New Cutting Mill SM 300 – Refinement of a Well-Proven Grinding Principle

Retsch's new cutting mill SM 300

Cutting mills are used in many different areas of sample preparation for subsequent analyses. Typical applications include the size reduction of secondary fuels, the processing of biomass for renewable energy research, the control of products in the context of RoHS and WEEE regulations or the recovery of precious metals – the variety of sample materials is huge.

To meet all the requirements of such varied applications, the mill needs to be flexible and powerful. Even though the existing cutting mills developed by Retsch already offer a high level of performance and operating convenience, Retsch demonstrates with the new model SM 300 that it is still possible to set a new standard for the sample preparation of medium-hard, tough-elastic and fibrous materials.

What are the advantages of the new cutting mill?

Thanks to the fold-back housing, the grinding chamber is fully accessible which, in combination with the smooth surfaces, greatly facilitates cleaning the mill after grinding. The push-fit rotor can be removed quickly and safely from the open chamber. The SM 300 can be optionally equipped with a cyclone-suction-combination. In addition to a cooling effect, it also improves the discharge of material from the grinding chamber and is therefore recommended for grinding small volumes or low density materials. The improved product flow, which was achieved by an asymmetrically arranged sample feed, and the double acting cutting bars in the grinding chamber greatly enhance the performance of the new cutting mill.

The SM 300 features a variable speed ranging from 700 rpm to 3,000 rpm which allows for optimum adaptation to the sample properties with regards to breaking behaviour and temperature sensitivity. Thus it is possible to grind a great variety of products with one mill:

• When processing circuit boards, a low speed of 700 rpm should be selected to prevent the sample from getting too warm (e.g. for detection of heavy metals such as mercury). The energy required for grinding such hard metals is gained from the high torque of 20 Nm. In addition, low speed helps to reduce wear of the grinding tools.

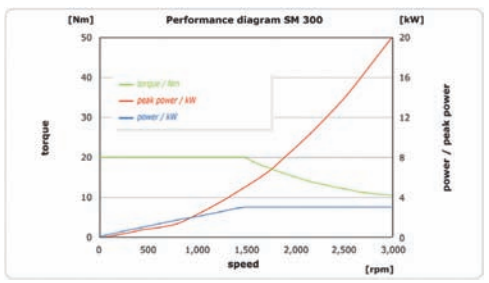
• A speed of 1,500 rpm combines the maximum power of 3 kW with the maximum torque of 20 Nm. This speed is ideal for all materials that are neither particularly heat sensitive nor too tough.

• The maximum speed of 3,000 rpm is suitable for materials which would otherwise not be discharged from the grinding chamber or which, due to their elasticity, could cause the rotor to slow down or stall it altogether. Due to the Rotational Energy Storage (RES) technology the SM 300 ensures successful grinding without rotor blockage, even when high throughput is required. A high torque alone would be insufficient here, so that the rotational energy stored in the flywheel mass in combination with the maximum power of 3 kW guarantees excellent grinding results.

The new SM 300 is ideally suited to grind samples such as rubber, wood or electronic scrap

The described advantages improve the quick and gentle grinding of materials such as rubber shoe soles to a fineness below 4 mm without previous embrittlement of the sample. The high maximum speed of 3,000 rpm (which corresponds to a peripheral speed of more than 20 m/sec) supports the discharge of the sample so that also fibrous materials, such as wood, can be pulverised without residues in the grinding chamber. In combination with the existing wide range of accessories, the cutting mill SM 300 represents an important step ahead with regards to performance, flexibility and comfort.

Peak power of up to 20 kW possible



The diagram shows the torque (green) and the power (blue) of the drive as well as the temporarily achievable peak power (red) against the speed. The peak power increases over the entire speed range. That means, the higher the speed, the more power is temporarily available for the cutting events. In the speed range up to 1,500 rpm, the power is a result of the product of torque and speed (power = torque x speed). It ascends linearly until reaching the nominal power. This means, if the speed is doubled from 750 rpm to 1,500 rpm, the power is also doubled from 1.5 kW to 3 kW (maximum drive performance).

At speeds >1,500 rpm, the power remains constant (maximum drive performance). The available torque decreases because of the aforementioned proportionality. In this speed range, the available peak power is gained by the great flywheel mass. Here the power corresponds to the rotational energy stored in the flywheel mass which increases quadratically with the speed. If the speed is doubled from 1,500 rpm to 3,000 rpm, the temporarily available peak power is quadrupled from 5 kW to 20 kW.

"Improved sample throughput"

Dr Richard J. Murphy and Dr Michael Ray from the Department of Life Sciences at the Imperial College in London use a Retsch cutting mill for their sample preparation: "We have been delighted with the performance of our Retsch cutting mill which we use for biomass preparation for our biofuel and biomaterials research. The mill has delivered improved sample throughput, ease of use, reliability and, above all, reliable and highly effective sample preparation at our labs. This unit has lived up to all our expectations and we can recommend it without reservation."

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The New CAMSIZER XT – Wide Measurement Range and Variable Dispersion Methods

The quality control of fine powders in a size range from 1 µm to 3 mm can be substantially improved with Retsch Technology's new CAMSIZER XT: More precise and faster analysis of particle size and particle shape helps to improve the product quality, reduce rejects and save costs.

The design of the Camsizer XT is based on the well-proven optical particle measurement system Camsizer but is optimised for finer samples. Not only the improved optical resolution but also new options for material feeding allow for an extended application range. Fine particles tend to agglomerate which makes it difficult to record the properties of a single particle. Therefore, it is important to have various possibilities of feeding the sample to the analysis area to be able to find for each material the optimum between the desired dispersion of the agglomerates and the undesired destruction of the individual particle.

The CAMSIZER XT offers three alternative dispersion methods: Pourable, not agglomerated particles are fed to the analysis area by the vibrating feeder of the 'X-Fall' module. With the 'X-Jet' module agglomerated particles can be accelerated and dispersed through a nozzle with adjustable overpressure. Finally, particles can be dispersed in liquids in the wet module 'X-Flow', optionally with ultra sound. Thus it is possible to choose the optimum method for each sample type.

Benefits:

- Digital image processing, according to ISO 13322-2, with patented two-camera-system
- Wide dynamic measuring range from 1 µm to 3 mm
- Newly developed optical system with ultra-strong LEDs for highest resolution and excellent depth of sharpness
- Reliable detection of smallest amounts of "undersize" and "oversize"
- Very short measurement time of 1 – 3 minutes
- Modular System 'X-Change' for dry and wet dispersion
- Measurement results are 100% compatible to sieve analysis if required

Retsch Technology is one of the leading suppliers in the market for optical particle measurement. The product range includes optical systems for measuring the particle size distribution of dispersions, powders and granulates as well as wet measurement of particles in suspensions, emulsions and colloids.