NETZSCH

Experience Bonds

Product Quality via Process Safety in Adhesive and Sealant Technology

Technology fascinates

From Development to Application

State-of-the-art adhesives and sealants are of vital importance in the development of new and innovative products for many key industries today. This is equally true for the automobile industry, energy technology, electronics, medicine, food technology, the construction industry or machine building.

Applications include alternatives to classical jointing technology, sealing, and even structural bonding. Many product properties can be adjusted to fit the application, and the processing of adhesives and sealants can be efficiently integrated into any production process, whether manual or fully automatic.

NETZSCH supports you in the development, production, testing, processing and application of your adhesives and sealants.

Our uncompromising quality standards make us to a global market leader in the areas of testing, mixing and dosing.

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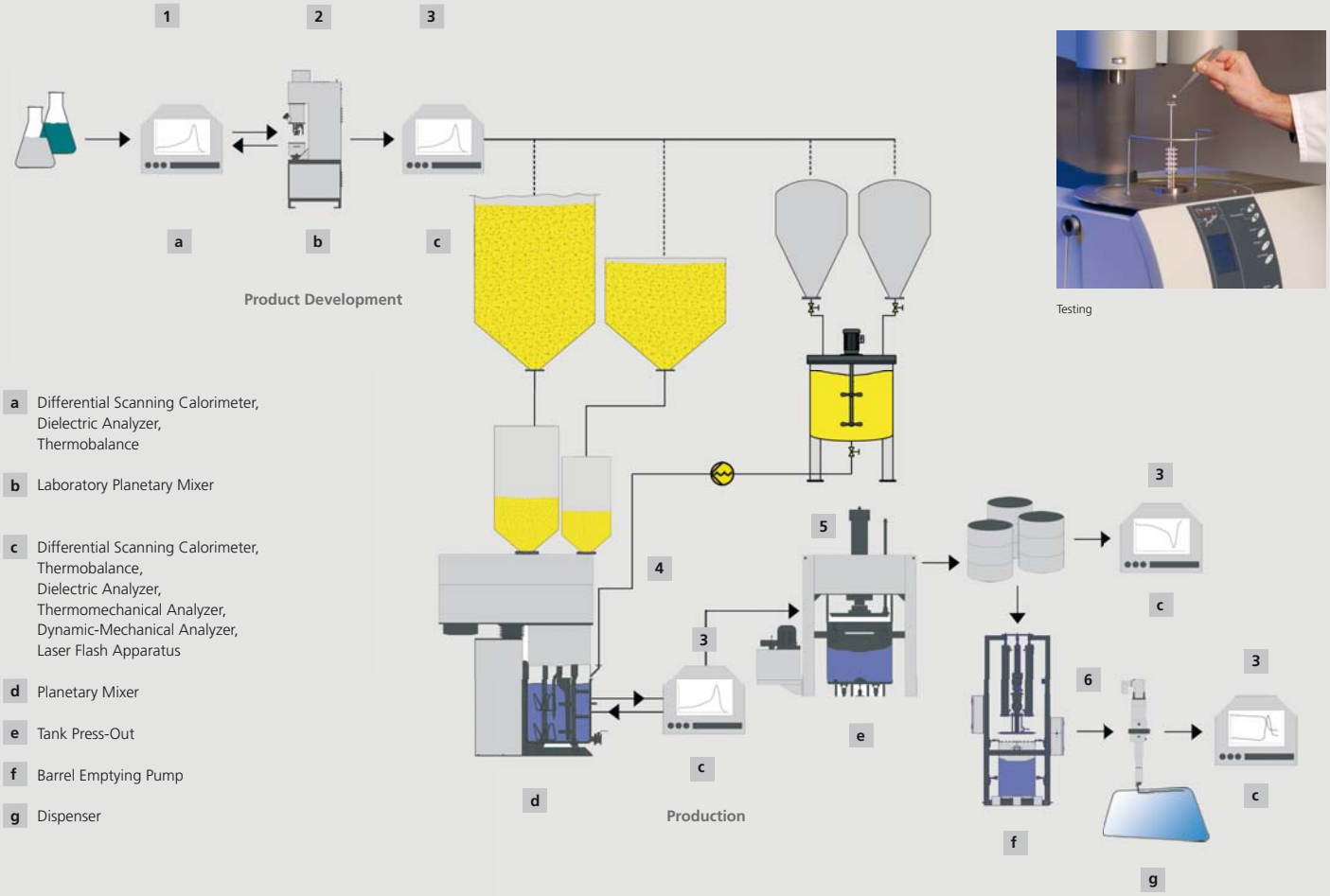
Professional Solutions for Your Process



a Differential Scanning Calorimeter, Dielectric Analyzer, Thermobalance

b Laboratory Planetary Mixer

c Differential Scanning Calorimeter, Thermobalance, Dielectric Analyzer, Thermomechanical Analyzer, Dynamic-Mechanical Analyzer, Laser Flash Apparatus

d Planetary Mixer

e Tank Press-Out

f Barrel Emptying Pump

g Dispenser

Testing

Mixing

Dosing

1 Characterization

Various Thermal Analysis methods can be used to investigate and kinetically analyze polymers and additives as well as the curing behavior of reactive adhesives.

2 Small Quantity Processing

Double rotation of the mixing tools allows the vacuum-tight, explosion-proof laboratory planetary mixers to provide homogeneous mixing and optimal deaeration of your adhesives and sealants.

3 Quality Control / Quality Assurance

Thermal Analysis methods can be used at incoming goods inspection, after any process step, and in the final inspection. The bonding itself can be tested under real usage conditions.

4 Production

Complete solutions allow for efficient handling of the solid and liquid components of the adhesives and sealants, and for their precise dosing in the heart of the system: the planetary mixer.

5 Filling

The adhesives and sealants are emptied from the production containers of the planetary mixer with the tank press-outs, which are part of the complete solution. If necessary, they are then conveyed to a filling system.

6 Emptying / Dosing

The core of the barrel emptying unit is the NEMO® progressing cavity pump. It empties barrels and containers almost completely and provides a nearly shear-free, low-pulsation conveyance of the medium to the dispenser.

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Cutting-Edge Technology for Your Product of the Future

Thermal Materials Characterization

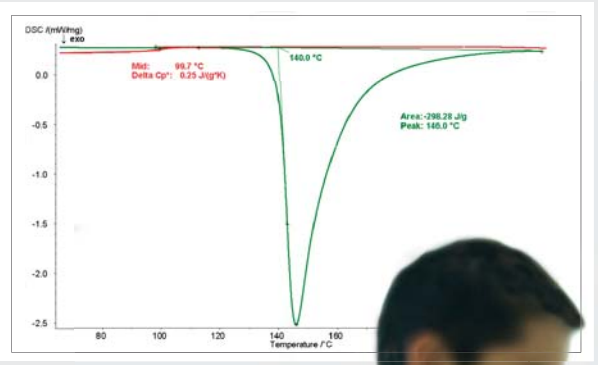
Our thermoanalytical measuring instruments and laboratory mixers accompany researchers and developers from the initial chemical studies through to the complete synthesis and homogenization of the adhesive or sealant. The melting and crystallization behavior of synthetic or natural raw materials, along with a great variety of additives, can be investigated with Differential Scanning Calorimetry (DSC). For sealing materials, the glass transition temperature is analyzed in the low temperature range, since it describes the cold flexibility. Material composition can be quantified by Thermogravimetric Analysis (TGA). The coupling of a thermo-microbalance to an infrared spectrometer (FTIR) or a Mass Spectrometer (MS) allows for the analysis of gases released and thus for identification of the adhesive and sealing system.

Mixing and De-Aeration in a Single Process Step

In cases where conventional mixing and dispersing equipment is incapable of processing viscous or pasty products (or can only do so very inefficiently), the unrivaled advantages of the planetary, mixing and kneading machines by NETZSCH come to light. As with the movement of the planets around the sun, the mixing elements of the planetary mixer not only rotate individually but also move circularly. They thus pass through the entire mixture, effectuating homogeneous mixing under a high kneading intensity and also easily and dependably removing air pockets under vacuum conditions.

Ideal Curing of Reactive Adhesives

Both the thermal and the UV-curing of 1C or 2C adhesives can be characterized reliably with DSC and Dielectric Analysis (DEA). Kinetic analysis of the measurement data allows the activation energy for the curing reaction to be determined. In addition, computer simulations can help generate a suitable reaction model for your optimum process conditions and determine the optimum degree of curing.



The DSC curve of the 1st heating (green curve) shows the exothermal curing of a 2C epoxy resin adhesive, which begins at approx. 120°C and releases a heat of reaction of 298 J/g. The 2nd heating (red curve) yields the glass transition temperature of the cross-linked adhesive at 99°C.

Laboratory planetary mixer Model PML 1 in vacuum design – Use of conventional, temperature-controlled tin cans as preparation containers

Comprehensive material analyses around the clock with the Automatic Sample Changer

NETZSCH

Technical Expertise for Your Process

The planetary mixer is the heart of the fully automatic production line for adhesives and sealants – but it can only attain its high efficiency potential if dosing for the various liquid and solid components is quick and precise.

The Right Mixture Is Key

Liquid and solid dosing is SPC-controlled and can be managed from a switch room either manually, semi-automatically or fully automatically. For liquids, the substance is first pumped into a stirring container on an SPC-controlled processing balance. The mixture is then supplemented with the necessary additives and automatically conveyed to the planetary mixer; shut-off valves are controlled from the final position.

The dosing of solid components starts automatically after a short mixing time. The closed process inhibits the formation of dust, especially in the processing of low-density solids. The finished adhesive and sealant is then conveyed to the filling station with the tank press-out and is filled into the packaging of your choice.

Reduce Production Times by up to 50%

A distinguishing characteristic of the planetary mixer is its vacuum-tight design, which allows gas venting of the product during the mixing and kneading process. The new generation of NETZSCH planetary mixer with optimized stirring elements shortens production times by up to 50% as compared with conventional planetary mixers – and at a consistently high quality level.

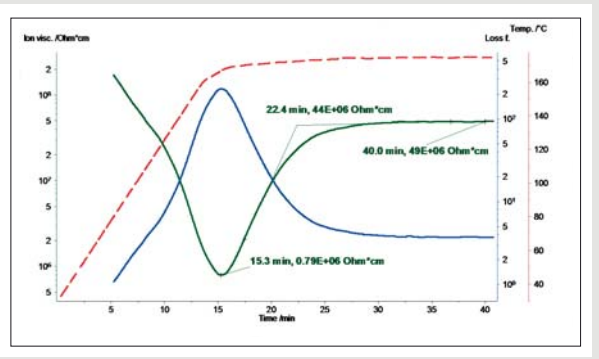
Fully automated, vacuum-tight planetary mixer system, Model PMH 1000

Time-Tested Machine Technology

Planetary mixer PMH 1600 integrated into a fully automated system with tank press-out and filling station.

Process Steps Analyzed Precisely

In order to ensure high product quality, NETZSCH offers various methods of Thermal Analysis. These can be applied not only during the incoming goods inspection (DSC, TGA) for polymers and additives, but also intermittently after individual production steps, e.g. after the mixing process (DSC, DEA). The optimal cross-linking of a specific mixture can thus be determined on the basis of the glass transition temperature. This is a key criterion for the desired elasticity of a sealant. With DEA, the curing behavior of reactive adhesives can also be measured directly during your process – i.e., in-situ. A large selection of sensors is available for tailoring your process to various temperature and pressure ranges.



The increase in ion viscosity (green curve) from the DEA measurement after 15 min yields the curing behavior of a structural adhesive at 175°C.

Differential Scanning Calorimeter DSC 204 ***F1*** *Phoenix*® with Automatic Sample Changer for up to 64 samples

Perfect Dosing

1C and 2C Dosing Systems

The technological superiority of the NEMO® progressing cavity pump makes our systems path-setters for the most challenging of dosing technology applications.

Dispenser with pressure monitoring

Automated dosing cell with six-axis robot

Barrel emptying pumps for barrel sizes from 0.5 l to 1000 l provide a nearly shear-free and low-pulsation conveyance of the medium to our dosing head. The dispensers, like the NEMO® pumps, also operate according to the principle of rotating positive-displacement pumps. They guarantee a dosing precision of 99% at an equally high level of reproducibility. Thus, highly viscous, highly abrasive and/or highly filled products can be managed very dynamically with the use of servo technology.

To offer complete dosing solutions for your 1C and 2C adhesive and sealant applications, our product line includes a great variety of dosing components such as cartridge emptying units, buffer storages and 2C-mixing heads. Our portfolio also includes accessories such as hoses, fittings, nozzles, dosing needles and much more.

Automated Dosing Cells

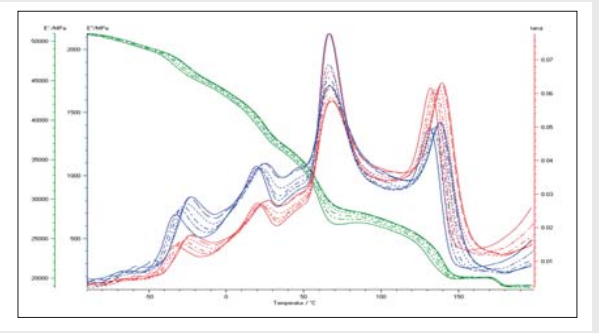
From concept to design and installation to commissioning, we offer complete, automated dosing cells.
Whether the cells are equipped with six-axis or linear robots, we establish clear interfaces for integration into your line. We take all of your needs into consideration and offer you tailored solutions from a single source.

Dosing Control and System Control

Dosing control here plays a central role. The system's modular design allows it to adjust to the most complex of customer requirements. From simple start/stop to comprehensive system control, we have the right solution for every application. A simple, clear user interface with touch-panel displays a diagram of the entire system at a glance, including all important process parameters, and allows for easy operation.

Clearly arranged system control

Tested Quality



Viscoelastic properties of an aluminum sandwich bonding from a DMA multi-frequency measurement

The final control of your adhesives and sealants is normally carried out using the DSC and TGA methods. Also, LFA (Laser Flash Analysis) is increasingly being used for determination of the thermal diffusivity and thermal conductivity of thin adhesive films, since it is a fast, non-contact measurement method.

With Thermomechanical Analysis (TMA) or Dynamic-Mechanical Analysis (DMA), the adhesion can be tested under real usage conditions (as a function of the force, the deformation path and the frequency).

Your Applications Are Our Profession

The broad range of application possibilities for adhesives and sealants can be seen across many branches. These materials must fulfill a wide range of functions and meet many requirements. Beginning with raw material selection, NETZSCH will assist you in the perfect tailoring of an adhesive or sealant to your specific application. We have the know-how and the technical expertise to deliver complete solutions for the production of your adhesive or sealant – from mixing the individual components to processing and filling to dosing.

NETZSCH continuously strives to optimize the curing process of reactive adhesives; it is our objective to achieve short cycle times without compromising high process safety. With NETZSCH equipment, precise dosing in the application of adhesives and sealants is always guaranteed. The top quality of your products depends on it.

Medical technology

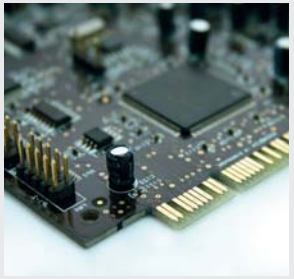
Renewable energies

Characterization and final control of the bonding ensures high product quality for your customers. Certain thermoanalytical testing techniques can also be used for failure analysis.

We develop special solutions for a multitude of market segments. Our synergies allow us to learn from each other, making exciting new developments possible. Our solutions expertise in every sector imaginable makes us your unmatchable applications expert.

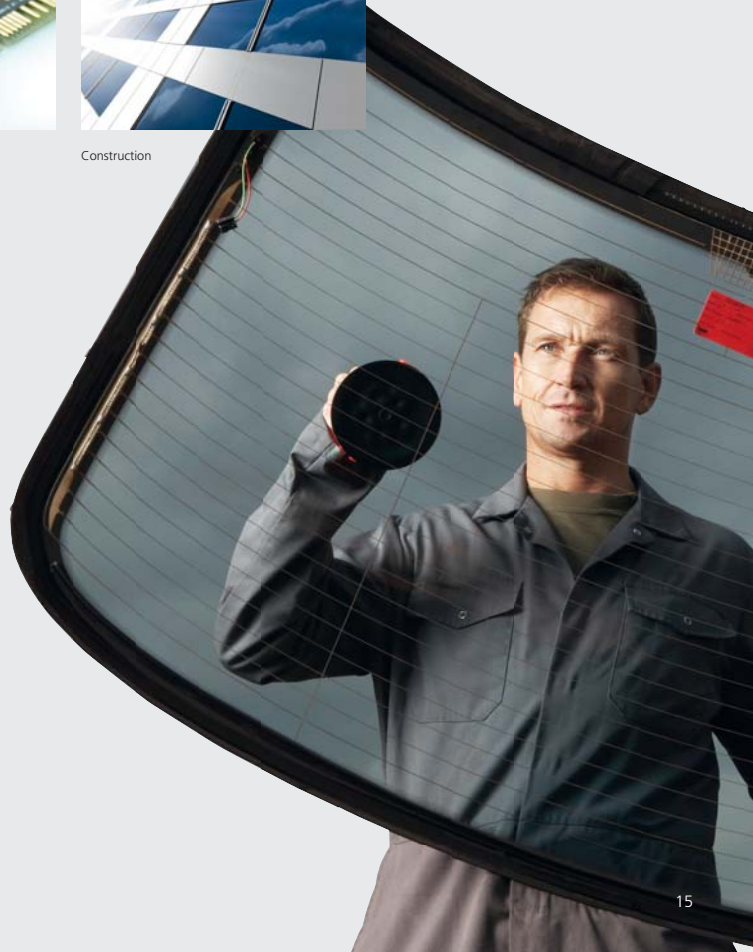
Industrial Application Fields

- Paper and Packaging
- Wood Processing
- Transportation
- Engineering / Construction
- Leather / Shoes
- Electrical Industry / Electronics
- Energy Management
- Medicine



Electronics

Construction



NETZSCH

The NETZSCH Group is an owner-managed, internationally operating technology company headquartered in Germany.

The three Business Units – Analyzing & Testing, Grinding & Dispersing and Pumps & Systems – provide tailored solutions for highest level needs. Over 2,200 employees at 125 sales and production centers in 23 countries across the globe guarantee that expert service is never far from our customers.

Testing

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