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ADVANTAGES AND SOLUTIONS FOR CONTINUOUS ADHESIVE PRODUCTION WITH THE PLANETARY ROLLER EXTRUDER

The continuous direct extrusion of adhesives represents a particular challenge in terms of process technology. This involves the precise combination and processing of recipe components with very different chemical and physical properties and varying thermal and mechanical stress limits. The planetary roller extruder (PRE) is a particularly effective solution for this purpose due to its mode of operation.

A key feature of the PRE is the separation and individual control of thermal and mechanical energy input. Precise temperature control technology plays a central role here. It enables efficient energy exchange and is particularly crucial for the feasibility of chemical reaction processes. Thanks to its internal energy exchange surface area, which is up to ten times larger than that of conventional units, the PRE is ideal for complex extrusion processes. The powerful and full-surface temperature control allows rapid temperature changes, which are necessary for the targeted triggering or termination of chemical reactions. This is based on the extensive, toothed internal geometry of the process section.

Processing in the PRE enables continuous production, eliminating discontinuous batch processes and quality fluctuations. All liquid and solid recipe components can be dosed in precisely defined quantities into individually temperature-controlled process zones. A uniform feed of bale goods such as natural rubber is achieved with precise formulation accuracy using an upstream melting extruder, e.g. from Bonnot or Uth. Flexible dosing options allow the targeted addition of solids with different physical properties as well as liquids with high or low viscosity. Even particularly sensitive materials can be processed gently in this way.

The low-shear and material-friendly preparation process in the PRE results in low thermal and mechanical stress on the adhesive compound. Precisely adjusted temperature zones without hot spots reliably prevent temperature peaks and localised overheating. Substances with different temperature dependencies, such as rubber or wax, can be dosed into precisely defined temperature zones and melted and mixed evenly without flocculation or clumping.

The excellent mixing and effective temperature control in the PRE ensure constant homogeneity of the discharge material. This allows high- and low-viscosity components, such as rubber, resins and liquids, to be mixed evenly with each other in a short process section.

Another advantage is the ability to actively cool the extrudate to the desired target temperature or viscosity during the process. The particularly efficient degassing performance of up to 1 mbar also results in excellent evacuation of volatile components. This allows direct further processing, for example by granulation, without additional preparation steps. In addition, the system's high self-cleaning performance reduces waste volumes during recipe changes and minimises losses during start-up and shutdown processes.

The individually configurable, modular design of the PRE makes it particularly flexible and suitable for demanding adhesive formulations.