

Water jetting vs. conventional dry blasting of stainless steel

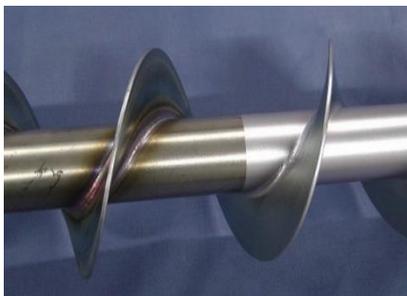
Stricter requirements require a better cleaning concept, Vecom offers an effective and chemical-free total solution

According to the latest regulations, stainless steel surfaces which are intended for the food industry have to be "smooth". This means that the material surfaces must have a roughness (Ra value) of less than 0.8 microns.

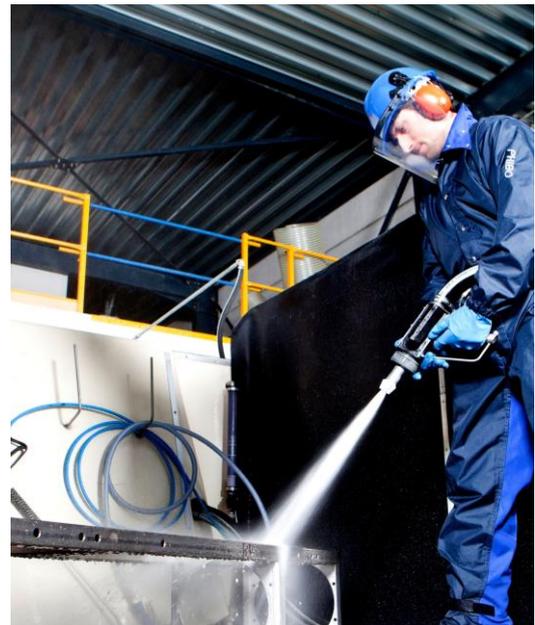
Furthermore, the surfaces must be cleanable on a microbiological level after the treatment. This means that in addition to the surface roughness, the surface topography (peaks and valleys) also plays an important role. The analysis of the 3D surface structure is important to determine if and in what extent organic material and other contaminants can accumulate in micro-cavities, scratches and cracks. In addition, the treated surfaces must be manufactured from corrosion-resistant and non-toxic materials. In future, the direct and indirect 'product-contact surfaces' will be critically evaluated more and more.

The principle of dry blasting

With conventional bead blasting, the blasting agent used (macro particles with a size of 500 to 5000 microns), are projected directly on (and partly in) the stainless steel surface in a concentrated manner. The consequence is that the surface topography and –roughness, after treatment with conventional bead blasting, are disastrous for the hygienic cleanability. The surface is too rough (> 0.8 microns) and there are many high peaks and valleys where contaminants can attach and accumulate.



There are also many fragmented bead particles anchored in the surface by the direct impact. The repeated re-use and projection of broken and crushed sharp and angular (glass) particles also has a negative impact. Finally, the peaks in the rough surface of the stainless steel are folded back by the impacts of these (glass) beads, causing contaminants, such as iron particles from the production process, to become fully encapsulated or encrusted behind half folded peaks. In time, this can lead to pitting corrosion.



The water jet process

For the treatment with the water jet process, Vecom uses an aqueous suspension of tiny particles (up to 100x less than classic blasting beads). The surfaces of stainless steel structures, parts and components are conditioned in such a way that both the surface roughness and -topography dramatically improve.

With the water jet process a slurry is pumped to a process gun specifically designed for this application, under low pressure and at a controlled flow rate. This slurry consists of an aqueous suspension of inert micro-particles of mineral origin with a size of 60 to 90 micrometres. Subsequently, this suspension is mixed with compressed air and sprayed on the stainless steel surfaces. The water jet process, in contrast to conventional blasting, can remove a small amount of organic oil or grease contamination. (In case of heavier contaminants, the surface should be degreased beforehand). The controlled flow of suspension from the gun removes oil, grease, corrosive substances and contamination, without the risk of encapsulation of impurities. Pulverized bead particles are removed by an ingenious filter system and not reused. Encapsulation is completely excluded in this way. The water jet process guarantees a highly efficient surface treatment, even on irregularly shaped surfaces. Heat tints, staining and microscopic imperfections are removed and the surface obtains a specific roughness and topography which is far below the imposed values. Because of the intensive peening treatment, micro-cracks and pores are closed. In contrast to conventional bead blasting, no damage or deformation of the surface occurs. After treatment, the surface has a contact angle of + 80°. As a result, bacterial and other contaminants have only very limited adhesion possibilities. The result is an extremely smooth, satin surface that enables an efficient, hygienic cleaning.

Although the water jet process shares important characteristics with regular pickling, such as removing heat tints and restoration of the chromium oxide skin, it is not a substitute for regular pickling. The water jet process is designed to provide a solution if very specific demands are made on the level of finishing of materials or structures. The intended result can only be achieved when the materials to be treated are clean and have a finish as perfect as possible. Already during the production process, due attention should be paid to this. Material selection, design, processing techniques and welding processes determine the level of finishing of the materials. It can be necessary to degrease and/or pickle in advance, as is nearly standard in conventional bead blasting. If this pickling or degreasing is necessary, Vecom can also be of service.



Right: test sheet treated with the water jet process
Left: test sheet treated with conventional bead blasting



Before and after

Advantages of water jetting

- Improvement of Ra (Ra value < 0,6) and surface topography
- Very efficient cleaning and very fine finish, both visually and on micro level
- Isotropic surface
- Micro cracks and perforations are closed by building up a compressive stress in the surface (peening) without deformation as in bead blasting
- The surface obtains hydrophobic properties (contact angle +80°)
- No risk of static electricity
- No possibility of Fe- or other contamination by encapsulation, because of the process technology and inert micro particles used (up to 100x smaller than with conventional bead blasting)
- No health or environmental risks: the water jet process is 100% dust free and no hazardous or toxic chemicals are used
- The process is safe, eco-friendly and based on sustainable technology
- Corrosion resistance is optimal

Interested and want to know more?

For further information and/or questions about this subject or in case you have other questions, please contact one of our specialists +32(0)3 4701050 or via waterstralen@vecom.be.