

## Conformal Coating – Sealing PCBs

# Protecting the precise contours of PCBs

"Sealing" in dispensing and potting technology describes a process in which sensitive electronics surfaces are coated with a very thin layer of casting resin or protective varnish. It serves to protect against environmental influences and corrosion, resulting in a longer service life and operational reliability of the components. To ensure that the material is distributed homogeneously across the surface, this well-known "conformal coating" process is employed using low-viscosity casting resins.

A thin layer of [casting resin](#) or protective coating is used to precisely seal the contoured surfaces of electronic assemblies such as [PCBs](#). Depending on the application and requirements, the layer thickness may range from a few micrometers to a few millimeters. This well-established process, also known as "conformal coating", is often used to protect sensitive electronics from environmental influences such as humidity, chemicals, dust, bacteria and extreme temperatures. The stabilization of filigree components, a narrower circuit path and achieving high surface insulation resistance (SIR) on the circuit board can play an important role. For effective protection, it is essential to thoroughly coat the surface, including sharp edges, soldered connections and other surface structures. Low-viscosity potting materials are therefore used in this process.

### Conformal coating: application and uses

PCBs and electronic components sealed with special casting resins or coatings can be found in all branches of industry where high reliability under critical ambient environmental conditions is required, such as in the [automotive](#), aerospace and lighting industries as well as for the military. Standard [household appliances](#) and consumer electronics also feature coated electronic assemblies.

The application options available for conformal coating materials are diverse and range from manual application by painting or spraying with spray guns to automated dipping or spray applications. Particularly in the field of large-scale production, machine or robot-controlled material application via suitable metering heads has established itself. While manual processes run the risk of uneven material application and air pockets, machine-controlled application of conformal coating materials offers high workpiece output, excellent application quality and reproducibility as well as a high degree of precision and flexibility thanks to program-controlled operations.

One way to coat only specific areas of the circuit board is to use what is called the ["dam and fill" process](#). In this case two potting materials with different viscosities are used.

### Effective processing of conformal coating materials

Thorough cleaning of the assemblies to be sealed is key to providing effective surface protection. Residues from flux agents or even dust or fingerprints can not only compromise the adherence of the seal, but can also promote component failure over the long term.

To achieve the most homogeneous application of the material as possible across the component's whole surface, it makes sense to use [preparation systems](#) with integrated temperature control. This makes it possible to adjust the potting material specifically to the application.

- The Scheugenpflug **A310 material preparation and feeding system** is the best choice in this case. Evacuation makes it possible to reliably remove the air in the potting material as early as during the preparation stage.  
[> Learn more about the A310](#)
- The proven **Dos P piston dispensing systems** are used for precise and repeat accuracy when applying the material. The volumetric dispensing systems feature precisely dimensioned dispensing cylinders corresponding to the volume required or the particular mixing ratio. This ensures high process reliability, since the dispensing accuracy does not depend on the temperature, pressure or viscosity of the casting resin.  
[> Learn more about piston dispensing systems](#)

Depending on the material used, curing can take place by way of UV rays, humidity or temperature. However, since the curing process takes place from the surface outward, comparably thick conformal coating layers run the risk of curing unevenly. Even any difference in curing as a result of shadow zones on the PCB can cause problems. Special potting materials provide a solution through an additional, secondary curing mechanism, thus making it possible to compensate for any insufficient curing in the shadowed areas. Here you can find system and process solutions suited for reliable curing: [Curing and cross-linking](#).

---

**TIP:** Different potting materials also have different affinities to the particular substrates. For this reason, the adherence and contact of the medium used on the PCB base material, the copper pathways, soldered connections and all components require careful inspection.

---

## About Scheugenpflug:

Scheugenpflug is a leading manufacturer of precision engineered systems and machines for efficient adhesive bonding, dispensing and potting processes. The product and technology range extends from cutting-edge material preparation and feeding units and high performance manual work stations to modular in-line and automation solutions, specially tailored to customer specifications. Scheugenpflug systems are used in the automotive and electronics industries as well as the telecommunications sector, medical technology and the chemical industry. The company has four additional locations in the USA, China and Mexico as well as numerous service locations and sales partners all over the world. Due to its considerable expansion Scheugenpflug was able to double its number of employees within 5 years and now employs more than 500 staff.

For additional information go to [www.scheugenpflug-usa.com](http://www.scheugenpflug-usa.com)