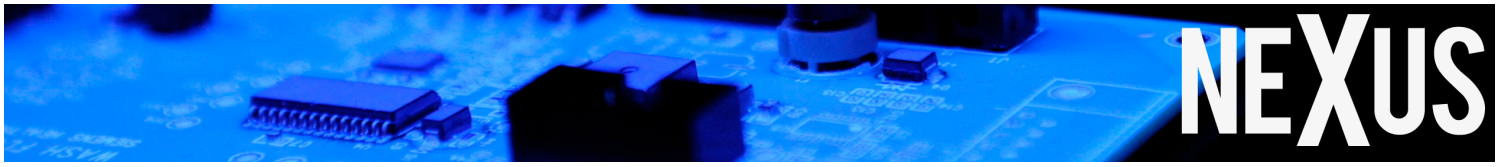


General design rules for selective conformal coating with a robot

By Dr Lee Hitchens, Nexus

Conformal coating working instructions

Clearly define all points of interest for the conformal coating process on a set of drawing's and instructions.

This includes information such as:

- Conformal coating material to be used, its viscosity and any other process details
- Application method to be used for applying the coating
- The masking details if required
- Coating thickness requirements
- The inspection criteria that the circuit board is to be inspected to including any Standards to be referenced.

Designate three areas on a conformal coating diagram

The three areas help provide guidance for coating.

These areas are:

- Areas that MUST be coated
- Areas that MUST NOT be coated
- Areas where it doesn't matter (coating is optional)

Design a keep out zone around components

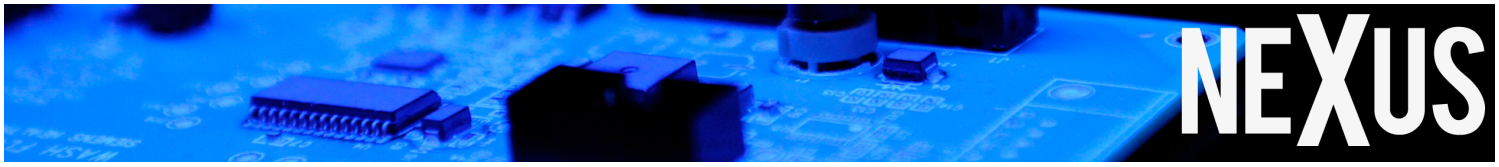
Applying conformal coating right up to the base of a connector without flooding the component due to capillary effects is difficult for a robotic selective coating system.

Maintain a minimum of 2-3 mm distance between MUST coat areas and MUST NOT coat areas.

If you do not define a sensible space then it may not be possible to prevent the liquid flowing into restricted areas.

Avoid 3D Problems with components

Try and group all components of similar heights within the same general area of the assembly.



This minimises the changes in dispensing height and enables the machine to run efficiently at optimum speeds. This will give you the best coating coverage.

It also avoids collisions of the spray valves that can lead to damage and delays.

Avoid through-hole component problems

Understand that through-hole components have a very wide range of placement orientations.

If used on a PCB, the drawing must cover all possible orientations of the devices, plus 2.5mm optional coating area.

This is to ensure you coat the component leads, wherever they may be positioned.

Do not specify the conformal coating as an under fill

If a device needs to be under filled, specify a formulated dedicated under fill.

Or, consider the difference in CTE mismatch may lead to the component lifting off the PCB in the long term.

Fill the via's to avoid capillary flow

Specify and use tented via's to prevent the capillary flow of material from one side of the assembly to another that can result in coating restricted areas on the other side of the board.

Add tooling holes for the circuit board

If the board is not a standard shape then it may need to be supported on the fixture or conveyor.

If the board is not supported it may not be level or straight when the coating is applied which can lead to many different problems.

Optimise the programming path for multiple PCBs

When coating multiple PCBs in a biscuit configuration, ensure you seek input from production engineers regarding orientation.

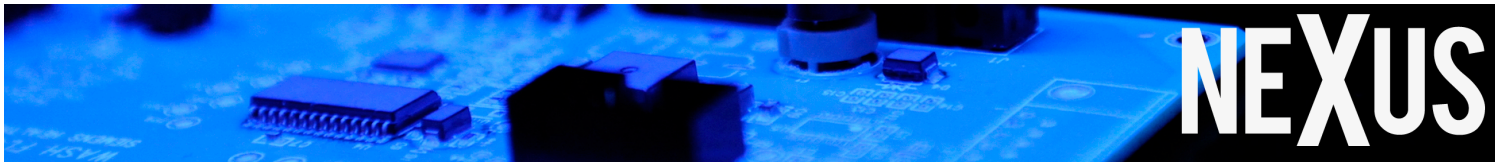
This is to optimise both the robot path and valve operation.

Having to stop and start often and/or change dispense height reduces your throughput massively and the coating can be deposited poorly.

Support the board if it is heavy and misshaped

The board should be flat and sufficiently rigid to prevent sagging during dispensing or curing, otherwise coatings may flow and pool in unexpected fashions.

In particular, heavy boards may need to be palletized to provide sufficient rigidity.



Protect connectors with gel to avoid capillary

Use conformal coating gel around connectors if possible before applying the spray coating if you want to get close to connectors.

Conformal coating materials will flow freely into unsealed connectors and wick up connector leads.

Make coating the edge of a PCB optional

Don't waste time conformal coating the edges of circuit boards unless you have a specific reason.

It is tricky and messy, especially if there is no frame or breakout around the board, and is of questionable efficacy in improving coating or reliability performance.

Make coating component packages optional

Coating the sides of a 3D device is difficult for a robotic system, especially since the coating is subject to gravity, as well as de-wetting due to mould release agents used in the component fabrication.

The plastic or metal package mouldings are almost certainly more resistant to humidity or other forms of water than any conformal coating.

Can you help improve these guidelines?

Do you know a design rule or guideline for conformal coating that could help others? Tell us how we can improve this section.

Contact us now at sales@nexus3c.com if you would like to talk about design rules or any other related topic to conformal coating and Parylene.