

## Electrical engineering: quality capacitors

### Plasma cleaning of capacitor components



Fig. 1: Capacitor components



Fig. 2: Closed capacitors

#### Application

The capacitors covered by this report consist of a metallized (e.g. with aluminium or zinc) polymer film which is wound up and pressed into the final form (fig. 1).

Then wires are fixed at the front by melting aluminium powder and the capacitor is sealed with a synthetic cap (fig. 2). Bond strength of the aluminium powder is reduced by contamination. It can be removed by a plasma process, eliminating the bonding problem.

#### Plasma process

Provided the surface contamination is organic, the respective capacitor raw materials can be cleaned using an oxygen plasma process. To enable processing of large amounts of small parts, they are treated as bulk good inside a rotary drum.

The gaps between individual parts of the loose material are sufficient for plasma to reach the surface to be cleaned. Microwave plasma technology needs no electrodes, so heat damage of any kind is avoided: The entire cleaning process takes place at ambient temperature. Cleaning is completed rapidly, with a cycle time of 15 min.

The cleaning process does not produce any harmful exhaust. Hydrocarbons are disintegrated and oxidized to carbon dioxide (CO<sub>2</sub>) and water. The additional activation of the cleaned surface results in a further increase of adherence.

As a result of plasma cleaning, reject rates are reduced to far less than 0.1 %, simultaneously increasing product quality.

#### Systems engineering

PiNK offers custom designed plasma systems for the purpose of cleaning such capacitor precursors in a fully automated way. Depending on the individual size, 5000 to 8000 components are treated simultaneously.

They are transported to the system on a conveyor belt in open baskets. The system is equipped with a fitting lid for the baskets. Basket plus lid make up the rotary drum that continuously rotates in plasma during the process. This guarantees homogeneous treatment.

On completion of the cleaning process, the basket is transported to the next processing stage. In addition to different component sizes, different component quality levels may also be treated. To avoid a mixture of different components, tolerances of the closure equipment are very low, to ensure that no components will remain.

Additionally, all baskets have a barcode to ensure clear assignment of batches. For quality control purposes, they are set and saved with all key process parameters.



Plasma system V138-G  
for the treatment of capacitors.

#### PiNK GmbH Thermosysteme

Am Kessler 6  
97877 Wertheim  
Germany  
T +49 (0) 93 42/919-0  
F +49 (0) 93 42/919-111  
plasma-finish@pink.de  
www.pink.de