

Application

Solvent-based varnish coating for electronic components

Targets: Coating companies, electronic industry (PCBs, hybrid circuits, components manufacturers), automotive industry, railway technology, telecommunication, civil / military / aerospace / control engineering firms

Application

Varnish protection is designed to protect PCBs and equipment from environmental elements. The coating (following the electronic boards outline or defined limits) offers excellent protection and coverage, maximizing PCB life duration. Favorable properties like low humidity, permeability, and strong chemical / mechanical resistance enhance varnish performance. It has to adhere well on all substrate types (board, varnish, copper, welds) and numerous materials used for the board components. The varnish, in many applications, must have thermal capabilities for low and high temperatures.

Solvent-base varnish (acrylic, silicon, epoxy, polyurethane) properties are derived from the base resin and additives. Organic solvents reduce the viscosity of the base resin and allow the varnish to be applied in all ways: dipping, wetting, spraying, and brushing. Solvent dosage requires precise adjustment in order to **reach varnish coating uniformity which is a flow characteristic of the coating solution and can be regulated by maintaining a constant viscosity.**

Challenges

A non-homogeneous result is a major issue with coating electronic components in varnish. It can be due to:

- An excessively thick coating, which causes:
 - o Excessive material waste (resin and solvent) which will increase material costs
 - o Production waste increases unnecessary manufacturing and adds labor costs
 - o Excessive production downtime is linked to production rejects or quality controls
 - o Non-conformity to specifications: impossible to use the PCB, bad protection, bad quality
 - o Customer or end-user claims
- A coating that is too thin can cause:
 - o Excessive production downtime linked to production rejects or quality controls
 - o Non-conformity to specifications: impossible to use the PCB, bad protection, bad quality
 - o Customer or end-user claims

More than direct economic issues are caused by a bad varnish coating. A company's reputation can be cheapened because of customer claims regarding their high-end technological product that was hugely compromised due to poor production performance and end quality.

Moreover, international environmental directives on solvents emissions apply to this industry and must be respected (5tonnes per year in EU). If not complied with, huge fines will be levied.

Solution

The only reliable solution for controlling coating varnish homogeneity is the implementation of inline viscosity control. The installation of a MIVI process viscometer on the coating circulation loop associated with the electronic signals and controller will allow timely solvent dosage injection to the base resin during the entire production batch / process. The MIVI can, if necessary, control the coating solution's temperature in order to maintain stable viscosity conditions.

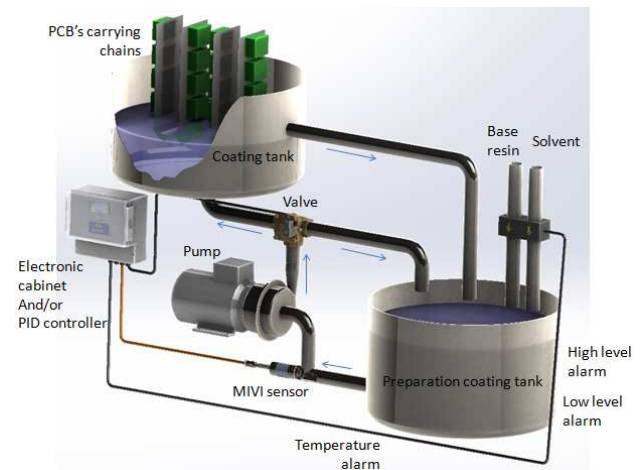
Installation - Operation

- Preparation tank supplied with base resin and pumped solvents (high and low level detectors)
- Sequential viscosity control activated in order to insert the correct solvent quantity
- Varnish flow through coating vat
- Parts coating activation when coating vat reaches required level (low level detection)

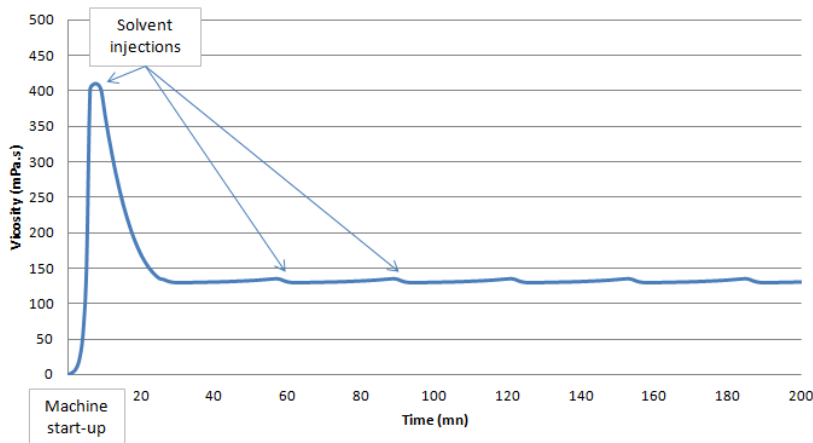
The MIVI inline process viscometer:

- is easily fitted on the coating circulation loop
- continuously delivers viscosity and temperature information to the electronic cabinet
- the controller instantly assures viscosity, temperature, and level alarms

Operation diagram



Coating process starting-up and viscosity control by solvent addition



Onsite installation



Key product characteristics

- Permanent operation, instant detection of viscosity changes
- Robust over time, no moving parts, simple maintenance
- Easy to use and easy to clean
- Electronic controller can include high and low viscosity alarms, temperature alarms, and automatic systems
- Many mounting positions