

focus on Laboratory Products

The Solution for Grinding Down to the Nano Range: the New Planetary Mono Mill PULVERISETTE 6 Premium Line

A Quantum Leap into the Nano Range – Now Also for Larger Sample Quantities

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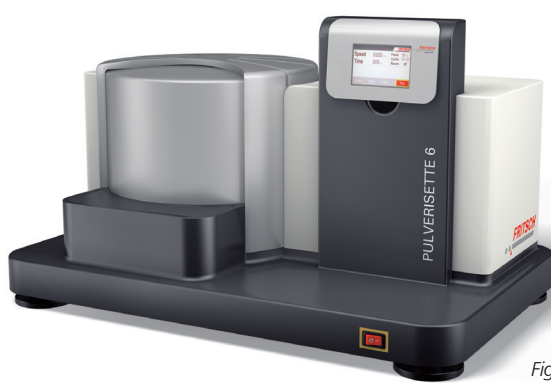


Figure 1. Planetary Mono Mill PULVERISETTE 6 premium line

In 2006, Fritsch GmbH first presented the Planetary Micro Mill PULVERISETTE 7 premium line [1]. This high-energy planetary ball mill revolutionised the production of finest particle sizes down to the nanometer range due to previously unachieved rotational speeds of 1100 rpm and a correspondingly high energy application.

Since then, the PULVERISETTE 7 premium line has become an indispensable instrument for mechanical alloying, research into new fuel cells and the development of lithium-ion batteries. The sample volume permitted by this instrument is relatively small, however, resulting in high demand for a mill with the same performance but a larger volume. During Achema 2012, Fritsch GmbH premiered the new Planetary Mono Mill [2] PULVERISETTE 6 premium line, which perfectly meets customer demands.

Planetary Ball Mills

Planetary ball mills are perhaps the most commonly used ball mills in laboratories for the sample preparing of soft to hard, brittle and fibrous materials. The name of this mill type derives from its unique kinematics: the grinding bowls, which are mounted on the rotating sun disk, rotate in the opposite direction around the centre of this disk. Due to this movement, the sample is very effectively and quickly comminuted by impact, shearing and friction forces resulting from ball-to-ball and ball-to-wall collisions.

With the planetary movement, the grinding bowl filling is subject not only to the force of gravity, as in the case with conventional ball mills, but centrifugal and coriolis forces further increase the kinetic energy of the grinding parts up to 100 times the force of gravity. At high rotational speeds, the effect of these forces on the grinding parts and the material being ground produces a great load intensity and grinding performance. The energy transmission density is roughly 10 times that of vibratory mills and 50 times of conventional ball mills [3].

The grinding result is influenced by many different parameters, especially by the rotational speed of the mill, the grinding time, the ball size, the ratio of the sample quantity to the ball filling as well as the material of the grinding parts.

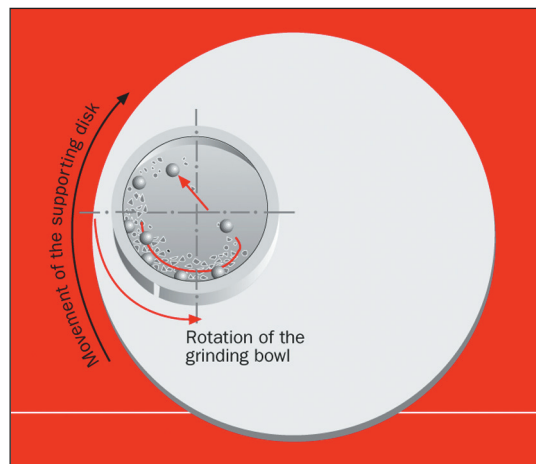


Figure 2: Function diagram of planetary ball mills

Grinding into the Nano Range

The demand for fine particles with a defined size distribution is constantly increasing, especially in the chemical and pharmaceutical industries. The production of finest particles down into the nanometre range can take place either via chemical synthesis, i.e. by generating the particles through crystallisation (bottom-up) or via comminution of already existing coarse particles in a mill (top-down). However, even the particles obtained through crystallisation are often too coarse and require subsequent processing in mills.

Industry interest in nano-particles can be explained by the fact that such particles demonstrate completely new physical and chemical properties due to their large specific surface (ratio of surface to volume). For instance, non-conductive materials suddenly become conductors and metal oxides that are actually opaque become transparent [4], [5].

Premium Performance

Compared with the previous model PULVERISETTE 6 classic line, the drive power was doubled for the premium line version. The powerful 1.5 kW motor enables a maximum rotational speed of up to 850 rpm, resulting in a significantly increased energy application. As proof of the mill's performance, a sample of aluminium oxide ground to particles down into the nano range is shown here:

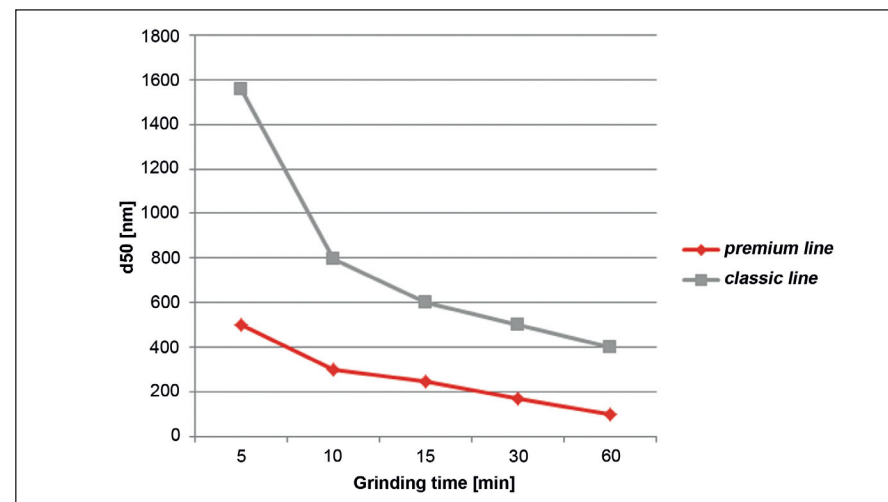


Figure 3: Comparison of Planetary Mono Mill PULVERISETTE 6 premium line with Planetary Mono Mill PULVERISETTE 6 classic line

After only 30 minutes the d50 value of the ground sample is already below 200 nm and after 60 minutes below 100 nm. In order to receive similar results with the classic line mill a significantly longer grinding time is necessary.

Premium Functionality

In addition to the significantly increased drive power, the operation of the mill is also 'premium': All key parameters, such as rotational speed, grinding time, pause function, number of grinding cycles, etc. are entered via a 4.3-inch touch screen with colour display and can be saved as a grinding program.

Until now, for planetary mills with one working station the user had to manually adjust the required compensation for imbalance with a counterweight. With the new Fritsch PULVERISETTE 6 premium line, the imbalance compensation is performed fully automatic – thanks to another brilliant patent by Fritsch.



Figure 4: Especially safe: Automatic grinding bowl clamping ServoLOCK

Also patented is the new grinding bowl clamping mechanism ServoLOCK. No more spindles or screws and instead with more or less effort clamping the bowls into place now simply: lower ServoLOCK handle – CLICK – finished!

Thanks to the motor-driven clamping ServoLOCK, the bowl is reproducibly tensioned with a clamping force of 16 kN [~ 1.6 t].

Conclusion

The unique functions of the Planetary Mono Mill PULVERISETTE 6 premium line:

- Doubled drive power for fast, powerful, high-performance grinding
- Fully automatic grinding bowl imbalance compensation
- Motor-driven grinding bowl clamping (ServoLOCK)
- Convenient touch screen with colour display

These features make the new Planetary Mono Mill to another worthy member of the Fritsch premium line family.

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Call for Entries for Young Investigator Award 2013

Until 15 January 2013, young researchers working in Europe who are not older than 35 years are invited to apply for the **Eppendorf** Award for Young European Investigators. This highly prestigious prize was first established in 1995. It acknowledges outstanding contributions to biomedical research in Europe based on methods of molecular biology, including novel analytical concepts.

The winner is selected by an independent expert committee chaired by Reinhard Jahn (Max Planck Institute for Biophysical Chemistry, Göttingen, Germany). The award winner 2013 will receive: prize money of 15,000 Euro; an invitation to the prize ceremony at the EMBL Advanced Training Centre in Heidelberg, Germany, on 6 June 2013; an invitation to visit Eppendorf AG in Hamburg, Germany; coverage of his/her work by Nature in print and in a pod cast.

Full details on the Eppendorf Award, the selection criteria and past award winners can be found at www.eppendorf.com/award. Potential prize winners will find all relevant information for a successful application.

Only online applications are accepted. The official online registration portal will accept applications as of 1st October 2013 at www.eppendorf.com/award/application.

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New Hand-Held Spectrocolorimeter



throughout the manufacturing process. It is a lightweight tool that is easy to handle and ready to use. In just over a second, it not only provides a reading of the sample but also a report telling how close the colour is to a measured standard. Users can create and measure against up to 20 self-programmable standards with a default average valuing of 3. The LC 100 automatically creates conformance reports in either PDF or Excel formats for each stored sample against each standard. These can easily be shared with a PC or directly to a compatible printer (via USB mass storage mode).

Stand-alone, the SV 100 is a very portable, quick yet accurate tool for colour measurement. However, it is the precision-designed Lovibond® accessory kit that makes it so flexible. Supplied with the stand and cap to remove ambient light and 10 Lovibond® 10ml cells, the instrument is now ideal for the colour measurement of food, powder, cosmetics, pastes and pharmaceuticals.

The new **Lovibond®** LC 100 / SV 100 combination is the ideal solution for the versatile communication of colour measurement. By housing the spectrophotometer in a uniquely designed stand, samples can be read at an ergonomic viewing angle, enabling the measurement of 'awkward' substances in Lovibond® optical cells. A secure cap is provided to cover the sample, protecting it from any excessive ambient light, enabling quick yet accurate readings.

The Lovibond® LC 100 colorimeter enables setting and maintaining colour standards

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Newly Improved Website Launched



LabCo are excited and proud to officially launch their newly improved and updated website. Behind the scenes they have been busy working a new design with your everyday enquiries in mind.

The Company have introduced a range of new features ensuring the LabCo site is both easy to use and informative.

Some improved features are: quick search box on the home page enabling users to quickly locate the product they are searching for; popular products giving a direct link from the home page to the product details page of best sellers; updated product information providing product descriptions, warranties, brochures, pictures and technical data sheets.

LabCo are currently in the process of designing even more features for www.labco-online.com. These exciting features will be launched soon.

Keep up to date with LabCo by regularly visiting their website and do not hesitate to get in touch with any suggestions or comments.

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