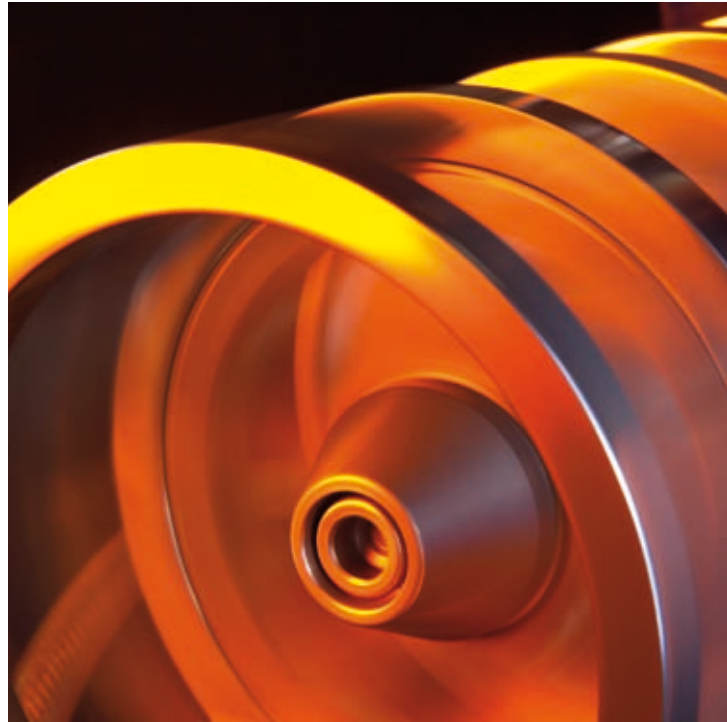


Centex® –
the full-volume
bead mill for
higher economics



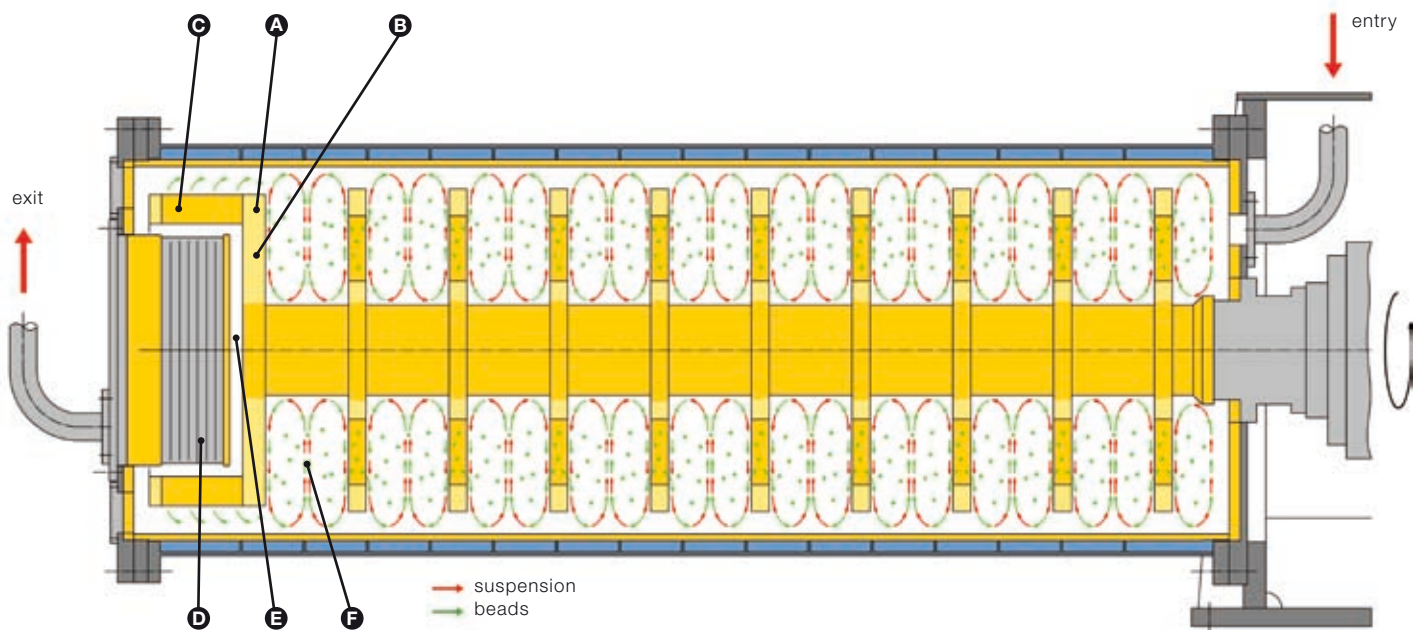
Centex^{® 1)} – The full-volume agitated bead mill setting standards in the industry

Higher productivity from smaller process chamber

The new full-volume Perl Mill[®] Centex[®] from Bühler offers optimized energy saving wet milling technology by consequent combination of a multitude of newly developed and ideally matching functional elements (Fig. 2.1):

- Slim process chamber with favourable l/d ratio
- Bühler high-efficiency grinding discs EcoMizer[®]. EcoMizer[®] discs with particularly large diameter (Fig. 5.3 and 5.5) for efficient acceleration of beads already with reduced rotor speed, resulting in more economical grinding
- Optimized axial distance of EcoMizer[®] discs
- Setup in series of defined grinding cells, resulting in energetically particularly favourable braid flow of beads (Fig. 2.1, F)
- Maximized use of active process chamber by identically dimensioned grinding cells (Fig. 4.1) from the entry of the product up to the deflector cage
- High flow capability by combination of neutral and conveying (Fig. 5.3 and 5.5) EcoMizer[®] discs which counter-act a local overconcentration of grinding beads
- Operationally safe separation of grinding beads even with particularly high flow rates due to the highly efficient **separator system SCS[®]** (Superior Centrifugal Separation), consisting of (see Fig. 2.1):
 - Deflector cage (Fig. 2.1, A) with integrated grinding disc function facing towards the adjacent EcoMizer[®] disc (Fig. 2.1, B)
 - Outer deflecting shape (Fig. 2.1, C) of cage based on longtime SuperFlow[®] know-how²⁾
 - Particularly large-dimensioned protection sieve SuperScreen (Fig. 2.1, D) for minimizing flow resistance (pressure drop), SuperScreen located within (Fig. 2.1, E) the deflector cage (Fig. 2.1, A), ideally protected against wear

Fig. 2.1:
Simplified schematic of a Centex[®] process chamber



Perl Mill[®], Centex[®], SCS[®], EcoMizer[®], DraisResist[®] and DraisElast[®] are registered trademarks of Bühler AG

¹⁾ International patents applied for, ²⁾ see e.g. US Pat. 5.996.914, patent owner Bühler AG

Centex® – Enhancement of economics and quality for countless applications



Paper pigments and printing inks



Masses for technical ceramics and for sanitary or functional ceramics



Paints and coatings for highly stressed surfaces

Paints and coatings

- Primer and filler
- Electrodeposit paint for the automotive industry
- Marine paint, for instance antifouling formulations
- Coil coating products
- Special paints and coatings even with higher viscosity

Printing inks for various applications

- Publication gravure ink
- Extender formulations
- Offset concentrates
- Direct conversion of pigments into printing ink formulations

Chemical industry and specialties

- TiO_2 in organic solvent for textile fibre applications
- Masses for catalysts
- Grinding processes during pigment production
- Post-treatment of TiO_2 (sulfate and chloride process)

Minerals industry

- Calcium carbonate as filler quality and as paper coating masses
- Kaolin and talc for a variety of final applications
- Wet grinding in minerals processing

Ceramics industry

- Suspensions of powders for engineering ceramics
- Ceramic glazing materials
- Glass-ceramic suspensions



Fig. 3.1:
Centex® L3 featuring control package
COMFORT and integrated cleaning device
within the front-sided SuperScreen



Fig. 4.1: Full-volume utilization by equidistant arrangement of grinding cells up to the deflector cage

Process technology at its best – for your advantage

Higher product quality with reduced specific grinding cost

The Centex® concept allows for a higher flow capability without compression of grinding beads, enabled by counter flow conveying EcoMizer® discs. Because of the consequent use of wear-resistant proprietary materials, a reduced clearance between the periphery of the Eco-Mizer® discs and the outer mill cylinder can be selected being responsible for the enhancement of the grinding efficiency – yet with longest service life of all components installed.

The required feed pressure is reduced significantly because of the particularly large-surfaced SuperScreen. The SuperScreen is located wear-protected centrally within the deflector cage.

In comparison to other full-volume agitated bead mills, considerably smaller grinding beads can be utilized

with a highest degree of reliability during operation.

During the axial flow of the product to be ground through the mill chamber along the series of defined grinding cells (Fig. 2.1), there is a significantly increased number of grinding-effective contacts between particles and grinding beads.

This results in a reduction of the specific energy requirement for the generation of more narrow particle size distributions. This means for the user: higher net production rate (= amount of finished product per unit of time) from a smaller process chamber and a higher product quality with lower specific grinding costs.

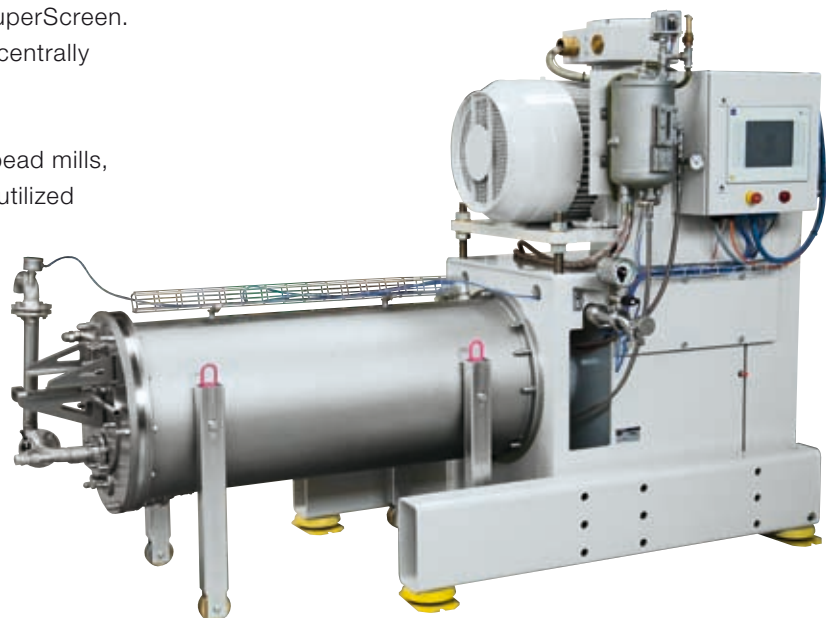


Fig. 4.2:
Centex® T3 with control package
PREMIUM, with integrated user-
friendly handling device for front-
sided SuperScreen

User friendliness with each mill size

In order to realize a user-friendly height independent of the respective mill size, the Centex® product family is subdivided into the L series and the T series.

With the **Centex® L** series (Fig. 5.1) featuring a drive power up to 45 kW, the drive motor is located within a box-type housing below the bearing cubicle (low arrangement). This results in an ideal location of the



Fig. 5.1: Centex® L3 with outstanding functionality: filling of grinding beads through firmly screwed front-end speciality funnel

process chamber in a height above the installed electric motor.

With the **Centex® T** series (Fig. 5.2) featuring an installed drive power beginning with 55 kW, the drive motor is located on top of the bearing cubicle (top arrangement). As a consequence of the flat design of the machine frame with a process chamber in low arrangement, again optimized user and service friendliness are achieved even with extremely large agitated bead mills.



Fig. 5.2: Centex® T3 during removal of mill chamber – user-friendly handling of the large T series

Exchangeable components for longest service life

All surfaces of the process chamber being in contact with the product of a Centex® mill are designed as individually exchangeable components manufactured from particularly wear resistant materials:

- Grinding chamber lid at the entry side
- Exchangeable inner liner of process chamber
- Wear-resistant plate inserted in process chamber lid at the exit side

- Particularly exposed bushings and spacers
- EcoMizer® discs and deflector cage

A variety of heat-treated metallic special alloys with highest hardness are available. For particularly abrasive materials to be ground in combination with a high cooling requirement, the inner liner is recommended to be manufactured e.g. from DraisResist® 40. EcoMizer® discs and deflector cages are manufactured e.g. from the particularly long-lasting hard-chrome cast DraisResist® 84.



Fig. 5.3: Exchangeable counter flow conveying EcoMizer® discs from DraisResist® 84 in a Centex® T3



Fig. 5.4: Easy removal of a SuperScreen from a Centex® T3



Fig. 5.5: Exchangeable counter flow conveying EcoMizer® discs from DraisElast® in a Centex® T5



Fig. 6.1: Centex® T5 large Perl Mill® (drive power $P = 355 \text{ kW}$) for the economical micro wet grinding of bulk material

Centex® – flexible and industrially proven

High-intensity cooling for temperature-sensitive products

The exchangeable through-hardened inner liner of the process chamber is in each case surrounded in the full length by an uninterrupted outer jacket. In between there is an annulus through which the actual coolant flows.

A tightly fitting, steeply pitched spiral lip is responsible for a high flow velocity of the coolant, resulting in excellent heat transfer in the surrounding cooling channel.

The first choice for metal-free grinding

For materials to be ground which during processing do not allow for any metal contact like e.g. ceramic suspensions, slurries of glass powder or white specialty pigments, the individually exchangeable components of the process chamber are coated e.g. with the highly wear-resistant specialty elastic material DraisElast® (Fig. 6.3).

For this application as well, as contribution for minimizing the maintenance cost, the inner liner is again designed as exchangeable tube, in this case coated with DraisElast®.



Fig. 6.2: Preparation of a Centex® L3 with high-intensity cooling in a production plant for marine paint



Fig. 6.3: Inspection of a metal-free Centex® T4 after one year of continuous operation in a milling plant for white pigments

Control and automation packages

All mills of the Centex® family can be equipped with different control and automation packages. The agitator speed is adjustable by means of a frequency inverter as a standard. Upon special request, selected sizes of the mill series are available with a fixed speed drive.

With the **control package COMFORT** (Fig. 7.1), the agitator speed can be adjusted continuously in a wide range by means of a +/- push button. The agitator speed and the real power absorption of the motor are indicated by digital displays.



Fig. 7.1: Control package COMFORT: start/stop mill and pump, quicker/slower rotor, display speed/power, emergency button

With the **control package 2-SPEED** (without figure), one grinding speed as well as one flushing speed are programmed. They can be selected by the operator by means of a selection switch. Depending on the product characteristics, both programmed fixed speeds can be changed by authorized personnel at the remote switch cabinet.

With the **control package PREMIUM** (Fig. 7.2), all adjustments of parameters and visualization of operational parameters are realized by a fully graphic touchscreen panel. The package allows for the selection of specific control algorithms and includes a variety of interfaces to superimposed control systems and for data logging.



Fig. 7.2: Control package PREMIUM: explosion-proof full version, fully graphic touchscreen panel with foil keys, emergency button

Single-pass – multiple-pass – recirculation

Due to the combination of innovative functional elements, Centex® mills allow for many applications to achieve particularly narrow particle size distributions or other desired target qualities already in a single pass. On the other hand, the comparatively high flow capability makes

Centex® mills also perfectly suited for a multi-pass operation with then even higher flow rates and moreover enables setting up the mills in series. Finally, for applications with a comparatively higher specific energy requirement like e.g. cases with high hardness of the particles or in case particularly high target finenesses are to be achieved, Centex® mills can be operated very economically in recirculation mode.

