

POLYMERS & PLASTICS

Sample preparation and
analysis with FRITSCH



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VIDEOS





A polymer is, put simply, a substance made of very long chains of many identical or similar building blocks. The term comes from Greek and means built from many parts. Such substances can be manufactured synthetically and form the basis of most plastics. They also occur in nature as biopolymers, which are essential to life. Because polymers differ widely in structure, they respond differently to mechanical energy.



This is where FRITSCH comes in. We provide the instruments and the expertise that turn very different materials into reliable samples. Our devices guide the sample in a controlled way from coarse to fine, keep temperature under control, and prevent smearing, agglomeration, and static charge. The result is homogeneous samples that enable meaningful measurements and support quality assurance.

**YOU BRING THE TASK, WE PROVIDE THE
PATH TO A STABLE SOLUTION.**

Contact us!

*We will find the perfect
laboratory equipment for
your application.*





PRE-GRINDING

The starting point is often a coarse, tough, or inhomogeneous material. The job is clear: bring it to a manageable particle size, without heat issues, without smearing and with clean discharge.

That is exactly what the P-19 is designed to do. Depending on the task it works with high torque from 50 to 700 rpm or for high throughput from 300 to 3000 rpm. Brittle injection-moulding remnants are handled just as reliably as fibrous compounds.

Together with the FRITSCH cyclone the mill becomes a cooled, continuously operating system. The material is drawn out of the grinding chamber immediately, stays cool and free-flowing, the size distribution becomes more homogeneous, and build-up is avoided. The increased air flow cools both sample and tools and improves discharge, even with light or electrostatically charged plastics.



P-19
CUTTING MILL



Whether coarse, tough or inhomogeneous material, our P-19 is perfect for a wide range of different polymers.

Even typical stumbling blocks in pre-crushing become manageable: amorphous thermoplastics that spring back near the glass transition temperature, or compounds with unevenly distributed additives. With the right speed, a staged sieve strategy, and even feeding, the P-19 leads you safely to the target.

**YOU PRESENT A DEMANDING POLYMER,
THE P-19 PROVIDES REPRODUCIBLE
PREPARATION FOR THE NEXT PROCESS STEP.**



FINE COMMINUTION

Once pre-grinding is complete, precise particle size matters. This is where the P-14 plays to its strengths. It offers two operating modes that can be selected like the right tool for the job: an impact rotor up to 24,000 rpm for maximum acceleration, or a cutting rotor up to 18,000 rpm for controlled cutting. This brings even challenging polymers swiftly to the desired fineness. Feed sizes below 15 millimetres with throughput up to 15 litres per hour are easily handled. Depending on material and sieve ring, an end fineness below 40 micrometres is achievable. For hard-to-grind or temperature-sensitive polymers you can embrittle the sample with liquid nitrogen and then mill it safely. For small quantities the P-29 mini cutting mill complements fine size reduction effectively.



Simply fitting the cutting set turns P-14 into a cutting mill that rapidly pre-mills and finely mills soft to hard-tough or fibrous materials and plastics.



Thanks to its impact rotor, FRITSCH P-14 effortlessly grinds medium-hard, soft, brittle, and fibrous materials.



The P-14's impact bar effectively manages extremely heat sensitive materials such as plastics. This also helps the mill pre-comminute and fine comminute samples ranging from hard and brittle to soft, greasy, or moist.



Combined with FRITSCH Cyclone, the P-14 makes the impossible possible – such as problem-free grinding of extremely temperature-sensitive or electrostatically charged samples.



Process stability is built in. A well thought-out safety concept, a temperature sensor, and very high air throughput keeps the sample cool and the parameters consistent. Patented cooling of the grinding parts, guided process air, and cooling fins on the rotor minimise melting and sticking. The grinding chamber and the electronics compartment are separated, so the process air in the chamber stays cooler and the electronics are reliably protected from dust. In combination with the FRITSCH cyclone you can use finer sieves and still increase throughput, because sample and tools are continuously cooled and the ground material is discharged cleanly. Depending on the task the P-14 runs in batches or continuously via the controllable L-24 vibratory feeder.

A SENSITIVE TASK BECOMES A ROBUST ROUTINE.

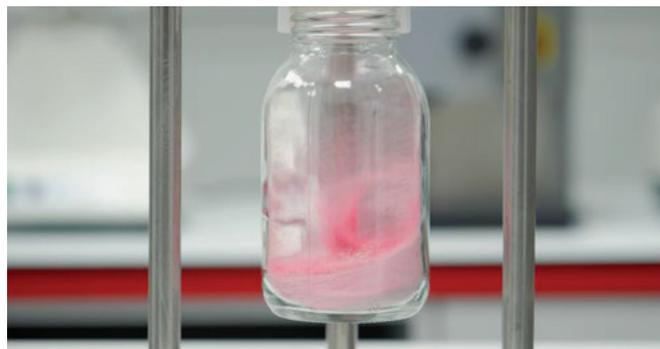
Cleaning follows the same principle. The clean design allows funnel, collecting vessel with lid, rotor, sieve ring, sieve shells holder and labyrinth disk to be removed without tools. Laser-welded sieve rings reduce dead space and increase stability. A wear-free labyrinth seal separates grinding chamber and drive. The machine runs audibly quieter than comparable devices, can be remote-controlled when required, and the L-24 vibratory feeder is controlled directly. For sensitive applications product-contact parts are available in stainless steel 316L, grinding tools are available in stainless steel 316L, pure titanium, tungsten carbide hardmetal, or zirconium oxide. This shortens cleaning, reduces downtime, and raises process reliability.



Temperature-sensitive samples are embrittled with liquid nitrogen.



Feed sizes below 15 mm with throughput up to 15 l/hour are easily handled.



The sample is continuously cooled and discharged cleanly after grinding.

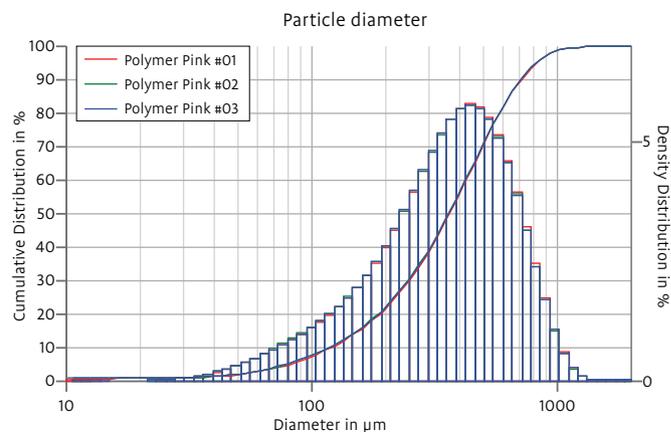


MEASUREMENT

Once fine comminution is right, measurement delivers clarity. The A-22 NeXT Nano determines the size distribution by laser diffraction from 0.01 to 3800 μm . In wet measurement you load the sample, start, and data is available after a short time. With dry dispersion the complete process usually takes one to two minutes: the Venturi nozzle breaks up agglomerates, the material passes the laser beam, then you open the measuring cell without tools and remove the product-contact parts for quick cleaning. Evaluation is automatic and reports can be adapted to your standard operating procedures. The method conforms to the international standard ISO 13320 for particle size analysis by laser diffraction.

THE RESULT: CLEAN WORKFLOWS AND ROBUST FIGURES THAT MAKE DECISIONS EASIER.

A-22 NeXT PARTICLE ANALYSER



A stable, representative measurement: the coefficient of variation is less than 1 %.

A-28 PARTICLE ANALYSER



When form matters as well as size, the A-28 Particle Analyser completes the picture. It captures morphology typically in under five minutes. Telecentric optics image particles uniformly across the field of view. Such evaluation makes deviations visible early, so processes can be controlled more tightly and scrap reduced. Results are presented clearly and support rapid approvals in day-to-day laboratory work. Targeted size reduction becomes meaningful analysis – and a question turns into a decision.



Polymer preparation succeeds when every step is right. That is what our instruments and our expertise stand for. The P-19 brings even tough remnants and inhomogeneous compounds reliably to a manageable size. The P-14 guides the sample quickly and under control into the micrometre range. The A-22 NeXT and A-28 make size and shape distributions visible and create clarity.

Typical hurdles such as heat build-up, smearing, agglomeration, static charge, wear, and contamination are addressed directly in the process: with suitable speeds, a staged sieve strategy, active cooling, cyclone discharge, and a design that is quick to clean. The result is homogeneous samples and dependable data.

THE DIFFERENCE COMES FROM EXPERIENCE.

Our applications team defines the right parameter ranges for your polymers, supports method transfer into the laboratory, prepares templates for standard operating procedures on request, and trains your staff. In this way a difficult material becomes a reproducible workflow, measurements become reliable decisions, and effort becomes quality that endures.



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