Press Release

Sensor Potting

Dispensing solutions for a wide range of applications

Sensors are potted in order to permanently protect electronic components from external influences such as heat, moisture, vibration, or chemical influences. ViscoTec dispensing pumps ensure high-precision, high-quality potting processes in the most diverse applications. In combination with the appropriate one or two-component potting materials for the respective application, perfect, customer-specific solutions are created. Depending on the application, the dispensing pumps master a variety of challenges.

Example from optoelectronics: Fork photoelectric sensor

A potting application, using the 2-component dispenser ViscoDuo-VM, has been designed in a joint project with Fichter Maschinen GmbH. Due to a flexible human-robot collaboration, dispensing can be carried out manually as well as automatically. In this application, special attention is paid to maintaining the homogeneity of the material "Component A". This is achieved by recirculation of the material and a specially designed agitator in the ViscoTreat-R storage tank. In addition, the use of a silica gel filter prevents the material from becoming exposed to moisture.

The system is completely flexible: Thanks to the integration of a palletizer for the product carriers, a fully automatic production process is possible. This will enable long, self-sufficient running times of the system without the need for operating personnel. At the same time, the system concept also offers the possibility to pot individual product carriers or even just individual sample parts manually via the manual workstation function.

With the endless piston technology built into the ViscoTec dispensers, large quantities can also be dispensed continuously. At the same time, even very small quantities or dots can be precisely dispensed with one and the same system. The flow rate can be adjusted at any time by analogue control of the dispensing drives via the main PLC.

A particular challenge in the implementation of the project was the precise maintenance of the fill level on the components of the fork photoelectric sensors. The issue was solved by implementing a two-stage potting process. During the first stage, the so-called pre-sealing, the material is dispensed at a higher dispensing speed, up to a fill level of approx. two thirds. As the complete product carrier is processed, there is sufficient time for the dispensed material to distribute itself cleanly in the component to ensure that all plates, wires, and connections are covered. In the second stage, the so-called deck potting, the height of the component is established. The remainder of the potting process follows until the sensor detects the potting height required. A triangulation laser sensor detects the height of the component and the fill level. When the optimum fill level is reached, the dispensing stops. Thanks to the programmable suck-back of the potting material at the end of the process, the dispensing unit is removed cleanly without risking contamination of the component by dripping. The second potting stage in the process is carried out at reduced dispensing speed. Both stages are well illustrated in the following videos: <https://www.youtube.com/watch?v=KdfgQsXQKGg> and <https://www.youtube.com/watch?v=_5NT7Oihef0>

Example from electronics: Temperature sensors

Using the 1-component RD Dispenser from ViscoTec, a temperature sensor is embedded in the sensor tube with thermal paste. It is important that no air bubbles remain in the sensor tube during the dispensing process, as it would distort the temperature measurement. In this case the material in the supply container is degassed. (This option is often offered by the material manufacturers at an extra charge). Alternatively, a treatment system can be integrated.

Again, there are two ways of implementing this application:

* Manual: The sensor tube is pushed onto the dispensing needle by hand and, after starting the potting process (quantity dispensing, via programmable servomotors or separate HMI), is pushed off the dispensing needle again by the resulting material pressure as the fill level rises. For longer sensors, it may be necessary to guide the sensor tube. At the end of the dispensing process, the operator removes the filled sensor from the device.
* Automated, in combination with a system or machine manufacturer: The dispenser is mounted in a fixed position and the sensor tube is automatically pushed over the dispensing needle by a robot. Dispensing is started and stopped by the main control system. The mechanism coordinates the traversing and dispensing speed. The quantity dispensed is a result of the running time of the dispenser (dispensing time) and the dispensing speed. The speed can be changed and adjusted flexibly during the dispensing process (0 to 10 V / 4 to 20 mA or via bus).

Example 1 from the automotive sector: Engine ignition for combustion engines

Sensors for the ignition of diesel engines are potted in a dip tank - in sets of ten pieces, each one is always dipped into a 3-component material. The dip tank must be kept at a certain level to ensure a uniform potting result of the individual sensors. A 2-component epoxy resin is used, to which a water-repellent agent is added as the 3rd component. These agents prevent moisture, which would damage the sensor. The mixing ratio of the three components is 100:5:15 (A:B:C).

Component A is degassed with a ViscoTreat-Im treatment tank and then conveyed further. Plastic storage containers made of PE with 180 ml capacity are used for the two low-viscosity components B (hardener, catalyst) and C (water-repellent agent). These are mounted directly on the respective dispenser. During the first stage, components A and C are mixed using the 2-component dispenser ViscoDuo-P 4/3 with a mixing ratio of 100:15 and fed to another 2-component dispenser (ViscoDuo-P 3/3). Component B is added to this with a mixing ratio of 100:5. The ready mixed, 3-component material is fed into the 1-component Dispenser 3RD4, with which the actual dispensing of the defined quantity is carried out. At peak times, two dispensers can also be operated simultaneously to reduce cycle times.

Example 2 from the automotive sector: Headlamp potting

In this application example, headlamps are potted with a 2-component silicone with a mixing ratio of 10:1. The quantities to be dispensed vary between 20 and 80 ml. The ViscoTec 2-component dispensing system used for this purpose consists of a stationary and a mobile section. The stationary section contains the two ViscoTreat-R 3/22 used for the supply, as well as the overall control of the system. The 2-component dispenser ViscoDuo-VM 12/8 forms the second section, the mobile part.

After the initial system had been successfully put in place, a central supply for six 2-component dispensers with different discharge capacities was later introduced. The supply takes place as follows: Component A is provided in a 200 l barrel with agitator. Using vacuum, the material is sucked from the barrel into an 80 l storage container by means of an emptying pump (3VMP36), which is located next to the container. Component B comes from a 30 l sheet metal canister and, again by using vacuum, is sucked into the ViscoTreat-R 3/22. Both materials circulate in an approx. 65 m long loop. In the course of the loop there are six outlets with ball valves to which the 2-component dispensers are connected.

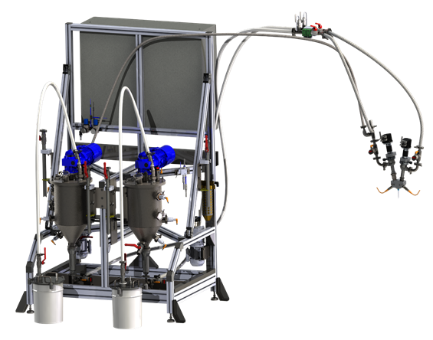
Dispensing tests: No sensor potting is the same

The exact influences to which the individual sensors are exposed, or to which the potting compound must be able to withstand, depend on the respective application. The dispensing solutions developed for this purpose vary just as much. Only a carefully selected dispensing technology and the appropriate material ensure the specified, reliable results, a safe process, and therefore high-quality sensors. Close cooperation between material manufacturer, dispensing specialist, and often machine or system manufacturer as well, is essential for this.

Extensive dispensing tests are carried out to determine which material best meets the requirements and which dispensing processes ensure specific features. Important results of these tests are of course cost, with regard to economic processes and realistic cycle times.

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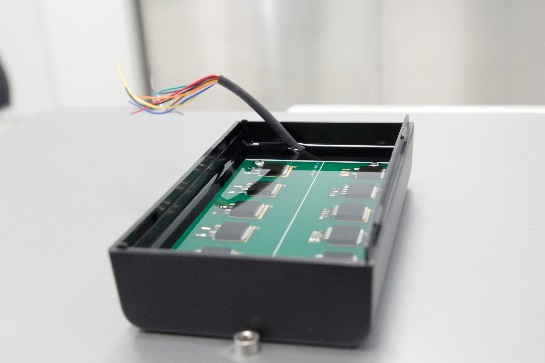
Pictures:



Example of a dispensing system for sensor potting with a two-component material.

Test setup for sensor potting at the ViscoTec technical center.



Potted component.

*Further application examples.*

ViscoTec – Perfectly dosed!

ViscoTec Pumpen- u. Dosiertechnik GmbH manufactures systems required for conveying, dosing, applying, filling and emptying medium to high-viscosity fluids. The technological leader headquarter is in Töging a. Inn (Bavaria). Furthermore, ViscoTec has subsidiaries in the USA, in China, Singapore, India and in France and employs about 260 people worldwide. Numerous sales partners all over the world complete the international distribution network. Next to technically sophisticated solutions to even the most complicated application, ViscoTec is the single point of contact to deliver all components for a complete system: From emptying to preparing and to dosing. This guarantees successful interaction of all components. All fluids showing a viscosity of up to 7.000.000 mPas can be conveyed and dosed almost pulsation-free and with extremely low shear. ViscoTec offers comprehensive consulting for every application and, if required, extensive tests will be carried out in close cooperation with the customer. The dosing pumps and systems are perfectly adapted to their respective application whether it is the food sector, the e-mobility industry, the aerospace field, the medical technology, the pharmaceutical industry and many other branches.

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