

Preparing, storing and dosing of material with process reliability

New solution for precise dosing of viscous to highly viscous polymers in the mixing of sealants and adhesives

PROCESS TECHNOLOGY MACHINERY AND SYSTEMS – The optimal mixture of raw materials has a major influence on the function of a seal or adhesive joint. This quality aspect should not be underestimated, especially in the case of viscous to highly viscous polymers. A new polymer dosing system offers an alternative to the often-used drum melter and granulate feeding systems – especially for a continuous mixing process.

The process requirements in the production of modern adhesives and sealants are constantly increasing, and so are the challenges of the process technology used. The traditional production of adhesives and sealants with conventional, discontinuous mixing units in batch mode and their downstream equipment is increasingly being replaced today by continuous mixing processes. This results in faster process cycle times, avoids process errors and enables high throughputs to achieve maximum cost-effectiveness.

In the field of continuous mixing, various types of machines are used with different mi-

xing methods, e.g. the twin-screw extruders/mixers, planetary roller extruders or co-kneaders. Adding varied raw materials may present different challenges. For example, the individual raw materials that are to be mixed in exact percentages to form a finished adhesive and sealant must be reliably fed to the appropriate mixing sections of the continuous mixers.

Many of these raw materials are available as liquid, powder or granules. A range of commercially available dosing units is available for these raw materials. However, the base polymers as basic component are typically available as bales or viscous materials (**Image 1**) in transport containers (e.g., hobcock). These starting forms, often with special material properties, are difficult to process with commercially available dosing units or their consistency may lead to further necessary process steps and/or loss of quality.

Mixing reliably

Feeding these components into continuous mixing processes places high demands on the dosing and conveying technology. With

the new polymer dosing system from UTH GmbH, it is possible to feed raw materials in different supply forms discontinuously and dose them precisely and continuously at the same time. The system is based on the roll-ex® gear pump technology and has been specially developed for feeding, plasticising and exact dosing mixture components of higher viscosity (sticky, viscous materials and highly viscous bales). In this system, a gear pump is combined with the appropriate feeding unit, a single-screw (**Image 2**) or conical twin-screw unit (**Image 3**). This dosing solution ensures easy handling while offering the prerequisite for easy process integration.

Due to the sizable feed area of the twin-screw feeder and its counter-rotating screws, large raw material units can be buffered and conveyed to the gear pump in the same step. Significant advantages are that these raw materials do not have to be processed in one or more intermediate steps first and that a complete intermediate step - such as granulating - can be omitted.

This means that the conical twin-screw feeder is responsible for several operations: On the one hand for the comminuting and plasticising of solids and on the other hand as intermediate storage of raw materials in the hopper. A gear pump specially developed for rubber is used for dosing. As is known, high repeatability and dosing accuracy are achieved by volumetric metering. And precisely this dosing accuracy provides the basis for an exact continuous mixing process and thus allows the reliable production of uniform formulations. All components of the dosing sys-



Image 1: Difficult materials or output forms can be fed in discontinuously – from left to right: polyisobutylene (PIB), butyl rubber, SBR bales

(Images: UTH GmbH)

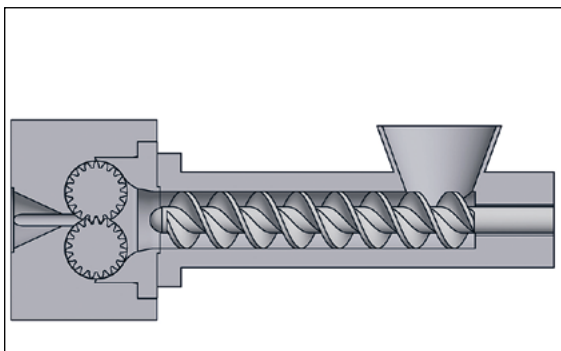


Image 2: Single-screw feeder and gear pump

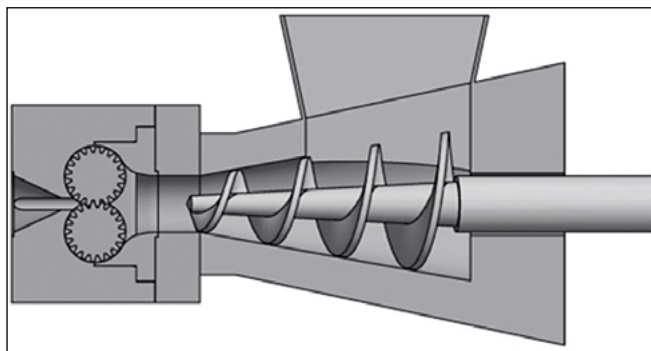


Image 3: Conical twin-screw feeder and gear pump

tem coming into contact with the product are also water-tempered – a function that enables process optimisation.

Various benefits

For the new system are industries such as pharmaceuticals, adhesives, chemicals and sealants. The possibilities of the system are shown below using varied materials:

- Dosing viscous PIB (polyisobutylene) is usually difficult: The viscosity is too high to convey the material error-free with liquid feeders and the flow behaviour does not allow granulation. This can be solved with the new system. In addition, several litres of material fed from small drums can be buffered in the feed area.
- The system also offers advantages for more solid materials such as butyl rubber or SBR. The material is fed in the form of blocks and comminuted by special conical twin screws. This allows omitting upstream processes such as granulation.
- Even adhesives fed from small drums or as strands, for example, are easy to process.

This system is an alternative to the commonly used drum melter and granule feeding systems and offers various advantages:

- Continuous conveying or feeding of the material (avoiding downtimes during process start-up after drum change)
- High process stability (prevention of air inclusions due to drum change)
- Considerable time and cost savings (no time spent on drum change)
- Saving valuable raw materials (no residual waste during emptying)
- Sustainable use of resources through reusability of transport containers (barrels, drums, etc.)

Verdict

The polymer dosing system has stood the test in various applications. For example, butyl rubber and PIB materials are already dosed in continuous mixing processes (e.g., twin-screw extruders / mixers).

Another application is the resumption and dosing of return materials (e.g., punch scrap) Waste materials accumulated during production can be reused and returned to the process. This saves expensive adhesives and sealants. Another use for this technology could be in the application of adhesives and sealants, especially where conventional systems (such as drum melters) cannot meet the required process requirements optimally.

Facts for the purchasers

- Time and cost saving potential in the process and in material consumption
- Sustainable use of resources through reusability of transport containers
- Easy to automate

Facts for the quality managers

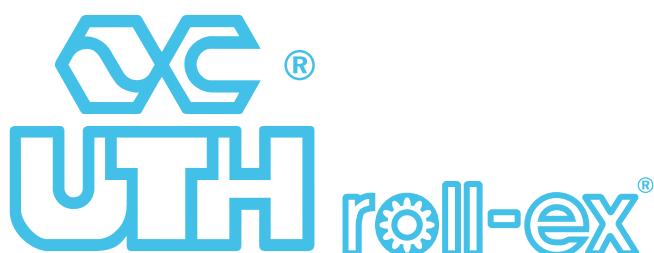
- Uniform and reproducible quality of the mixtures
- High process stability

More information

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