

Dental medicine technology

Plasma activation of dentist drill bit modules



The V55-GKM unit is designed for the plasma activation of medical engineering products.

Application

Quality standards concerning function and life span are extremely high in medicine technology. Especially the repeated sterilization procedures put a strain on the materials. Particularly hot-steam sterilization leads to degradation of the polymer surfaces. Adhesive compounds and lacquers are attacked hard in the process and lose their adhesion quality after several hot-steam treatments, so that important parts of the functionality are going lost. The aim of a plasma treatment is to clearly increase the adhesion between the polymer workpiece and adhesives and lacquers respectively.



During plasma activation the surface tension of the drill bit modules increases and O-functional groups are implemented in the PE surface. As a result the sterilization resistance improves significantly.

Systems engineering

The plasma treatment of the modules occurs in short treatment cycles of about four minutes. Several hundred pieces can be activated simultaneously, depending on the system size. Therefore the modules are lined up in a bunk shelf, which can even be rotated to achieve a better homogeneity by the treatment. For the treatment of a higher number of items the process can fully be automated.

Plasma process

As a result of the treatment in an oxygen plasma the wettability of the plastic material changes. Polar functional groups are being integrated in the polymer surface during the plasma process. Thereby the surface tension is modified as shown here in the example of the module for dental use (from less than 38mN/m to more than 58 mN/m) which is shown in diagram 1.

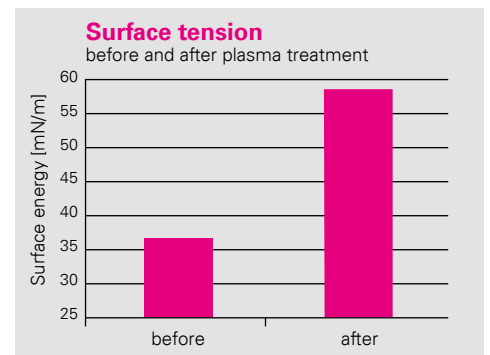


Diagram 1

Apart from the wettability of the synthetic material also O-functional groups in the PE surface are of crucial importance for the adhesion of the colour. Real chemical compounds can be formed out between the workpiece and the colour which have an positive effect on the durability in the sterilization procedures. In our application example the sterilization resistance increases from only 15 cycles up to more than 50 cycles after plasma treatment (diagram 2).



Diagram 2

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