

Mini-Mill PULVERISETTE 23



- ⊗ For fine comminution of very small quantities, dry laboratory samples or solids in suspension. For mixing and homogenisation of emulsions
- ⊗ A real minimum quantity mill that still allows a suitable recovery even for forensic applications
- ⊗ Max. feed quantity: up to 5 ml
- ⊗ Throughput: up to 100 ml/h
- ⊗ Final fineness 10 μm

What do we have here ?
Genetic analyses !

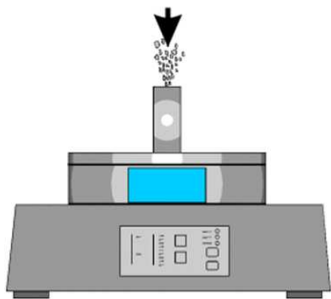
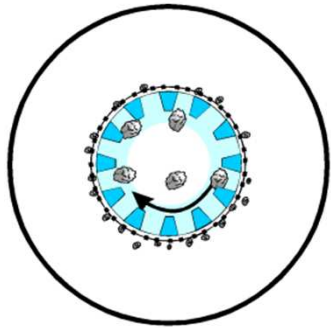


SAMPLE PREPARATION

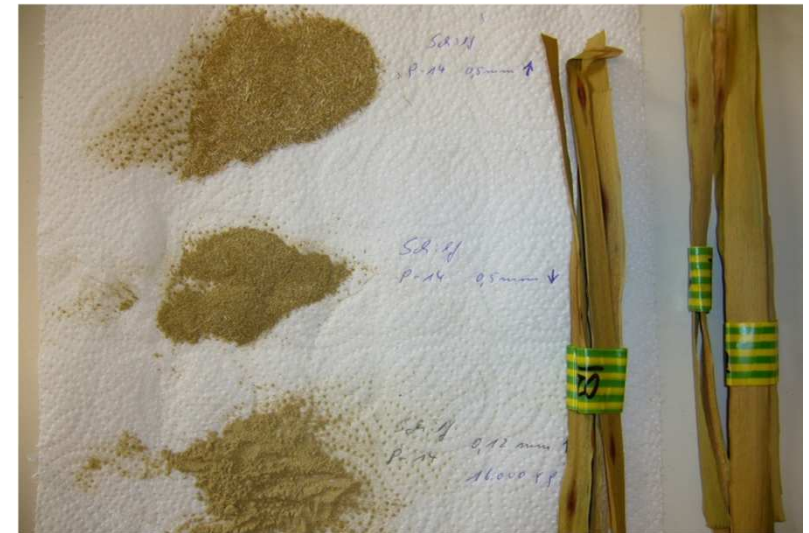
– Chopping wood e.g. –

Impact force

Variable Speed Rotor Mill



- ① **Soft materials** plants, wood, roots, drugs, herbs, textiles, grain, seeds, chalk, kaolin
- ② **Medium-hard samples** tablets, dragées, animal feed
- ③ **Elastic samples** styrene, PVC, PP, rubber, etc.



Variable Speed Rotor Mill PULVERISETTE 14



Operating principle	Impact
Max. feed size	10 mm
Max. capacity	5 l/h
Final fineness	0.08-6 mm
Hard (abrasive)	-
Medium-hard	+
Soft	++
Brittle	+
Tough	+
Fibrous	++
Temperature-sensitive	+
Moist	-

Foodstuffs, cereals, plants, textiles, wood, chemicals, plastics, animal feed, coal, soils

- **Motor speed 6,000 – 20,000 rpm, constant torque**
- **Digital display of rated speed**
- **Soft-touch keyboard**
- **Microprocessor controlled**
- **TÜV - Safety**

Overview – Cutting Mills



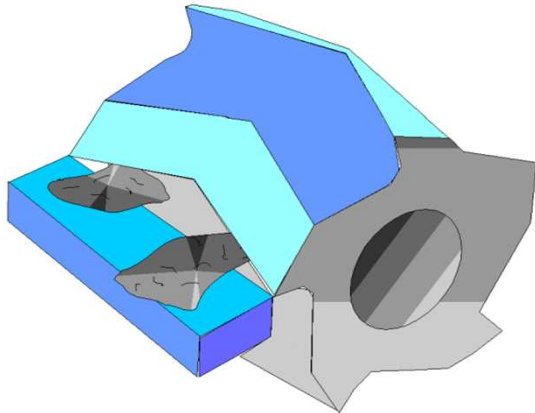
IDEAL FOR

HETEROGENEOUS SAMPLES
DERIVED FUELS
PLASTICS
PLANT MATERIALS
RoHS/ WEEE

Cutting Mill PULVERISETTE 15	Universal Cutting Mill PULVERISETTE 19	Power Cutting Mill PULVERISETTE 25	Cutting Mill Combination PULVERISETTE 25/19
Effective and inexpensive	Easy cleaning due to simply exchangeable grinding parts	Powerful pre-crushing even for larger samples	Pre-crushing and fine grinding in a single step
			

Working principle	Cutting	Cutting	Cutting	Cutting
Optimal for material type (for materials table and material type definitions, see page 7)	Medium-hard, soft, fibrous	Medium-hard, soft, brittle, tough, fibrous	Medium-hard, brittle, tough, fibrous	Medium-hard, brittle, tough, fibrous
Max. feed size (depending on the material and funnel)	70 x 70 mm	70 x 80 mm	120 x 85 mm	120 x 85 mm
Max. throughput (depending on the material and sieve size)	50 l/h	60 l/h	85 l/h	60 l/h
Sieve Inserts	0.25 – 6 mm	0.25 – 6 mm	1 – 10 mm	0.25 – 6 mm
Feeding	Batchwise/continuous	Batchwise/continuous	Batchwise/continuous	Batchwise/continuous
Materials of the grinding parts	Tool steel, chromium-free steel	Tool steel, hardmetal tungsten carbide, chromium-free steel	Tool steel, hardmetal tungsten carbide, chromium-free steel	Tool steel, hardmetal tungsten carbide, chromium-free steel
Rotor speed	2800 – 3400 rpm depending on voltage and frequency	2800 rpm	300 rpm	300/2800 rpm
Electrical details	400 V/3-, 50 Hz, 1900 watt 230-240 V/1-, 50 Hz, 2100 watt 100-120 V/1-, 60 Hz, 1800 watt	400 V/3-, 50-60 Hz, 2000 watt 230 V/1-, 50-60 Hz, 2200 watt 100-120 V/1-, 50-60 Hz, 1850 watt	400 V/3-, 50-60 Hz, 3340 watt	400 V/3-, 50-60 Hz, 6340 watt
Motor shaft power in accordance with VDE 0530, EN 60034	1.5 kW for all motors, except 1.1 kW for 100-120 V/1- motor	1.5 kW for all motors, except 1.1 kW for 100-120 V/1- motor	2.2 kW	2.2/1.5 kW
Weight	42 kg	56 kg	75 kg	214 kg
Dimensions w x d x h	Table-mounting or on stand: 42 x 48 x 69 cm	Table-mounting or on stand: 44 x 55 x 63 cm	Table-mounting or on stand: 45 x 65 x 63 cm	On stand: 62 x 82 x 145 cm

➤ Combined Cutting and Shearing Action (i.e. Cutting Mill)



Materials: rubber, leather, paper, cardboard, tissues, plastics, wood, non-metallic waste, coal, animal feeds, maize, grain, confectionery, malt, farinaceous products, spices, dried meat, bones, horn, dragées, tablets, leaves, fibres, peat, roots, tobacco, cork, straw or film. Furthermore, the Universal Cutting mill can also be used in the pharmaceutical or animal feed industries, in dental, medicinal and metallurgical technology as well as in Veterinary Institutes.

Universal Cutting Mill PULVERISETTE 19 / Power Cutting Mill PULVERISETTE 25



Operating principle	P-19	P-25
Cutting		
Max. feed size	70 x 80 mm	120 x 85 mm
Max. capacity	60 l/h	85 l/h
Final fineness	0.25-6 mm	1-10 mm
Hard (abrasive)	-	+
Medium-hard	++	++
Soft	+	+
Brittle	++	++
Tough	++	++
Fibrous	++	++
Temperature-sensitive	-	-
Moist	-	-

- **Fast locking lid**
- **Easy access and very easy cleaning**
- **Rotors**
- **Less sample deposits**
- **Very stable and robust**
- **Cutting geometry**
- **Bearings**
- **Sample exhaust**
- **Motors**
- **Sieve cassettes**
- **TÜV - Safety**

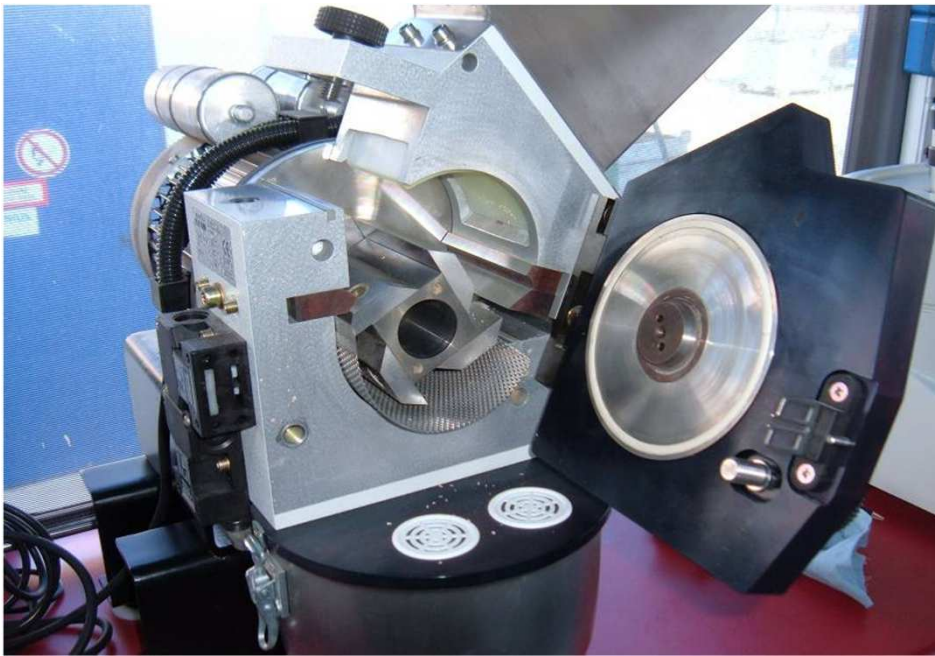
Cutting Mill PULVERISETTE 15



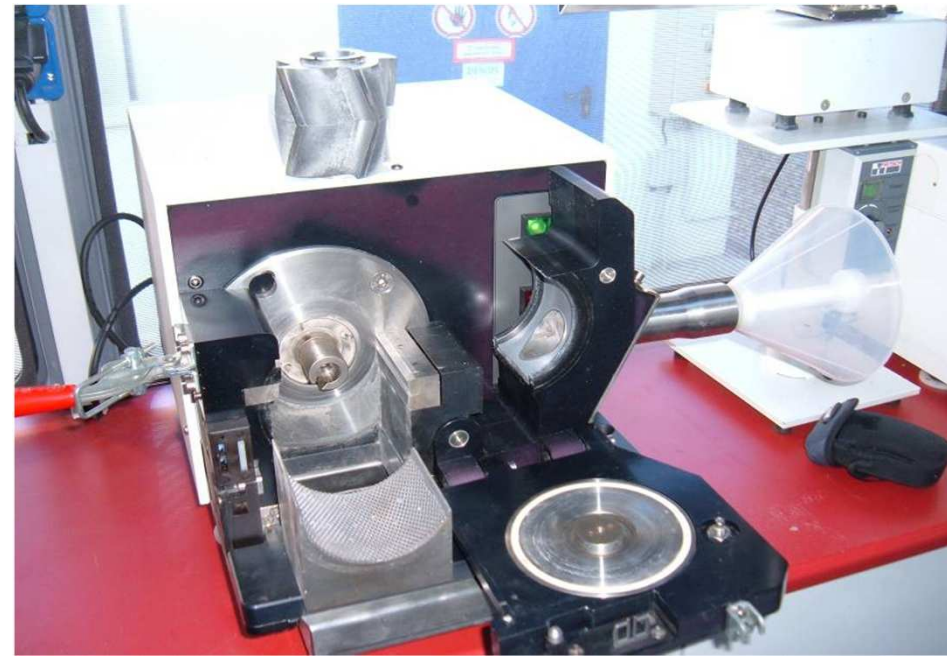
Operating principle	Cutting
Max. feed size	70 x 70 mm
Max. capacity	50 l/h
Final fineness	0.25-6 mm
Hard (abrasive)	-
Medium-hard	-
Soft	++
Brittle	+
Tough	+
Fibrous	++
Temperature-sensitive	+
Moist	-

SAMPLE PREPARATION

– Comparison of the inner life of the Cutting Mills –



Cutting Mill P-15



Universal Cutting Mill P-19

SAMPLE PREPARATION

–Universal Cutting Mill PULVERISETTE 19 w/cyclone system –



SAMPLE PREPARATION

– Learning to divide –



④ **Comminution is always followed by taking of a representative sample**

- ④ either for the next stage of comminution or
- ④ for the analysis

④ **For this purpose, we offer the Rotary Cone Sample Divider LABORETTE 27.**



Rotary Cone Sample Divider LABORETTE 27



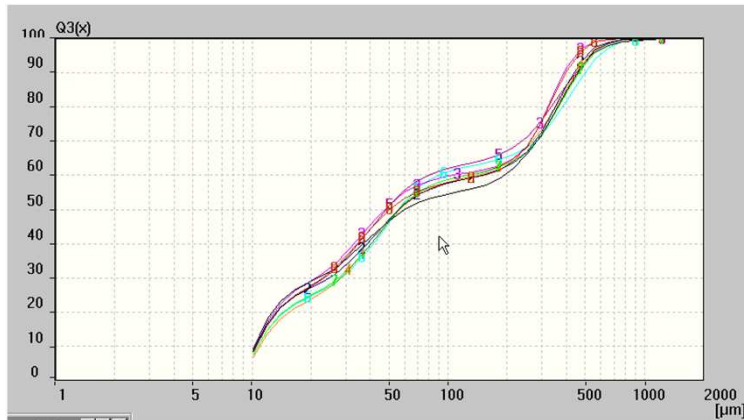
- Ⓢ Representative division of dry solids or suspensions
- Ⓢ Dividing heads with ratios 1:8, 1:10 and 1:30
- Ⓢ Representative division of randomly segregated samples

Main Advantage of Rotary Cone Sample Divider

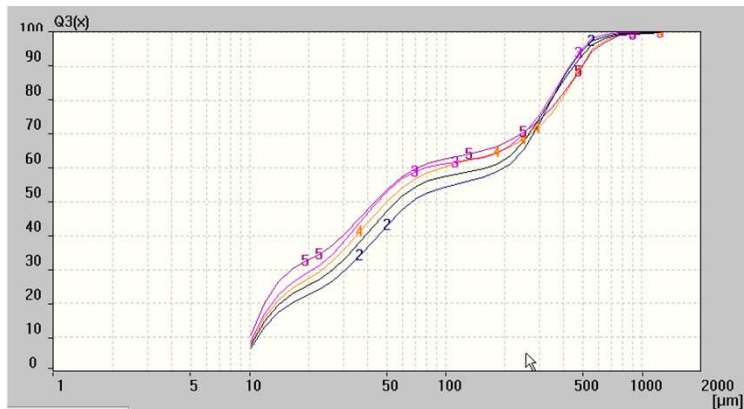


- **Rotation of Cone:**
 - ⊙ spreading sample over 360°
 - ⊙ splitting sample into very small volume elements
 - ⊙ feeding sample simultaneously to the sample containers

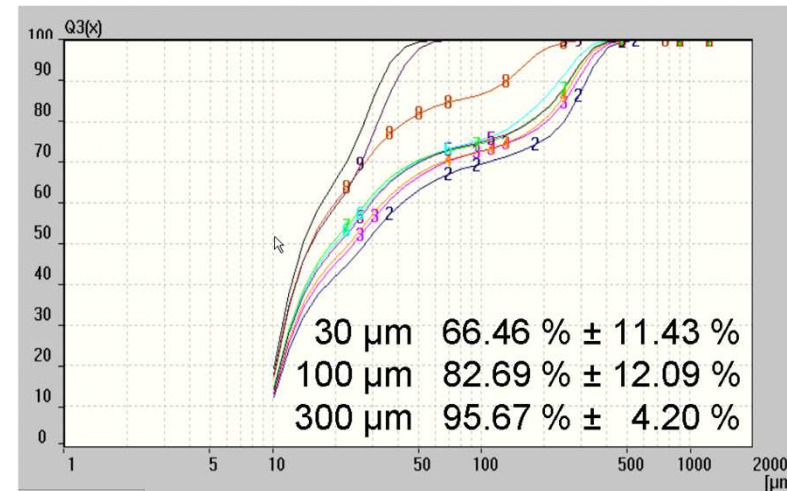
Importance of sample dividing



Rotary Cone Sample Divider



Normal Sample Divider



**Without sample dividing =
Not representative**



Particle size analysis everywhere



- **Powder metallurgy** - sintering processes
- **Cement industry** - reactivity
- **Chemical industry** - paints, toners
- **Food industry** - chocolate, rice, beans
- **Pharmaceutical industry** - sprays, eye drops, tablets

Typical working ranges of different principles



Method	Range
Dry sieving	63 μm – 125 mm
Wet sieving	20 μm – 200 μm
Micro sieving	5 μm – 100 μm
Gravitational sedimentation	0,5 μm – 500 μm
Laser diffraction	0,01 μm – 2000 μm
Electron microscope	0,05 μm – 1 μm
Projection microscope	1 μm – 10 mm

SAMPLE PREPARATION AND PARTICLE SIZING

- Sieve Shakers from FRITSCH -



Determination of particle size distributions by sieving

