



Cell Mill



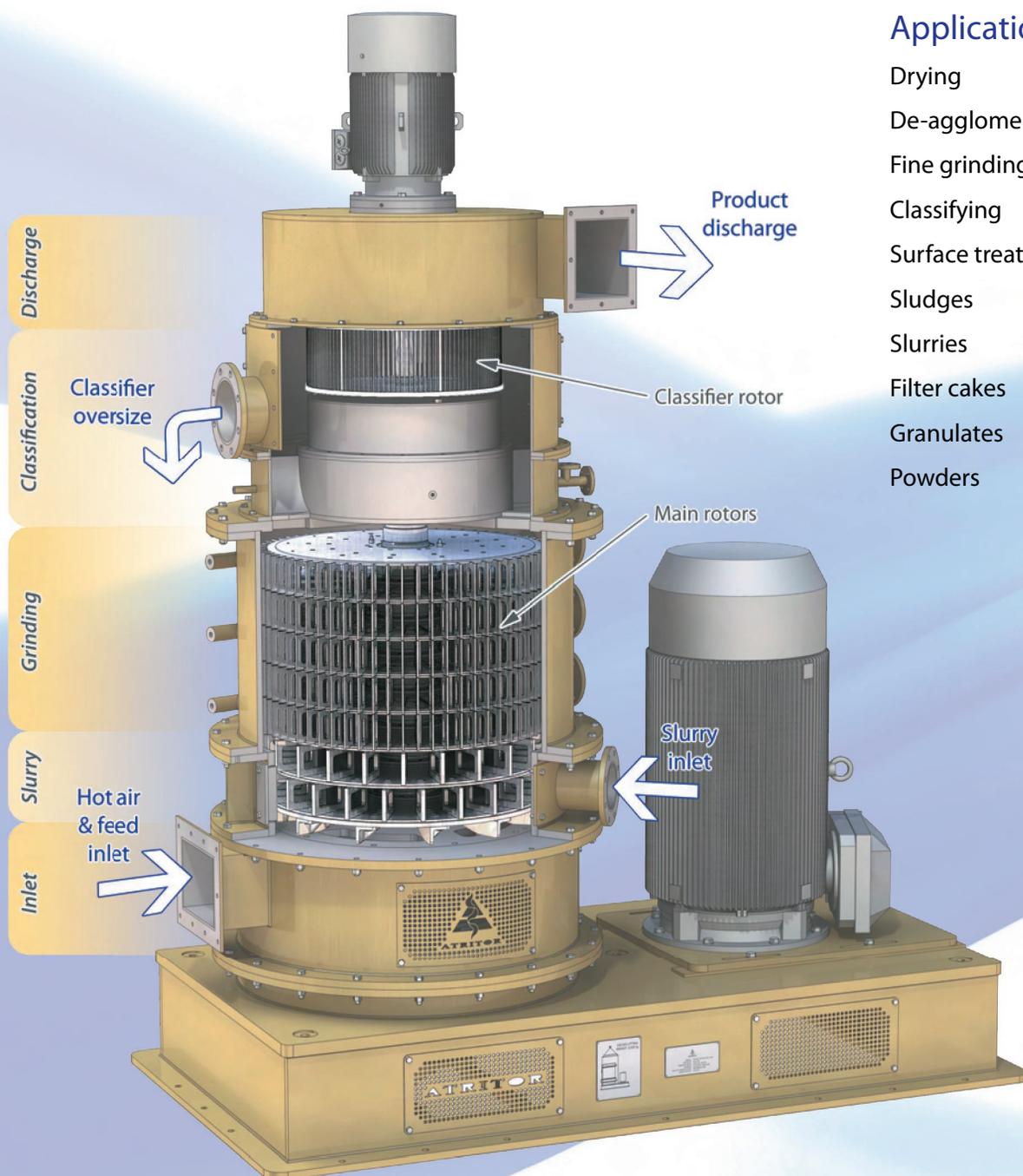
ATRITOR

The Atritor Multirotor Cell Mill

The Cell Mill is a highly efficient mechanical mill which has been developed for the production of ultra-fine powders with tightly controlled particle size distributions.

It will simultaneously grind, dry, classify and chemically modify the surface of powders. It will perform similar functions in the de-agglomeration of wet ground filter cakes and slurries.

Grinding capacities range from 50 kilograms per hour to 15 tonnes per hour, with evaporation rates up to 3,000 kilograms per hour.



Applications

- Drying
- De-agglomeration
- Fine grinding
- Classifying
- Surface treatment
- Sludges
- Slurries
- Filter cakes
- Granulates
- Powders



CM1500 Cell Mills processing performance mineral powders



CM1500 in manufacture



CM1500 ready for delivery



Cell Mill internal assembly

Operating Principle

The main grinding element is a vertically-mounted multi-stage rotor, each section of which is composed of up to 200 blades clamped between two support discs mounted on a central hub. Depending on the grinding duty, a mill will contain as many as eight rotor sections - a total of 1,600 blades.

The grinding blades rotate at speeds of up to 120 metres per second within three millimetres of the grinding track, which is a uniquely ribbed static liner.

The interaction between the blades and liners creates up to 1,600 turbulent “cells” in which the combined forces of impact, shear and attrition rapidly produce ultra-fine powders.

Process System

As with all Atritor plant, the Cell Mill ① is an air-swept unit - material is conveyed through the system in an air stream.

Feed material is metered into the inlet air stream using a variety of variable-speed devices ②, depending on material characteristics.

After the grinding operation has taken place, the finished product is discharged from the Cell Mill and is carried in the air stream to a cyclone ③ and/or reverse jet bag filter ④.

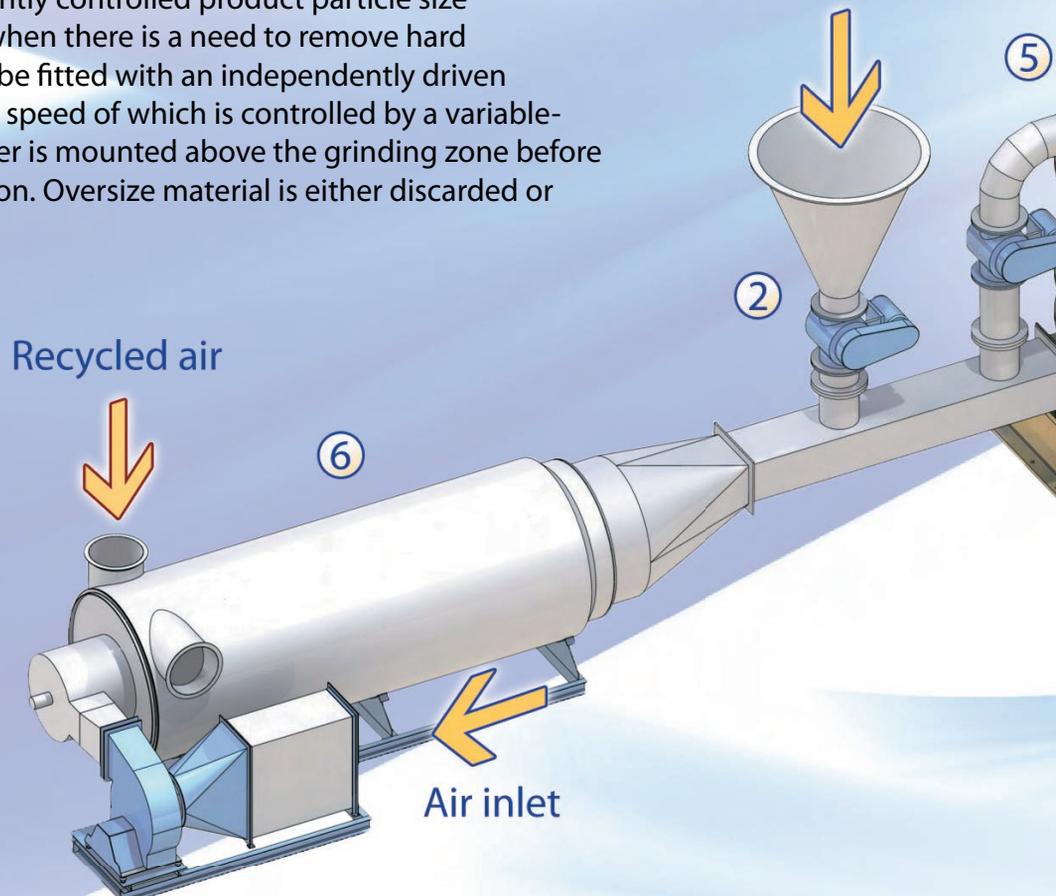
Integral Classifier

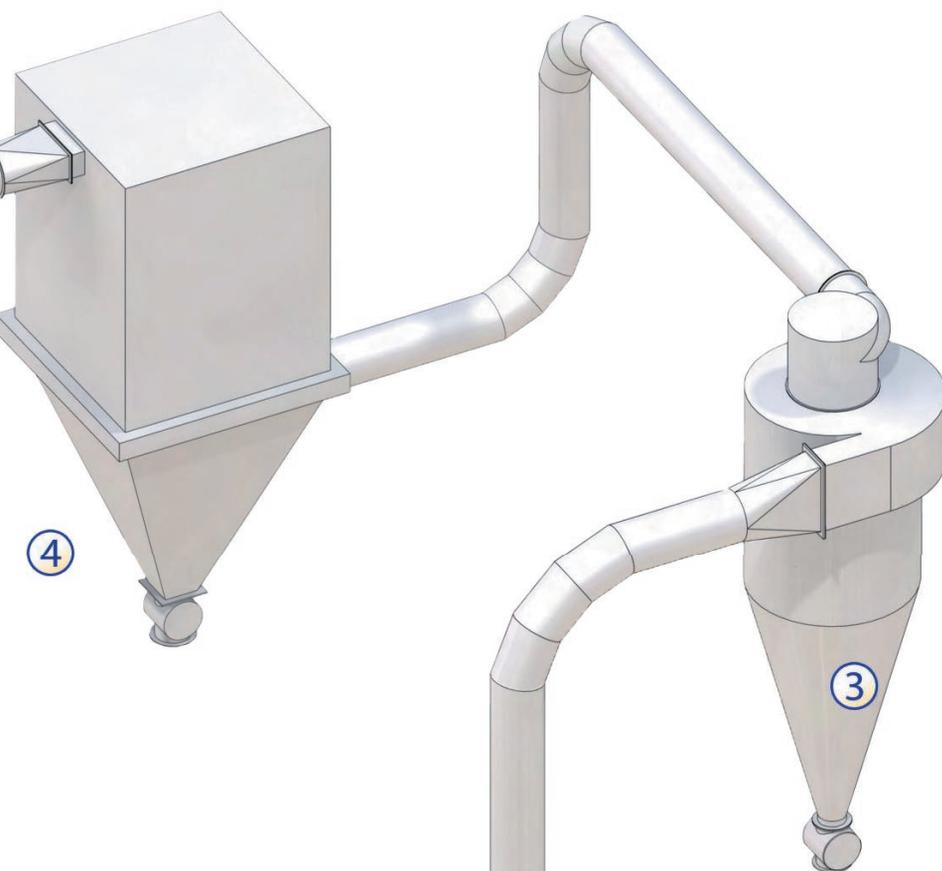
For applications where a tightly controlled product particle size distribution is required, or when there is a need to remove hard impurities, the Cell Mill can be fitted with an independently driven dynamic air classifier ⑤, the speed of which is controlled by a variable-frequency drive. The classifier is mounted above the grinding zone before the product discharge section. Oversize material is either discarded or recycled to the feed inlet.

Exhaust gases



Feed material inlet





Drying Function

The Cell Mill is an efficient dryer when the process air is heated using a hot air generator ④. The Cell Mill can accept inlet temperatures up to 450°C. The dryness of the product is controlled by the outlet temperature, which is typically in the region of 85°C. Filter cakes, sludges and slurries can be dried and de-agglomerated close to their natural particle sizes in a single operation.

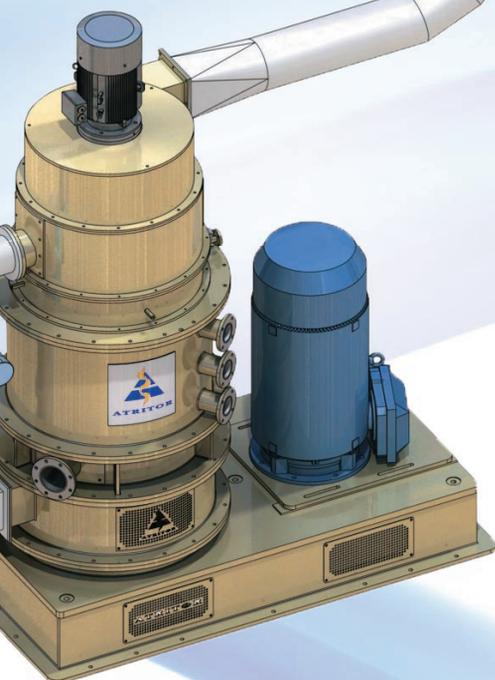
Slurry Injection

With the increasing demand to dry slurries of various solids concentrations, a special section for the Cell Mill has been developed with heavier duty components to deal with the increased mechanical loads.

Generally the slurry is fed into the mill by a wide-throat pump through specially designed nozzles.

Coating and Surface Modification

Performance minerals frequently require surface treatment to influence their functionality. A whole range of surfactants can be successfully applied during the milling operation by simply metering them at the relevant rates into the grinding zones of the mill. In certain circumstances more than one coating agent can be applied simultaneously.



①

Construction Details

All Cell Mills are of modular construction. This allows each unit to be purpose-built for its specification whilst retaining the basic principles of operation and the use of common spare parts.

The number of blades, rotors and liners can all be varied to give optimum performance. The inclusion of an integral classifier on a Cell Mill does not affect the construction of the main milling chamber.

This modular construction also ensures extremely easy maintenance, with rapid access to all working parts.

The rotor blades are available in hardened steel, stainless steel or tungsten carbide-tipped steel.

The grinding track is produced in steel, high-chrome iron, stainless steel or high-alumina ceramic.

Special Features

- Rotors and liner rings are removed from the mill as complete units
- Rotors and liners are rebuilt outside the mill, minimising downtime
- Rotating elements use drive pins instead of keyways, giving easier location
- There are no blade- or liner-securing bolts inside the mill
- Balancing of rotating parts is performed before they are returned to the mill – good balance ensures maximum bearing life
- There are no adjustments required during normal operation



CM500 Cell Mill (five-rotor)



CM500 Cell Mill (seven-rotor)

Typical Feed Materials

The following table lists a selection of materials that the Cell Mill is capable of processing.

Minerals	Chemicals	Foodstuffs
Clays	Alginates	Animal proteins
Kaolin (natural and calcined)	Hydrotalcite	Casein
Limestone, marble, calcite	Iron oxides	Cocoa
Magnesium hydroxide	Magnesium hydroxide	Peas
PCC and GCC	Methyl cellulose	Potato protein
Phosphates	Pigments	Sugar
Precipitated silica	Silica gels	Wheat flours
Talc	Stearates	Wheat gluten
Titanium dioxide	Zeolites	Wheat starch

Technical Data

Cell Mill	Units	CM350	CM500	CM750	CM1000	CM1250	CM1500	CM2250
Maximum speed	rpm	6,500	4,500	3,000	2,250	1,800	1,500	1,000
Minimum air flow	m ³ /h	1,250	2,000	3,000	4,000	5,000	6,000	9,000
Maximum air flow	m ³ /h	4,000	6,000	12,000	15,000	20,000	25,000	37,500
Minimum power	kW	15	22	45	75	110	132	200
Maximum power	kW	30	55	90	132	200	350	500
Classifier power	kW	5.5	7.5	15	22	30	37	55



CM500 Cell Mill plant in Turkey

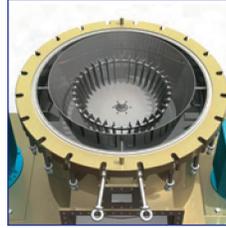
Other Equipment in the Atritor Range



Dryer-Pulveriser



Cell Mill



Air Classifier Mill



Turbo Separator



Microniser

Complete Engineered Solutions

Atritor Limited has a long history and extensive expertise in providing complete turn-key process plant. We are able to fully specify all ancillary equipment, both within the immediate drying process and beyond.

We can provide the following services to ensure complete customer satisfaction:

- Research and development of products and processes
- Pilot plant facilities for all equipment in our range
- Full process plant design using the latest **AutoCAD®** and **SolidWorks®** software
- Quality control to ISO 9001:2008
- Design and supply of PLC-based control systems
- Supply of all equipment for a complete process
- Full installation service
- Experienced engineers for commissioning and operator training
- Process guarantees
- After sales service and spare parts supply



ATRITOR

ATRITOR LIMITED

PO Box 101
Blue Ribbon Park
Coventry
CV6 5RE
United Kingdom
Tel +44 (0) 2476 662266
Fax +44 (0) 2476 665751
Email sales@atritor.com

www.atritor.com

*All Atritor equipment is
built to the
rigorous standards of
ISO 9001:2008*



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