

Process Engineering

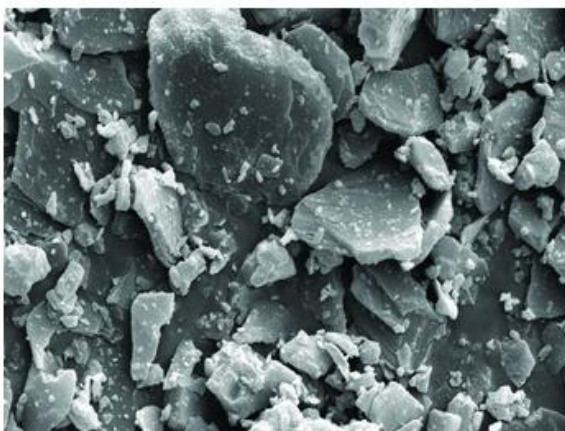
Why is preparation of adhesive bonding and potting materials necessary?

To meet the steady increase in technical requirements for electronic components, potting media properties must be extremely precise. Rheology, viscosity, filler content and curing behavior are only a few of the factors that play a role in their practical use. However, the growing complexity of materials often negatively impacts the ability to process or dispense them. In this case, material preparation and feeding systems specially designed for this purpose are required. These systems optimally prepare the material for the actual application and ensure homogeneous feeding to the dispensing system.

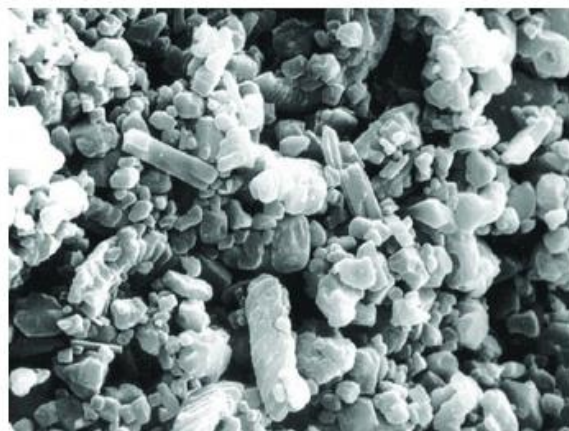
Preventing filler sedimentation

A customized material preparation and feeding system forms the foundation for high-quality, reproducible adhesive bonding and potting results. For instance, many casting resins are enriched with fillers in order to optimize their properties according to the particular potting task. However, depending on the density or viscosity of the material, these fillers have a tendency to precipitate during storage. This leads to poor quality or even rejects.

For guaranteed continuous homogeneity of the potting medium, the inclusion of a sophisticated mixing mechanism in the material tanks is recommended. Constant and gentle circulation prevents separation of the fillers and further supports degassing. Well-timed, quantity-driven circulation of the material in tanks, pumps and feed lines counteracts deposits, particularly during breaks in production.



Aluminium hydroxide filler, 2000x resolution



Chalk filler, 5000x resolution

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.

Eliminating air bubbles

Air bubbles in casting resin are a problem not only in the finished part. If the air bubbles reach the dispenser, they may cause errors the quantity of potting material required and distort the mixing ratio. This in turn leads to irregular production results and even rejects. Therefore, the best way to ensure the potting medium is bubble free is to process it in a vacuum. A high-end preparation system is required to remove all traces of dissolved air using thin-film degassing. A properly designed agitator circulates the dispensing material and in doing so aids in degassing the vacuum tank contents. This lets the contained air rise to the surface of the material where it comes in contact with the surrounding vacuum. The degassing effect always occurs at the surface layers of the material.

Trapped air bubbles rise more easily from low viscosity material. Proper heating can lower the viscosity of the medium, thus accelerating the degassing process. In addition, all screw connections, material lines, pumps and valves need to be hermetically or vacuum sealed. This is the only way to prevent the reintroduction of air during the manufacturing process.

Moisture prevention

Some resin systems cure with moisture. To trigger a reaction, all it takes is to expose the potting medium to the ambient air (air humidity) for a longer period of time. On the other hand, moisture can lead to undesired secondary reactions in certain resin systems. If in the case of 2C materials the resin is mixed with the hardener, the hardener reacts with the moisture absorbed by the resin. This leads to the creation of CO₂, and the material starts to foam. The unmixed hardener also absorbs moisture. This can cause crystals to form which, in the worst-case scenario, block the machine filters. Adequate storage, completely emptying the container and preparing the material in a vacuum using a suitable system minimize such risks. If possible, moisture-sensitive resin compositions should be kept under vacuum in a preparation system after opening. This completely prevents exposing them to moisture.

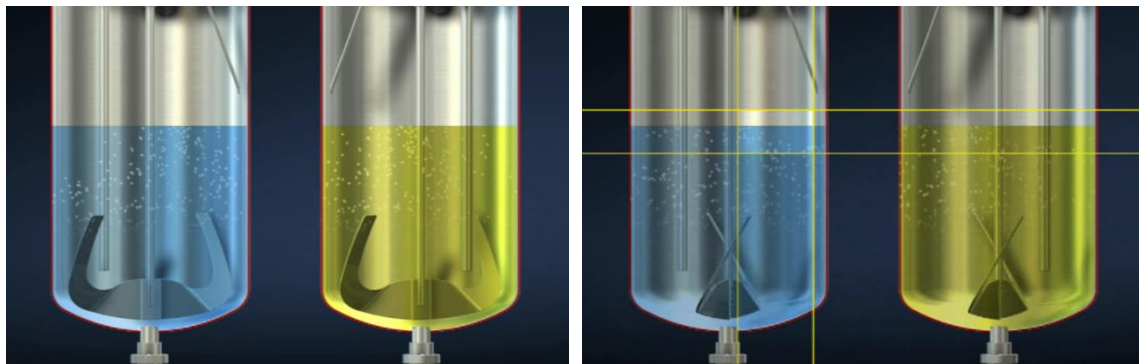
Reliable preparation and feeding of potting material

Scheugenpflug offers two powerful material preparation and feeding systems specifically designed for preparing complex casting resins and adhesives:

- The versatile **LiquiPrep LP804** can be used to prepare and feed the potting compound in a vacuum. Integrated temperature control facilitates direct exertion of influence on the viscosity of the medium used.
[Learn more about the LiquiPrep LP804](#)
- The new **barrel agitator station** was designed specifically for applications requiring large amounts of material. This system makes it possible to fully evacuate at 200 liter barrel.
[Learn more about the barrel agitator station](#)

Video: Process technology

<https://youtu.be/8GTvWfwFktU>



Circulation

Air bubbles rise up