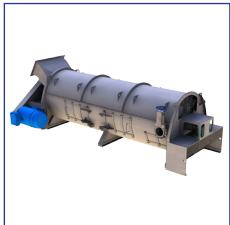


Other Equipment in the Attritor Range



Cell Mill



AST Dryer



Classifier Mill



Turbo Separator



Spiral Jet Mill

Complete Solutions

Attritor Limited has a history dating back over 90 years, and in that time the Company has gained a great deal of experience and expertise providing full process solutions to our customers. We work with our clients to understand their needs and to provide bespoke process systems.

We provide:

- Full plant design using the latest 3D and 2D software
- Detailed equipment design and specifications
- Full process control systems
- Manufacturing and supply of complete systems
- Installation, commissioning, training and service support
- Process guarantees



ATTRITOR

ATTRITOR LIMITED

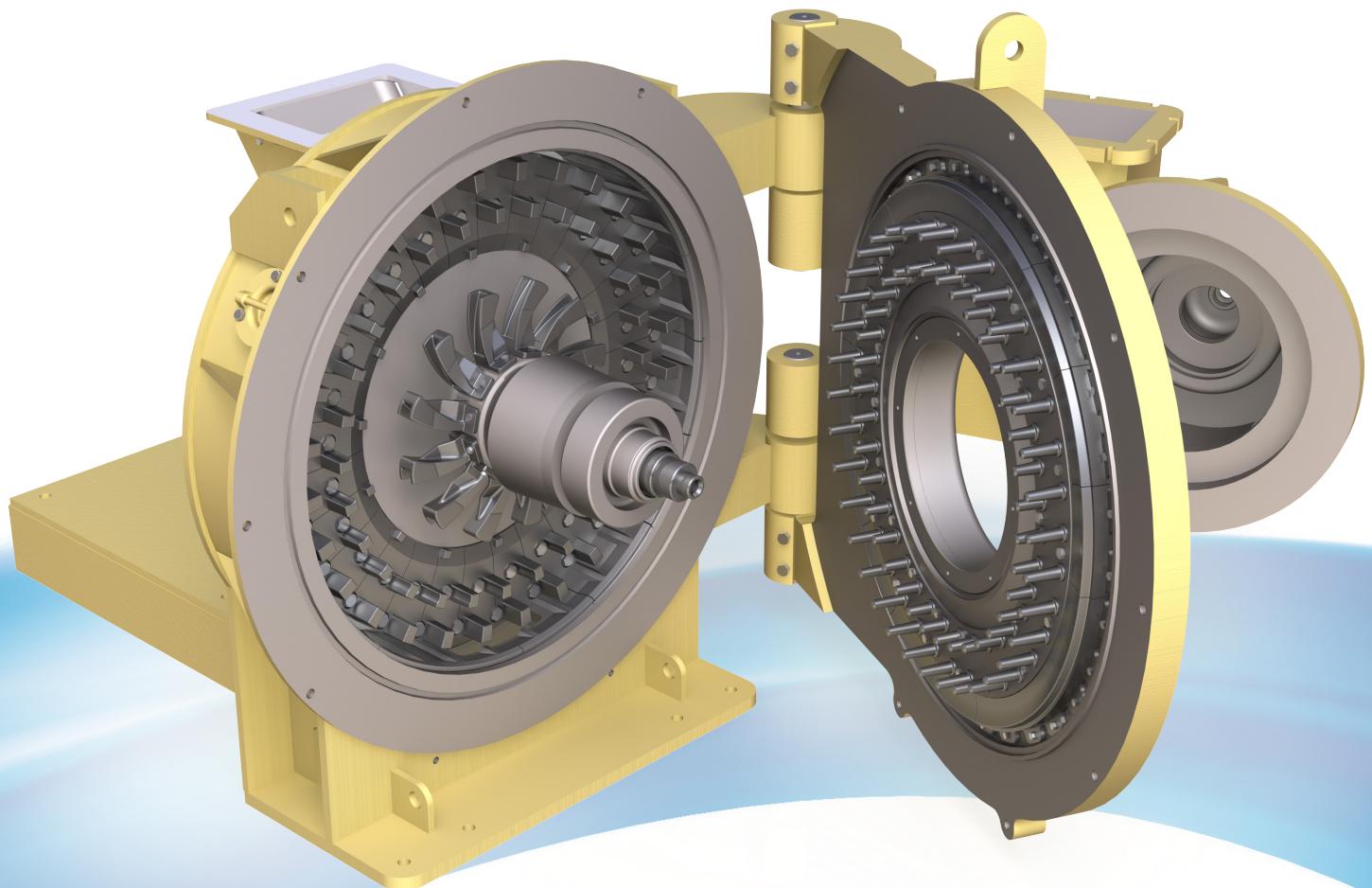
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All Attritor equipment is
built to the
rigorous standards of
ISO 9001:2008



Certificate No. FM 11960



Dryer-Pulveriser



The Company

Atritor Limited can trace its history back over 90 years. It is an independent company with its own UK-based manufacturing facility including an alloyed iron foundry, machine shop and assembly operation allowing Atritor complete control of the manufacture of its equipment. It has a full-scale pilot plant, engineering design office for new process and equipment design, and a full spare parts service with a significant stock of parts.

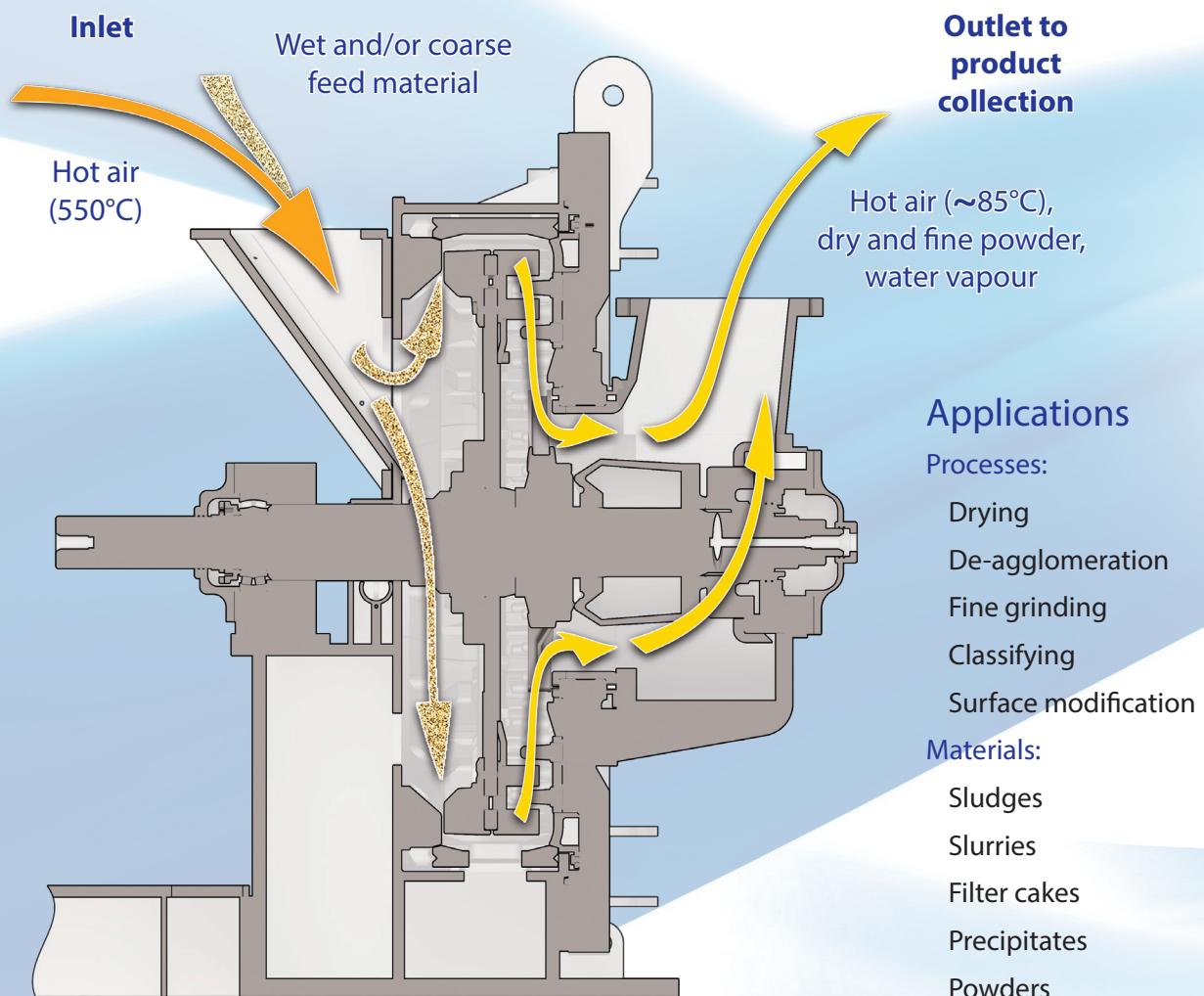
The Atritor Dryer-Pulveriser

The Atritor Dryer-Pulveriser is an air-swept mill, originally designed to produce pulverised fuels for combustion processes. It has subsequently been used for drying and milling hundreds of materials such as mineral fillers, chemical filter cakes and foodstuffs.

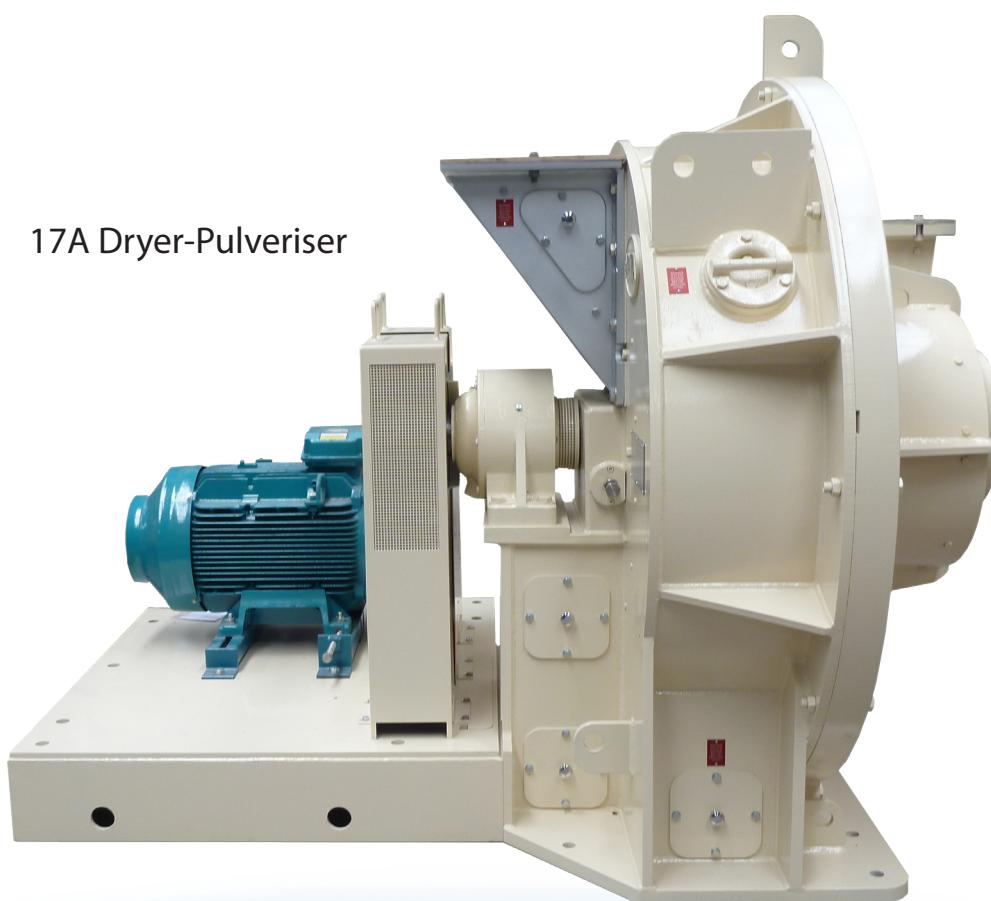
The Dryer-Pulveriser can accept feedstocks of up to 50mm and is available in various sizes with production capacities ranging from 250kg/h to 30t/h.

With the inlet air heated to 550°C the machine is an efficient dryer achieving water evaporation rates up to 4,200kg/h.

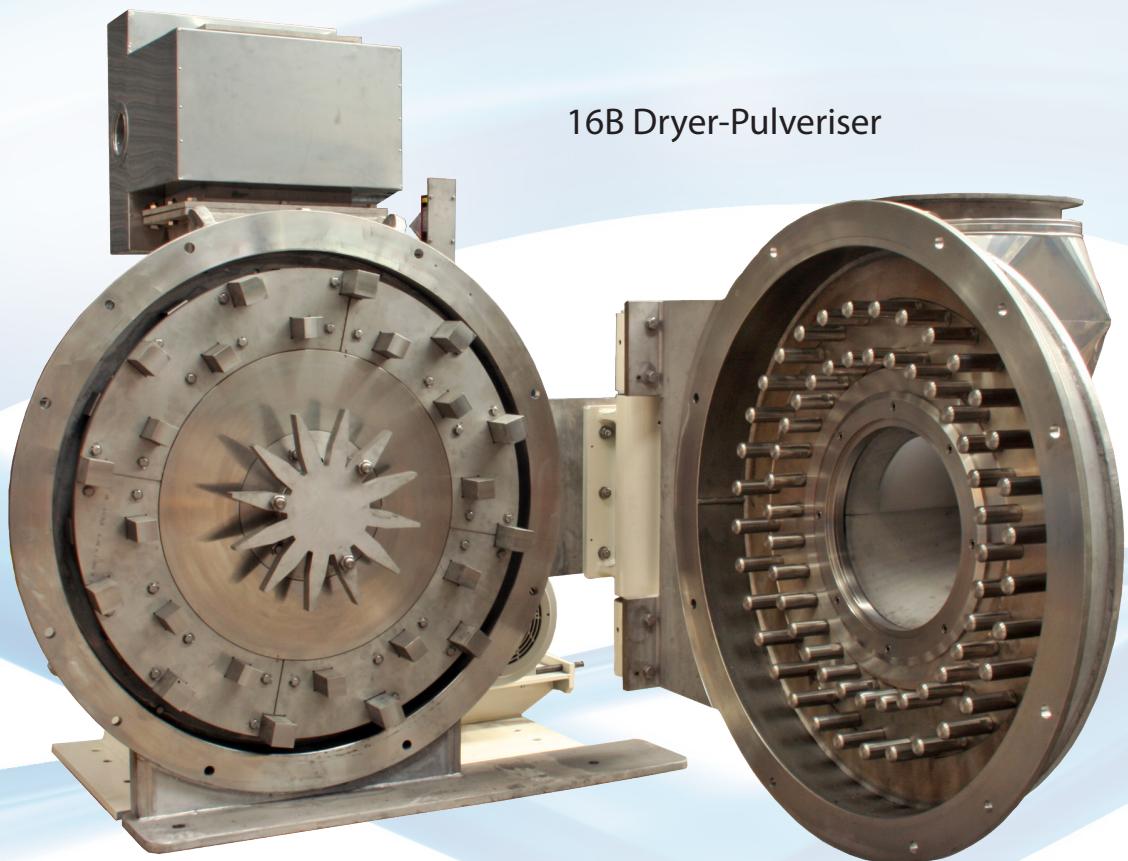
There are two types of Dryer-Pulveriser, the 'A'-series and the 'B'-series. The 'A'-series is built with cast iron wear resistant internals suitable for aggressive, higher wear applications. The 'B'-series has a lighter weight, fully-fabricated construction suitable for non-wearing duties, or for applications in which stainless steel contact parts are necessary.



17A Dryer-Pulveriser



16B Dryer-Pulveriser



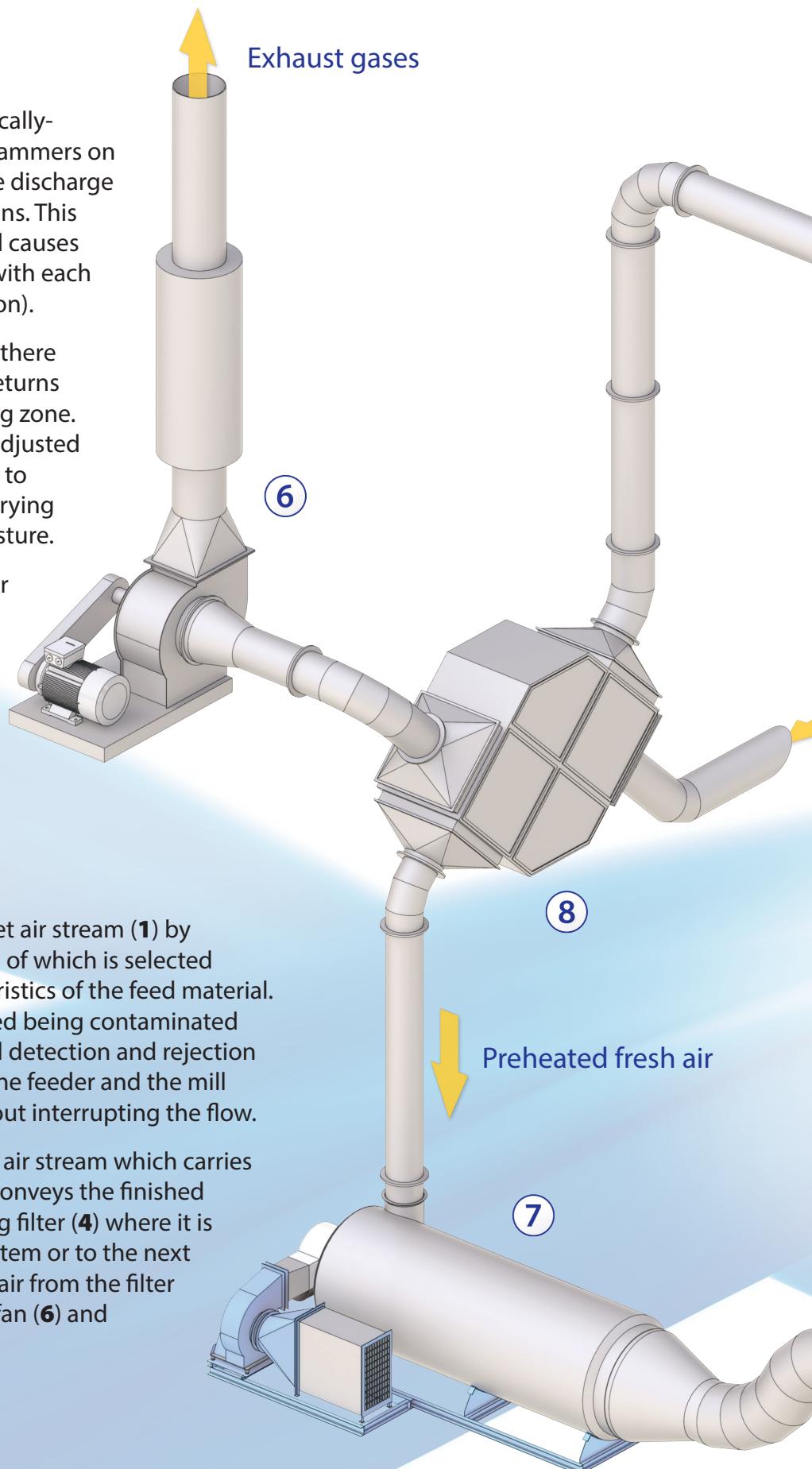
Operating Principle

The Dryer-Pulveriser has a vertically-mounted rotor carrying fixed hammers on both sides, the hammers on the discharge side intermeshing with static pins. This creates massive turbulence and causes particles of material to collide with each other and reduce in size (attrition).

Near the outlet of the machine there is an adjustable classifier that returns oversize material to the grinding zone. The classifying section can be adjusted to provide top sizes from 30µm to 500µm whilst simultaneously drying products to as low as 0.1% moisture.

A pre-sizing zone is available for applications with larger feed sizes.

An independently-driven classifier section is available on some sizes of Dryer-Pulveriser.



Process System

Material is metered into the inlet air stream (1) by a feeding device (2), the design of which is selected based on the physical characteristics of the feed material. If there is a possibility of the feed being contaminated with metallic impurities a metal detection and rejection facility is interposed between the feeder and the mill inlet. This removes metal without interrupting the flow.

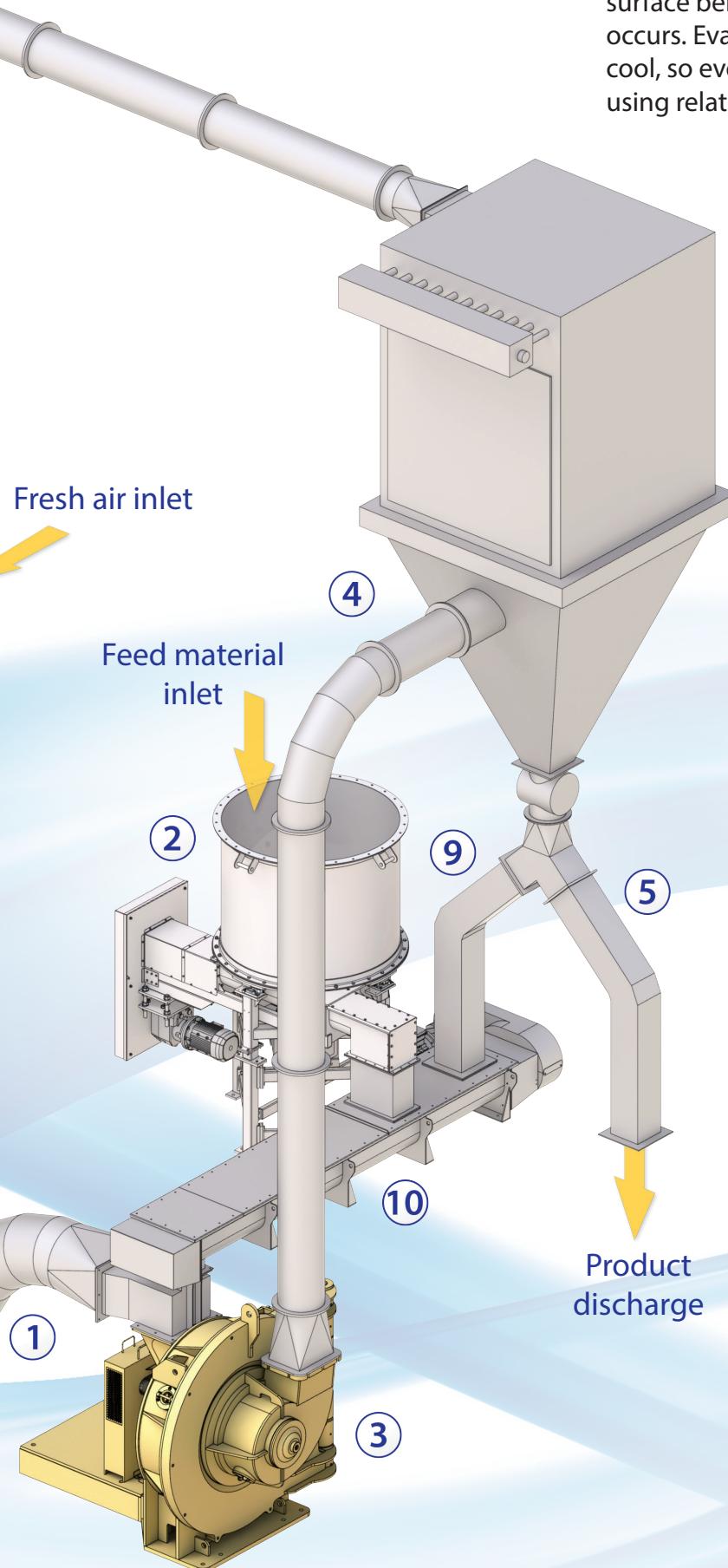
The material is entrained in the air stream which carries it through the mill (3). The air conveys the finished product to a cyclone and/or bag filter (4) where it is discharged (5) to a bagging system or to the next stage of the process. The clean air from the filter continues to the main process fan (6) and then to atmosphere.

Drying Function

The airflow into the mill can be heated to temperatures as high as 550°C to simultaneously dry the feed material. The material is flash-dried, with new wet surface being continuously exposed as size reduction occurs. Evaporative cooling keeps the material surface cool, so even heat-sensitive products can be dried using relatively high inlet temperatures.

The outlet temperature of the mill is adjusted to give the required product dryness. Any source of clean, hot air is suitable, though an oil or gas-fired air heater (7) is usually used.

Exhaust gases from the system can be passed through an optional heat exchanger (8) to heat the incoming air, increasing thermal efficiency and reducing heat losses to near zero.



Backmixing

Feeding of some sticky materials may require some feed conditioning. This is achieved by blending the feed with a proportion of the dry product, which is continuously recycled (9) from the product collector to a mixer/feeder (10) at the mill inlet. The process increases the overall material flow but does not reduce drying capacity or efficiency. The surface of the dry fraction is re-wetted in the mixing process so there is no risk of damage when recirculating heat sensitive materials.

Coating and Surface Modification

Products that require surface modification can have a range of surfactants applied during the milling and drying operations by simply metering the chemical in the required proportion into the mill with the main feed. It is possible to apply more than one surfactant simultaneously.

'A'-series

The main casing is a fully-machined, heavy duty, fabricated steel construction. The three main elements are hinged together for easy access. All the internal surfaces are lined with alloyed iron castings for long wearing life. The main rotor is an assembly of hard castings bolted to a heavy steel disc. All the castings are of small size for ease of handling.

The swing hammer section of the mill is cast in manganese steel.

The mill is usually supplied for operation with a separate fan in the circuit; however it is possible to incorporate a fan into the mill for specific applications.



Fitting the rotor in a 20A Dryer-Pulveriser

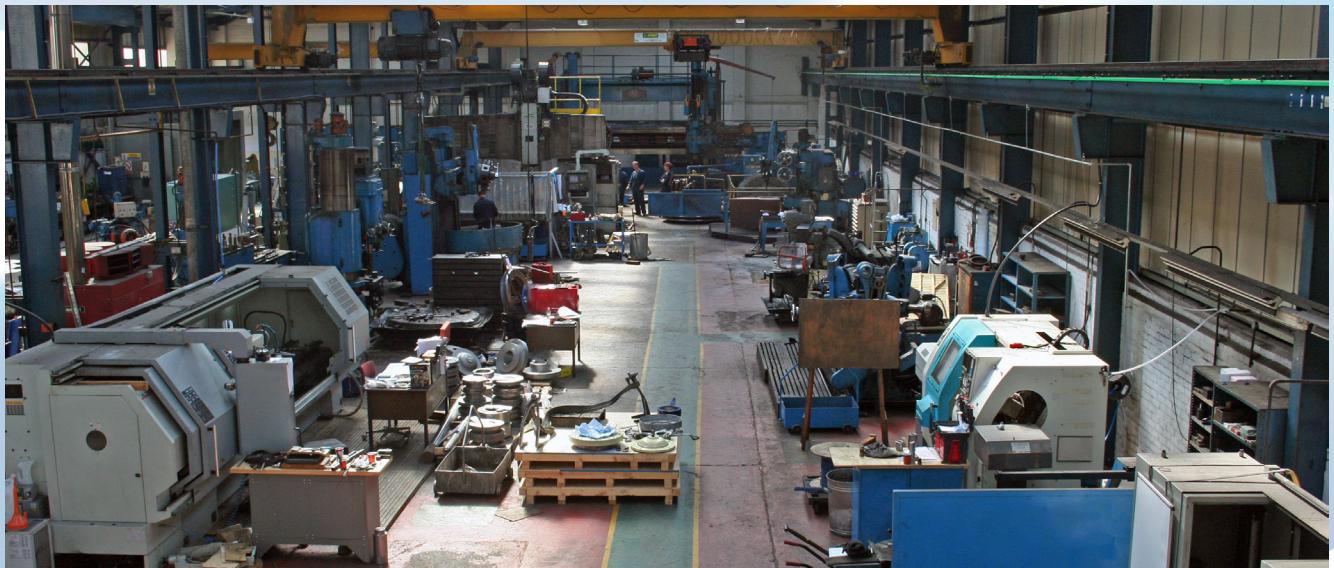
'B'-series

The construction of the 'B'-series is lighter than that of the 'A'-series, though the hinged arrangement is retained. The mill contains no cast iron wear parts but some internal linings are available. The rotor is a single fabrication but with the standard geometry of the 'A'-series.

No swing hammer zone or internal fan is available. However, it is possible to manufacture the 'B'-series mills in stainless steel. A 1B pilot scale unit is available for development work.



The inside of a 20B Dryer-Pulveriser, showing the fabricated rotor and integral classifier



Atritor's well-equipped machine shop



Overview of Atritor's cast iron foundry



The casting of sand moulds



Atritor's organised foundry production line

Pilot Plant

Atritor has production-scale pilot plant facilities available in the UK and the USA to demonstrate the equipment and processes that we offer. The pilot plant can be used to accurately size the equipment necessary for a customer's application and has, over the years, conducted in excess of 10,000 trials on a range of materials, providing a large historical database of the capabilities of the equipment.

The pilot plant is supported by a well-equipped laboratory with a range of techniques for analysis of particle size, moisture content and density of the materials processed.

It allows our process engineers to gain specific experience of the customer's product that can be used to design the materials handling systems around our processes, which enables Atritor to offer process warranties on the plants and processes that we supply.



The 8A Dryer-Pulveriser in Atritor's test facility

Technical Data

Atritor	Units	1B	4A/B	6A/B	8A/B	11A/B	16A/B	17A/B	18A/B	20A/B
Maximum speed	rpm	5,000	2,000	1,750	1,500	1,350	1,200	1,075	950	850
Maximum power	kW	2.2	15	30	37	45	75	110	160	250
Minimum power	kW	1.1	5.5	11	15	22	37	45	75	132
Max. airflow 'A'	m ³ /h	-	1,250	2,500	3,500	5,000	8,500	12,500	20,000	34,000
Max. airflow 'B'	m ³ /h	200	1,750	3,500	5,000	7,500	13,000	20,000	30,000	50,000
Max. evaporation 'A'	kg/h	-	140	300	420	600	1,020	1,500	2,400	4,000
Max. evaporation 'B'	kg/h	25	200	420	600	900	1,560	2,400	3,600	6,000
Max. solids capacity	kg/h	100	1,500	3,000	4,000	6,000	10,000	15,000	24,000	40,000

Material References

The range of materials that the Dryer-Pulveriser has processed is vast – certainly far too many to list – but it includes pulverised fuels, raw and refined minerals, organic and inorganic chemicals, dyes and pigments, plastics, cellulose, food products and waste streams.

If you have a material that requires drying, milling or simply de-agglomerating, please contact us as our extensive database of more than 10,000 tests can provide relevant data for most applications.



An 18A Dryer-Pulveriser and gas-fired air heater for processing precipitated calcium carbonate (PCC)