 – 0.05 µm

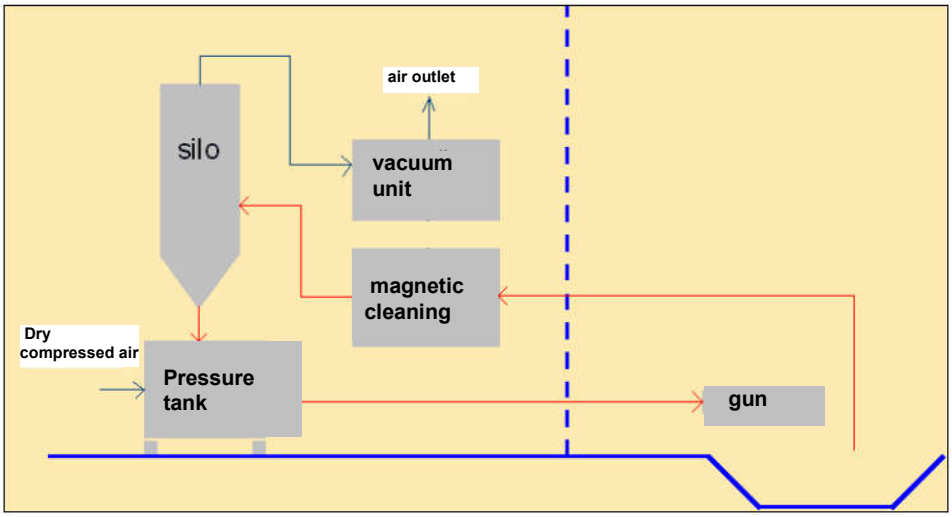


Fig. 2: Schematic diagram of a beadblasting unit

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