Product Fineness

The historic size distribution for solid fuel to be fired in suspension is 75% < 75µm.

However, this is greatly influenced by the calorific value of the fuel and by the specific application. For example, the cement industry has used the criteria that the residue at 90µm should not exceed a value of half the volatile content. Thus, a coal with a CV of 20% needs to be ground to 90% < 90µm whereas a lignite with more than 40% volatiles need only be 80% < 90µm. Dried coffee grounds have 80% volatile content, so can be coarsely milled. Conversely, petroleum coke with 10% volatiles must be much finer to ensure complete combustion.

System Turn-Down

The fineness of the product from the mill is largely unaffected by the processing rate so, particularly in direct firing applications, the feed rate can be adjusted to demand at will.

Mill Capacity

Two factors determine the capacity of a mill; the required fineness and the Hardgrove Grindability Index (HGI) of the material. The latter is determined by a standard test method and can vary from 30 to 150 or more. The lower the number, the more difficult the material is to grind. Typical European coals vary between 45 and 65 but even this is significant – the capacity at 45HGI is only 60% of the capacity with 65HGI.

Product fineness is equally significant – the capacity at 90% < 90µm is 70% of that at 80% < 90µm.

So for optimum capacity and minimised specific power, a high volatile material with a high Hardgrove Index should be sought.

Our Dryer-Pulverisers have nominal capacities ranging from 100kg/h to over 10t/h, but these are influenced by the two criteria described.

Power Consumption

The specific power consumption is typically 20-25kWh/tonne of fuel processed but is influenced by the criteria affecting capacity, as it is inversely proportional. However, less than one third of the fitted motor power is used to rotate the mill, so specific power does not increase significantly at lower operating rates.

Maintenance

The Dryer-Pulveriser is designed for rapid replacement of worn grinding elements. The casing is hinged, allowing quick access to the mill internals. All wearing parts are produced in our own foundry in an abrasion resistant high chromium alloyed iron and are stocked in large quantities.

The single most important criterion affecting the operating life of wearing parts, and thus the maintenance cost, is the ash content of the fuel. In this context, petroleum coke, with its invariably low ash, is preferable to coal but most cleaned coals will have less than 10% ash.

Technical Data

ATRITOR SIZE	2A	4A	6A	8A	11A	16A	17A	18A	20A
MOTOR SIZE (kW)	5.5	11	18.5	30	37	75	90	132	250
CAPACITY (kg/h)	100	300	700	900	1 350	2 500	3 500	5 000	10 000

The above capacities apply for a coal with a Hardgrove Index of 55 and a pulverised product with the following cumulative residues:

PARTICLE SIZE (µm)	500	250	150	90	75
RESIDUE (%)	0.05	0.5	5.0	20	25

Complete Engineered Solutions

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

- Full process plant design using the very latest 3-D SolidWorks and AutoCAD software
- Process control systems with custom programmed PLCs
- Supply of all equipment for a complete process
- Full installation service
- Experienced engineers for commissioning and operator training
- Process guarantees
- After-sales services and spare parts supply

Other equipment in the Atritor range

Multirotor Cell Mills

Micronisers

Classifier Mills

Opposed Jet Mills

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Atritor Dryer-Pulverisers are built to the rigorous standards of BS EN ISO 9001:2000

BS EN ISO 9001:2000
CERTIFICATE No FM 11960

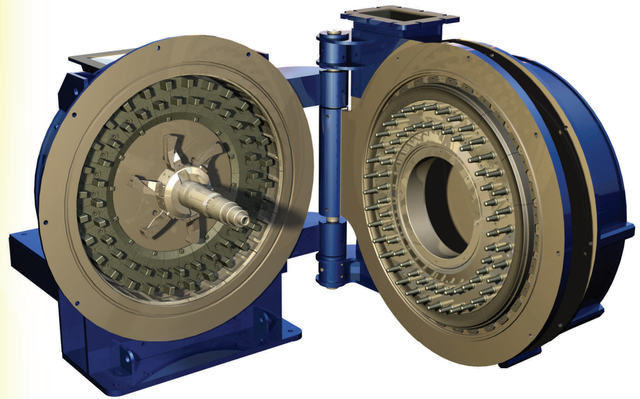
Website
For more information about the company, visit our website

www.atritor.com

and send us your enquiry.

Email sales@atritor.com

Production of Pulverised Fuels



Introduction

Atritor has been involved in the preparation and combustion of solid fuel for more than 80 years. The Dryer-Pulveriser was developed specifically for the direct firing of rotary cement kilns, and in the era of small wet-process kilns it dominated the business in the UK. The development of larger, more sophisticated kilns with larger fuel demand and tighter control of combustion characteristics has favoured indirect firing systems, and Atritor mills are now firing kilns in the UK, Europe, Asia, Oceana, Africa and the US using direct, semi-direct and indirect systems.

Dryer-Pulveriser installation including bag filter

Fuels

As the Dryer-Pulveriser can process very wet and sticky materials, its ability to handle any type of fuel makes it unique. Almost anything with a reasonable calorific value can be prepared and burnt. The most common solid fuels are coal and petroleum coke, although we have successfully fired waste coffee grounds (very wet but with a high volatile content and very low ash), cocoa marc, sawdust and wood waste.

Equipment Description

The Atritor Dryer-Pulveriser is a self contained air-swept mill of unique design operating on the principle of attrition. Size reduction occurs in three progressive stages, the first stage accepting a 50mm feed size. It can have an integral fan enabling the ground coal to be blown directly to the burners with the conveying air providing some of the necessary combustion air.

For a typical coal fired application, the mill is fed by a specially designed table feeder which, for direct or semi-direct combustion, can provide automatic rate control from the mill load, furnace temperature, or other process variable.

The feed should pass through a magnetic separator or metal detector to ensure that no tramp metal enters the mill. This separator can be located either before or after the feeder.

A variable number of radial arms (rejectors) control residence time and the fineness of the grind is easily adjusted by the number of rejectors used.

Heat for drying the coal is provided by the introduction of hot air and/or products of combustion at the mill inlet. As the mill contains a very small quantity of material at any moment and the whole of this is in circulation, the surface area exposed to the hot air is enormous, producing high drying efficiencies.

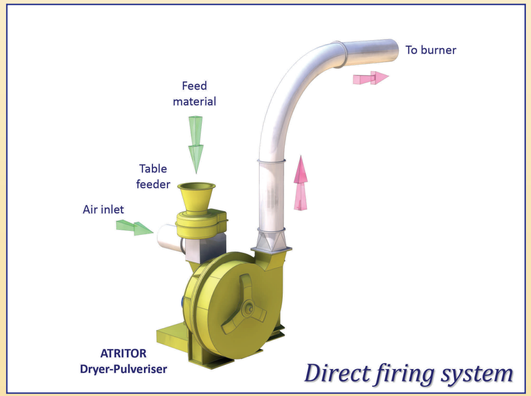
Applications

- Rotary kilns (cement and lime)
- Shaft kilns
- Ceramic kilns (tunnel and chamber)
- Boilers (fire tube and water tube)
- Metallurgical furnaces
- Hot air generators

Pulverised fuel production in Indonesia

Pulverised fuel production in Poland

Firing Methods

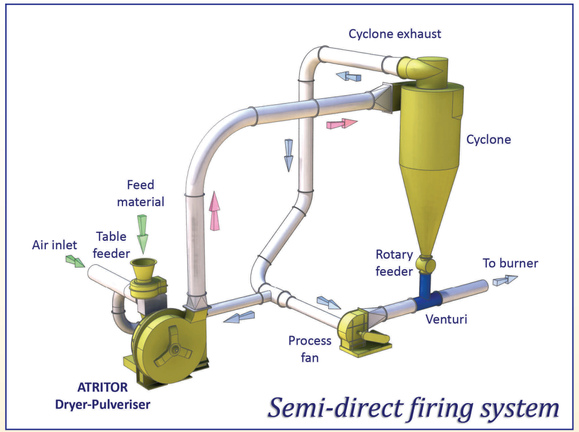


Direct Firing

Direct firing is the most simple method possible, requiring only a feeder, a mill and a burner.

As no pulverised fuel is stored, there are no issues with fire or explosion. However, depending on fuel selection and its associated criteria, the air used in the milling and drying process may exceed the primary air requirement of the combustion process, particularly in high turn-down periods.

Semi-Direct Firing

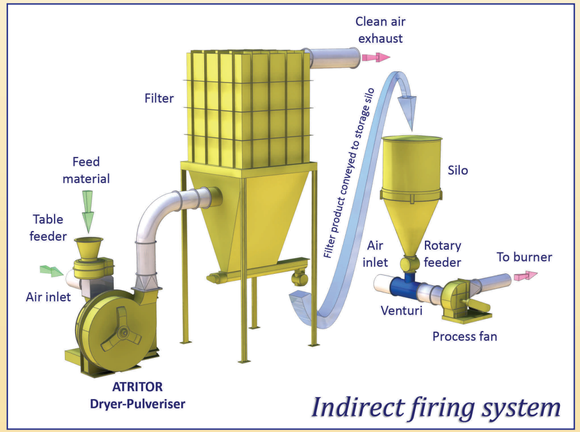


Semi-direct firing mostly overcomes this problem.

The dry, milled product is collected in a cyclone and it discharges through the base into the firing fan discharge pipe to the burner. Process air from the head of the cyclone is partly taken by the firing fan, with the residue returning to the mill inlet.

Again, no fuel is stored so there are no issues with fire or explosion associated with this. However, the cyclone should be vented to a safe place with fuels containing more than 10% volatiles.

With a semi-direct system, the feed to the mill can still be directly controlled by the combustion process parameters.



Indirect Firing

An indirect firing system dissociates fuel preparation from combustion and is often essential for a multi-burner or multi-combustor system.

It introduces a bag filter in place of the cyclone of the semi-direct system, and silo storage of the ground product. This requires a full study of fire and explosion risks and the inclusion of appropriate safeguards.