



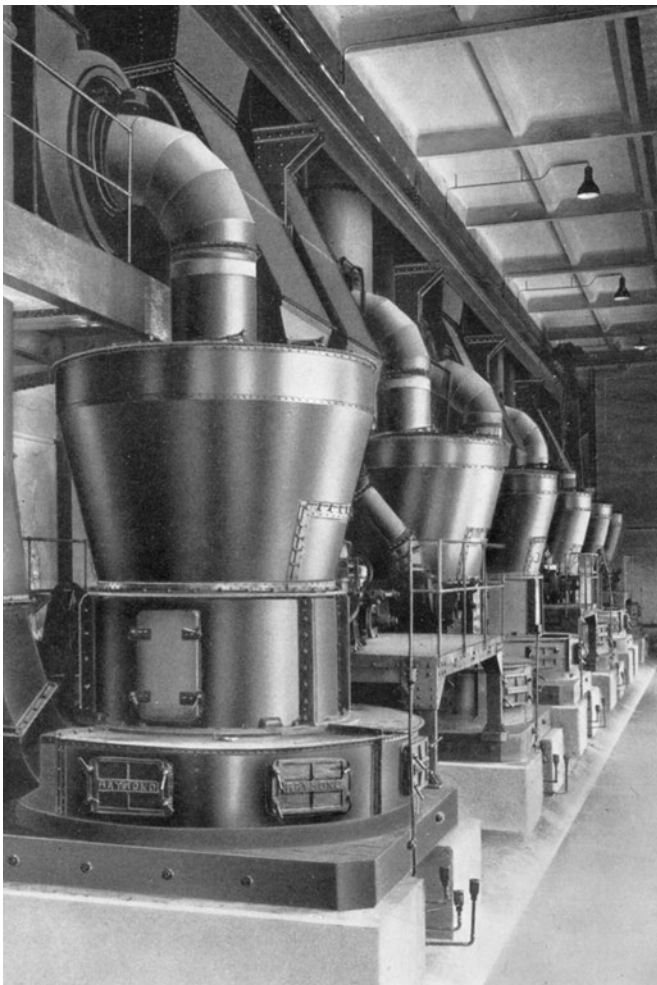
Loesche Grinding Technology for the Power Industry



Loesche group history

Always one step ahead

- | | | | |
|------|------------------------------------------------------------------------------------------------------------------------------------------|------|----------------------------------------------------------------------------------------|
| 2010 | Loesche Energy Systems supply 6x LM28.3 Mills to Gheco One Plant, Thailand (see image below) | 1985 | Delivery of first self-inerting coal grinding plant (LM 21.2 D) for the steel industry |
| 2009 | Loesche Energy Systems retrofit 16x High Efficiency Dynamic Classifiers at Didcot, UK | 1980 | Delivery of first modular coal mill (LM 26.3 D) |
| 2008 | Doosan Heavy Industries licensed to supply Loesche mills to the Power Industry | 1965 | Construction of first pressure mill (LM 12.2 D) |
| 2006 | Loesche Energy Systems Limited founded in UK as centre of excellence for coal and biomass mill application in the power utility industry | 1961 | Introduction of hydraulic spring assembly system |
| 2002 | Coal grinding plant (LM 23.2 D) for grinding wood pellets for power stations | 1953 | 500 th coal mill plant sold worldwide |
| 1992 | Central coal grinding plant (LM 26.3 D) for the production of lignite (brown) coal dust | 1927 | First Loesche coal mill delivered for the Klingenberg power station in Berlin |
- We have been successfully involved in the grinding of solid fuels since 1925.



Loesche Energy Systems Limited

Grinding experts for the power industry

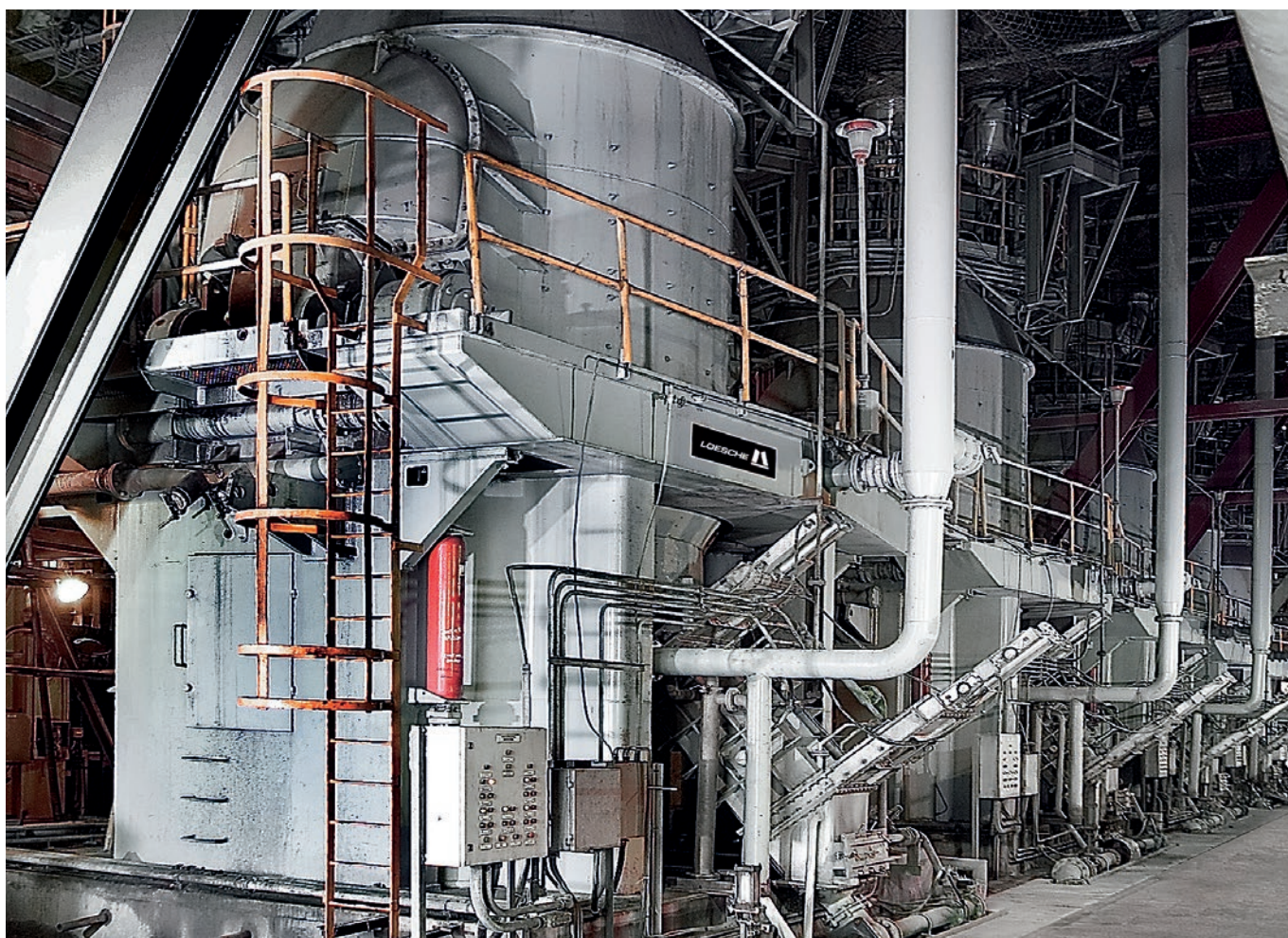
Loesche Energy Systems Limited, based in the UK, is a wholly owned subsidiary of Loesche GmbH and the supplier of Loesche Grinding Technology to the Power Industry. Loesche GmbH has decades of experience in the development of grinding technology and is certified in accordance with EN ISO 9001:2015. Their main field of operation is in the new installation or replacement of mills, improvement of existing mill performance or offering turnkey service for complete grinding plants.

Loesche produces grinding mills and classifiers for all solid fuels, with throughputs ranging from 8 to 240 t/h (16,000 to 640,000 lb/h).

With a long wear life and easy replacement of worn parts, we minimise maintenance and downtime. All of our technology utilises energy and resources efficiently and meets international safety regulations, including NFPA 85. Loesche quality and reliability are internationally recognised.

Our customer service has a client focused approach and offers on-site technical support, in-house design and a laser scanning service, coupled with unlimited spare parts capacity.

We offer projects from feasibility studies through to completion. Loesche Energy Systems Limited can contribute toward the optimisation of your power plant.



Loesche mills for solid fuels

New or refurbished plant, Loesche have the mill to meet your needs

Loesche vertical roller mills for solid fuels are offered with 2, 3 or 4 rollers with a capacity range of 8 to 240 t/h (16,000 to 640,000 lb/h) giving us the flexibility to match the process requirements for your plant.

Our mills offer a large range of benefits for both purchaser and operator, from the standard version to top-of-the-range ATEX certified installations.

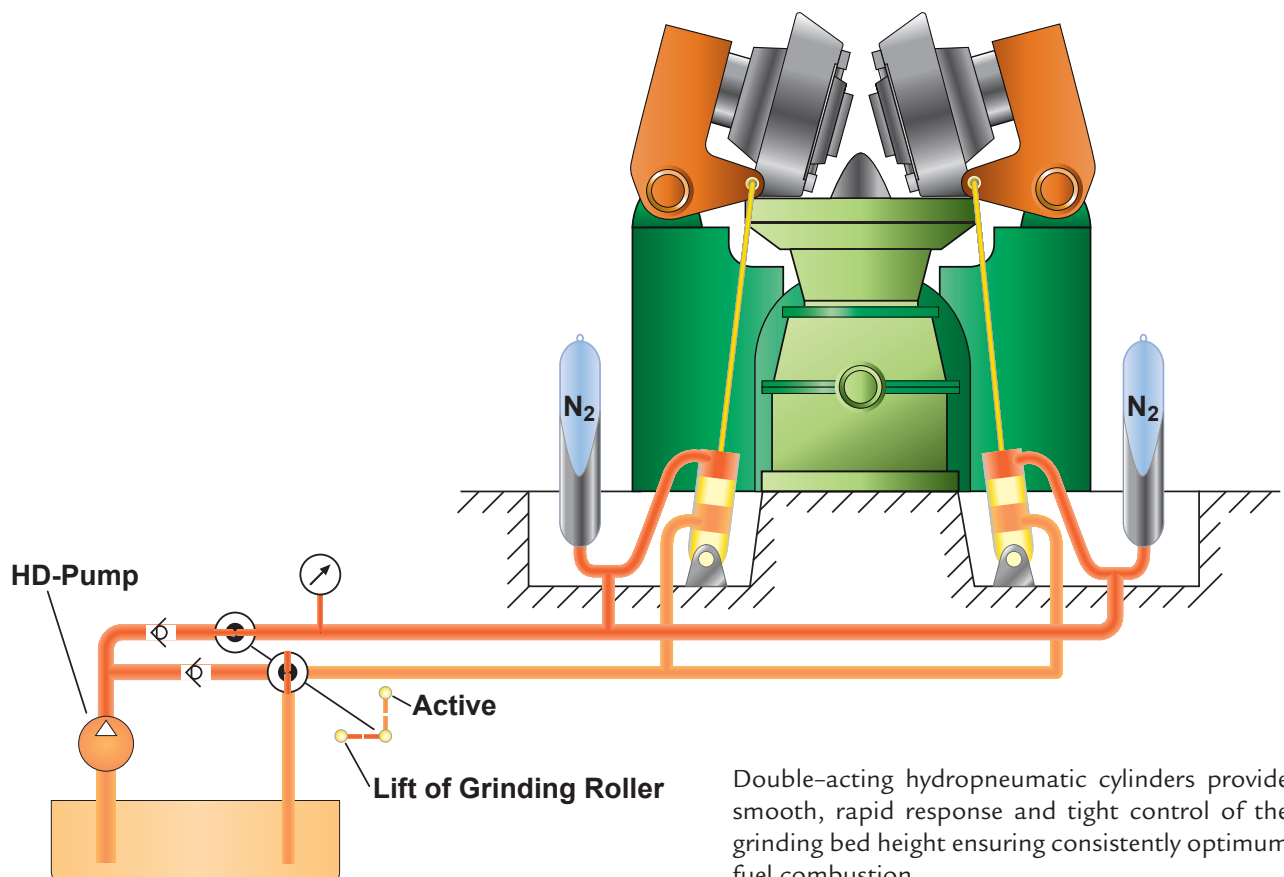
Highly developed and established system components ensure high reliability and mill availability together with low reject rates, resulting in low spare part requirements and lower maintenance costs.

There is minimal re-circulation of Pulverised Fuel within the mill. On-line fuel blend changes are also possible.

Our mills are supplied with Loesche high efficiency classifiers, ensuring consistent fineness across the mill throughput range (see page 8) and have complete electrical control and instrumentation equipment solutions. Loesche mills are relatively quiet in operation.

Key features

- Individually-guided, double-acting hydraulically loaded grinding rollers improves roller response and control (see below)
- Horizontal grinding table with segmental grinding plate
- Roller swing-out device for quick and easy changing of grinding components
- High wear life power plant tyres available
- Planetary gearbox with full lubrication and cooling systems
- Inclined grinding rollers to create shear as well as compressive forces
- Low vibration mill reducible to 40% of the mill load
- Safe by design, as no metallic contact between grinding components, even when empty
- Pressure shock resistant design as standard
- Low starting torque, even with a full mill
- Single electrical mill drive, no auxiliary drive required
- Variable speed mill drives for Petcoke projects
- Integrated reject clearing system
- Integrated seal air connections for all mills
- Mill inerting nozzles for connection to fire suppressant systems
- Full access platforms available to client requirements
- Modular design enables utilisation of identical components in differing mill sizes



Mill capacity range

A mill to suit your requirements

Loesche mills have been in development and operation for many years in both cement and solid fuel applications and are easily identified by the model number.

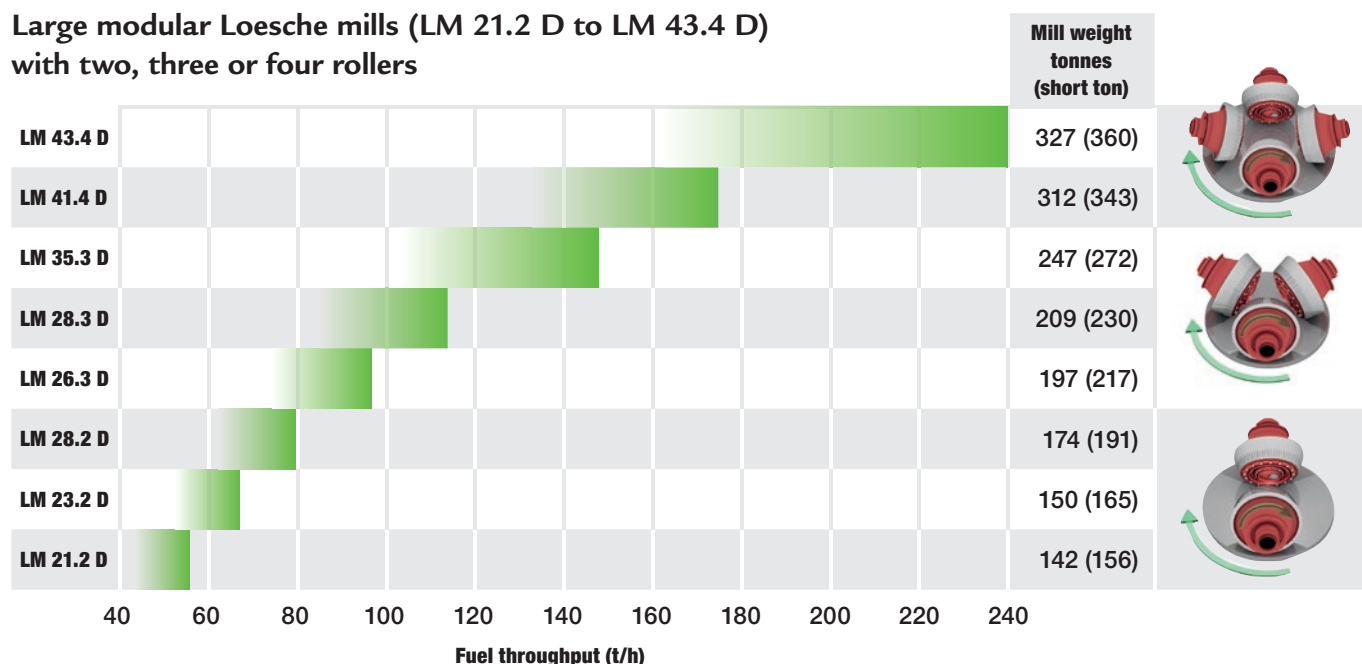
Larger mills are also available (contact Loesche Energy Systems Limited for details). The range below reflects those usually found in power applications.

Info

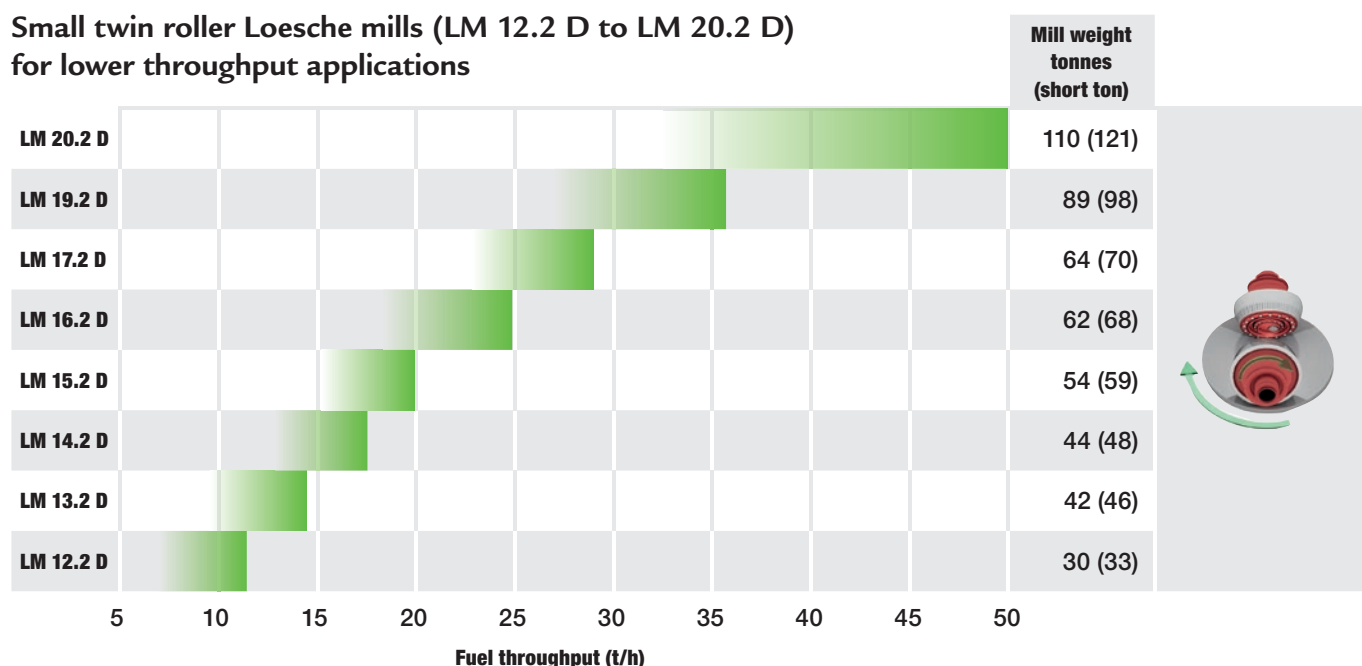
Loesche mill name format

LM	##	.	#	D
Loesche mill	Table diameter (in decimetres)		Number of rollers	Pressurised

Large modular Loesche mills (LM 21.2 D to LM 43.4 D) with two, three or four rollers



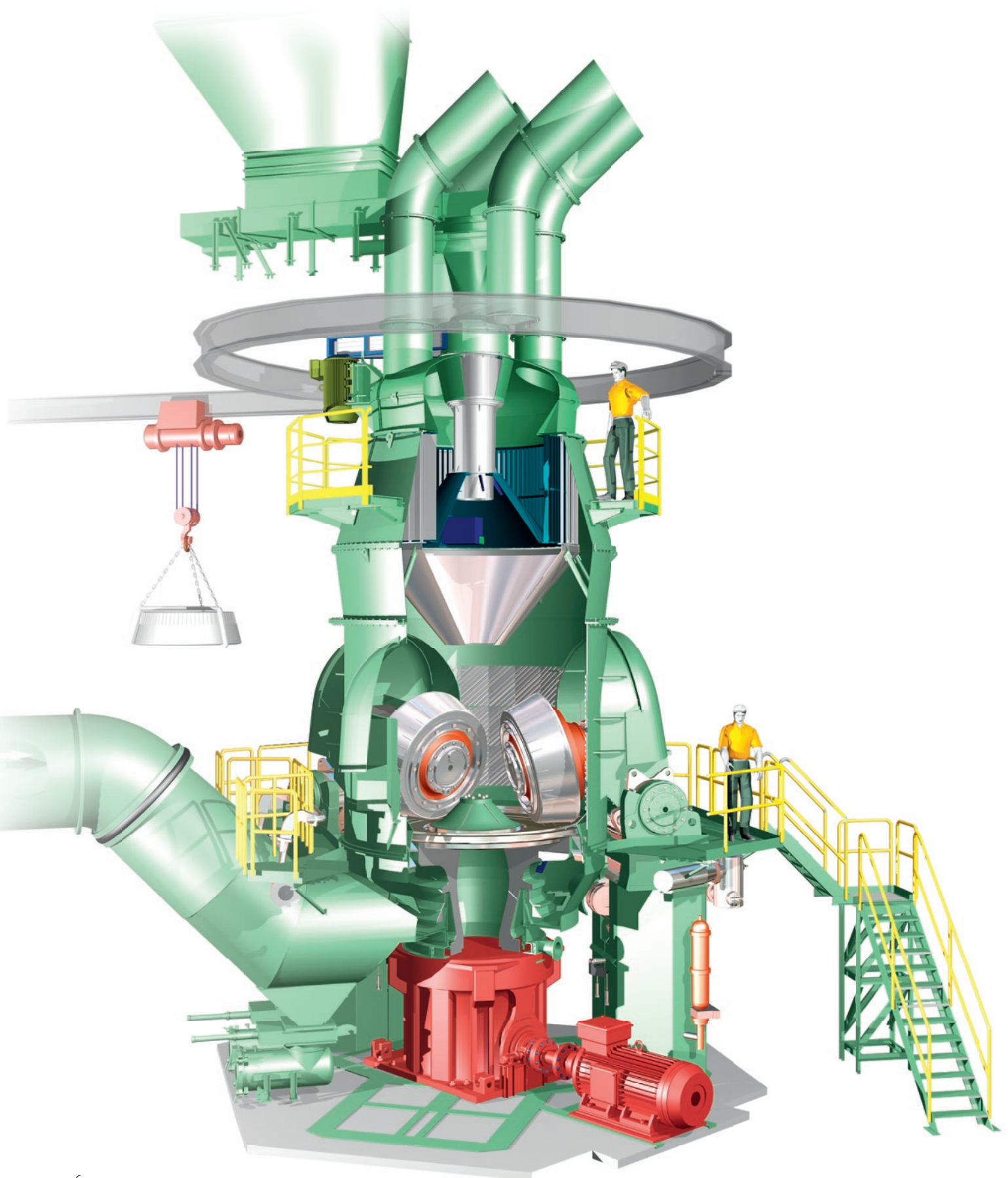
Small twin roller Loesche mills (LM 12.2 D to LM 20.2 D) for lower throughput applications



The information above represents guideline values for an averaged coal. For further information and the right mill for your application, please contact Loesche Energy Systems Limited.

Typical mill and classifier arrangement

Solid fuel mill with LSKS classifier shown



Mill operation/Functional description

New or refurbished-plant, choose Loesche mills for high availability and reduced maintenance

Grinding principle

The feed material is ground in a Loesche roller grinding mill, between the rotating grinding table and the individually guided grinding rollers. The compressive force applied by the roller crushes the feed material. The inclined attitude of the conical roller generates shear forces within the material. These comminution forces are generated by the pressure within the hydro-pneumatic spring assembly and are regulated by the control system.

Process description

The feed material enters the mill from the fuel hopper and falls onto the centre of the grinding table. The feed material is spun outwards by the rotation of the grinding table, where it comes under the rollers. It is ground by the compressive and shear forces exerted on the material by the grinding rollers and the grinding table.

The hot primary air is directed upwards in a vortex by the louvre ring (throat) around the grinding table. The pulverised solid fuel is captured in this air flow and is conveyed upwards to the classifier. Moisture contained in the fuel is evaporated by the primary air, which reduces its temperature.

The product flows upwards through the top of the mill housing and into the classifier.

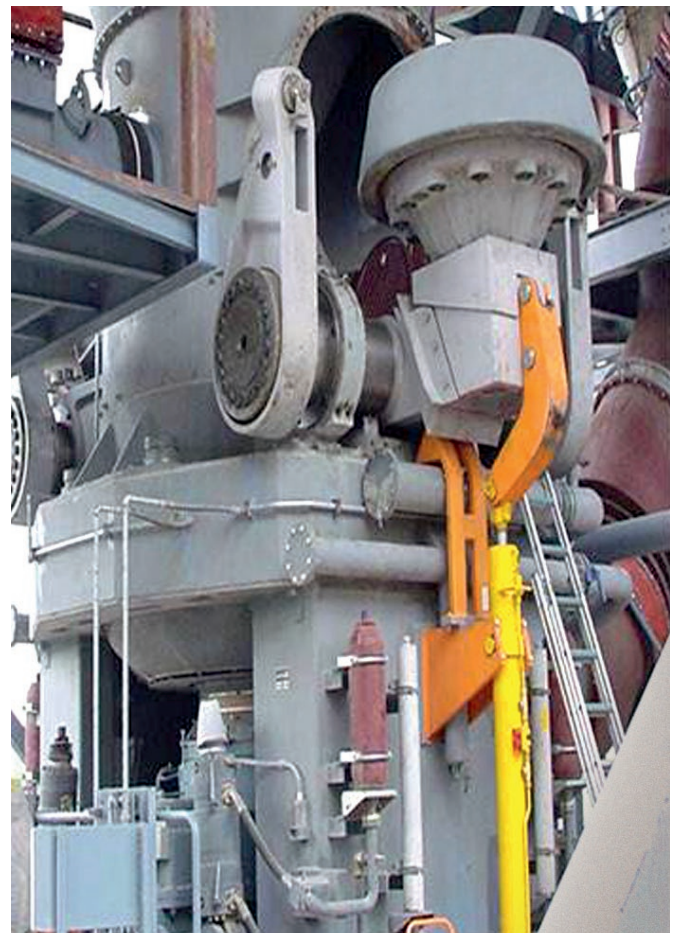
Depending on the fineness of each particle in the flow, it either passes through the classifier and into the pulverised fuel (PF) outlet pipework and directly to the burners in the boiler or, if the particle is too large, it returns through the grit return cone and back to the grinding table for further grinding.

Additional features

- The mill is powered by an electrical drive motor via a bevel/planetary gearbox. Thrust bearings in the gearbox absorb the roller forces that act through the grinding table.
- The double-acting hydraulic cylinders of the spring assembly raise the grinding rollers prior to commencing grinding, allowing the mill to start with a lower torque (approx. 40% of the operating torque), regardless of its filling condition.
- There is no metallic contact between the grinding rollers and grinding track due to adjustable stop buffers mounted on the mill.

- Wear life of the grinding parts is maximised through material selection and generous material wall thickness.
- Worn roller tyres and grinding table segments subject to wear are easily replaced with the roller swing-out device (see below).
- Foreign particles (rejects) not picked up by the air flow leave the table and fall through the louvre ring. Scrapers installed on the underside of the mill table push them into the mill reject box for safe removal.
- Low particle recirculation through the classifier ensures maximum grinding efficiency.

Swing out device for easy roller removal



Loesche classifiers

High efficiency classifiers with consistent fineness across mill throughput range

With new or existing mills, an efficient classifier will improve the burner performance and overall plant efficiency.

All Loesche classifiers offer:

- Consistent fineness across the mill throughput range
- Close particle size distribution, optimised for burner applications
- Wear protection suited to the fuel
- Pressure-shock-proof housings to NFPA 85
- Compliance to ATEX where required
- A seal air system which protects the bearing cartridge
- Balanced PF-outlet distribution
- The latest in technological developments
- Fuel introduction either laterally or centrally
- Up to 8 classifier outlets for connection to burners

High efficiency dynamic classifiers type 'LSKS' feature:

- Up to 85% passing 75µm (200 mesh) and 99.999% passing 300µm (50 mesh)
- Fuel throughput from 1 to 1000 t/h (2000 to 2 million lb/h)
- Full access for maintenance or service
- Customisation to project requirements
- Rotor replacement once worn

High performance static classifiers type 'LDS' feature:

- Minimal maintenance
- Fineness determined by the angle of the static vanes
- Interconnected vanes for easy adjustment to requirements

Dynamic classifiers for Biomass feature:

- A special design specifically for the Biomass market
- The same quality and throughput available as for other fuels
- Optimised fineness for Biomass combustion
- Avoidance of potential clogging of the rotor blades
- Higher pipe velocities

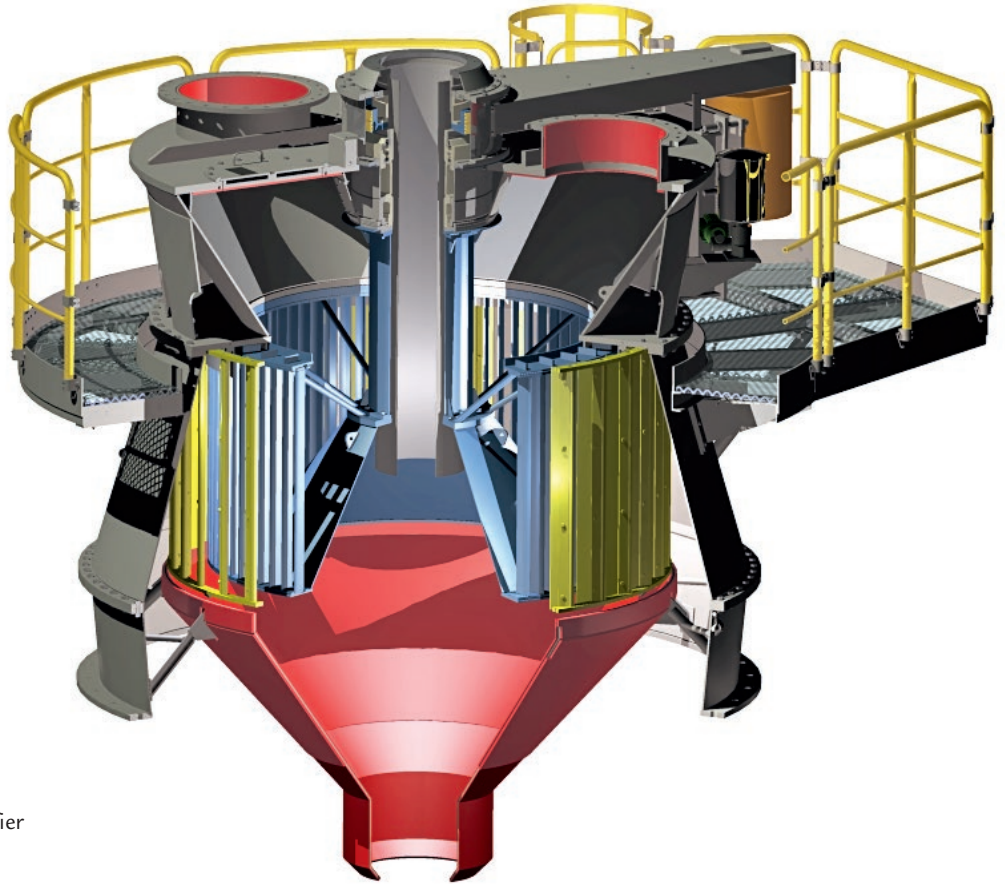
Classifier retro-fits on existing mills

Replacing the current classifier with a Loesche LSKS High Efficiency Dynamic Classifier significantly improves mill performance. Operational benefits can include:

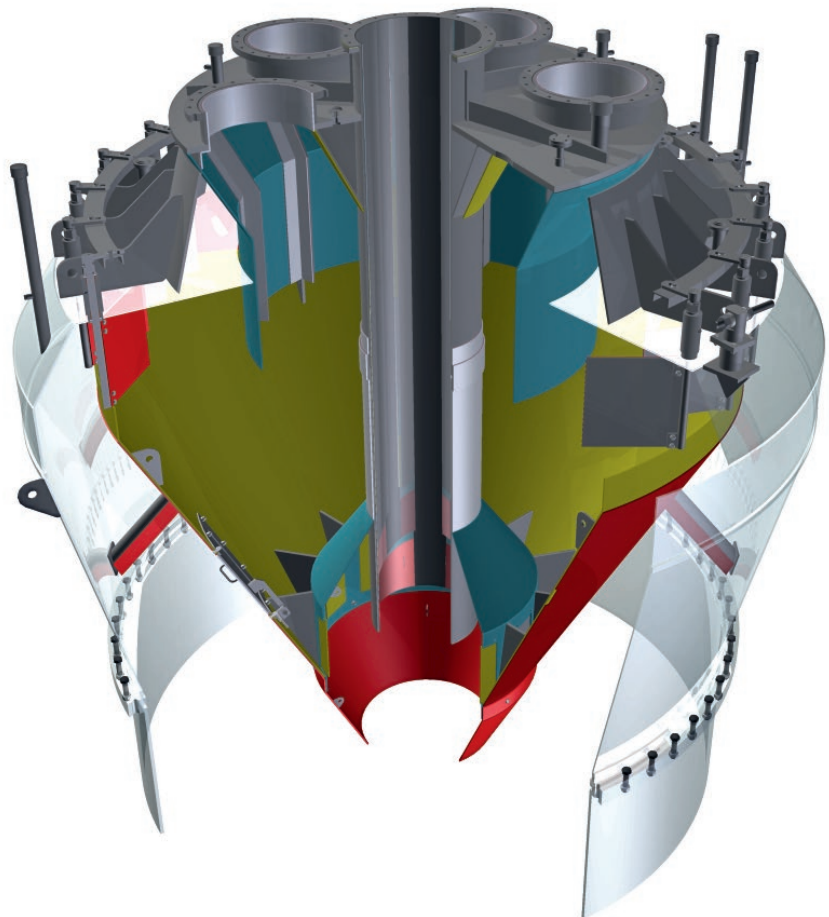
- Increased mill coal throughput (allowing a return to an N+1 basis or to make up lost MWe)
- Increased fineness for the same level of throughput
- Reduction in LOI and unburned carbon
- Reduced NO_x emissions from the boiler
- Reduced Pressure Drop across the mill (Delta P)
- Optimisation of coal diet along with improved fuel flexibility
- Reduced Power Consumption (Mill and Mill Fan)

Loesche can retro-fit classifiers to all types of mill either directly or remotely mounted. With our in-house laser scanning facility (see page 14), we can rapidly model the site geometry to illustrate the scope of work required.

Each situation is different; to find out what we can do for you, please get in touch.



LSKS High Efficiency Dynamic Classifier



LDS High Efficiency Static Classifier

Loesche high efficiency dynamic classifier operation

Low maintenance, excellent fineness

The Loesche LSKS high efficiency dynamic classifier is the 4th generation of classifier by Loesche.

This classifier has a carbon steel housing with internal wear protection. The gas flow is primarily directed into the rotor by hard wearing static guide vanes. The rotor consists of a cage equipped with replaceable blades which is statically and dynamically balanced. This is driven by a frequency controlled electric motor connected through pulleys via multi-v drive belts. The classifier comes with all ancillary controls and instrumentation.

Classifier functional description

The Loesche LSKS classifier is an air-flow classifier. An upwardly flowing and rotating air-fuel mixture, generated by the mill and contained by the classifier housing, enters the classifier in the zone of the static guide vanes. These redirect the air-fuel mixture into a tangential flow toward the rotor. In the gap between the static guide vanes and the spinning rotor the particles are subjected to various forces. Based on the particle's mass, velocity and the balance of the forces acting upon them, they either do not pass through the rotor and return through the grit cone to the mill for further grinding, or pass through the rotor and are carried up in the air flow and out of the classifier to the burners on the boiler. The size of particles passing the rotor is related to its speed, whereby a lower rotor speed gives a coarser Pulverised Fuel but greater throughput, and a higher rotor speed gives a finer Pulverised Fuel with a lower throughput.

Info

How classification happens

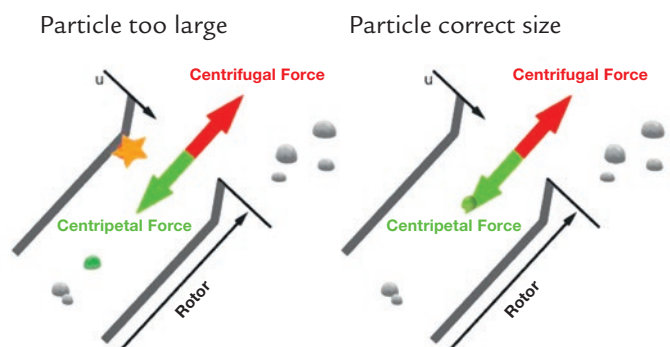
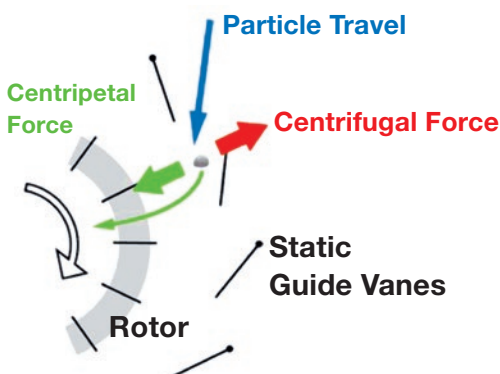
The mill provides the initial classification. Only particles of a certain size can be lifted by the primary air flow through the louvre ring. Once the particle reaches the classifier the particle is subjected to the forces outlined below. The balance of which, at two key points determines how the particle exits the classifier; to the burners or returned to the mill for further grinding.

Between the static and rotating vanes

The centrifugal force on the particle, determined by the speed of the rotor, is greater for larger particles. Large particles strike the vanes, lose energy and fall vertically between the vanes back to the grinding area.

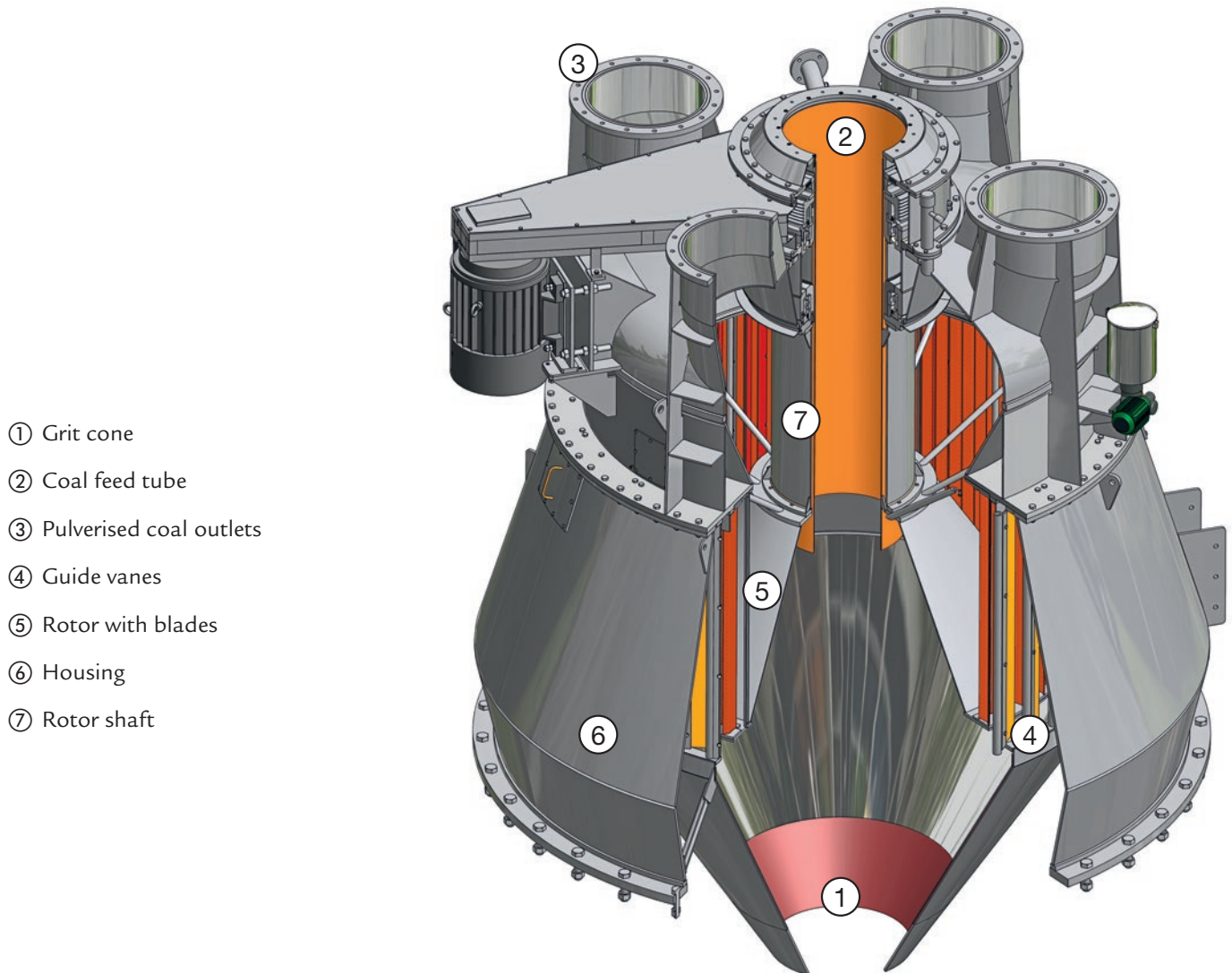
In the rotating vanes

Small and medium particles make it to the rotor vanes. Medium particles travel slower than small particles and strike the rotating vanes as they pass and are pushed outwards to fall vertically onto the grinding bed.



Loesche high efficiency dynamic classifier for the power industry

The ideal solution for optimised boiler performance...



- Steeper grain size distribution curve with reduced coarse end fraction material
- Reduced recirculation of fine product
- Improved boiler efficiency through reduction in unburnt carbon in ash content and NO_x emissions
- Improved mill operation for wider coal diet specification
- State of the art design suitable for retrofitting both vertical spindle and horizontal ball mills
- Flexible operation and response rate to mill load demand
- Turnkey solutions available



Dynamic Classifiers for Ho-Ping Power Plant

Solid fuels

Loesche coal-grinding mills are highly adaptable to individual customer requirements

Loesche has extensive experience over many years with a large variety of fuels with varying properties. A change in feed material or blend can be achieved without interrupting grinding operation.

Bituminous coal

Bituminous coals are the most frequently used fuels. Loesche have experience of grinding a huge variety of coals with a vast range of properties.

Pelletised Biomass

Our mills perform as well on Biomass as they do on other fuels. Increasingly CO₂ targets are being offset by the use of Biomass. Whatever your Biomass grinding needs are, Loesche have the mill and classifier to meet your demands.

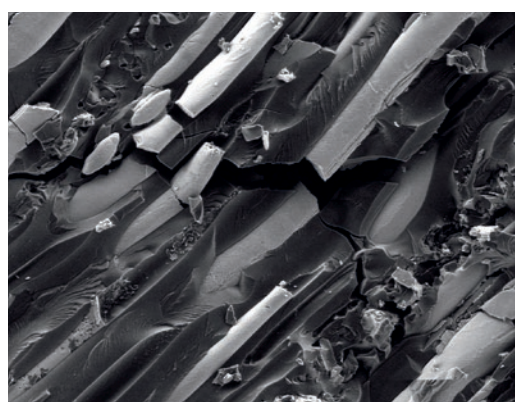
Petroleum Coke and Anthracite

Due to the low level of volatile matter (between 1 and 15%) a greater fineness is required to achieve the necessary particle surface area for optimum combustion in the boiler. Mills for Petcoke are equipped with a wider control range of the hydraulic spring assembly system and a variable speed controller for the mill motor to allow speed adjustment of the grinding table, to optimise grinding.



Bituminous

1 cm

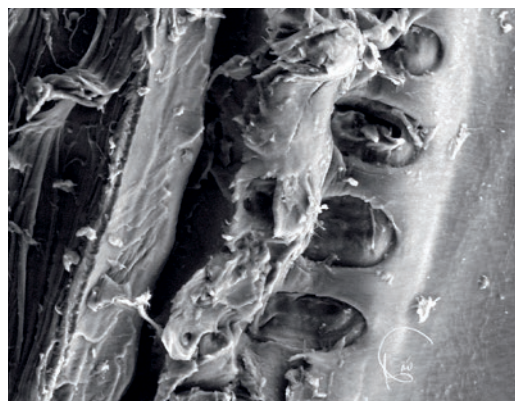


50 µm

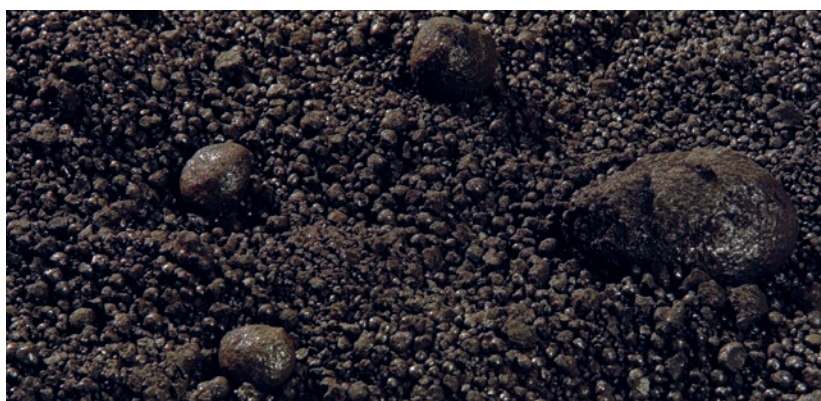


Wooden pellets

1 cm

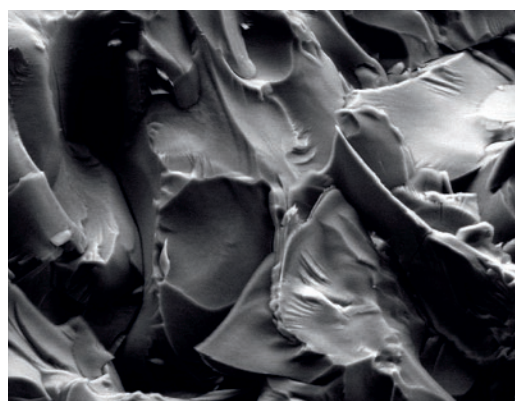


50 µm



Petroleum coke

1 cm



50 µm

Lignite (also known as brown coal)

Loesche have also vast experience with lignite from our steel industry background. Where the lignite has a high fibre content, the shear forces in the grinding process help to ensure that the fineness requirements are met.

Loesche expertise

High ash content: Loesche use materials with superior anti-wear characteristics, an increased wall thickness of the roller tyre and optimised wear protection is used to increase the time between outages.

High moisture content: with high primary air temperatures, all drying takes place in the mill. By using indirect firing and dense phase burners we are able to grind solid fuels with moisture contents above typically accepted limits.

Loesche Development Centre

Continual development of our mills and classifiers is carried out at the Loesche Technological Development Centre in Neuss, Germany.

Services include:

- Calibrated practical grinding tests
- Examination and assessment of new materials
- Optimisation of mill settings for special products
- Testing of new wear-resistant materials and concepts
- Testing of new mill designs
- Simulation and optimisation of plant process and operation



Loesche Grinding Test Rig

Customer services

Loesche Energy Systems Limited recognise how critical the grinding equipment is to power plant operation

Our customer services department is here to ensure that you receive the best service every time. Typical services are outlined below, but please do not hesitate to contact us whatever your query.

Spares

Maximised component life reduces the requirement for purchase and storage of spares. However, with wear parts and inevitable accidental damage the Loesche spares department are here to ensure your scheduled shutdowns run smoothly. We can help with maintenance scheduling and procedures with long-term agreements to help you plan, as well as offer site support of almost unlimited capacity.

Technical field support

Loesche personnel are available to ensure that our quality product is working to our exacting standards. We can offer construction, commissioning and maintenance supervision, as well as diagnostic process or mechanical audit reviews for optimisation of your plant. We can also offer on-site training services for your personnel. Please ask for details.

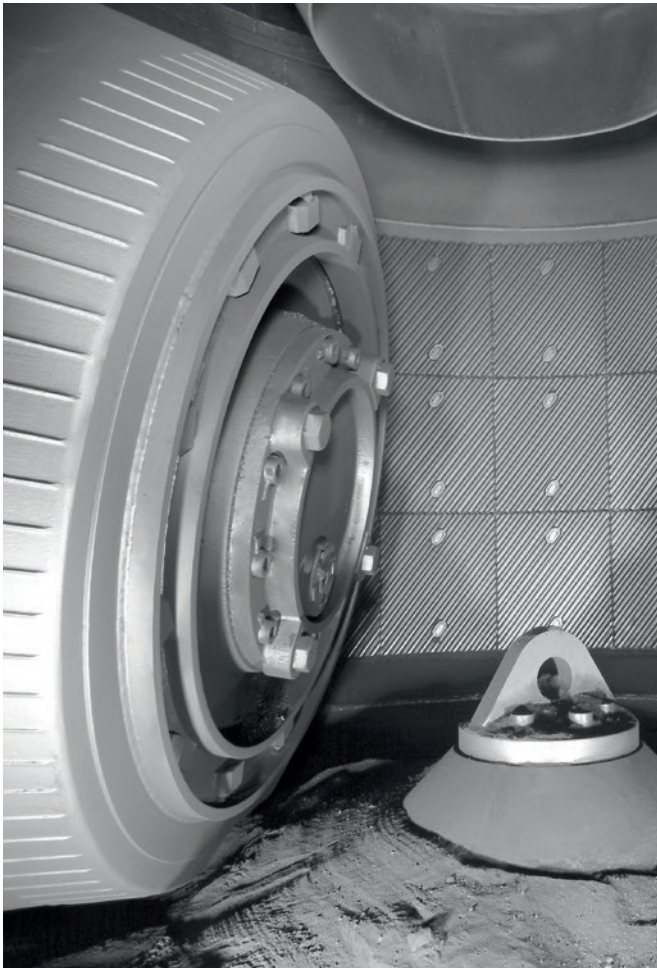
Laser scanning service

This is particularly applicable for retrofit projects, where we can fully model the existing geometry and show exactly how the Loesche equipment will fit. Our design engineers carry out laser scanning and modelling to provide a 3-D environment of the actual site geometry.

This produces a colour 3-D point cloud model, the data of which can be securely and safely transmitted to the client via our online portal. We can also generate “before and after” models.

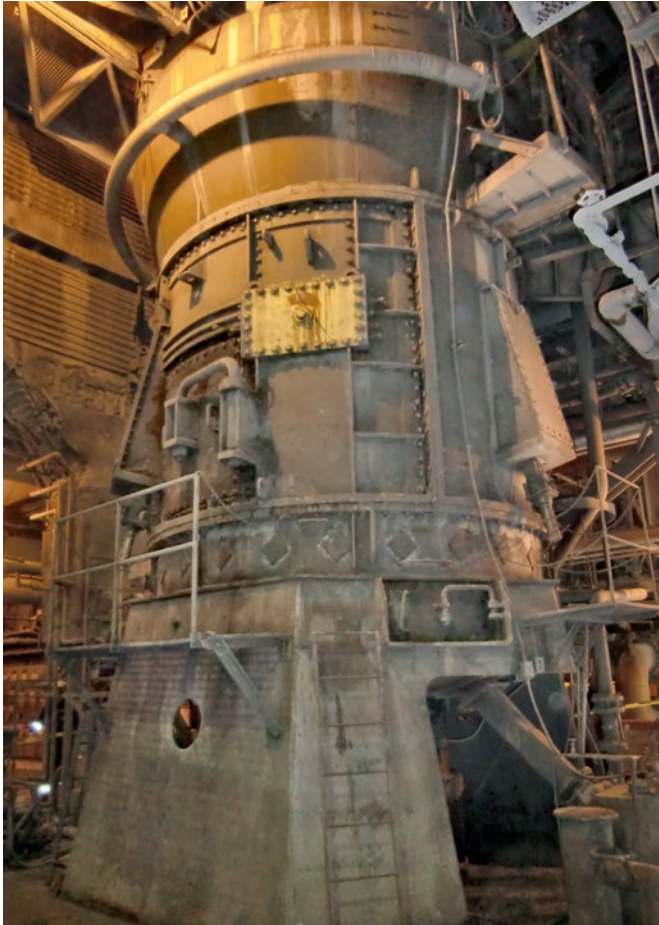
Loesche Energy Systems Limited then submit an illustrated report with project customised designs, which will ensure a timely installation.

Replacement tires and table segments

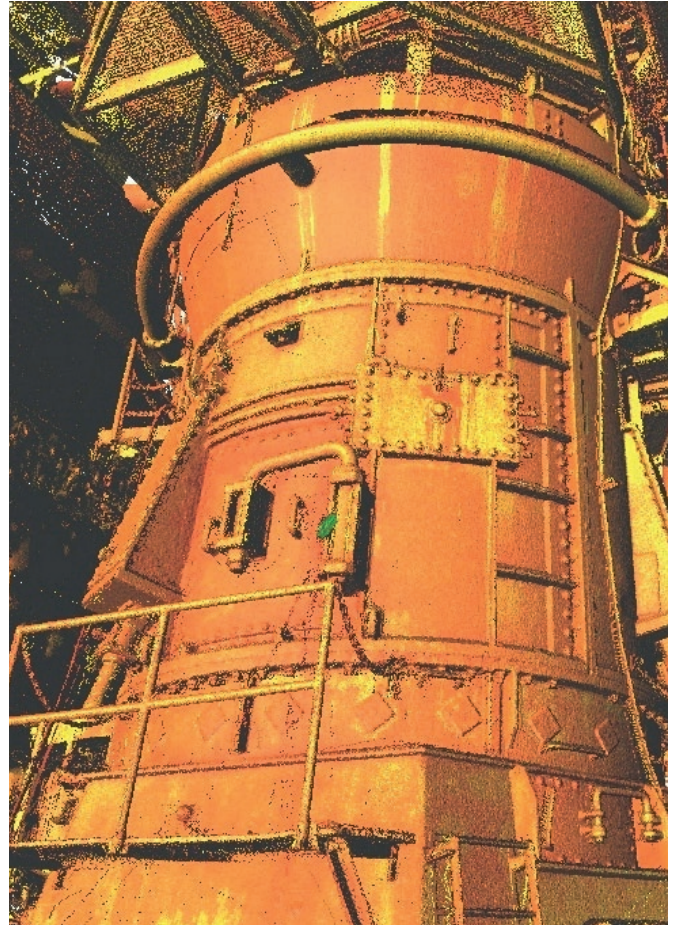


Rocker arm spares

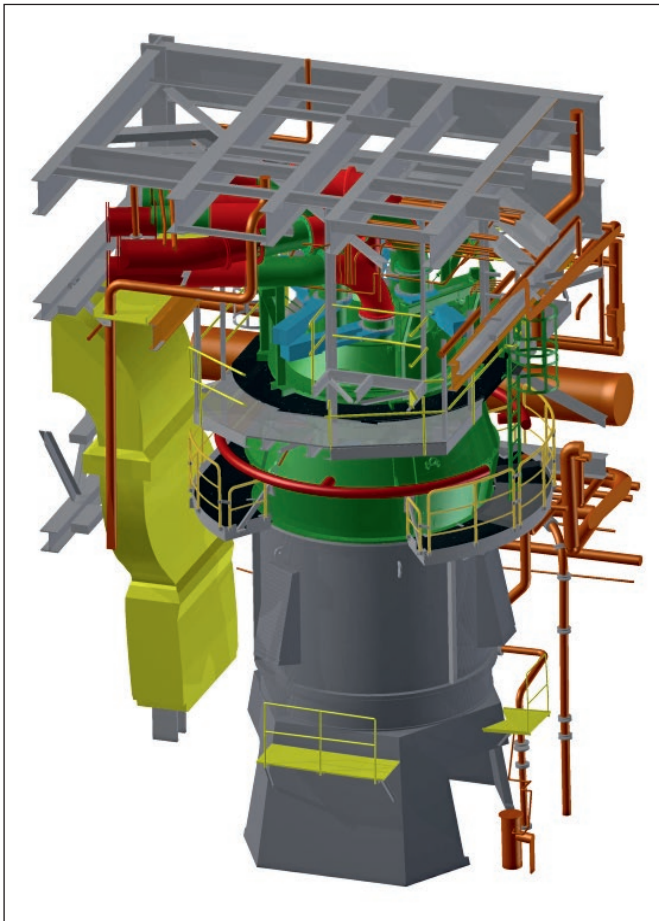




Pre Conversion



Point Cloud Data



CAD Layout



Post Conversion

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