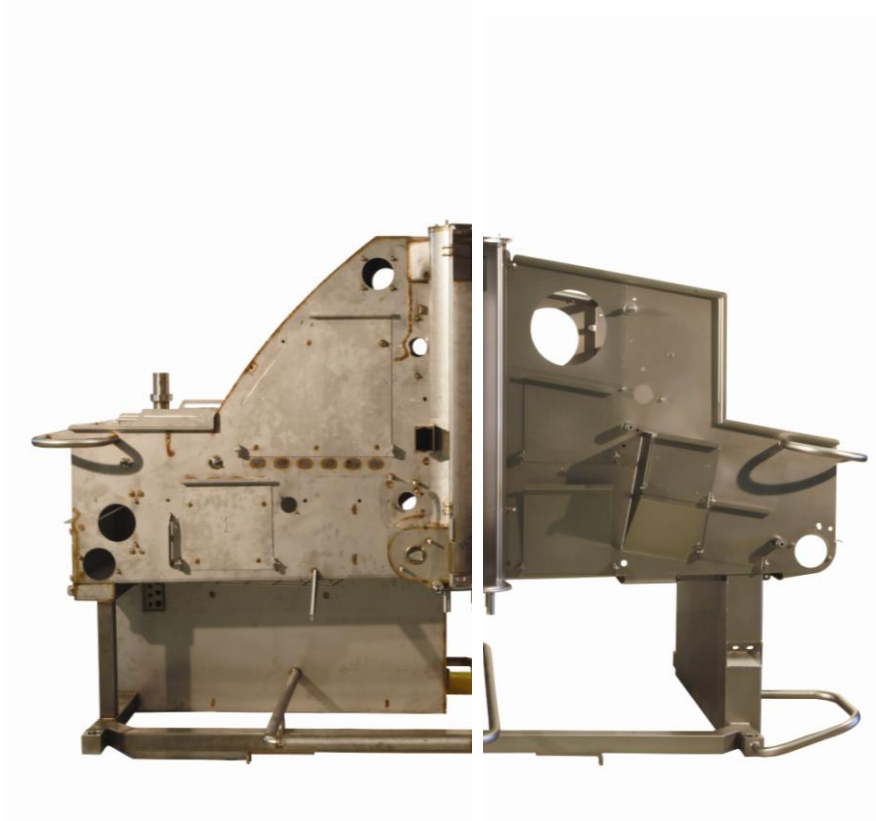




ViwateQ® Finishing, the new stainless steel surface treatment



Before (left) and after the ViwateQ® treatment

What is ViwateQ® Finishing

ViwateQ® Finishing is a new physical treatment for austenitic stainless steel (AISI 300-series), suitable for large and small surfaces and designed for improved cleanability of equipment for the food industry. It removes the sharp peaks left by grinding and makes the deep valleys more accessible for cleaning.

Cleanable down to microbial level

By investigation by the European Hygienic Engineering & Design Group (EHEDG) the microbial cleanability of a surface has been related to the average surface roughness R_a .

If R_a exceeds 0.8 micrometer micro-organisms remain behind in the surface. And if R_a is less than 0.2 micrometer micro-organisms appear to be more difficult to remove due to adhesion.

The optimal value of R_a for cleaning down to microbial level is between 0.25 and 0.60 micrometer. Obviously the surface should also have no irregularities like deep scratches or pits.

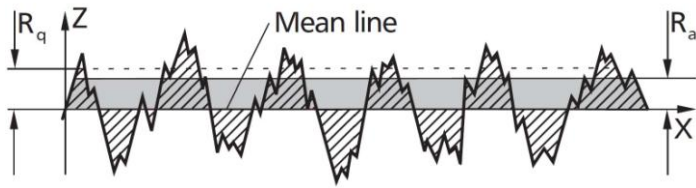


Figure of R_a -value. The order of bacteria is between 0.3 and 2.0 micrometer. The R_a value should be in the order of magnitude of the smallest micro-organism.

$$R_a = \frac{1}{l} \int_0^l |Z(x)| dx$$

But the R_a value is an average value and does not always show the effect of e.g. a deep valley just behind a high peak. It is known that the R_a value is not always representative of the amount of micro-organisms remaining behind. With a R_a value of more than 0.8 micrometer, in most cases after cleaning the microbial indicator *Geobacillus stearothermophilus* (from the EHEDG comparable cleanliness test) is found. But sometimes also at lower R_a values.

Cleanable down to protein level

In 2006 and 2010 the national research institute TNO developed a better distinguishing method for determining the quality of surface treatments. It is carried out with labelled milk protein. The method consisted of several test plates being soiled and cleaned under standard cleaning procedures. Subsequently, the residual protein is determined spectrophotometrically. For the characterization of the surface TNO introduced a new measure: Soil Retention Index (SRI), a result of the R_a value, the number of peaks and the total volume of the deeper valleys.

TNO concluded in two reports that there is a clear link between SRI and residual protein. Between R_a value and residual protein there is no connection. The R_a value therefore is unsuitable to express the degree of cleanability (of residual protein).

ViwateQ® Finishing is the best method

The TNO study has shown that concerning the cleanability down to the protein-level the SRI value relates well to residual protein.

All standard finishing methods such as pickling, glass beading, ceramic beading and electropolishing, applied to a standard ground plate, were examined and compared with the ViwateQ® method. The ViwateQ® Finishing showed the best improvement in SRI values, even better than electropolishing.

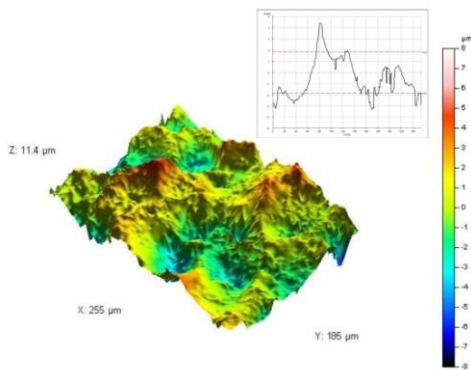
The ViwateQ® method has the ability to optimally influence the surface roughness. All peaks are removed, exposing the deeper valleys and making them more accessible for cleaning. The R_a value always improves, but never gets below 0.35 micrometer. And in contrast, the R_a of mirror polished material increases from 0.001 to 0.35 micrometer. This falls just within the value range for optimal cleaning down to microbial level.

ViwateQ® Finishing compared

Two surface treatments are widely used for large areas:

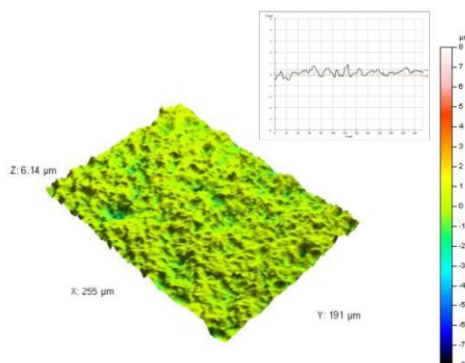
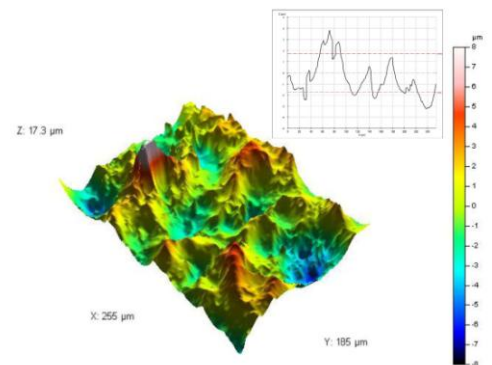
- glass beading
- ceramic beading

Both methods are characterized by the striking of glass beads (and later sharp pieces of glass) or harder ceramic balls on the surface. The surface gets dull, but looks even. However, at micro scale the surface is rough and more dirt remains behind. This is also evident in the 3D-ATM scans, made by TNO Eindhoven.



Parent material is AISI 304 2B-finish sheet, which is then glass beaded.

Parent material is AISI 304 2B-finish sheet, which is then ceramic beaded.



Parent material is AISI 304 2B-finish sheet with ViwateQ® Finishing.

ViwateQ® Finishing does not strike the surface, but goes along the surface and simultaneously removes the higher sharp peaks. This creates a wavy pattern, a kind of lotus effect. Therefore micro-organisms, but also the proteins, are directly on the surface and are thus easier to remove. Also for some applications with dry cleaning.

What more does ViwateQ® Finishing do ...

Although ViwateQ® Finishing is not a pickling process it removes the oxide film and simultaneously all unwanted contaminants, including the burned weld area. Immediately afterwards a new oxide layer arises by natural passivation. Measurements with the Oxyliser show an optimal positive potential within 30 minutes. This means maximum corrosion resistance. And this without using additional etching chemicals, so there is no risk of "under-deposit attack" and subsequently microbial contamination in these small crevices.

Besides better cleanability and good corrosion resistance, the structure of ViwateQ® treated surfaces also has the advantage of better rolling properties for dry foods. ViwateQ® treated polished or 2B-finish plate gives a better drop angle for several powders tested, because parts of a 2B-finish sheet that are too smooth are slightly roughened (to 0.35 micrometer) and peaks too rough are removed.

Rolling properties compared (angel [degrees] at which rolling starts; typical)

	Grit 80 or 120	Mirror Polished	2B-finish	ViwateQ
Sugar	28 - 35			25 - 30
Milk powder	45 - 55	40 -50	38	30 - 40
Rice Starch	45 - 60	50		38 - 42
Maltodextrin	38 - 45			28 - 35
Cacao powder	70	85	60	40 - 50

ViwateQ® provides the following benefits:

- Ideal surface condition for the food sector;
- Less susceptible to corrosion because the chance of 'under deposit corrosion' has almost entirely disappeared;
- Reduced cleaning time and / or better cleaning effect, and thus more production time, less pollution and safer product.

ViwateQ® Finishing is the result of 15 years of research and try-outs, finally offering such an improvement of the stainless steel surface. To the board of ViwateQ, besides a good understanding of the application of the user, the working conditions and environment are always paramount.

ViwateQ® Finishing is covered by several patents.

More information c.q. stainless steel surface contractor:

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