MMD SIZERS™

GREEN MINING SOLUTIONS



SIZING MINERALS WORLDWIDE

THE MMD GROUP OF COMPANIES

WWW.MMDSIZERS.COM

The MMD Group of Companies



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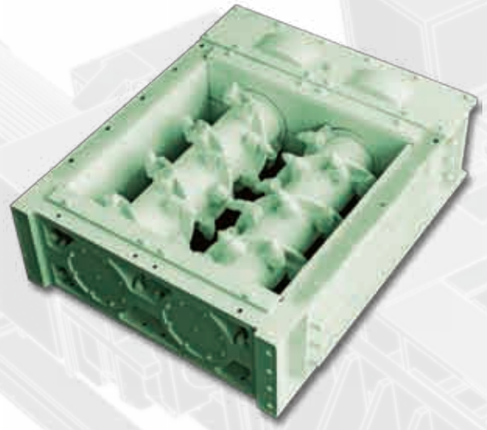
The MMD Group of Companies is a world leading specialist in the processing and reducing of natural and manufactured materials utilising *Sizer Technology*.

Founded in 1978 to design and manufacture mineral processing equipment for the UK underground coal mining industry, MMD developed the Twin-Shaft Mineral Sizer, an innovative product providing a technological breakthrough in mineral reduction.



The MMD Twin Shaft Mineral Sizer has progressed from a 500 series machine, through to the 1500 series machine, capable of handling material up to 3 cubic metres, with capacities in excess of 12,000 tonnes per hour. The MMD Sizer has the ability to process wet sticky material or hard dry rock or a combination of the two, and has proven to be the ideal sizing solution for over 80 different minerals worldwide, in industries such as cement, ceramics, construction, diamonds, energy, industrial minerals and precious metals.



MMD has also successfully designed and manufactured, mobile, semi-mobile, and static Sizer stations for the complete mineral sizing solution.

The Principles of SIZER TECHNOLOGY

The basic concept of the MMD Sizer, is the use of two rotors with large teeth, on small diameter shafts, driven at a low speed by a direct high torque drive system. This design produces three major principles which all interact when breaking materials using *Sizer Technology*. The unique principles are; The Three-Stage Breaking Action, The Rotating Screen Effect, and The Deep Scroll Tooth Pattern.

The Three-Stage Breaking Action



Initially, the material is gripped by the leading faces of opposed rotor teeth. These subject the rock to multiple point loading, inducing stress into the material to exploit any natural weaknesses.

At the second stage, material is broken in tension by being subjected to a three point loading, applied between the front tooth faces on one rotor, and rear tooth faces on the other rotor.

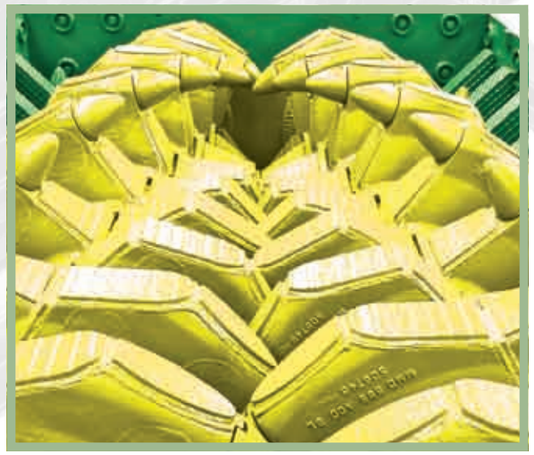
Any lumps of material that still remain oversize, are broken as the rotors chop through the fixed teeth of the breaker bar, thereby achieving a three dimensional controlled product size.

The Rotating Screen Effect



The interlaced toothed rotor design allows free flowing undersize material to pass through the continuously changing gaps generated by the relatively slow moving shafts.

The Deep Scroll Tooth Pattern

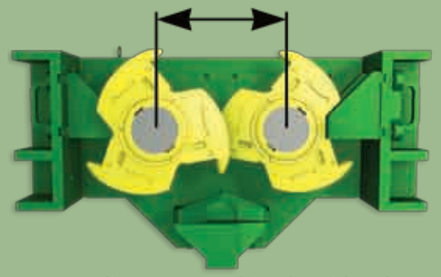


The deep scroll conveys the larger material to one end of the machine and helps to spread the feed across the full length of the rotors. This feature can also be used to reject oversize material from the machine.

MMD Sizer Designation

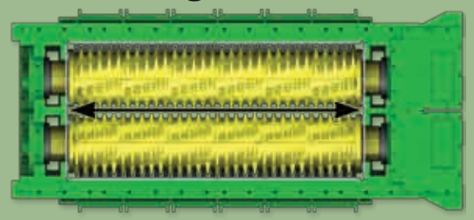
The different models of MMD Sizer are designated by the distance in millimetres between the centre line of the two rotors, the tooth configuration fitted to the rotors, the effective length of the inlet opening and the direction of shaft rotation.

Centre Distance



The centre distance combined with the tooth configuration controls the maximum size of infeed material that the unit can process efficiently.

Length of Inlet



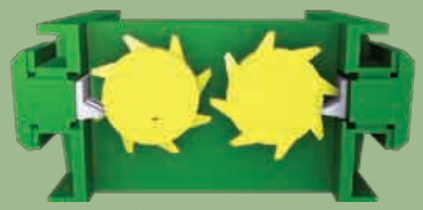
The length of the inlet has a major effect on the volume of material that the unit can process.

Inward Running



Inward running is the normal method of operation for most tooth configurations and must be used on wet sticky materials.

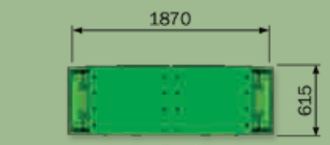
Outward Running



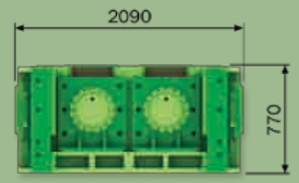
On secondary and tertiary Sizers, outward running can be used on certain materials to produce a smaller product than is possible when running inwards.

Sizer Series Comparison

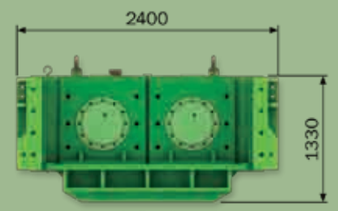
Typical dimensions for the range of MMD Sizers
(All dimensions are in millimetres)



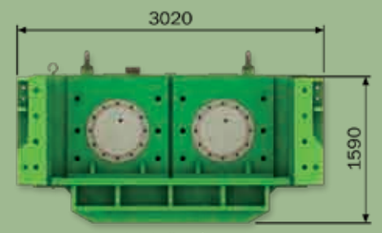
500 Series



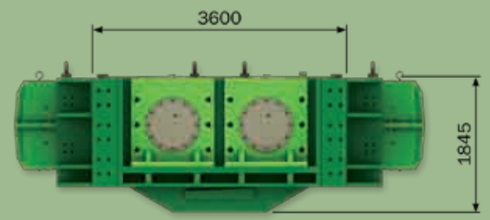
625 Series



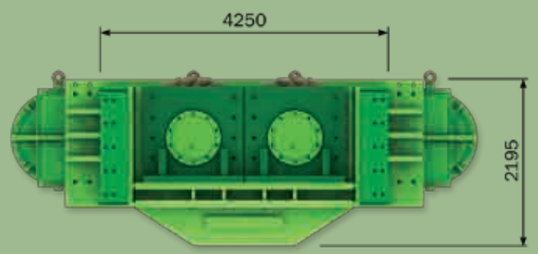
750 Series



1000 Series



1300 Series



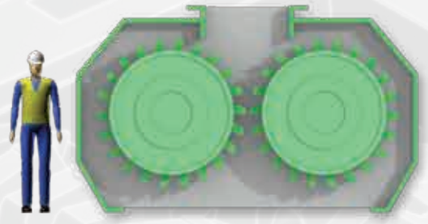
1500 Series

A Comparison of 1,000 Tonnes Per Hour Crusher Dimensions

All machines shown are to the same scale

General Specifications:

Material	:	Medium/Hard Limestone	**Infeed Size**	:	750mm
Product Size	:	250mm	**Capacity**	:	1,000TPH



Double-Roll Crusher
Type: 1,800 x 1,800mm
Mass: 70 Tonnes



Impactor
Type: 2,000 x 2,250mm
Mass: 85 Tonnes



MMD Mineral Sizer
Type: 1000 Series
Mass: 60 Tonnes

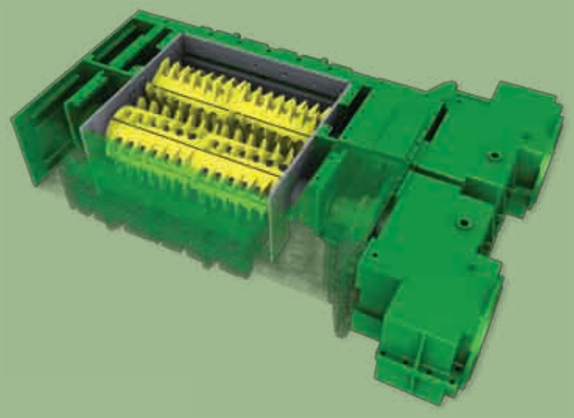


Gyratory Crusher
Type: 42″
Mass: 120 Tonnes



Jaw Crusher
Type: 88″ x 66″
Mass: 170 Tonnes

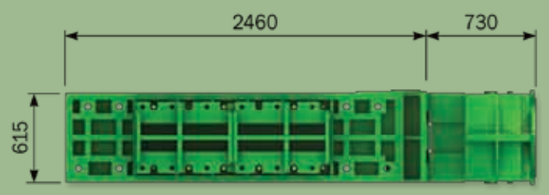
The MMD 500 Series Twin-Shaft Sizer

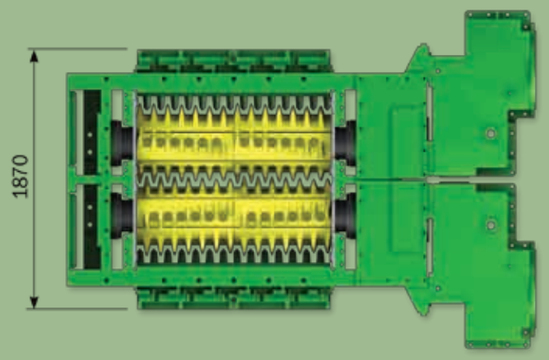


The 500 Series Sizer was the first designed in the MMD range and has been successful in numerous industries worldwide. It is one of the most versatile machines, and can be supplied as a primary, secondary or tertiary machine depending on the tooth configuration.

This machine can be constructed as a fixed centres, adjustable centres or as a single rotor unit with a range of tooth configurations to suit individual applications. Different lengths are available to enable processing of higher or lower tonnages, and can be single or double drive, depending on tonnage requirements and the material being handled.

A typical adjustable 500 Series Sizer with twin 75kW electric motors, has an approximate mass of 12 tonnes.







Limestone | **Denmark** | In: 800mm | Out: -150mm | Capacity: 450TPH



Quartzite | **Ghana** | In: 500mm | Out: -100mm | Capacity: 300TPH



Lignite | **Spain** | In: 180mm | Out: -30mm | Capacity: 10TPH



Aggregates | **France** | In: 250mm | Out: -100mm | Capacity: 600TPH



Coal | **China** | In: 500mm | Out: -50mm | Capacity: 300TPH



Tunnel Clay/Limestone | **Greece** | In: 350mm | Out: -200mm | Capacity: 650TPH



Coal | **Australia** | In: 400mm | Out: -150mm | Capacity: 1,300TPH



Limestone | **China** | In: 300mm | Out: -80mm | Capacity: 250TPH



Gypsum | **UK** | In: 150mm | Out: -40mm | Capacity: 300TPH

Gold Ore | **Brazil** | In: 200mm | Out: -40mm | Capacity: 600TPH



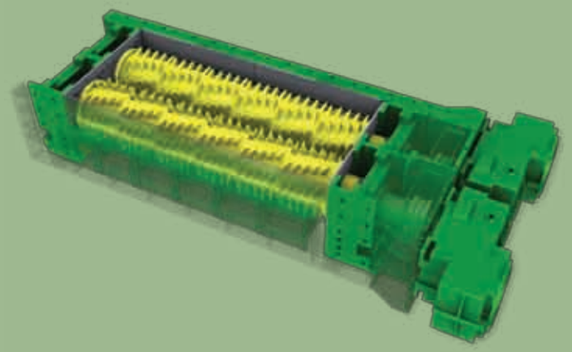
Burnt Lime | **UK** | In: 125mm | Out: -40mm | Capacity: 100TPH



Clay | **UK** | In: 250mm | Out: -100mm | Capacity: 600TPH



The MMD 625 Series Twin-Shaft Sizer



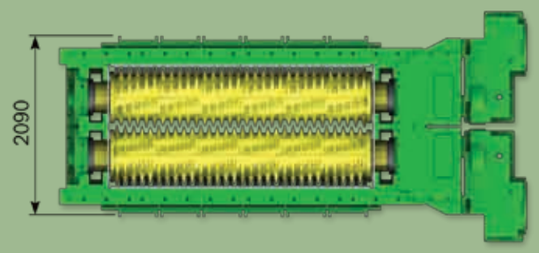
The 625 Series Sizer is one of the most popular machines as it can be configured for primary or secondary use in the same system on medium tonnages, allowing common drives for both primary and secondary units.

The length of the inlet can be adjusted at the design stage to suit the tonnage required and can be constructed as a fixed or adjustable centres unit. A wide range of existing tooth configurations are available for this machine to cover most applications.

This machine can be single or double drive, using one or two 260 kW electric motors, depending on tonnage and material being processed.

A typical 5 tooth secondary 625 Series Sizer, with a 2 metre long inlet, and double 260kW drives, has an approximate mass of 26 tonnes.







Coal | **Colombia** | In: 300mm | Out: -50mm | Capacity: 1,600TPH



Chalk | **Belgium** | In: 800mm | Out: -250mm | Capacity: 500TPH



Borax | **USA** | In: 250mm | Out: -75mm | Capacity: 1,600TPH



Shale/Limestone/Clay | **Ireland** | In: 1,000mm | Out: -100mm | Capacity: 500TPH



Clay/Limestone | **India** | In: 350mm | Out: -90mm | Capacity: 750TPH



Gold Ore | **Guinea** | In: 350mm | Out: -80mm | Capacity: 1,500TPH



Shale | **Ireland** | In: 800mm | Out: -80mm | Capacity: 600TPH



Coal/Stone | **China** | In: 300mm | Out: -100mm | Capacity: 2,500TPH

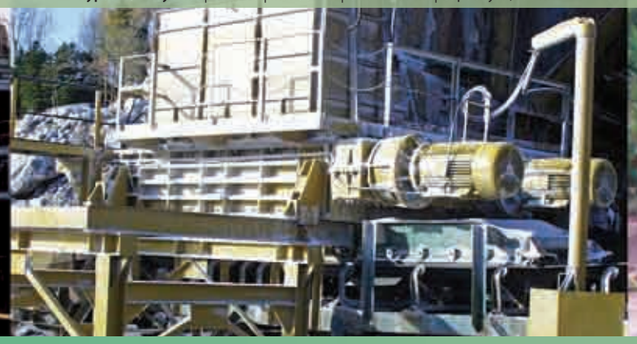


Silver Ore | **Bolivia** | In: 750mm | Out: -150mm | Capacity: 600TPH

Lignite | **Czech Republic** | In: 300mm | Out: -40mm | Capacity: 2,500TPH



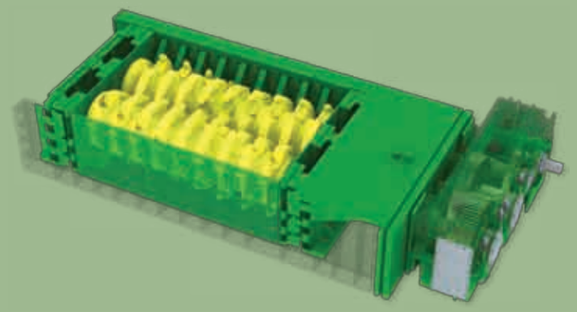
Gypsum/Anhydrite | **Canada** | In: 700mm | Out: -200mm | Capacity: 1,200TPH



Potash | **Spain** | In: 350mm | Out: -50mm | Capacity: 800TPH



The MMD 750 Series Twin-Shaft Sizer

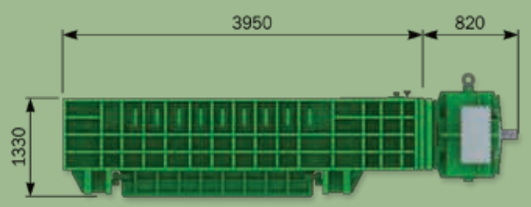


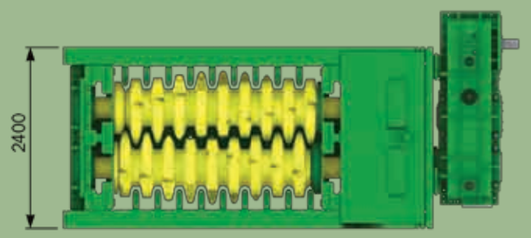
The 750 Series Sizer was developed shortly after the 500 to provide a range of higher tonnage machines capable of breaking larger and harder materials. These machines can be used as a primary or secondary machine depending on the tooth configuration.

A wide range of tried and tested tooth configurations are available to cover most applications, but MMD are always prepared to develop new ones if necessary for a new application.

When used as a Primary in a process system, it is often paired with a 625 Series secondary to provide a higher reduction ratio than is possible with a single machine. In common with all other MMD Sizers, the inlet size can be tailored to suit the tonnage required.

A typical 3 tooth primary machine with single 400 kW electric drive, has an approximate mass of 40 tonnes.







Coal | **South Africa** | In: 1,000mm | Out: -180mm | Capacity: 900TPH



Limestone | **Lebanon** | In: 800mm | Out: -300mm | Capacity: 1,500TPH



Limestone | **Nigeria** | In: 1,000mm | Out: -200mm | Capacity: 400TPH



Clay/Gold Ore | **Papua New Guinea** | In: 600mm | Out: -250mm | Capacity: 600TPH



Nickel Ore | **Australia** | In: 800mm | Out: -200mm | Capacity: 800TPH



Coal | **South Africa** | In: 1,000mm | Out: -250mm | Capacity: 2,000TPH



Chalk | **UK** | In: ,500mm | Out: -300mm | Capacity: 600TPH



Gypsum | **USA** | In: ROM | Out: -250mm | Capacity: 1,000TPH



Iron Ore | **Australia** | In: 1,200mm | Out: -250mm | Capacity: 1,200TPH

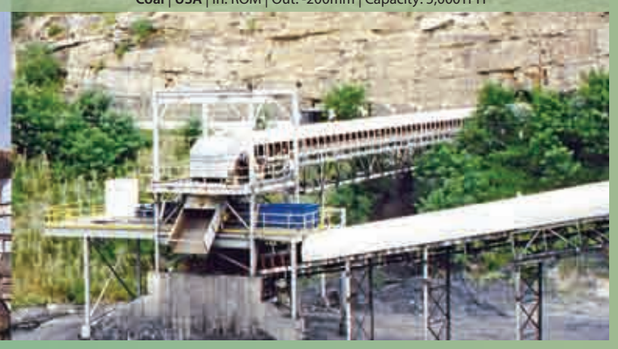
Limestone/Clay | **UK** | In: 350mm | Out: -100mm | Capacity: 1,000TPH



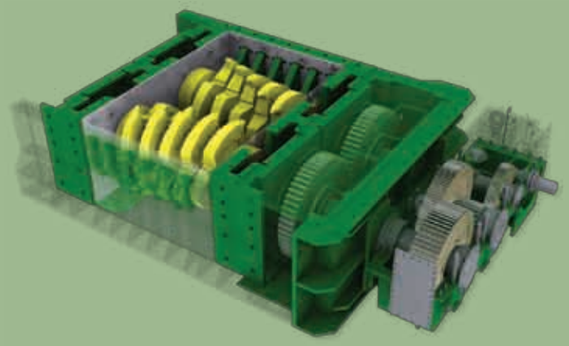
Lignite | **Spain** | In: 800mm | Out: -180mm | Capacity: 2,500TPH



Coal | **USA** | In: ROM | Out: -200mm | Capacity: 5,000TPH



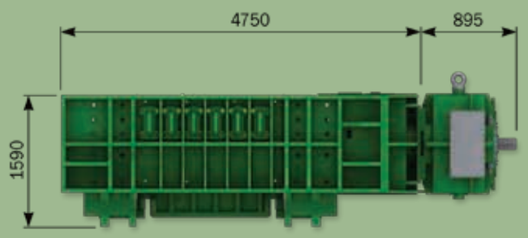
The MMD 1000 Series Twin-Shaft Sizer

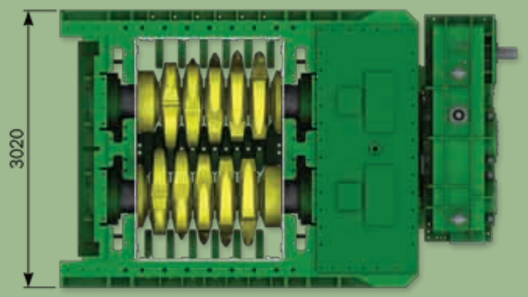


The 1000 Series Sizer was designed to provide a range of primary machines between the 750 and the high tonnage 1300 series. The extra centre distance allows it to cope with a larger infeed size, increasing the capacity considerably for the same inlet length, which can be varied.

This machine is often paired with a 750 series secondary when a multi machine system is necessary to achieve the final product requirements. These units can be fitted with single or double drives of varying powers, using the extensive range of purpose designed MMD gearboxes.

A typical 3 tooth by 5 ring long machine with a single 400kW drive has an approximate mass of 60 tonnes.







Overburden | **Thailand** | In: 1,200mm | Out: -400mm | Capacity: 6,500TPH



Mineral Sands | **South Africa** | In: 1,500mm | Out: -300mm | Capacity: 1,500TPH



Overburden | **Canada** | In: 1,500mm | Out: -250mm | Capacity: 2,000TPH



Limestone | **Mexico** | In: ROM | Out: -300mm | Capacity: 2,500TPH



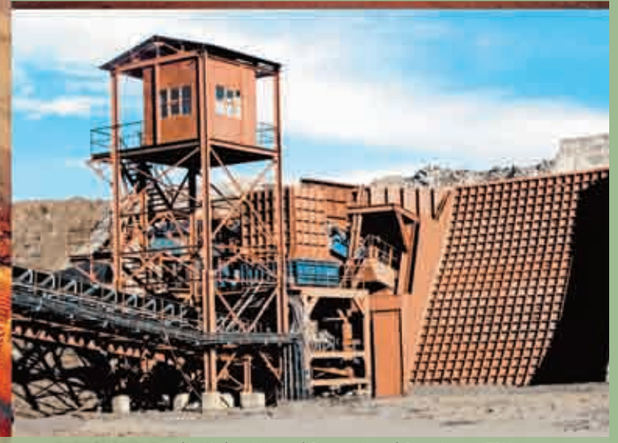
Carbon Anodes | **Norway** | In: 1,600mm | Out: -350mm | Capacity: 70TPH



Gold Ore | **Guinea** | In: 300mm | Out: -125mm | Capacity: 1,600TPH



Coal | **Colombia** | In: 300mm | Out: -50mm | Capacity: 1,600TPH



Limestone | **India** | In: 300mm | Out: -150mm | Capacity: 700TPH

Bauxite | **Jamaica** | In: ROM | Out: -150mm | Capacity: 1,600TPH



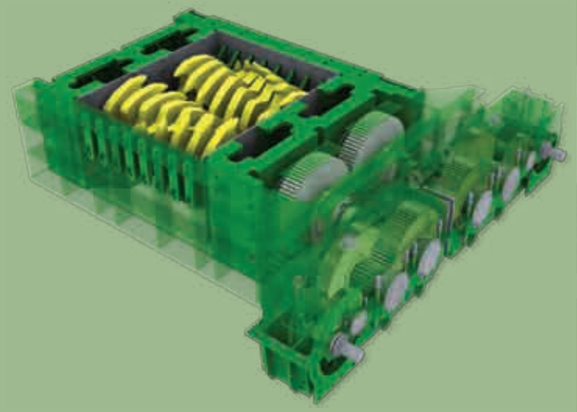
Limestone | **Libya** | In: 1,000mm | Out: -300mm | Capacity: 1,200TPH



Lateritic Gold Ore/Clay | **Mali** | In: 1,000mm | Out: -250mm | Capacity: 750TPH



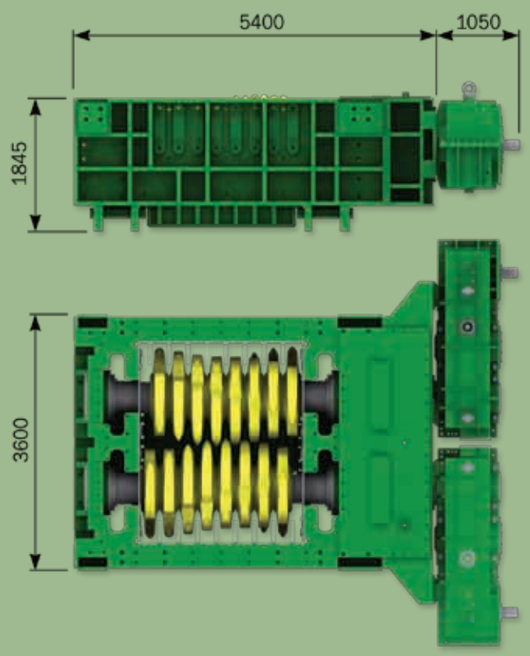
The MMD 1300 Series Twin-Shaft Sizer



The 1300 Series Sizer was developed initially for high tonnage overburden operations as a key component in the change to short haul truck and shovel operations feeding conveyor systems. As overburden by its very nature constantly changes, these machines, in common with the complete range of MMD Sizers, can work on a vast range of materials from wet sticky clay to hard abrasive granites, making them ideal for this type of application.

These machines have since been utilised in many other types of application all over the world. The 1300 Sizer is normally fitted with double drives of varying powers, depending on the application.

A typical 3 tooth machine with twin 400kW drives, has an approximate mass of 95 tonnes.





Overburden | **Russia** | In: 1,200mm | Out: -350mm | Capacity: 3,500TPH



Lignite | **China** | In: 1,800mm | Out: -300mm | Capacity: 2,500TPH



Bauxite | **Brazil** | In: 1,200mm | Out: -300mm | Capacity: 3,000TPH



Limestone | **Mexico** | In: 1,250mm | Out: -300mm | Capacity: 2,000TPH



Overburden | **UK** | In: 1,500mm | Out: -350mm | Capacity: 1,000TPH



Overburden | **Spain** | In: 2,500mm | Out: -250mm | Capacity: 3,500TPH



Overburden | **Thailand** | In: 1,500mm | Out: -300mm | Capacity: 4,500TPH

Kimberlite | **Canada** | In: 2,500mm | Out: -350mm | Capacity: 1,500TPH



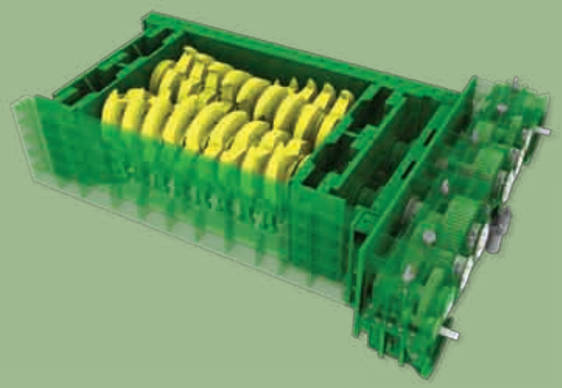
Zinc Ore | **Australia** | In: 1,500mm | Out: -300mm | Capacity: 2,500TPH



Limestone | **Taiwan** | In: 1,000mm | Out: -350mm | Capacity: 1,200TPH



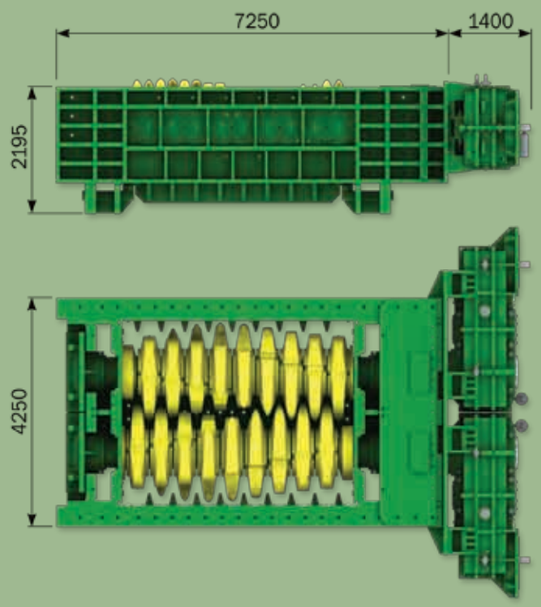
The MMD 1500 Series Twin-Shaft Sizer



The 1500 series Sizer was first supplied to operate within the oil sands industry in Northern Canada to facilitate the switch to short haul truck and shovel extraction, which proved to be a significant economic improvement over the traditional systems previously employed.

The 1500 series Sizer is presently the highest capacity unit available, but design studies are underway for higher tonnage capable Sizers in the future. The high reliability, low wear and low maintenance costs are always key features in any mining operation, but are crucial in this abrasive, hostile environment, where the operation runs 24 hours per day. Varying the inlet length allows changes in capacity to suit the application.

A typical 3 tooth machine, with twin 400 kW drives has an approximate mass of 160 tonnes.





Oil Sands | **Canada** | In: 3,000mm | Out: -400mm | Capacity: 10,000TPH



Overburden | **Colombia** | In: ROM | Out: -450mm | Capacity: 10,000TPH

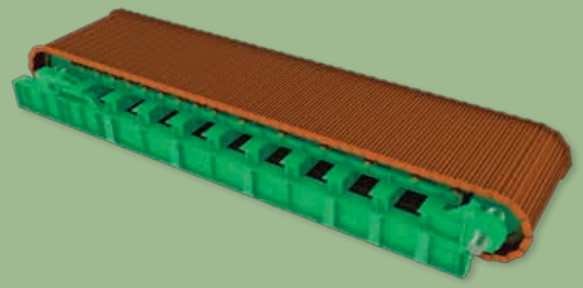
Kimberlite | **South Africa** | In: 2,000mm | Out: -300mm | Capacity: 800TPH



Iron Ore | **Australia** | In: 2,500mm | Out: -250mm | Capacity: 6,000TPH



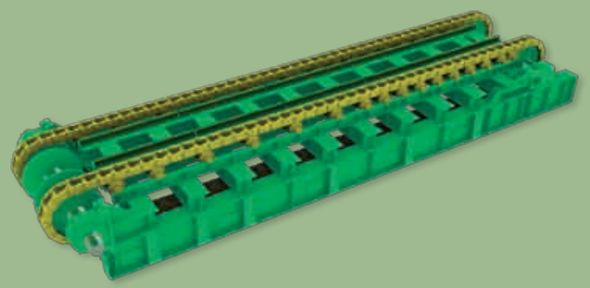
The MMD Heavy-Duty Apron Plate Feeder



To complement the capacity and strength of the Twin Shaft Mineral Sizer, MMD has designed Heavy Duty Apron Plate Feeders to convey raw material to the crushing plant.

Designed to handle impact loads and abrasive materials, they are often arranged beneath tipping points, where their combination of reliability and robustness have proven to give many years of trouble free operation with minimal maintenance.

The main features of an MMD Apron Plate Feeder are the heavy duty chains and rollers which are attached to the main frame. The chains and rollers vary in size depending on the application and stresses they will be put under. Chains and rollers are manufactured by Caterpillar and designated as D4, D7, D9 and D11 chain and rollers. Subsequently a Feeder is initially categorised as D4, D7, D9 or D11.

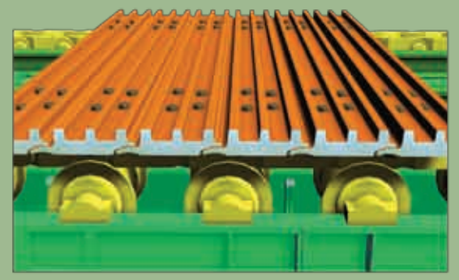


The Feeder length is measured from the centre-line of the tail sprocket to the centre-line of the head sprocket, and varies depending upon the project requirements.

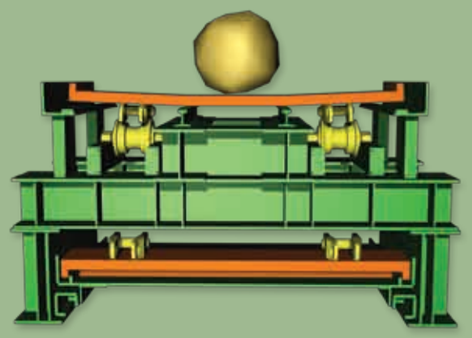
The drive located at the head sprocket is generally a variable speed unit as it is often the main method of controlling the throughput of the plant. There are two types of variable speed drive available, hydraulic, and electro-mechanical.

MMD Apron Plate Feeders are also available with an in-built fines retrieval system. The employment of cleaning scrapers welded to selected conveyor plates bring the fine material to the top of the feeder to be deposited with the rest of the material, eliminating the need for a separate fines conveyor.

The apron plates, which are fixed to the chain, are made from specially rolled sections and are manufactured in various widths to cater for the maximum volume of material which may need to be processed. These plates have overlapping edges preventing spillage between the plates, and are fixed to the chains with bolts that are positioned between the grousers, protecting the bolt heads from damage caused by the material being conveyed.

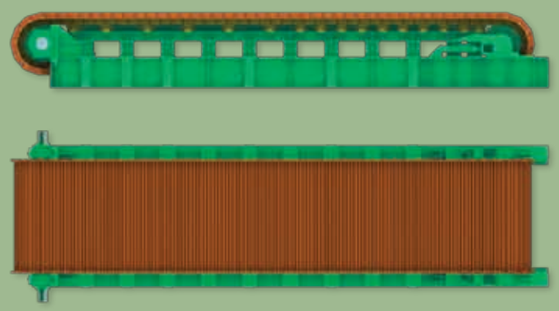


The elimination of impact energy is of special importance. The impact force is initially absorbed by the conveyor plates, which deform within their elastic limit. The impact rails then transmit the forces which are dissipated into the main frame construction.



Typical Apron Plate Feeder key dimensions:

Type	Effective Width	Overall Width	Overall Height
D4	1,500mm	2,160mm	1,200mm
D7	2,000mm	2,775mm	1,480mm
D9	3,000mm	3,990mm	1,960mm
D11	4,000mm	5,025mm	2,260mm





D7 Apron Plate Feeder with Fines Retrieval System



D7 Apron Plate Feeder with electro-mechanical drive



D7 Apron Plate Feeder with hydraulic drive



D4 Apron Plate Feeder installed in a confined space

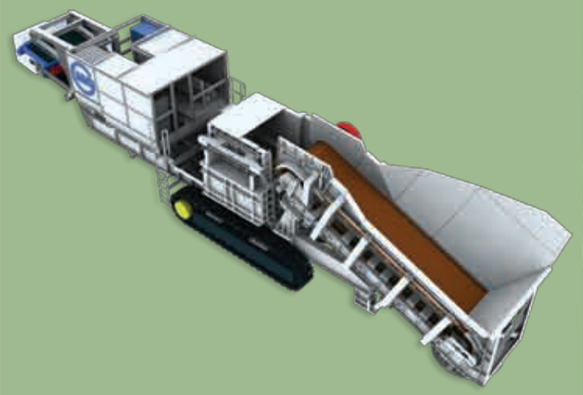


D9 Apron Plate Feeder with electro-mechanical drive

D9 Apron Plate Feeder forming part of the Fully Mobile Slewing Sizer Station



MMD Mobile & Semi-Mobile Sizer Stations



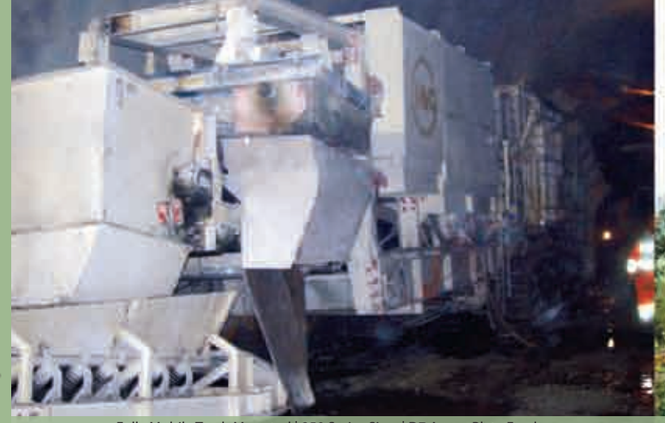
Operators are demanding more and more flexible extraction systems, meaning process equipment has to be more adaptable to suit the range of modern mining methods available. MMD has, throughout its existence, developed purpose designed units to suit any mining method and material as required. The whole range of Sizers can be incorporated into a wide range of transport options available to suit the duties required.

Wheeled units
These are really only suitable for the smaller Sizers due to the limited carrying capacity on this type of design and the many highway restrictions now imposed world wide. This style of unit is normally powered by a diesel engine and a hydraulic system to power the discharge conveyor and feeder if fitted.

Track Modular units
Any of the Sizer range can be fitted to this type of unit which can have tracks permanently installed or incorporated in a separate transporter. These can be diesel or electric powered and when the tracks are fitted they can be lifted clear of the ground for maintenance.

Transportable Modular units
Any Sizer can be installed on this type of unit; the main difference is that the modules are designed to be moved on wheeled trailers. These units are normally electrically powered in the same manner as static installations and designed to suit the operator's preferred method of transport.

Track Mounted
This is probably the most versatile method of mounting the whole range of Sizers and is adaptable to the widest range of extraction methods. These units can be electric, diesel or a combination of the two. If the Sizer, Feeder and discharge conveyor are electrically driven, and the tracks are driven by a diesel engine, the main supply cable can be disconnected during relocation.



Fully Mobile Track-Mounted | 850 Series Sizer | D7 Apron Plate Feeder



Trailer-Mounted Street Legal Transportable | 625 Series Sizer



Semi-Mobile | 1250 Series Sizer | D7 Apron Plate Feeder



Rail-Mounted Semi-Mobile | 500 Series Sizer



Modular Fully Mobile Track-Mounted | 1000 Series Sizer | D7 Apron Plate Feeder



Fully Mobile Slewing Station | 1500 Series Sizer | D9 Apron Plate Feeder



Trailer-Mounted Transportable | 750 Series Sizer



Fully Mobile Track-Mounted | 750 Series Sizer

Fully Mobile Track-Mounted | 1300 Series Sizer | D7 Apron Plate Feeder



Fully Mobile Track-Mounted | 1150 Series Sizer | D7 Apron Plate Feeder



Fully Mobile Slewing Station | 1400 Series Sizer | D9 Apron Plate Feeder



The MMD Fully Mobile Slewing Sizer Station



MMD are the innovators of a new product, which allows the flexibility of a mining shovel to be matched with the cost effectiveness of long distance conveyor haulage. The 10,000 Tonnes Per Hour *Fully Mobile Slewing Sizer Station* is a new, cost effective engineering solution, which enables excavating, sizing and conveyor haulage processes to take place in unison, along the mine face, advancing as it progresses.

In a typical application, the Sizer Station would be positioned between the mine face and overland conveyor, and the hopper directly fed from the face with run of mine material by an excavator or mining shovel. Material is then drawn up the variable speed MMD Apron Plate Feeder, and discharged into the MMD Sizer, reducing the material to a definable product size suitable for efficient long distance conveyor haulage. Material is subsequently discharged from the Sizer Station, via the discharge conveyor and into a hopper car that travels along the overland conveyor. The sizer station and the shovel move repeatedly back and forth along the mine face until the entire mine has been excavated.

The modular assemblies include:

- MMD 1400 Series Twin Shaft Mineral Sizer
- MMD D9 Apron Plate Feeder
- Transfer conveyor and discharge conveyor
- Main Chassis and Superstructure
- Receiving Hopper
- Tracks and Slewing Mechanism

An obvious advantage of this system is the elimination of haul trucks in a truck and shovel operation, where trucks are used to carry the material to the processing plant, or out of a mine dump area. This process is no longer necessary as material can be loaded directly into the mobile sizer station, and processed at the mine face, simplifying the system and optimising production.

The Fully Mobile Slewing Sizer Station has many attributes and features to enable consistent efficient operation of the complete system. Listed below are some of the key areas:

Fully Mobile
The Sizer Station is able to propel itself variably at a rate of 0 to 12m/min.

High Throughput
Throughputs of up to 10,000TPH average, and 12,000TPH peak can be achieved.

Accurately Sized Material
The Sizer Station accepts feed material of up to 2.4m^3 and produces a minus 350mm product, reducing subsequent conveyor belt wear and damage at transfer points.

Compact Dimensions and Lightweight
The Sizer station has been designed to be a compact, light-weight unit (61m x 15.4m x 18m @ 1760 Tonnes) with a relatively low centre of gravity, and able to withstand various weather conditions .

Modular Construction
The entire sizer station is constructed of modular components to enable easy maintenance, assembly and transport.

Low Maintenance
Less than 2.5% of the total working hours is spent on maintenance.

Efficient Operation
Utilising an 18 metre radius shovel, the system is able to remove a strip approximately 70 metres deep before needing to relocate the face conveyor.

Accepts Run-of-Mine Material
The Sizer station's hopper accepts material directly dug and dumped from the mine face, requiring no screens or preparation equipment.

Flexible Loading Area
The hopper is approachable by excavation equipment from at least 270 degrees.

Large Capacity Hopper
The hopper can hold up to 350 tonnes of material.

Regulated Production Rate
The variable speed MMD Feeder enables the station to control the processed production tonnage.

Accurate Material Discharge
The discharge conveyor is able to luff from -7 to +15 degrees and also slew 60 degrees either side of centre to provide accurate material discharge.

No Onboard Operator
The sizer station can be configured to require no on board operator when in normal operation.

Traverses Steep Gradients
Negotiates up to 10% inline gradients and 5% cross gradients on most terrain.

Simple Operation
All processes can be controlled and viewed from the control cabin, conveniently located at the top of the station.

Easy Access
Access to the station is by 8 conveniently situated landing points. All parts of the station can be viewed safely, even when in operation.



Sizer Station negotiating a +10% gradient


P&H Shovel loading the D9 Plate Feeder, via the 350 Tonne capacity Hopper


Discharge Conveyor, feeding the overland conveyor system


1400 Series Twin-Shaft Mineral Sizer



MMD SIZERS™

THE OLYMPIAN 888 SWING-SIDED, HIGH CAPACITY, ENERGY EFFICIENT, ADJUSTABLE TERTIARY SIZER

ENVIRONMENTALLY SUSTAINABLE MINING



SIZING MINERALS AROUND THE WORLD

- ★ Swing sides give complete access for inspection and change out of breaker segments & breaker combs, enabling complete external maintenance.
- ★ Various segments and combs available to meet CUSTOMER'S sizing requirements.

- ★ Adjustable centres to give maximum capacity with minimum power draw, and 100% reverse out of a stall. Inspection cover to check setting and wear externally. Patent Pending.

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