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How to Optimize the Dispensing Process

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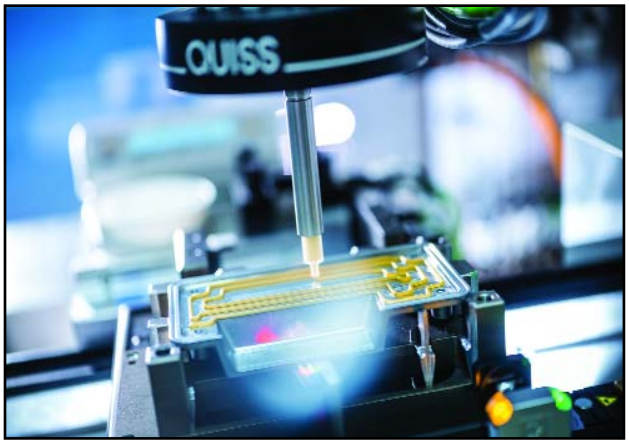
Effective and reliable dispensing requires that process technology be set up specifically for the application. Anyone tasked with planning dispensing systems and responsible for the processes should know the principles and key factors involved so that the dispensing processes can be successfully implemented in cooperation with system and material partners.

Examining Process Technology

Examining process technology from many different perspectives will save time and money. It will also improve product quality. Examining process technology along the value chain of a product will have a considerable impact on the effectiveness of the dispensing process.

As current trends progress, the demands on process technology (materials, cycle times, etc.) may increase depending on the project. In such cases, conflicts between time, costs, quality, and flexible production can be solved with customized systems. As a rule, however, system solutions are generally sufficient.

Liquid sealants, adhesives and potting materials are used today for a wide variety of tasks and the applied material often performs several functions.



RTVision.3d vision system, designed to ensure process quality control.

Process technology is flexible enough to handle any material from the ever-growing variety of sealants, adhesives and potting media. For the dispensing process only the relevant material properties need to be clarified and the appropriate process technology selected.

Today's development processes often make it difficult to specify an exact solution. For example, many e-mobility components are being developed and, in most cases, produced with materials that must be dispensed.

The classic specification becomes "project-related documentation." In these projects, it is important to engage everyone involved in the process chain at an early stage, in order to ensure the best results.

Effective and reliable dispensing is always based on the same sub-processes or sub-sys-

tems. A partial element that has not been properly implemented will damage the entire process and lead to higher costs, time lost and possible loss of quality.

Material Preparation

Material preparation ensures that the material has and retains the desired homogeneity, is optimally tempered, and is protected against moisture. Many materials are filled as standard. Fillers tend to settle.

The material becomes inhomogeneous, which affects not only subsequent processes but also the quality of a seal or bond. The effects of temperature on the sedimentation process must also be considered. The thinner the medium, the faster the fillers settle.

Degassing

When air bubbles in sealants, adhesives and potting materials get into the dispenser, they may falsify the amount dispensed and the mix ratio and cause malfunctions in the product. If the task requires bubble-free material, not only the dispensing process but also the material preparation and material feeding must take place under vacuum.

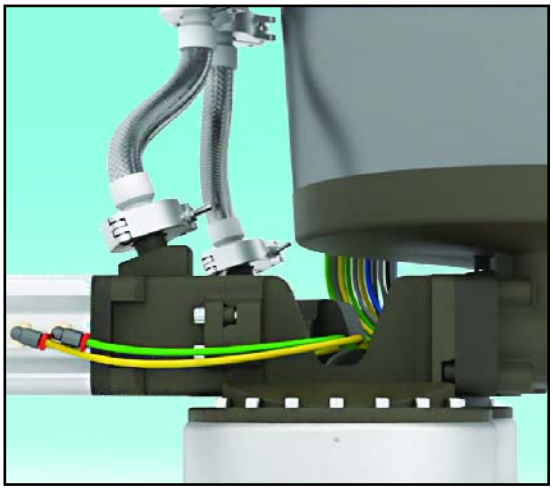
Material feeding

After preparation, the material is conveyed to the dispensing system. The crucial parameters for selecting the pump and feed technology are the viscosity of the material, the type and content of the filler and the size of the containers.

In terms of process technology, it is important to ensure that no air is introduced, the medium is gently and evenly conveyed throughout the entire process and the selected containers are emptied as completely as possible. There have been tremendous developments in pump technology in recent years. A good example is Scheugenpflug's patented diaphragm pump.

To ensure that the defined dispensing quality is efficiently achieved the key factors to consider are the chosen dispensing process, the dispensing method and mixing in the dispensing system.

The degree to which the material is to be free of bubbles will dictate which dispensing process should be used. Dispensing under atmospheric pressure is the default for many applications and components. However, complex geometries, small workpieces, high packing densities, the use of moisture-sensitive casting resins and high-quality requirements may require encapsulation under vacuum.



Scheugenpflug's patented diaphragm pump.

The requirements for precision and repeatability can differ considerably depending on the task. For simple requirements dispensing by mass measurements (gravimetric) is used. Dispensing by time measurement (time/pressure) is only suitable for 1C materials, and for high demands on potting quality, dispensing by volume measurement (volumetric) is used.

If 2C material is to be used it must be mixed before being applied. Material behavior is a crucial factor when deciding on a mixing system. Static mixers are easy to handle, cost-effective and maintenance-free. Here, the resin and hardener are combined in a plastic tube and mixed homogeneously. Dynamic mixers are only used for high material requirements and media with very short pot life and extreme mixing ratios. Here, the two components are fed separately into a chamber in a given mixing ratio and mixed by a rotating agitator.

Key Aspects of Dispensing

Dispensers are key process components. Modern systems are optimized for specific tasks. In addition to piston dispensing, geared dispensing systems (volumetric dispensing systems) are specially designed for continuous application of liquid to highly viscous potting materials. Classic uses include the application of sealing beads on component housings and the application of adhesives as part of joining processes.

Maximum repeatability and optimum dispensing quality are key project requirements. This is accomplished through regular control of process parameters and equipment conditions, and can also be greatly improved by using vision systems. Scheugenpflug's RTVision.3d image processing system allows dispensing equipment to "see."

The degree of automation in a dispensing system is important to define when selecting the most appropriate process technology. Quantities, cycle times, dispensing materials, quality requirements, cost-effectiveness and the production environment are the crucial parameters here. Manual, partially automated and fully automated dispensing solutions are being used at present with different levels of automation and modular system solutions.

Many dispensing tasks are becoming increasingly automated. As a result, standalone systems are being used less and less. Integrated in complex production environments, the upstream and downstream process steps (such as component and position detection, surface cleaning and pretreatment, and curing) must also be considered holistically and adapted to the dispensing systems.

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