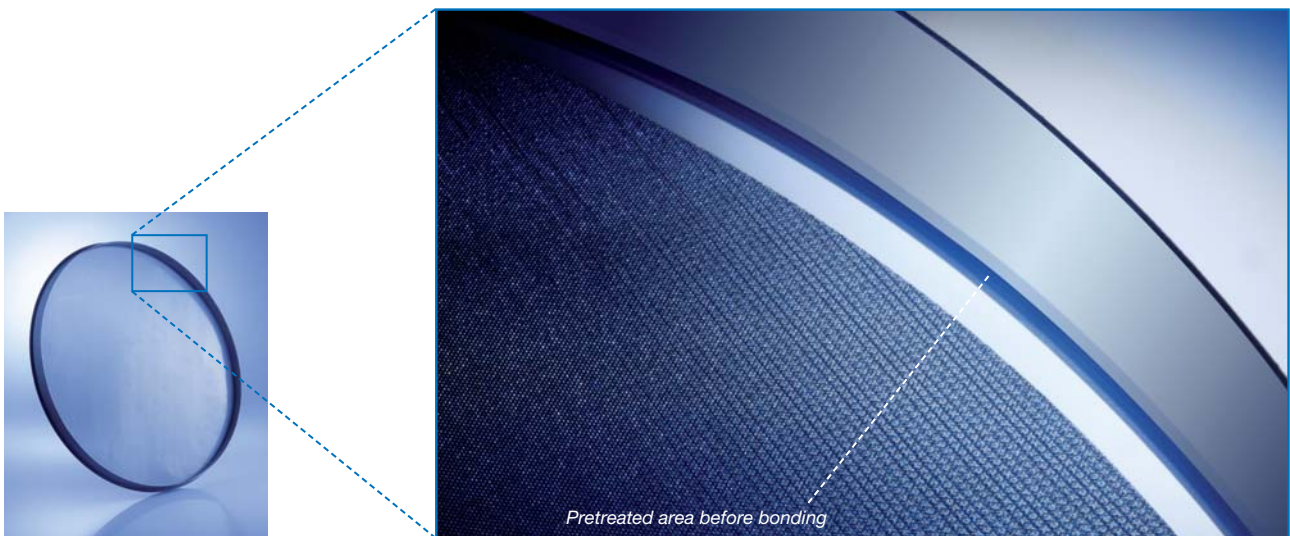


DELO-SACO surface pretreatment method



1. What is DELO-SACO?

The DELO-SACO technique is a pretreatment method. This method uses a simple blasting process to coat surfaces. It improves the bond strength of many materials, such as metal, plastic, ceramic and glass,

to a great extent. Thanks to its high reproducibility and long-term resistance, the DELO-SACO method opens paths for clearly improved reliability and prolonged durability of bonded connections.

2. In which cases is surface pretreatment necessary?

Pretreatment of components becomes unavoidable if a bonded connection is not sufficiently resistant to extreme climatic conditions, such as humidity, temperature or media influence, or if nonpolar, hardly soluble plastics, like POM, PP or PE, are to be bonded. These materials give a very poor wettability for adhesives due to their low surface energy. Furthermore, the nonpolar surface allows

an only inadequate dipole-dipole interaction with the adhesive molecules, which leads to insufficient adhesion. It must be verified which surface pretreatment method produces the best results for the specific application by conducting comparative examinations after application-specific aging tests.

3. How does the DELO-SACO method work?

The DELO-SACO technique generates a defined surface by means of a modified sand blasting process. An especially coated corundum grain (= DELO-SACO PLUS) is used to achieve this. Besides the effects known from

sand blasting, a thin silicate layer is firmly connected to the component surface. The following processes take place during blasting:

Cleaning and activation of the surface

As known from sand blasting, the upper substrate layers are removed and the surface is roughened. As a result, the component is cleaned and the effective surface is enlarged. Furthermore, lattice defects,

displacements or other radical modifications of the surface are regarded as active centers between component surface and adhesive layer.

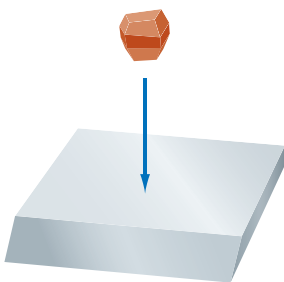
Coating

The DELO-SACO-PLUS grit, which are corundum grains with a siliceous layer, is accelerated towards the component surface (figure 1). Upon collision, parts of the energy are transformed into heat (figure 2). For a short time, very high temperatures are achieved in the micro area of the substrate surface and a highly reactive condition, the so-called tribo-plasma, is developed. Parts of the coating of the DELO-SACO PLUS grain are removed and firmly inserted into the component surface (figure 3). The grain rebounds and the coating remains on the substrate surface (figure 4). The (mostly dark)

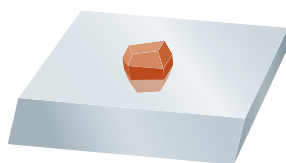
coloring of the coated surface enables good visual control.

The very high temperatures arising are restricted to the micro area so that a macroscopic heating of the components is avoided.

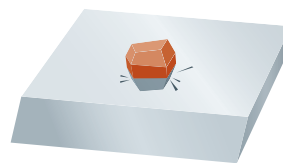
Micrographs show that the layer thickness is approx. 5 µm. For the effectiveness of the coating, it is essential that removal and surface coating proceed at the same time. Therefore, a high-purity and active surface is directly coated without any insulating contaminations hindering a stable composite.



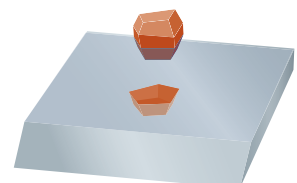
Blasting of the component surface with the specially coated DELO-SACO PLUS corundum grain



Cleaning and increase in roughness depth upon impingement on the material surface



Upon impingement of the coated grain, parts of its coating is inserted into the substrate surface (tribochemical effect)



Rebound of the grain: The coating remains on the substrate surface

Posttreatment

In order to achieve a stable and humidity-resistant connection between substrate surface and adhesive, a primer is subsequently applied onto the substrate surface. For this purpose, special organo-functional silanes are used. They firmly coalesce with the siliceous

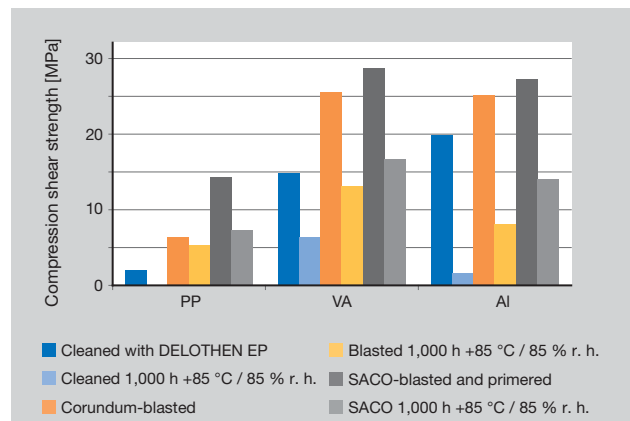
layer and have functional groups for the respective adhesive. Up to know experience with epoxy-functional and acrylic-functional primers has been made. The primer can be applied by dipping, brushing or spraying.

4. Which bond strengths can be achieved with DELO-SACO?

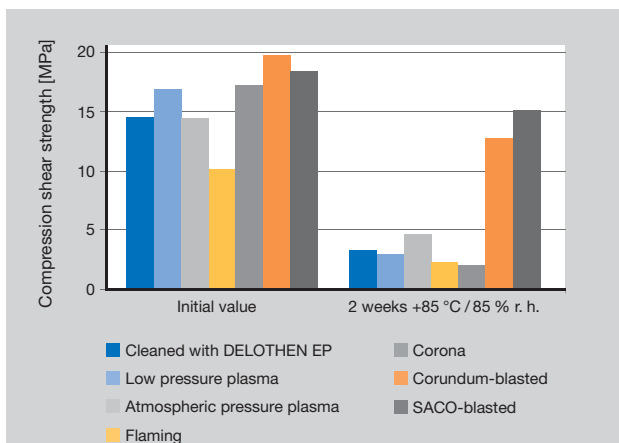
As the components are not macroscopically heated, it is possible to ideally prepare both metal and plastic, in particular those that are difficult to bond, for bonding.

It is possible to produce very high-strength bonded connections with DELO-SACO pretreated materials. It is not only the initial strength that is especially high. The significantly increased resistance on metal and plastic surfaces merits particular emphasis in this regard.

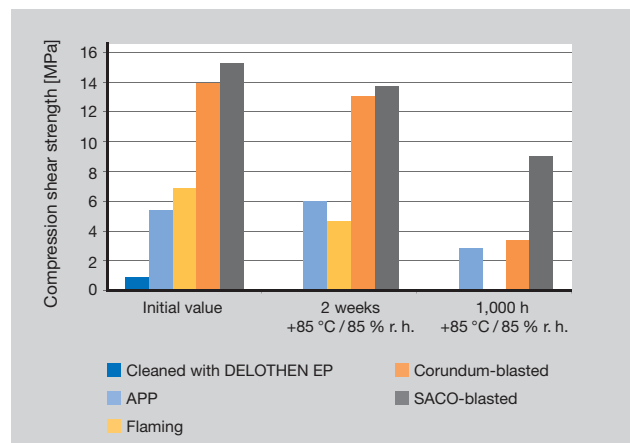
Comparison of pretreatment methods for DELO-PUR 9694



Comparison of pretreatment methods on LCP Vectra T130 for DELO-DUOPOX AD895



Comparison of pretreatment methods on PP for DELO-DUOPOX AD895



5. What equipment is required for DELO-SACO?

Supply

A compressed air supply with at least 4 bar is required. The flow rate depends on the sand-blasting device used. It ranges from approx. 200 to 500 m³/h with a small injector blasting system. The compressed air must be prepared without oil and water.

Blasting device

In principle, every standard blasting device can be used. The nozzles and supply lines must be designed in such a way that it is possible to use corundum with a grain size of 110 µm (carrier material of DELO-SACO PLUS).

The pressure should be continuously controllable with a pressure reduction valve and readable by means of a pressure gage.

DELO-SACO system

The DELO-SACO system consists of two components:

1. DELO-SACO PLUS coating grit, corundum size 110 µm
2. DELO-SACO SIL E adhesive agent

7. Storage and storage life

Information on storage and storage life can be found in the Technical Data Sheets of DELO-SACO PLUS

6. How is the DELO-SACO method used?

Cleaning

Strongly contaminated or oily components should be cleaned before blasting. We recommend our DELOTHEN cleaners. Rust or scale layers must be removed by corundum blasting.

Blast-coating with DELO-SACO PLUS

The blasting process corresponds to that of conventional corundum blasting. Blasting pressure and distance depend on the blasting device used. The grit consumption is approx. 2.4 g/cm². However, this volume is only a reference value which fluctuates depending on component and blasting device.

Important:

The distinct coloring of the blasted surface enables easy visual control of the blasting process. Blasting grains remaining on the component can easily be brushed off. Blowing off with oil- and water-free compressed air is also possible.

Application of the adhesive agent

The adhesive agent can be applied by dipping, brushing or spraying. The evaporation time of the carrier material is approx. 5 minutes.

and DELO-SACO SIL E.