Reliable Application of Adhesives and Sealants in Solar Module Production

The construction of today's typical solar modules appears at first glance quite simple. However, these applications when viewed closely have many requirements which will need to be fulfilled to produce a quality component. In principle, solar modules should be easy to install, have little weight and be dependable in the field. This requires resistance to all weather conditions, such as snow, rain, humidity, solar radiation, etc.

To meet these quality requirements, appropriate adhesives and sealants contribute a key role and have to fulfill the highest quality standards in module manufacturing.

The benefits of adhesives and sealants compared with other joining methods in production processes include lightweight and excellent sealing capability. These advantages allow manufacturers the flexibility to customize their operations and also allow the versatility to include many options in their applications.

These highly complex materials have been developed for extreme conditions. Solar modules are expected to last for 20 years in the field. The photovoltaic performance must be dependable and all electrical connections must not be compromised. In their life span solar modules are expected to stand up to all environmental conditions. Temperature ranges and fluctuations from -25 to +85° C and intense changes in moisture and humidity must not affect these units.

Because of the complex chemical and physical requirements of the adhesives and sealants used in the manufacturing process the application and dispensing of these materials must play a key role. The adhesives and sealants must in fact be dispensed reliably and accurately and guarantee that absolutely no air pockets occur in the sealed areas of the modules. These air pockets can allow moisture to enter the module and thus the lifetime and efficiency of the module decreases rapidly.

It is therefore extremely important to have an appropriate dosing system, which ensures that these materials are precisely dosed and100% process reliable. This is particularly important when the dispensing system is integrated with the full automation and complex features of the modern manufacturing plant.

ViscoTec offers a complete solution for these highly critical solar module dispensing applications. ViscoTec Meter Mix Dispense systems are used in the potting of the control and connection boxes as well as the bonding and sealing of the solar module units themselves.

The following chart is an example of a typical ViscoTec dispensing system for sealing of solar modules.

This system is an automated solution for dispensing two-component adhesive or sealant. The static mixed adhesive can be dispensed, for example by using a robot or axis system to produce a uniform sealing bead on the solar module, or as potting of connections boxes.

It is estimated that 2-component materials make up 80% of all materials in the solar module industry. When compared to other possibilities such as tape, 2-component materials are vastly superior when it comes to flexibility and cross linking. Lightweight and versatile these materials have an obvious advantage.

The ViscoTec system begins with the emptying of the shipping containers usually offered in 20-25 kg pails. Our next step is to provide for the degassing of the material with our exclusive ViscoTreat-Inline system. This equipment accurately extracts any air pockets out of the media and supplies it to our 2-component, dispense system the ViscoDuo-V.

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The control of the system is easily integrated with any PLC and ViscoTec offers a variety of different products for various situations.

The ViscoTec technology is based on the endless piston principle which offers a positive displacement, non-pulsating, volumetric flow. The dispensing is also independent of viscosity-or temperature changes. We can offer some of the highest accuracies on the market with a repeatability of +/-1%.

These temperamental and highly viscous adhesives can be dispensed with very little shear and are gently supplied by the pump's rotor/stator. Even highly abrasive and filled materials are handled without problem.
By using the Pail emptying system ViscoMT-XS, excellent results are achieved in the emptying process. Residual amounts left in the container are less than 1% and thereby of guarantee enormous savings in expensive wasted adhesive.
The ViscoTreat-Inline degassing systems provides a critical role in transferring and conditioning of the supplied material to prevent faulty dispensing. In the ViscoTreat-Inline the adhesive components are degassed at about 2mbar absolute and extracted of all existing critical air and gas pockets.

Certainly the biggest advantage of the degassing system is the "Inline" usage, i.e. the rotor-stator-technology of the endless-piston-principle allows that each degassed adhesive component can be continuously supplied out of the vacuum. Unlike other degassing systems the process need not to be interrupted for withdrawing the batched degassed component. The entire process is monitored by several pressure and level sensors, allowing a fully automated process with the corresponding process control.

Finally the prepared adhesive components are supplied to the innovative two-component dispensing system ViscoDuo-V. The special V-design makes a mixing the components directly at the metering point possible, without contaminating the system with already mixed material. The principle of short distances allows a clean, flexible and constantly controlled dosage. All dispensing parameters can be set by using the dispensing control ViscoDos-2K manufactured exclusively by ViscoTec. By combining the two dispensers and the adjustment of dosing speed the exact mixing ratio is adjusted and calibrated only once.

Due to its compact design, the ViscoDuo-V system can be easily mounted and integrated with all types of robotic automation. In the case of solar panels the adhesive bead produced by an axis system and the ViscoDuo-V. is set-up by the speed of the robot and the dispensing (ml/min). Excellent results are easily achieved. Even with complex curves or at difficult positions the bead can be accurately applied. The adhesive bead is uniformly metered without any discrepancies or irregularities. By using the automatic drawback option of ViscoTec dispensers, dripping can be prevented thus a clean cut-off and no dripping or stringing can be guaranteed.

Solar panels can therefore be produced reliably in a fully automated process which meet s the ever increasing quality requirements of today's industry. Because of the increased cost controls and pressures to eliminate costly waste ViscoTec continues to play its part by supplying cost effective and reliable solutions to our many corporate partners.

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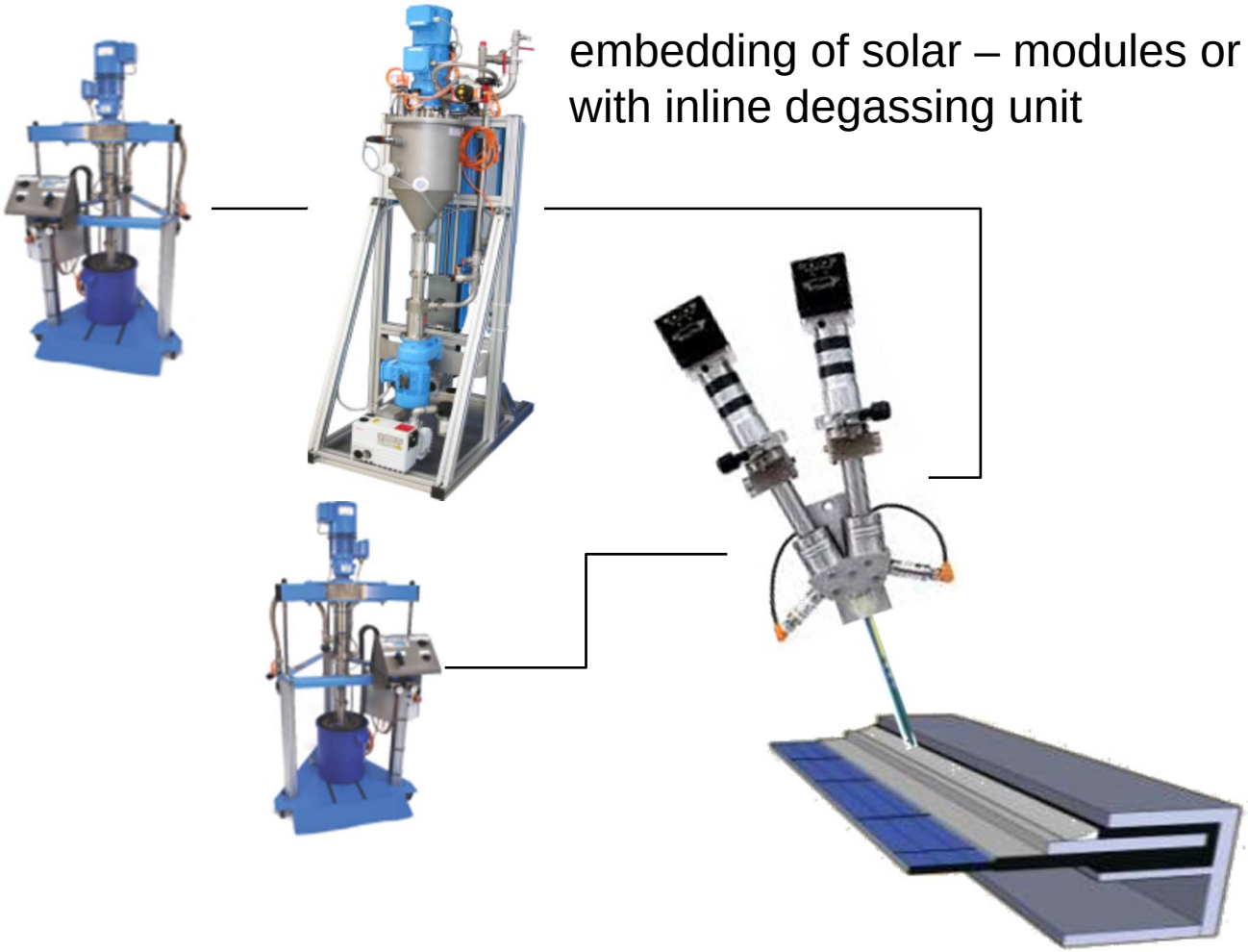
ViscoTec in the PV-Industry
ViscoDuo-V + ViscoTreat + ViscoMT



embedding of solar – modules or sealing of sockets with inline degassing unit