Glob Top, Dam and Fill & Flit Chip Underfill

Selective protection for PCBs

To protect PCBs from damaging outside influences, they are coated with a thin layer of casting resin or protective finish during the conformal coating process. In addition to sealing the entire circuit board, it is possible to pot only sections or individual components on the substrate. Different methods ranging from "glob top" to "dam and fill" and "flip chip underfill" have been developed for this purpose.

Things would not be the same today without them. The PCB (or circuit board) is now the most frequently used carrier and connecting component for electronic components. There are practically no limits to its use. In addition to computers, cars and airplanes, PCBs are also used in household appliances and communication devices, in security electronics and medical devices. For example, to ensure that airbags deploy reliably and on-board computers in airplanes operate correctly, the intricate electronics on the PCB must be permanently protected against moisture, dirt, impact, chemicals and other damaging influences. This is just one of the tasks provided by potting. Different methods have been developed based on the particular electronic components (sensors, processors, etc.) to be potted or the potting function(s) required.

Conformal coating

Conformal coating is basically the application of special coatings or potting compounds on the PCB in order to protect sensitive electronics. Depending on the application, materials can be applied manually by brush painting or spraying them on. However, due to their high precision and reproducibility, users are more frequently opting for automated or robot-controlled application using suitable metering heads.

Scheugenpflug Inc. • 1000 Cobb Place Blvd., Suite 514 • Kennesaw, GA 30144 • Tel. 1 770 218 0835
www.scheugenpflug-dispensing.com • marketing.us@scheugenpflug-dispensing.com

Easier processing through correct heating

In many cases the viscosity of a dispensing material decreases as its temperature rises. In addition to faster and easier processing, air bubbles in the material rise faster, rendering any required evacuation easier. However, keep in mind that filled media tend to settle faster in the form of sediment in this case. To achieve a continuous and constant temperature, the complete dispensing process, including storage tanks, material feed lines, pumps and dispensers, etc., should be heated. Caution is advised in the case of potting compounds that cure when heated. Performing a series of experiments with such potting media is recommended before using them in production.

Dam and fill / frame and fill

Dam and fill is a selective process that enables potting of individual areas on the PCB without affecting the surrounding surfaces and components. This process, also known as "frame and fill", uses two potting compounds of varying viscosity. A dam or frame made of high viscosity material is first dispensed around the section of the board to be protected. The resulting cavity is then filled with a liquid casting resin until the particular structures are completely covered. The dam and fill process is also used for optical bonding: In this case, the first step is to dispense a dam on the substrate to form a gap between the cover glass and display or touchscreen. The dam is then filled with an optically clear adhesive. In addition to improved heat dissipation and increased stability, this process also provides significantly better display readability.

Glob top

Another option for protecting selected sensitive areas on the PCB is the "glob top" process. The only difference between this and the dam and fill process is the potting compound. In this process, the viscous casting resin is dispensed on a semiconductor chip until it fully encapsulates the chip and its wire bonding contacts. The potting compound used for this process is not allowed to flow so easily as to contaminate adjacent components or to coat areas of the PCB that need to remain open. This must be taken into consideration when choosing the casting resin and determining the quantity of potting compound required.

Flit chip underfill

Flip chip underfill is a process that was developed specifically for the mechanical stabilization of flip chips. To reduce stress or deformation between the substrate and flip chip, the thin gap resulting from the connection is filled with a low-viscosity material, which is called an underfill. After the material is applied, capillary action helps draw the underfill around the chip into the narrow gap until it is completely filled with casting resin.

- **The Dos GP gear pump dispensers** are the ideal choice for underfill applications in particular. The optional swivel needle provides fast and precise material application even in the case of highly complex component geometries.
  Learn more about the gear pump dispensers

- The gear pump dispensers have also already proven themselves time and again for glob top and dam and fill applications. Depending on the requirement and material used, the volumetric **piston dispensers** from Scheugenpflug are also a cost-effective alternative. Their dispensing cylinders are tailored precisely to the required volume or specified mixing ratio, ensuring maximum process reliability.
  Learn more about the piston dispensers

Efficient thermal management for PCB

In addition to conformal coating applications, thermal management applications for PCBs are also important. Due to their higher performance compared to pads or films, users in this case are increasingly choosing liquid thermal interface materials.

- For such cases, Scheugenpflug has introduced the **Dos P016 TCA** piston dispenser, which can apply liquid thermal interface materials up to three times faster.
  Learn more about the Dos P016 TCA

- The new **DispensingCell** provides users a compact complete solution for thermal management applications. Apart from short delivery times, this fully preconfigured and parameterized system offers an attractive price-performance ratio as well as a fast start of production thanks to Plug and Produce.
  Learn more about the DispensingCell

TIP: When potting SMD circuit boards, it is important to choose potting materials with low thermal expansion coefficients. Otherwise you run the risk of the material shrinking at low temperatures, thus damaging the soldered connections. The glass transition temperature (T_G) of the material must also be above the operating temperature of the circuit board.
