



**DEREK  
PARNABY CYCLONES  
INTERNATIONAL LIMITED**

**MINERALS  
PROCESSING -  
EFFLUENT TREATMENT**  
Systems & Equipment

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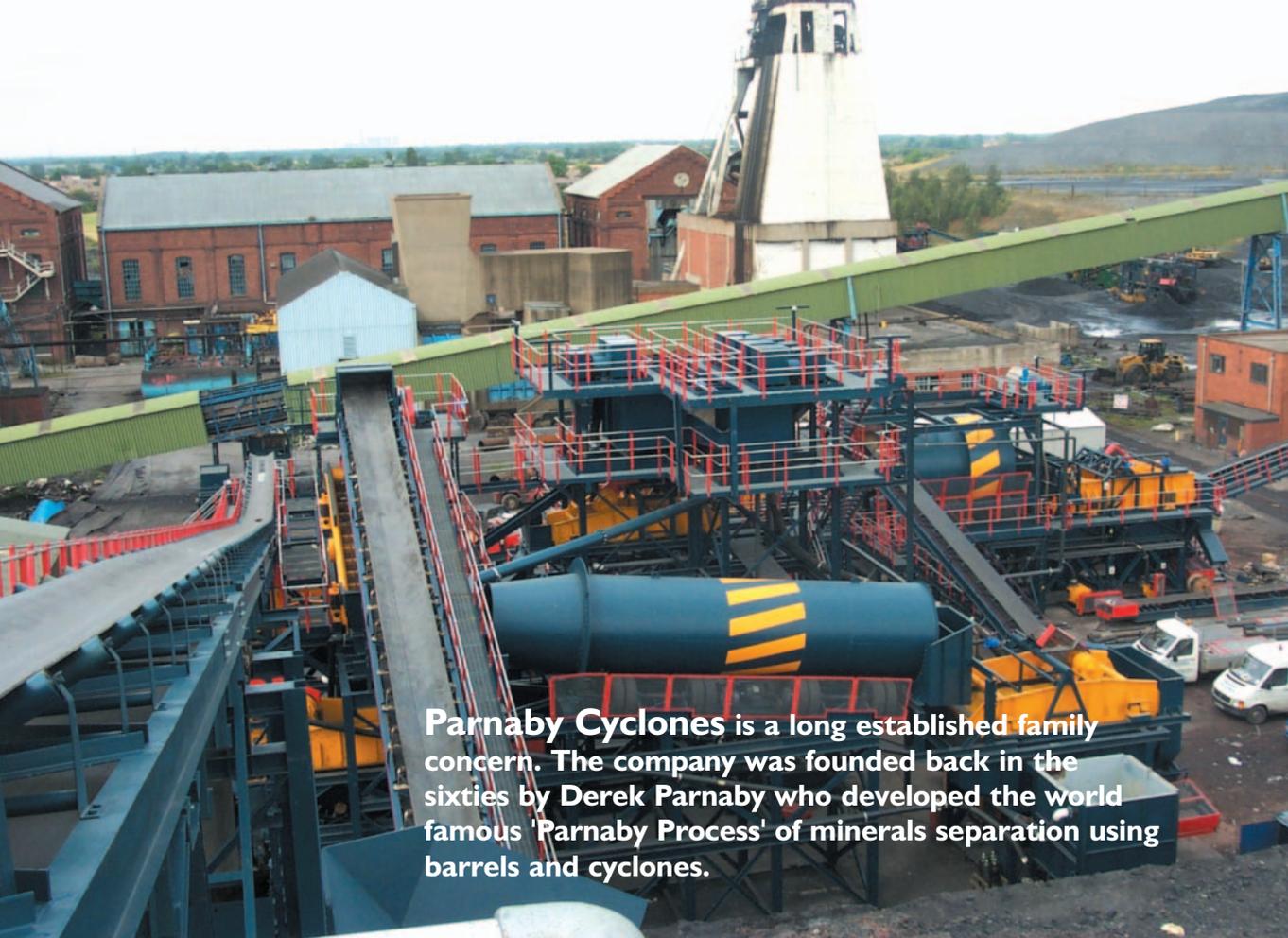
**PARNABY SUPPORTS THE OLYMPIC GAMES!**

McGrath Bros of Hackney have added a full Parnaby Closed Circuit Effluent Treatment Plant alongside a new washing facility at its East London site. The design and layout of this plant required special attention due to the severe lack of both space and clean water available on site, making the reuse of process water paramount. A plate press from Filmac of Italy is installed. This press features the Filmac unique cake discharge system and is the first to be sold in the UK.



**OTHER RECENT PROJECTS**

Fateh Mills, Pakistan • Fraser Alexander, South Africa • Coal Contractors (1991) Inc, Pennsylvania, America • Celtic Energy, South Wales • Aryan Coal, India • NEMI (Northern Energy and Mining Inc), Canada – now Peace Valley Coal



**Parnaby Cyclones is a long established family concern. The company was founded back in the sixties by Derek Parnaby who developed the world famous 'Parnaby Process' of minerals separation using barrels and cyclones.**

**Over the intervening years the company has developed a wide range of minerals processing and effluent treatment plant.**

**The range includes modular and mobile coal washing plant, effluent treatment systems, scrubber barrels, sand classifying and dewatering, waste water (sewage) filtration plant.**

**Today Parnaby Cyclones design and install systems and equipment for the washing, separation, dewatering and recycling of a range of materials for the coal, aggregates, recycling and water industries. Latest developments are in the field of processing waste electronic and electrical components.**

### **INNOVATION AND QUALITY**

Quality of design, manufacture, installation and after sales service has always been of the highest priority. Since 1996 this has been officially recognised by the ISO 9001 international quality standard.

Parnaby Cyclones insist on the best quality raw materials, all steelwork in Parnaby equipment conforms to BS 449.

Almost all our equipment is manufactured in-house at our 20,000 square metre site situated in North-East UK.

### **SERVICE**

Parnaby Cyclones provides excellent customer service including:

- SITE VISITS, EVALUATION & BUDGET ADVICE
- PLANT DESIGN TO CUSTOMERS SPECIFICATION
- WIDE RANGE OF PRODUCTS
- RAPID INSTALLATION IF REQUIRED
- GUARANTEED AFTER SALES SERVICE
- QUALITY PRODUCT AT THE RIGHT PRICE

### **HEALTH & SAFETY**

- Parnaby Cyclones is committed to safe working practices.
- We employ a qualified Health and Safety Manager (NEBOSH General National Certificated).
- All work undertaken is supported by risk assessments and method statements.



**COAL PREPARATION**

Parnaby Cyclones with over 50 years of experience is a key partner in maximizing the efficiency of coal preparation. Systems have been developed for washing and separating different grades of coal, the recovery of fine coal particles and the treatment and disposal of effluent.

Washing and separation of coal improves its saleability. The end product has:

- higher calorific value
- lower ash content
- potentially lower sulphur content

There are two main systems for the processing of coal. The first uses a natural medium (water and raw material) and secondly a dense medium (with magnetite added).

**NATURAL MEDIUM WASHING PLANT**

The natural medium washing plant is the most cost-effective method of processing easily separated coals, in particular run of mine coal for industrial use, and recovering coal from colliery waste



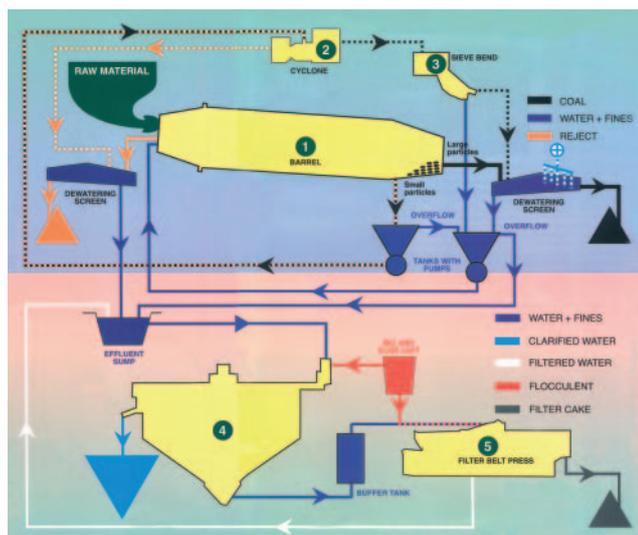
**FUNCTION**

The plant uses four types of separating equipment:

- BARREL
- CYCLONE
- DEWATERING SCREENS
- SIEVE BENDS

# PROCESSING & TREATMENT FLOW DIAGRAM

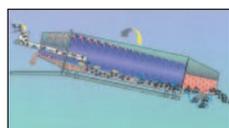
## Natural Medium



### BENEFITS

The Parnaby natural medium washing plant provides substantial benefits:

- LOW CAPITAL EXPENDITURE
- LOW RUNNING COST
- HIGH EFFICIENCY
- ROBUST MODULAR DESIGN
- QUICK ASSEMBLY EASY TO MOVE
- EXTENSIVE PRODUCT RANGE
- LOW POWER USE



① BARREL



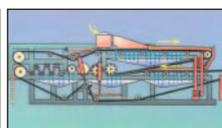
② CYCLONE



③ SIEVE BEND



④ THICKENER CONE



⑤ FILTER BELT PRESS



### NATURAL MEDIUM CYCLONE

Cyclone-only plants can be supplied for washing small coal below 50mm particle size. In the cyclone, the small particles are separated by centrifugal and vortex action (the cyclone itself does not move). The water/particle mixture is pumped into the side of the cyclone tangentially and swirls around creating a vortex in which the lighter coal particles are sucked to the middle (and out to a dewatering screen). The heavier shale particles are thrown by centrifugal force to the wall of the cyclone and are discharged at the opposite end.

## COAL PREPARATION



### DENSE MEDIUM WASHING PLANT

The dense medium washing plant is the most efficient separation process available. It is ideally suited for:

- SEPARATION OF DIFFICULT COAL TYPES
- WASHING AND PRODUCTION OF HIGH VALUE PRODUCTS FOR DOMESTIC & INDUSTRIAL MARKETS



#### FUNCTION

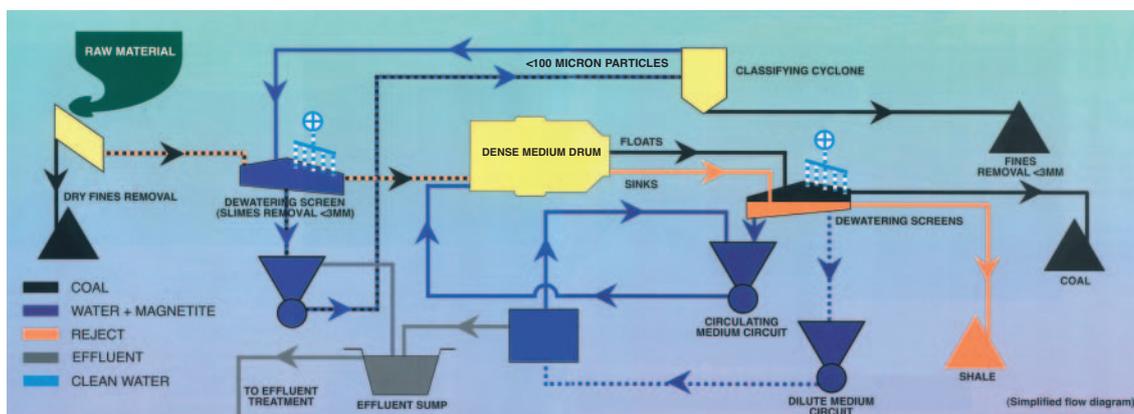
The overall process differs from the natural medium plant because the medium is created using magnetite (fine iron particles) instead of the fine particles in the raw material. This allows for more exacting control and a wider range of separation gravities

Small and fine particles are removed from the raw material before it is fed into the drum. Initially it passes over a dry screen to remove particles smaller than 10mm, then any remaining fine particles/slimes (smaller than 3.0mm) are removed by a vibratory rinsing and dewatering screen. The small particles are then separated in a classifying cyclone. Alternatively the fine particles can be separated in a fines recovery plant.

## BENEFITS

The Parnaby dense medium washing plant can efficiently separate raw material from a wide range of proportions. Other benefits include:

- 2 OR 3 PRODUCT SEPARATOR DRUM
- LOW POWER REQUIREMENT
- HIGH EFFICIENCY PROCESS SEPARATION
- LOW MAGNETITE CONSUMPTION
- ROBUST MODULAR DESIGN
- QUICK TO ASSEMBLE, EASY TO MOVE
- CAN EASILY BE ENCLOSED IN A BUILDING
- EXTENSIVE PRODUCT RANGE
- SINGLE DRUM CAPACITY UP TO 250 TPH



## OPTIONS

A three product separator drum is also available which has a second chamber which repeats the process (at a higher separation gravity) thus producing prime coal, middling's and shale.

One combined cyclone and dense medium drum plant can process up to 500 tph of coal up to 200mm particle size. Dense medium cyclone- only plants can be supplied for washing small coal below 50mm particle size.

## FINES COAL RECOVERY UNIT

The Natural and Dense Medium Washing Plants can recover coal as small as 0.5mm particle size. Smaller particles pass through the screens and drain to the effluent sump.

We have developed a range of fines coal recovery plants to treat the overflow from the washing plant before it goes for effluent treatment. These plants can recover and dewater coal particles down to zero particle size.

There are four types of fines coal recovery plants available:

- WATER-ONLY CYCLONE
- HYDROSIZER
- GRAVITY SPIRAL
- FROTH FLOTATION PROCESS

# QUARRYING

## SAND & AGGREGATES

Parnaby Cyclones manufactures and installs a wide range of equipment for the washing, separating and classifying of different grades of sand and aggregates. We also supply effluent treatment systems, thickener only systems, or full closed circuit treatment plants.

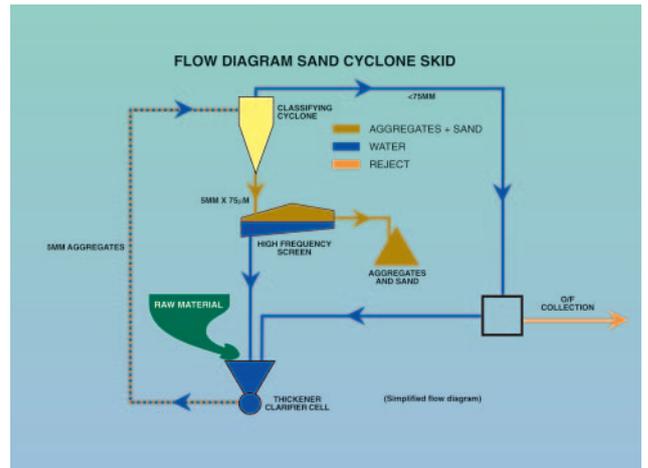
## FUNCTION

We use classifying cyclones (also known as sand cyclones) and high frequency dewatering screens to recover sand down to 75 microns particle size.



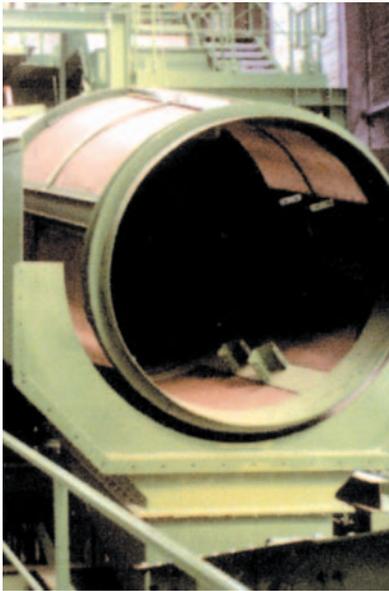
## BENEFITS

Parnaby's sand plants are low cost, robust and efficient for separating coarse and fine sands, with single stage and two stage cyclone modules available with cut points typically at 63, 75 and 100µm. Two product sand plants separate typically at 5 x 2mm and 2mm x 75µm capacities upto 150tph are available.



## OPTIONS

Where required we can provide equipment to separate lignite from sand. This improves the quality of the sand, especially for use in concrete. We recommend the use of natural medium cyclones to remove lignite from sand of particle size <20mm.



## REMEDICATION & RECLAMATION

Parnaby Cyclones provide a range of services and equipment to contractors involved in the redevelopment of land. This market has grown substantially as a result of government policies to reduce waste disposal to landfill and to build on brownfield sites.

## DEMOLITION & SKIP WASTE

We provide contract services for the sorting, separating, recovery and disposal of waste from demolition sites and skips.

Much of the waste is in the form of stone, brick, concrete, and plaster which is transformed into graded recycled aggregates suitable for use in concrete, car parks, pipe laying etc.

We also separate wood, metal and plastic suitable for recycling.

## SOIL RECLAMATION

Working with contractors to decontaminate brownfield sites prior to redevelopment we use mobile units to wash and separate all the aggregates, sand and soil excavated on site and make them suitable for reuse.

At the end of the effluent treatment process any contaminants in the form of a dry filter cake is then typically encapsulated in a cementitious mix suitable for burial.



# RECYCLING



In recent years Parnaby Cyclones has become increasingly involved in the recovery of materials for recycling. In addition to the recycling of sand and aggregates from land redevelopment already described, we are also developing new systems for the recycling of metals and plastics.

The Waste Electrical and Electronic Equipment (WEEE) regulations which came into force in the UK in 2007, are

leading to a huge growth in the quantity of equipment of mixed materials being handled by recycling contractors. After the easily salvageable materials have been removed, the remainder is usually shredded; mixing glass, plastic and metal together.

Parnaby Cyclones have developed systems to separate this shredded waste, and to recover all recyclable material; our systems can even separate plastics of different densities.

## BENEFITS

- Recovery and recycling of building materials (sand and aggregates)
- Recovery of wood, metal and plastic for recycling
- Greatly reduced quantity of waste sent to landfill
- Reclamation of contaminated land

# EFFLUENT TREATMENT

## CLOSED CIRCUIT SYSTEM

All the industries that we work with are continually faced with the treatment, handling and disposal of effluent. The Parnaby closed circuit system is an efficient, environmentally friendly and cost effective method of treating a wide range of effluents including:

- COAL SLURRIES
- QUARRY EFFLUENTS
- MARINE SILTS
- CERAMIC CLAYS
- SEWERAGE SLUDGE

## FUNCTION

Effluent is pumped from the floor sump to the top of a thickener/clarifier cone. A flocculent is then added which causes fine particles to settle rapidly. Clear water overflows from the top of the clarifier into a storage tank. The sludge at the bottom of the cone (which usually contains 30-35% solids) is pumped to a conditioning tank.

If necessary more flocculent is added at this point prior to the final stage of dewatering in a Parnaby Belt Press Filter or Plate Press Filter system. The filtrate which is removed from the process sludge is pumped back to the thickener and the dewatered filter cake is discharged to ground. Typical moisture 22-25% for Plate Press and 30-35% for Belt Filter Press (the above are for mineral fines).



## OPTIONS

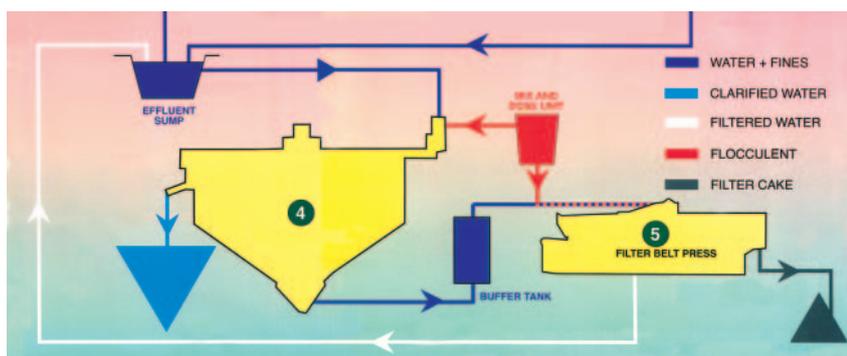
We supply two types of filter press:

- Multi-roll filter belt press
- Filter plate press

Both types are available in a range of sizes and configurations. In the belt press the sludge is squeezed between two filter belts to remove the liquid. The arrangement of the rollers ensures that pressure is increased as the sludge progresses through the machine. In the plate press the sludge is pumped into a series of chambers between filter plates then all the chambers are compressed. The end products of the two types of press are the same – clean filtrate and dry handleable filter cake. The fundamental difference is that the belt press operates continuously whereas the plate press is a batch process. We advise our customers on which presses are most suitable for their particular requirements.

## BENEFITS

- NO LAGOONS REQUIRED
- COMPLETE SYSTEM REQUIRES COMPARATIVELY LITTLE SPACE
- MODULAR DESIGN EASY TO INSTALL
- LOW RUNNING COSTS
- LOW NOISE LEVEL
- MAXIMUM REUSEABLE WATER RECOVERY
- MOBILE SYSTEMS ARE AVAILABLE
- HIGH THROUGHPUT



**At Parnaby Cyclones** we are totally committed to providing excellent customer service. We are very aware that every customer has individual and often unique requirements. We design and supply a wide and complex range of systems and equipment, so we consider each customer's needs in great detail before recommending the best solution.



### **SERVICE FROM INITIAL ADVICE TO AFTER-SALES CARE**

Our comprehensive customer care includes:

- Site visits, evaluation and advice on budgeting
- Tailored design to customer's specification
- Turn key project through design, supply, installation and commissioning
- Guaranteed after sales service
- Spares and maintenance packages
- Health and Safety documentation
- Project management



## MOBILE UNITS

When considering the best solutions for our customers we take into account how long they will need the equipment in one place at each project site. Our systems can be supplied as semi-permanent modular units, as easily transportable units or as independent mobile units.

We can provide the following complete plants as mobile units:

- NATURAL MEDIUM BARREL PLANTS
- DENSE MEDIUM DRUM PLANTS
- NATURAL MEDIUM AND DENSE MEDIUM CYCLONES
- FINES COAL RECOVERY PLANTS
- CLOSED CIRCUIT EFFLUENT TREATMENT PLANTS

Mobile units can be made to suit customers needs. The smallest mobile unit's process 10 tph, but an average unit will process 50 to 100 tph. Linked cyclone and drum modules can process up to 250 tonnes per hour.



## BENEFITS OF MOBILE UNITS

- COMPLETELY SELF-CONTAINED INCLUDING ELECTRICS
- SAME ROBUST CONSTRUCTION AS MODULAR UNITS
- CAN BE INSTALLED AND WORKING WITHIN 3 - 5 DAYS
- NO ELABORATE FOUNDATIONS NEEDED
- PLANNING PERMISSION NOT USUALLY REQUIRED
- SAME HIGH LEVELS OF PROCESS EFFICIENCY
- LOW CAPITAL COSTS
- LOW RUNNING COSTS
- SIMPLE TO OPERATE AND MAINTAIN
- MAXIMUM FLEXIBILITY

An ideal mobile combination would comprise:

- **DENSE MEDIUM MOBILE DRUM PLANTS** (for processing large coal at up to 125 tph)
- **NATURAL MEDIUM CYCLONES** (for processing coal smaller than 12mm at up to 125 tph)
- **MOBILE EFFLUENT TREATMENT SYSTEM** (for processing up to 25 tph of dry solids)
- **DENSE MEDIUM CYCLONES** (up to 150 tph)

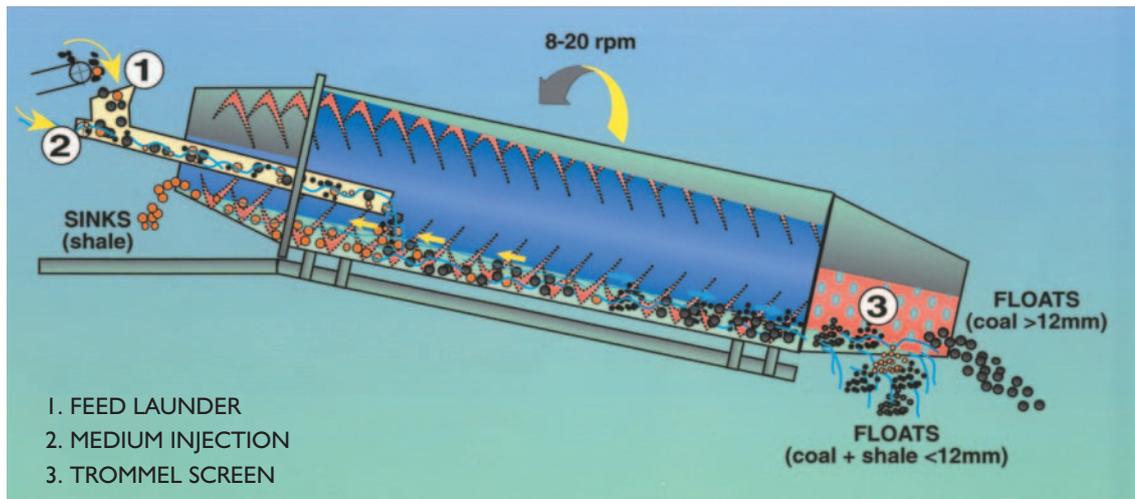
## CONTRACT PROCESSING

We provide washing, separating, dewatering and recycling services on a contract basis for customers who do not wish to invest in capital equipment.

Many of our customers involved in remediation reclamation and recycling prefer to engage us to process waste material at an agreed price per tonne or fixed rental rate. We provide the equipment and the operators and take responsibility for any repairs and maintenance.

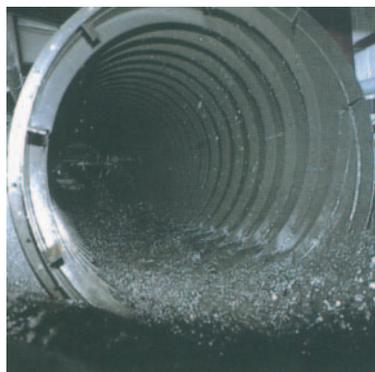
## NATURAL MEDIUM BARRELS

This is the most cost effective equipment for processing easily separated coals, especially run-of-mine coal for industrial use.



Raw material and water are fed into the top of the barrel. The water then combines with the fine coal and shale particles to form a viscous natural medium (1.0 to 1.3 sg). The internally scrolled barrel is angled at 8°; with the combination of the viscosity of the medium and the dynamic effect of the barrel revolving (at 5 - 20 rpm) this causes the coal to float near the top of the flowing stream. The shale, which is heavier, sinks to the bottom and is carried by the scrolls back out of the top end of the barrel. The effective range for separation is between 1.5 and 1.75 sg.

At the lower end of the barrel there is a sizing screen which allows water and particles smaller than 12mm to drain through. This mixture is then pumped to the cyclones. The larger coal particles pass over a dewatering screen and on to the stock pile. The small coal particles produced from the cyclones are passed over a vibratory dewatering screen.



### OPTIONS

Six models of natural medium barrels are available, which can process throughputs of between 20 and 500 tph. The modular design of all Parnaby plant allows for several barrels and cyclones to operate together. A composite natural medium washing plant can process 1,000 tph of coal up to 200mm particle size.

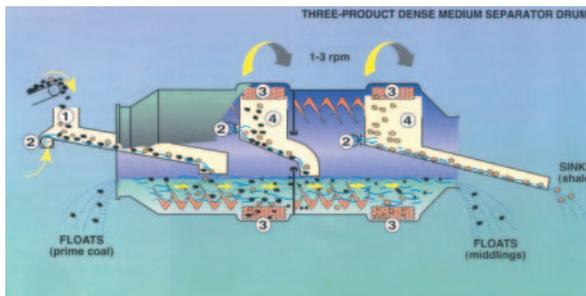
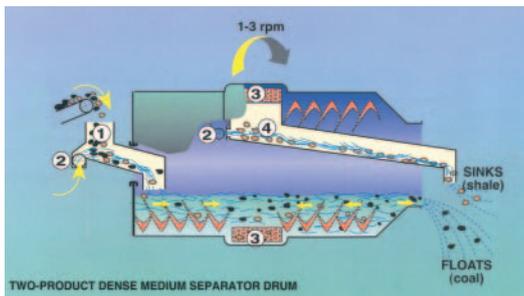
## DENSE MEDIUM DRUMS

This the most efficient single piece of equipment for separating minerals and waste with different specific gravities. It can separate raw material which is 50% coal and 50% shale.

The dense medium drum is horizontal and revolves slowly (about 1-3 rpm). As the raw material enters the drum, magnetite is added via the water circuit to achieve the required density. Separation is achieved entirely by the buoyancy of the medium; dynamic effect plays no part. The coal floats near the surface of the medium and flows out of the end of the drum. The heavier shale or high density coal particles fall to the bottom of the drum and are moved along the scrolls to perforated lifters which collect and deliver into a waste chute.

### Standard sizes

2 product	3 product
50tph	100tph
100tph	150tph
150tph	200tph
200tph	250tph
250tph	



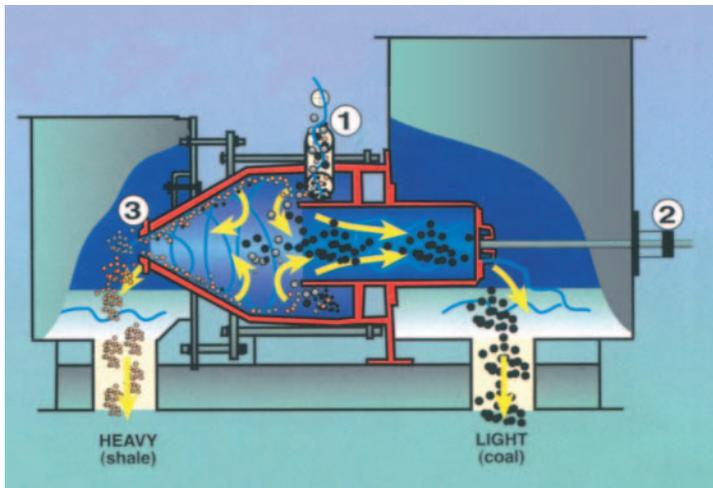
- ① FEED CHUTE    ② MEDIUM INJECTION    ③ PERFORATED LIFTERS FOR SINKS    ④ SINKS CHUTE



## CYCLONES

In Cyclones the small particles are separated by centrifugal and vortex action (the cyclone itself does not move). The water/particle mixture is pumped into the side of the cyclone tangentially and swirls around creating a vortex in which the lighter particles are sucked to the middle and out to a dewatering screen. The heavier particles are thrown by centrifugal force to the wall of the cyclone and are discharged at the opposite end.

Cyclones can be used alone or in a system with natural medium or dense medium drums. Larger plants may include banks of cyclones operating together. Cyclone-only plants are suitable for the cleaning of small coals of less than 50mm particle size.

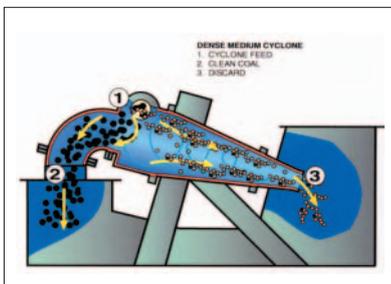


## NATURAL MEDIUM CYCLONE

This is used to separate particles of different density in a viscous medium. The natural medium cyclone is mounted horizontally.

## DENSE MEDIUM CYCLONE

This is used for very accurate separation of particles of different density. Particles smaller than 0.5mm are removed from the mixture before it enters the cyclone. Magnetite is added to the water/particle mixture to allow precise control of density. The dense medium cyclone is mounted at a 15° angle. The lighter particles (coal) come out of the upper end and the heavy particles (high ash coal or shale) the lower.



## WATER-ONLY CYCLONE

This is used in Fines Coal Recovery Plants and can recover particles of <5mm x 100 microns. It operates in exactly the same way as a natural medium cyclone.

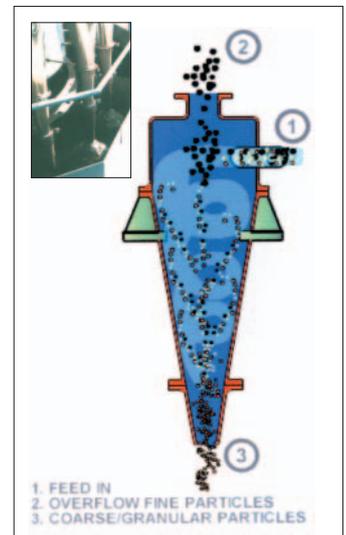
### STANDARD SIZES

- 420mm diameter
- 510mm
- 660mm
- 710mm
- 800mm
- 1000mm

## CLASSIFYING OR SAND CYCLONE

Used for separating particles of different sizes the classifying cyclone is mounted vertically. The smaller particles come out of the top and the larger particles out of the bottom or spigot.

This equipment is also known as a sand cyclone in the quarrying industry and is suitable for classifying particles from <5mm with cut point as low as 20 microns.





## SCREENS

Parnaby Cyclones have extensive experience in the design and manufacture of a wide range of vibrating screens for applications in the coal, aggregate, waste and recycling industries.

### INCLINE SIZING SCREENS, LOW HEAD STANDARD, & HIGH FREQUENCY DEWATERING SCREENS.

All screens are constructed with heavy-duty box section sub-frames, heavy duty side plates, wear plate lined feeding and discharge boxes. They are available with a wide range of screening surfaces for sizing and dewatering applications. The screens are painted with two coats of single pack polyurethane; alternatively the screens can be coated to the customer's specification. Vibratory motor and geared mechanism options are available.

#### VARIOUS SIZE OPTIONS

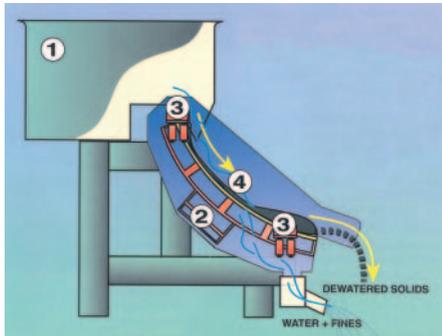
0.75	x	2.0m
1.2	x	2.4m
1.5	x	3.0m
1.5	x	4.0m
2.4	x	5.0m
2.4	x	6.0m
3.0	x	6.0m

#### STANDARD SIZES

- Capacity range - up to 500 tph dry solids feed per screen (dry screening) and up to 200tph per screen (wet screening).
- Maximum particle size range 0 - 250mm
- Minimum screen deck aperture - 200 microns.

#### BENEFITS

- NEARLY TWICE THE THROUGHPUT OF STATIC UNITS
- NON BLINDING OPERATION
- VERY EFFICIENT DEWATERING OF FINE GRADE PRODUCTS
- LOW CAPITAL EXPENDITURE
- LOW RUNNING COSTS
- LOW NOISE LEVELS
- COMPACT DESIGN



## VIBRATORY CURVED SIEVE BEND UNIT

Vibratory curved screens can be used to size and dewater many materials including coal, sand and food products. Many different screen sizes are available - the finest can dewater particles as small as 150 micron. Screens can be supplied in mild steel or stainless steel or with polyurethane coating.

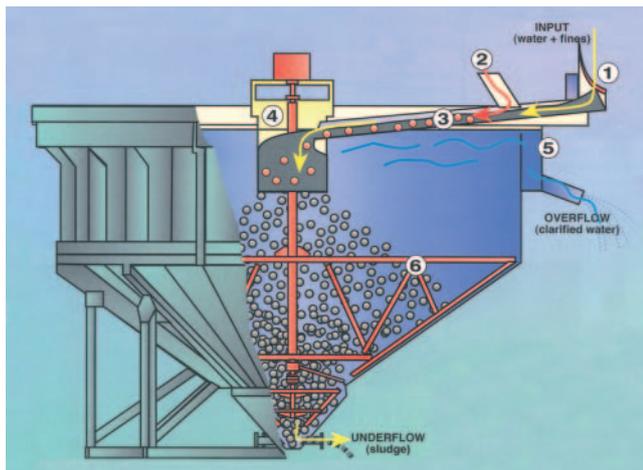


## LIVE DECK SCREENS

Parnabys can supply this specialist type screen for separation (dry basis) of fine particles ie these screens can operate / separate as low as 2mm particle size with exceptional efficiency. How it works - elastic polyurethane screen panels are alternatively tensioned and relaxed. In the tensioning phase the panels are actually stretched and the holes are elongated which frees any stuck particles from the surface of the panels, vastly improving screening efficiency over any concentrated screen.

Screens of 1m x 2m through to 2.4m x 8m long can be supplied to handle a wide range of feed rates and different materials.

## EFFLUENT TREATMENT



### THICKENER/CLARIFIER CONE (HIGH RATE DESIGN)

The Parnaby thickener/clarifier cone with its special profile and internal moving rake has been designed to achieve the rapid settlement of solids in water.

#### BENEFITS

- HIGH THROUGHPUT
- LOW FLOCCULENT REQUIREMENT (50-100gpt)
- MODULAR DESIGN
- EASILY ASSEMBLED
- DOES NOT NEED TO BE BOLTED TO FOUNDATIONS

#### STANDARD CAPACITIES

Various sizes are available with throughputs ranging between 30 and 1000m<sup>3</sup> per hour.

#### VESSEL SIZES:

- 3 metres
- 4.2 metres
- 6 metres
- 7 metres
- 9 metres
- 10 metres
- 12 metres
- 15 metres
- 20 metres

### GRAVITY THICKENER BELT

This is designed to process a wide range of liquid effluents to increase the solids content from 0.5% in the feed to 10% in the overflow. It maximizes particle capture in the overflow and minimizes particle content in the filtrate



### FLOCCULENT MIX AND DOSE UNITS

Parnaby's manufacture a range of powder and liquid grade polymer/flocculent preparation and dosing systems to suit clients requirements.



## EFFLUENT TREATMENT



### MULTI-ROLL FILTER BELT PRESS

This is the final or last stage of effluent treatment. It is an efficient and reliable method of separating solids from liquid to produce dry filter cake and particle-free filtrate.

The sludge is treated with a polymer flocculent and then squeezed between two filter belts to remove the liquid. The arrangement of the rollers ensures that pressure is increased as the sludge progresses through the machine. The liquid squeezed through the filter belts drains into trays under the main rollers, passing to a floor sump. The dewatered cake discharges at one end to a conveyor and is stable enough for handling / transportation.

#### BENEFITS

- High throughput
- Continuous operation
- Dewatering, easy-to-handle filter cake
- Excellent quality of filtrate
- Minimal operator supervision
- Maximum reliability
- Minimum maintenance
- Low capital cost

#### SPECIFICATIONS

- Fully galvanized frame
- Long life, double-row spherical bearings
- Heavy duty rollers with 1mm irathane coating
- Variable pneumatic belt tensioning
- Variable speed main drive
- Stainless steel filtrate trays
- Long life polyester filter belts
- Stainless steel belt washing sprays
- Automatic belt tracking

### FILTER PLATE PRESS

Parnaby Cyclones work in association with a leading European manufacturer to supply a range of filter plate presses within the UK. These presses work at pressures up to 14bar with inbuilt PLC controls. With rapid cycle times these machines can give high throughput and very low moisture cakes.



#### BENEFITS

- Technologically advanced system with full automation for waste water clarification and sludge dehydration.
- Rapid cycle times
- Capacities up to 9000 litres (1.5tph dry solids) per machine
- Can be used in: food, farming and agriculture; mining and mineral processing; chemical, textiles and paper.
- Moisture levels as low as 18% can be achieved

## UPWARD CURRENT HYDROSIZERS

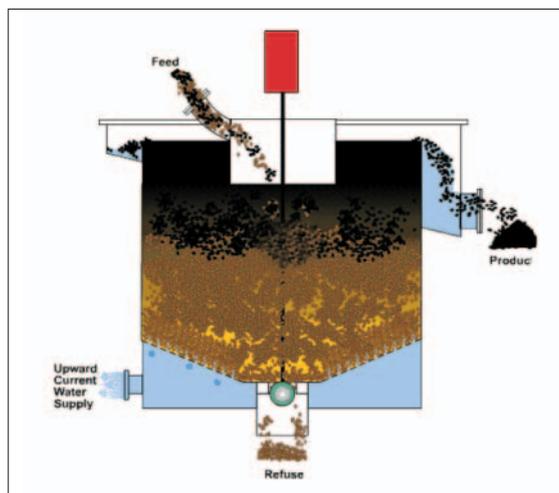


The Hydrosizer, is an upward current vessel for beneficiation of fine coals, the system can process up to 3mm particle size material, however it is Parnaby's experience to best utilise the process for cleaning of < 1mm fractions in order to obtain the best results.

### A typical system comprises:-

Fines < 1mm are delivered to the classifying cyclone's feed tank, here dilution water is added as may be required to give a feed consistency of 15% by weight, from here the mixture is pumped to the fines classifying cyclone's at approx 20psi.

The cut point is d50 of 100-150 $\mu$ m, the < 100 $\mu$ m fines reporting to the cyclone's overflow and subsequently to effluent treatment. The > 100 $\mu$ m x 1mm fines are delivered to the Hydrosizer inlet launder with dilution to maintain approx 20% solids w/w.



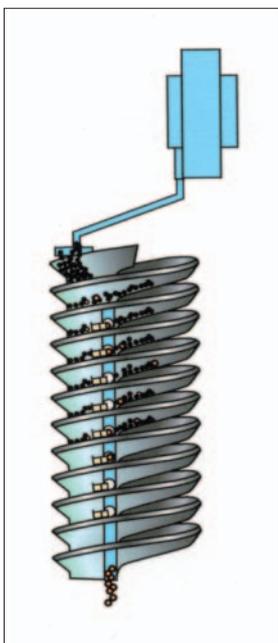
The Hydrosizer can be described as a hindered settlement process in so far as by creating an upward flow of water through the vessel to achieve a constant flow over the rim of the vessel, the lighter coal particles report to the overflow.

The heavier shale particles settle downwards through the rising flow of water, to be discharged at a controlled rate from the base of the vessel through a plug discharge valve or valve's This process is regulated by electronic controls to maintain an efficient separation.

The coals overflowing the upper rim of the vessel are collected in the clean coal tank and pumped to thickening cyclone's and concentrated to approx 40% solids w/w and finally dewatered via a screen scroll basket centrifuge dryer to a free moisture content of approx 15%.

The fines shales are discharged as described earlier, from the bottom of the vessel to the fines tailings tank and pumped to the fines tailings vibratory high frequency dewatering screen the screen effectively removes typically 40 -50% of the fines waste with a retained moisture of circa 25-30% to the screen overflow.

The underflow of the tailings screen < 100 $\mu$ m waste, are pumped to the effluent treatment plant.



## GRAVITY SPIRAL SEPARATORS

This system does a similar job to the hydrosizer, ie: separates fine coals / minerals of < 1.0mm size fraction with efficient particle separation between 1.0mm and 100 microns, as described for the hydrosizer system. The raw feed must firstly be deslimed at 100 microns, the 1mm x 100 microns diluted to approximately 20% weight for weight basis is processed / separated in the spiral column, the separation is gravity assisted. The feed enters the twin start spiral u-section at the top, flows down the spiral column and the heavy particles stay close to the central column, the lighter particles are thrown out centrifugally, separating from the heavier to be drawn off separately at the base of the column. 2 and 3 product separation is available and products handling is similar to that detailed for the Hydrosizer.

## FROTH FLOTATION CELLS



Fine coal can be separated from shale and other waste by the process of froth flotation. Coal can be made water repellent by the addition of a reagent like oil; such that when a suspension of coal is agitated with air it sticks to the air bubbles and floats to the surface, collecting as froth.

Shale and other waste are not wetted by the reagent due to the different nature of their surface and hence do not stick to the bubbles and remain in suspension to be drawn off the froth cells at a controlled rate. The froth is removed from the upper cell weir by the assistance of rotary paddles. The process is effective for beneficiating of fine coal <math><0.5\text{mm}</math>.

## SCREW CLASSIFIERS

The Parnaby screw classifier is a heavy duty robust machine designed to separate / dewater a wide range of materials. They are particularly effective for the separation/dewatering of small and fine grade aggregates, particle sizes <math><30\text{mm}</math>. Also effective in the recycling of various materials from aggregates through to plastics.

Size range 300 dia, 400 dia, 500 dia, 600 dia, 700 dia, 800 dia available with capacities up to 150 tph.

### Application:-

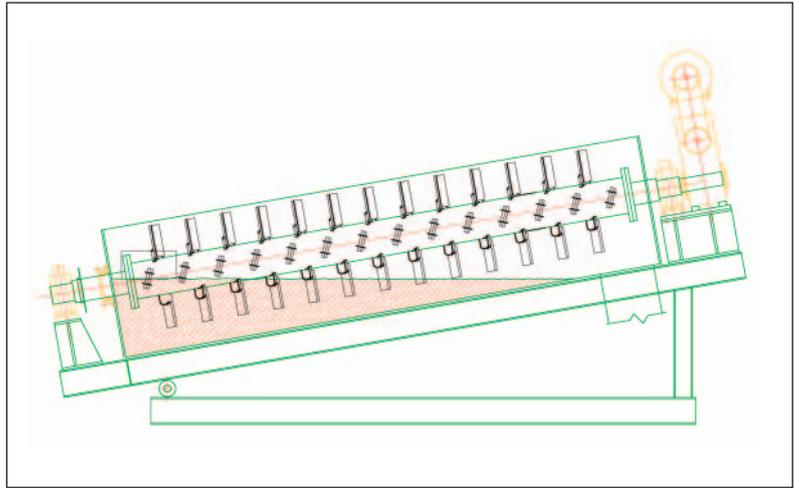
- Coal Preparation
- Quarrying
- Recycling
  - aggregates
  - metals
  - plastics
  - glass



## LOGWASHERS

The Parnaby 'dynamic' power scrub logwasher is an extremely robust solution, for removal of heavy or plastic clays from aggregates with clay contamination upto 20% and capacities upto 200tph.

The Parnaby Logwasher can also be an ideal solution for processing of recycled aggregates, both cleaning and removal of contamination such as wood, plastics etc.



### ADVANTAGES

- Extremely robust construction.
- High availability / low down-time for maintenance.
- Can handle up to 100mm particle size.
- Efficient cleaning of heavy clay contaminated materials.
- Efficient planetary drive gear units.
- Competitive pricing.
- Quick and easily installed to new and existing project sites.

## CONVEYORS

Conveyor systems are built in various lengths to suit and in widths from 600mm to 1600mm complete with chute works, support trestles, 'Universal' idlers, conveyor belting, drive gearbox and motor, rubber lagged head drum and guards. Conveyors which we offer are either stacking, overland, incline, picking or chevron.



## CRUSHERS/SIZERS

### ANSEC A550 MINERAL SIZER

The Ansec A550 series of mineral sizers have been developed from the highly successful A200 single roll and A500 twin roll sizers.

Considerable research and development coupled with extensive field trials have helped to produce machines which can accurately size material with very low increase in the quantities of 'fines', this leading to increased efficiency in the transportation of materials by effectively eliminating the problem caused by large lumps of material.



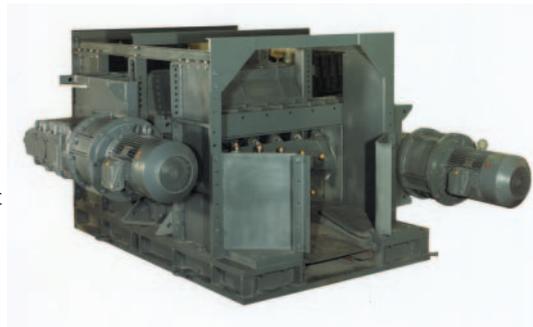
The machines are of simple yet extremely robust construction, giving efficient operation with minimum operating costs and maintenance.

Materials up to 28,000 to 30,000 psi compressive strength can be effectively processed by these machines.

Throughputs of up to 2,500 tonne/hour have been achieved, but the actual throughput of a specific machine will depend on the material being processed, infeed size and the sizing requirements.

### ON - PAN BREAKER

The Ansec two stage on-pan sizer was developed for heavy sizing work with large infeed size requiring a product size of less than 250 mm. So often the limiting factor with on-pan breakers is the height to drum centre which determines the maximum lump size entering the machine. The primary stage on the Ansec machine can be set independently to grab the large pieces, whilst the second stage can be set to obtain the required product size.



### A200 SERIES MINERAL SIZERS

The A200 series of mineral sizers were developed to meet the needs of mining today. Reductions in manpower and increased efficiency through its simple robust design give good value for money.

Material up to 28000 psi can be processed thru the A200 machines which use a variety of pick designs from the basic carbide tips point attack to the purpose designed cast manganese steel teeth for special applications.

Considerable research and development coupled with extensive field trials have helped to produce machines which can size accurately with very low increase in 'fines'.

The feature of the machines is the ease with which adjustment of sized product is achieved (especially important in the smaller size product). Maintenance is simplicity itself with teeth being individually changed if required reducing down time and cost to a minimum.



Extensive trials with British Coal's test establishment and site operations have led to national approval both for underground use and coal preparation plants.

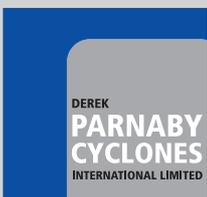
The Ansec A200 Mineral Sizer is a pour through machine designed for throughputs from 30 tonnes per hour to 1800 tonnes per hour. Product sizing is in the range <25 mm to <250 mm.

Throughputs depend on material and size required.

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