Distributor for:

Multotec Process Equipment
Multotec Wear Linings
PrepQuip (Pty) Ltd.
CLIMAX$_X$ Equipment Company

preptech.INC.

www.preptech.com
888.447.7737
Monessen Riverfront Industrial Park
240 Riverview Drive, Monessen, PA 15062

PrepTech, Inc.

PrepTech, Inc., established in 1997, serves the coal and mineral processing industry.

Engineering
PrepTech offers engineering services:

- Bid specification packages, including balanced flowsheets and plant layouts
- Computer simulation and optimization of cleaning plant flowsheets

Equipment
PrepTech also represents several equipment manufacturers:

- Multotec Process Equipment (Pty) Ltd. of Kempton Park, RSA
- Multotec Wear Linings (Pty) Ltd. of Pretoria, RSA
- PrepQuip (Pty) Ltd. of Kempton Park, RSA
- $CLIMAX_X$ Equipment Company, Inc. of Pittsburgh, PA

Testing Facilities: Test spirals are available for in-plant testwork or testing at our warehouse in Monessen, PA. A pilot-scale filterpress and a pilot-scale froth flotation column are also available.

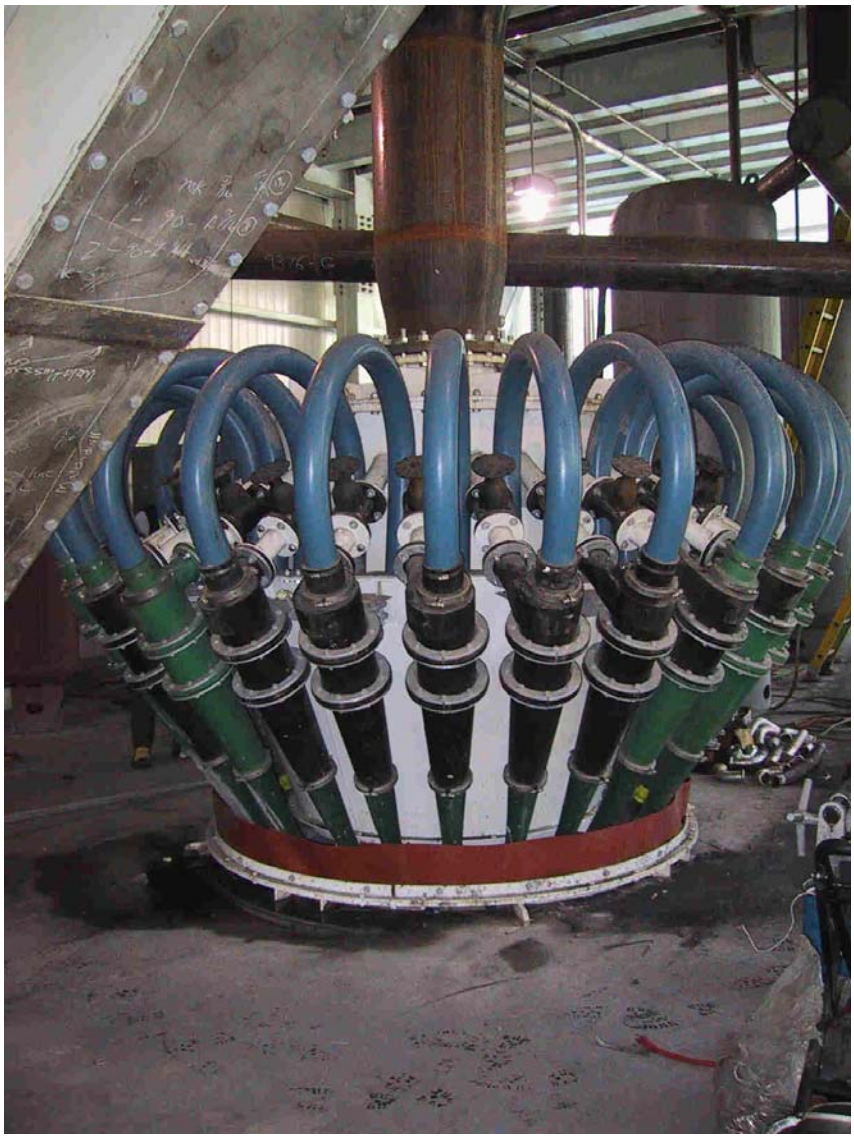
Service and Parts Inventory: PrepTech offers after-sales service for all products. A parts and equipment inventory is maintained at PrepTech's warehouse in Monessen, PA.

Contact PrepTech :
Toll free 888.447.7737

Headquarters in Apollo, PA
Phone 724.727.3439
Fax 724.727.2532

Warehouse in Monessen, PA
Phone 724.684.4577
Fax 724.684.6877

Multotec Cyclones



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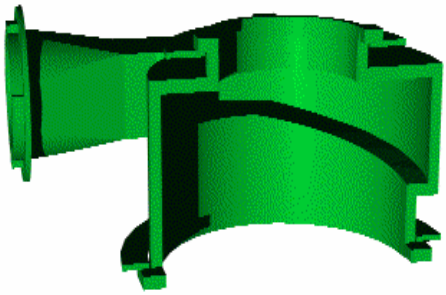
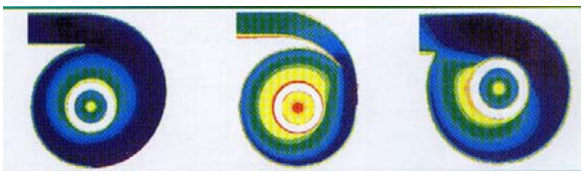
Multotec Cyclones—Dense Medium and Classifying



PrepTech offers Multotec high-alumnia ceramic lined *dense medium* (heavy media) cyclones and a variety of *classifying* cyclones:

- ceramic lined,
- rubber lined--used extensively in the sand and gravel industry
- polyurethane--most notably, the VV165 cyclone (6.5-in diameter) in use in many coal preparation plants for desliming at 325 mesh prior to flotation



A—Scrolled Evolute Velocity Profile.

The feature that sets the Multotec cyclone apart is the inlet head design. The Scrolled Evolute design gives a cyclone with a higher capacity compared to other common designs. This is a direct result of the reduction in turbulence at the cyclone inlet. Velocity profiles for these inlets confirm the finding that votex finder wear is almost non-existent.

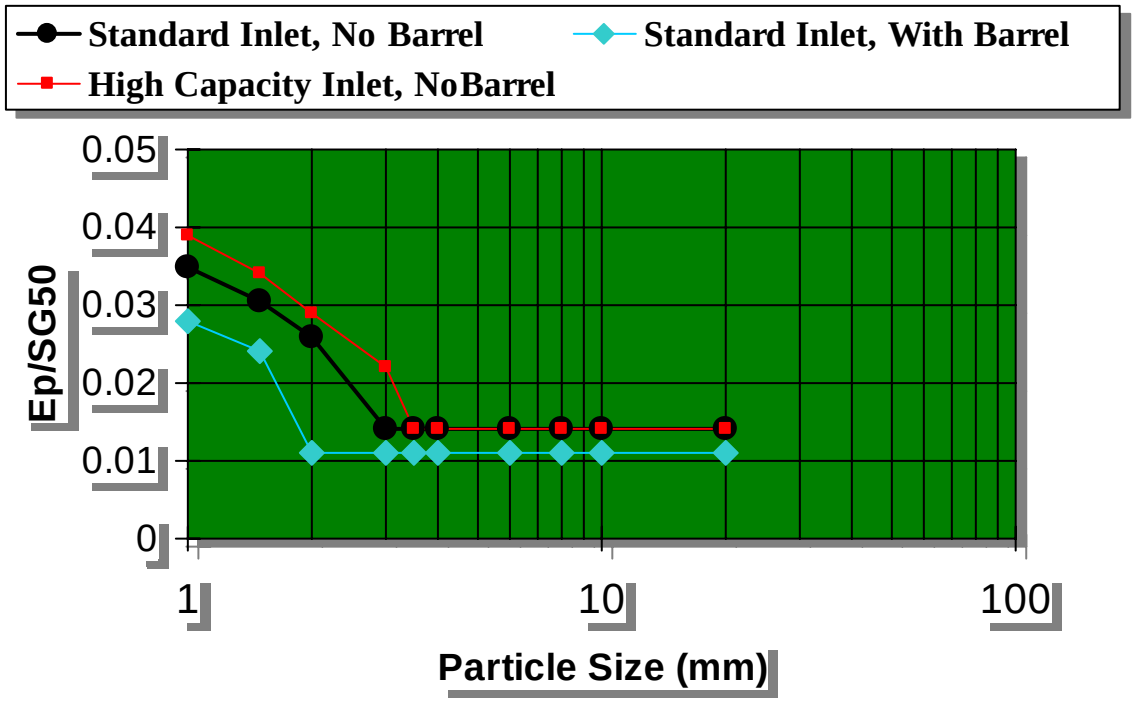
Dense Medium Cyclones

Dense medium cyclones are available in a wide range of sizes (up to 1,450 mm diameter!) and with various inlet and vortex finder configurations. Cyclones are selected for each application based on:

- feed tonnage
- topsize
- yield—critical in determining the proper apex size
- coal (or ore):medium ratio
- particle size distribution

A mild steel shell is lined with engineered, high-alumnia ceramic tile. A stainless steel shell is offered for high corrosion applications.

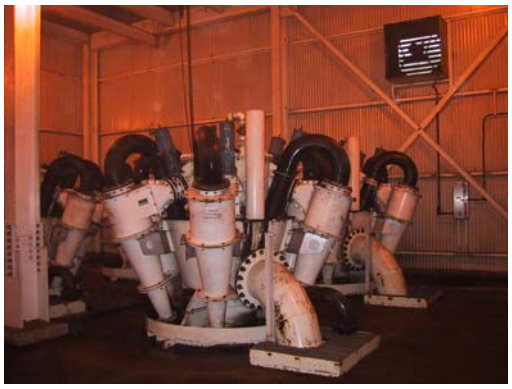
Multotec Cyclones—Dense Medium

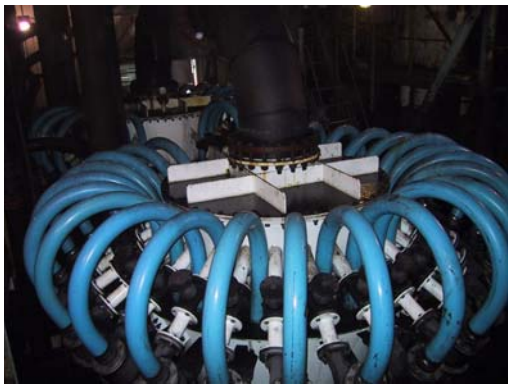


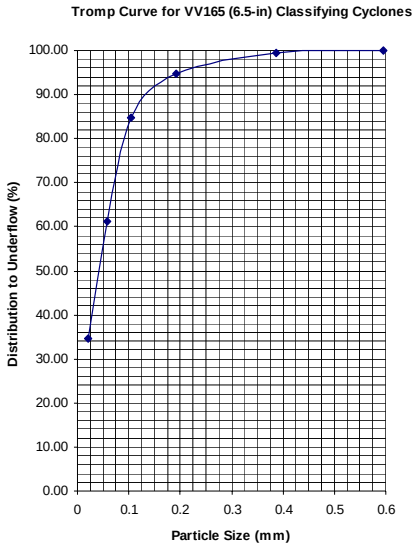
Dense Medium Cyclone configurations are selected to match each application for performance, as well as capacity.

Examples of Dense Medium Cyclone Capacity at 9D Cyclone Head and 1.5 s.g. Coal					TPH Capacity @ 4:1 M:C		
Cyclone Model	Diameter (mm)	Diameter (in)	Inlet Type	Medium S.G.	1.4	1.5	1.6
MA510-20-1	510	20.1	A		75	79	83
MA510-20-1	510	20.1	AB		62	66	69
MA510-20-1	510	20.1	B		50	52	55
MA660-20-1	660	26.0	A		133	141	148
MA660-20-1	660	26.0	AB		111	117	124
MA660-20-1	660	26.0	B		89	94	99
MA800-20-1	800	31.5	A		206	218	230
MA800-20-1	800	31.5	AB		172	182	192
MA800-20-1	800	31.5	B		138	146	153

Multotec Cyclones—Classifying







Classifying Cyclones

PrepTech offers a wide range of Multotec classifying cyclones to suit every need. Cyclones sizes and configurations are selected based on Multotec's "New Plitt" formula.

High Capacity Ceramic
For typical classifying cyclones applications in coal, the new "HA" range of cyclones is offered. These feature high-alumina tile linings throughout the body, a monolithic alumina body cone and apex, and a polyurethane vortex finder. Mild steel shells are standard; however, fibre-reinforced composite shells are offered for high-corrosion applications.

These will replace the Multotec "SC" or silicon carbide lined cyclone range for typical fine coal classification.

Rubber-lined
For many sand and gravel applications, rubber-lined cyclones are preferred. PrepTech offers a complete size range of Multotec rubber-lined cyclones. Both mild steel and fibre-reinforced composite shells are available.

Polyurethane Cyclones for Desliming
Desliming prior to froth flotation has begun to be a popular choice for some coals. The VV165 (6.5-in diameter) classifying cyclone is the choice for this duty. A Tromp curve from a VV165 cyclone test (intermediate vortex finder, 25 psi, 20 mm apex) is given to the left. The measured capacity of the cyclone under these conditions is 208 gpm.

Multotec Spiral Concentrators

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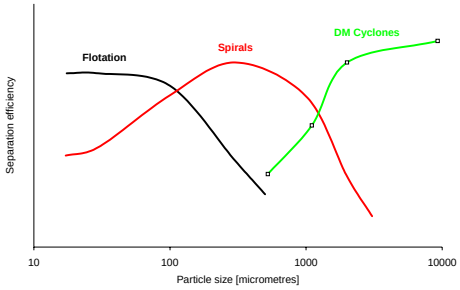
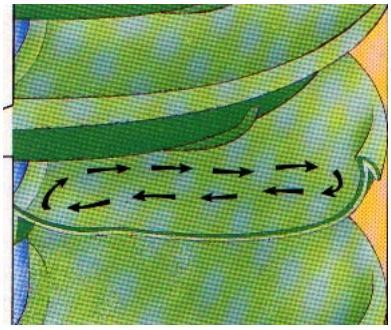
Multotec Spiral Concentrators--Coal





Types of Coal Spirals Available:

- SX4—Single-stage, 4-turn spiral
- SX7—Two-stage, 7-turn spiral
- Available in single start, double start and triple start configurations
- Up to 12 spiral assemblies or 36 starts in a bank

What are Spirals?

- Flowing film concentrator
- Relatively low capital cost (+/- $700-$900/tph capital for single stage)
- Virtually no operating cost (reagents, consumables, power, wear)
- Handle oxidized/weathered coal
- Robust and simple to operate
- Generally treat 1.0 x 0.1 mm (16 x 150 Mesh)
- Allow heavy media cyclones to clean down to 1 mm—more efficient desliming and media recovery
- Allow froth flotation to clean minus 150 Mesh—better flotation of finer particles

Unique Feature of Multotec Coal Spirals:
Auto Reject Channel

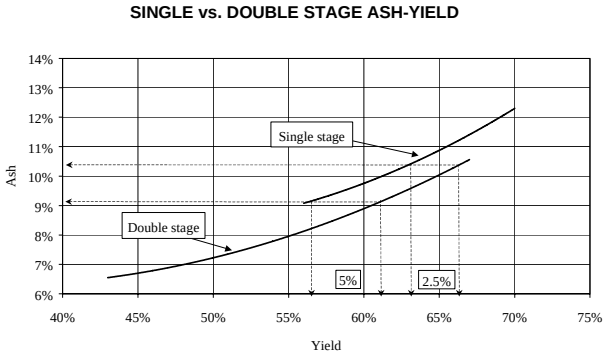
- Improved removal of high density particles without auxiliary splitters
- Improved removal of misplaced material through circular transversal flow
- Higher reject capacity
- Less sensitive to beaching of coarse particles

Operating Criteria

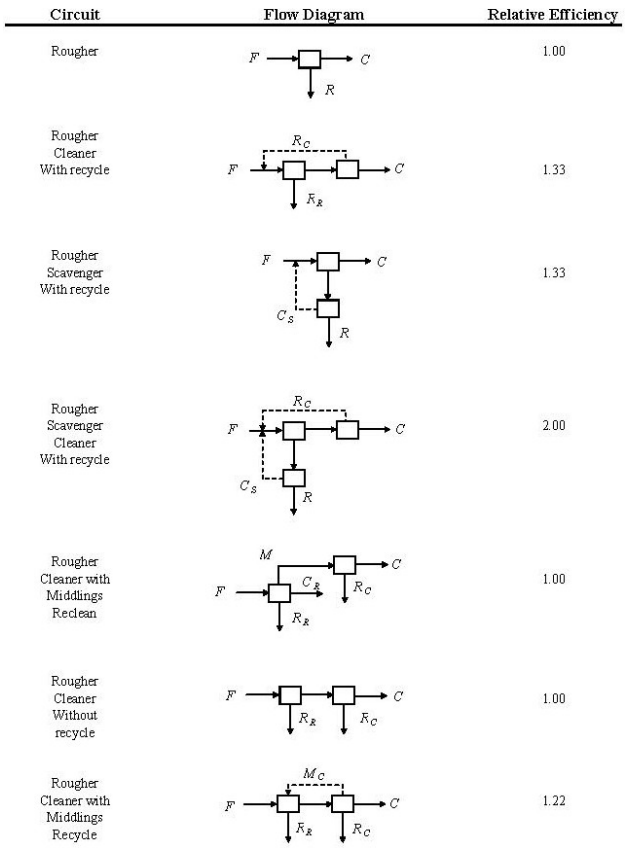
FEED SIZE	-1.0+0.1	mm
DRY FEED	2.5-3.5	TONS
SLURRY VOLUME / START	35	GPM
FEED % SOLIDS	25 - 35	W/W

Multotec Spiral Concentrators--Coal

Benefits of Two-Stages of Coal Spirals

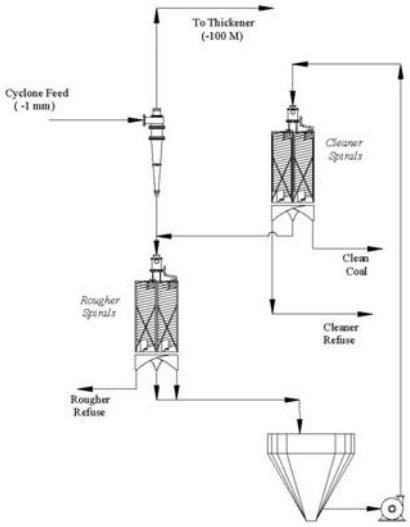


Prinsloo and Abela. 1998



Luttrell et al., 1998

- Two-stages found to be more efficient than single-stage (Prinsloo and Abela, 1998)
- Improvements between 2.5 and 5 percentage points in yield at same ash
- Luttrell et al. (1998) found the rougher-cleaner with middlings recycle circuit to be the most cost-effective of the more efficient circuits from a theorectical perspective. In practice, they calculated a 3.8% yield increase at the same ash content.



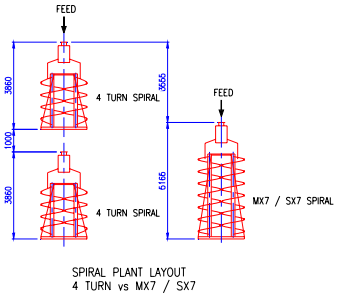
Rougher-cleaner with middlings recycle as two stages of spirals

Prinsloo, T.R., and Abela, R. L. 1998. Multiple Stage Fine Coal Spiral Concentrators. *Proceedings of the International Coal Preparation Congress*, Brisbane.

Luttrell et al. 1998. Improving spiral performance using circuit analysis. Minerals & Metallurgical Processing. November, Vol. 15, No. 4, pp. 16-21.

Multotec Spiral Concentrators--Coal

Benefits of Two-Stage Coal Spirals (SX7)



SPIRAL PLANT LAYOUT
4 TURN vs MX7 / SX7

- Advantages of double stage circuit, but in one spiral assembly
- Reduce cost while improving performance
- Reduction in capital equipment cost, overall plant height and floor area

SX7 Two-stage Coal Spiral

- Four spiral turns followed by removal of a primary refuse
- Remixing of middlings and clean coal followed by three spiral turns
- Stream is split into secondary refuse, middlings and clean coal
- Middlings to be recycled to feed

Recent Performance Data

- Recent efficiency values achieved with SX7 in plant circuits (1 x 0.1 mm)
  - 0.094 at 1.83 separating gravity (generalized probable error, Epm = 0.051)
  - 0.122 at 1.82 separating gravity (generalized probable error, Epm = 0.067)
  - Note: typical single-stage Epm ~0.10

Multotec Spiral Concentrators--Coal

Benefits of Two-Stage Coal Spirals (SX7)

Overall Plant Benefits

- Allows DMC to process only down to 1 mm size—more efficient desliming, more efficient media recovery

- Often allows coarse coal circuits to operate at higher separating gravities because the finer fraction is cleaned more efficiently—greater recovery of coarser, lower moisture coal (incremental inerts=moisture + ash)

- *Coal Leader*, July 2003 reports:

  - Spiral circuit yield increase of 5.7%.

  - At 45 tph, this increase at $25/ton and 5,500 tpy gives $350,000/year

  - Spiral cutpoint dropped to 1.66 s.g., allowing the heavy medium s.g. to increase giving 13 tph more clean coal in that circuit for a total impact of $1.79 million per year.

  - Cost for the spiral installation was $140,000.

- *Coal Prep 04*, Bethell and Dehart:

  - Hobet processes 5.4 million raw tpy

  - Addition of SX7 spirals, clean coal effleunt cyclones, and fine wire sieving

  - Plant yield increased by 28 tph or 105,000 tpy

  - At a market value of $35/ton, a net revenue increase of =/-$3.7 million/year will be realized, providing a payback of +/-3 months on the capital spent

- As of November 2004, installed capacity is 636 SX7 starts, treating approxiamtely 1,590 tph at 2.5 tph/start

Multotec Spiral Concentrators--Minerals

Types of Mineral Spirals Available:

- High grade and low grade
- 3, 5 and 7-turn spiral
- Available in single start, double start and triple start configurations
- Up to 12 spiral assemblies or 36 starts in a bank

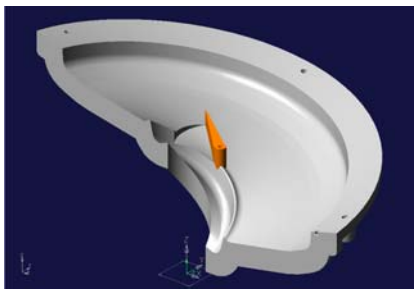
New High Capacity Mineral Spiral Design: SC22

The Multotec SC22 Spiral Concentrator has been developed with the aim to optimise the following criteria:

- Separation performance
- Reliability
- Cost-effectiveness
- Capacity

The SC22 Spiral Concentrator has a 7¾ turn helix with an overall height of 3850 mm (152 in) and a diameter of 660 mm (26 in).

Spiral troughs are manufactured from high-quality polyurethane resin with a fibreglass backing. The combination of raw materials used in the production of Multotec spirals has been proven to result in superior adhesion between the two layers, and delamination problems are virtually unknown. For maximum wear life, high-wear areas are manufactured with increased Polyurethane thickness.



The auxiliary splitters of the SC22 Spiral Concentrator are moving on a flat surface which has a downward gradient towards the product gully which facilitates product removal while allowing for easy adjustment and operational stability. The heavy-duty splitter body is mounted on a 316 stainless steel shaft, thus providing a robust and corrosion-resistant unit.

Multotec Spiral Concentrators--Minerals

Unique Design: Adjustable intermediate tailings reject port

Consists of an inner and outer disk in eccentric configuration. The outer disk can be rotated in its seat in the spiral trough, and the inner disk can be rotated in the outer disk.

Operational advantages

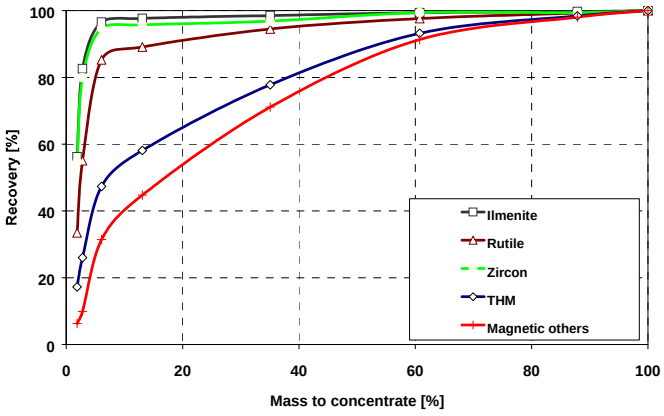
- The circular, sealed design prevents the inside tracks from being exposed to slurry and solids, reducing the risk of blockage.
- No parts of the adjustment mechanism are protruding outside the spiral onto the walkway, which reduces the risk of injury or damage.

Metallurgical advantages

- The design of the tailings reject port allows independent adjustment of position and orientation of the tailings reject orifice.
- The design of the inner disk encourages preferential discharge of light particles while misplaced heavy particles are preferentially deflected from the tailings discharge.

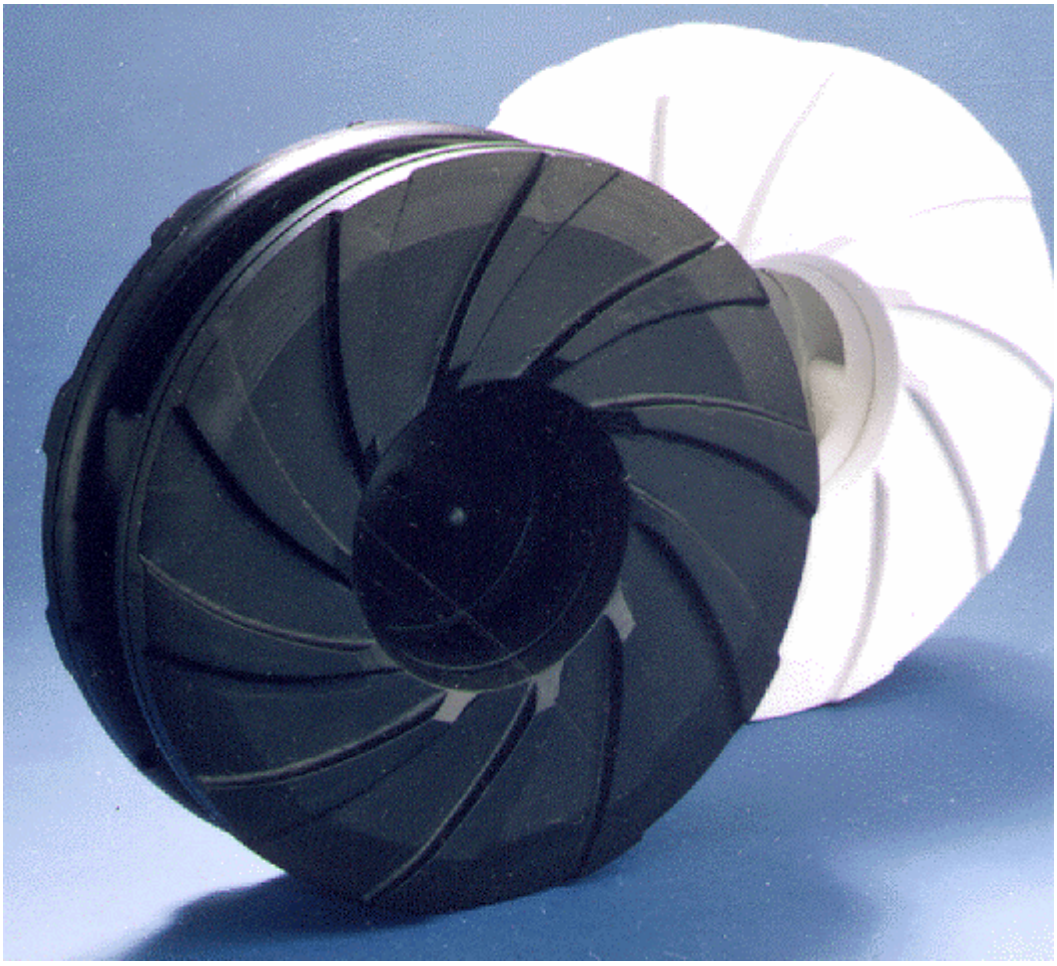
Operating Conditions

- No wash water required
- Capacity: up to 4.5 stph (4 Mtph) solids depending on application; typical 2 to 2.7 stph for most applications
- Pulp density: 30 – 50% by mass
- Size range: max 2 mm, depending on density
- Pulp volume: max 26 USgpm (6 m3/h)



Performance evaluation of SC22 Spiral Concentrator in a large South African heavy mineral application (plant data). Operating load is approx 2.4 stph solids.

Multotec Ceramic Impellers



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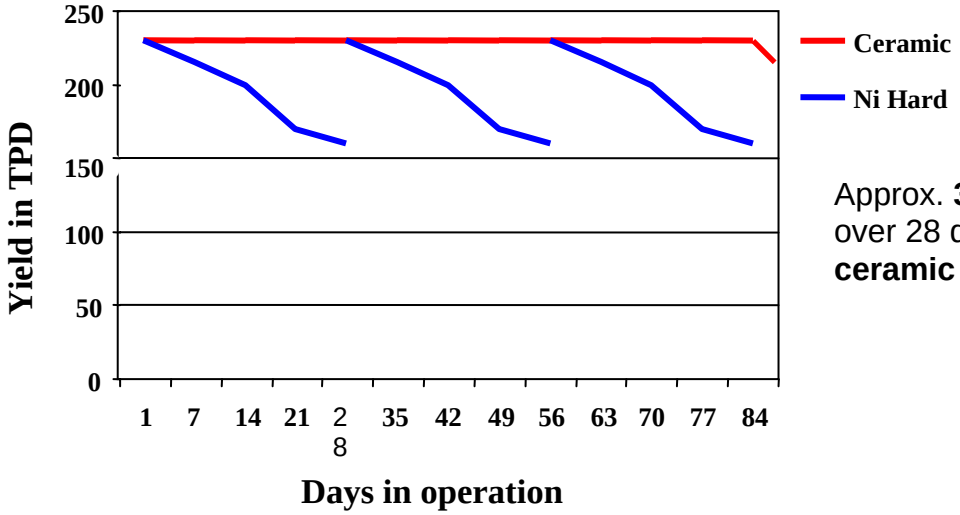
Multotec Ceramic Impellers

Advantages:

- Impeller life in excess of 6 times that of Ni-hard steel or polymers
- Approximately half the weight of steel
- Less down time
- Lower maintenance costs
- Extended, more consistent yield
- Less re-circulation = Longer pump life

Features:

- Alumina-Epoxy-Steel composite
- Individually balanced
- Pump curves are available
- Compatible with existing pumps



Approx. **35%** yield loss per **steel** impeller over 28 days compared to **2%** for the **ceramic** impeller over 84 days

PrepQuip Froth Flotation Column

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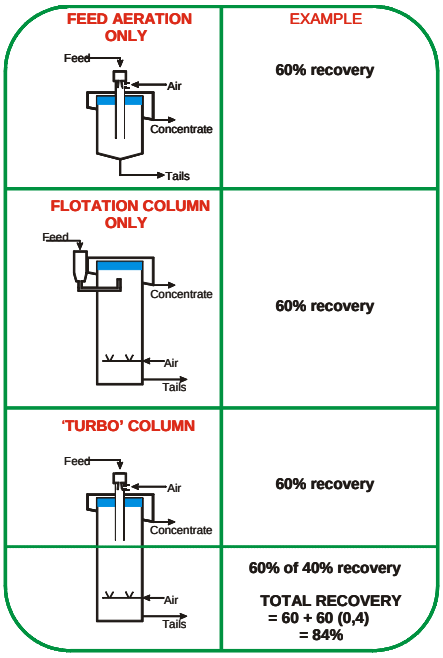
PrepQuip Froth Flotation Column



Two Types are Available

- Conventional

  Suitable for easy applications due to single aeration.

- Turbo

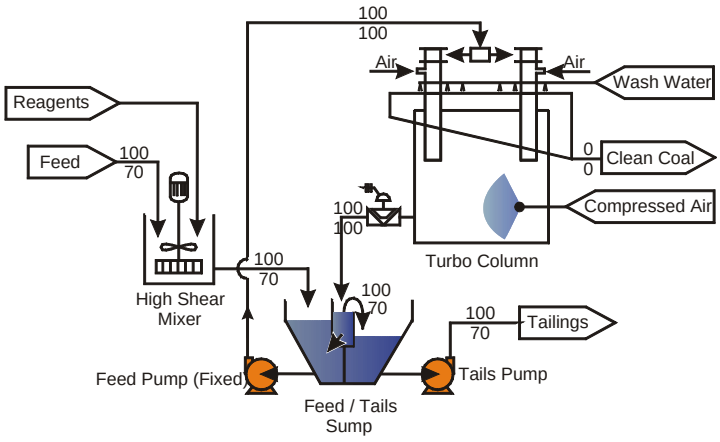
  Supercharged unit for difficult applications.

Applications include metal concentrates and minerals

Column Features

- Internal froth launders
- Froth washing
- Air spargers
- Interface level controllers
- No moving parts
- Lower reagent consumption
- Low energy consumption
- Reduced downtime
- Lower residence time
- Higher gas hold-up

Plant Design



PrepQuip TH Filterpress

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PrepQuip TH Filterpress

- Manufactured by TH (Spain)
- The TH Press Features
  - Fully automatic
  - Hydraulic system (low power req.)
  - Hydraulic driven feed pumps
  - Fulcrum design
  - Plates from Polypropylene, Mild or 304/316 Stainless Steel
  - Filter area : 1.4m^2 to 208 m^2
  - Capacity : 1 to 85 tons dry solids/hr
  - 25mm rubber seals
  - Individual plate feeding
  - Cake discharge arrangement
  - Cloth washing system

- More than 154 units supplied world wide
- Applications include metal concentrates, minerals, metallurgical, effluents

- Filters sold to
  - Copper
  - Chrome
  - Scrubber Dust
  - Glass polishing
  - Coal
  - Quarry Stone
  - Limestone
- Coal applications
  - More than 75 units
  - More than 1,100 tons dry solids/hr
  - Largest Installation worldwide:
    China National Coal
    240 Tons/hour
    15 x 18-S3 Filter Units

PrepQuip In-line Guard Screen

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PrepQuip In-line Guard Screen

GUARDS AGAINST

- Damage due to oversize debris
- Downtime caused by oversize debris

APPLICATIONS

- Metal concentrates, Minerals, Effluents, Equipment protection

RANGE OFFERS

- Line sizes : 80 to 500mm (3 to 20 inches) NB. Larger sizes available on request

- Capacities : 41 to 1590 m^3/hr (180 to 7000 gpm)
- Screen apertures : 0.5mm, 1 mm, 3 mm, 5 mm, 10 mm
- Operating pressure : Up to 6 Bar (G) or 85 psig. Higher pressures available upon request.

DESIGN FEATURES

- Compact and heavy duty design

- Trouble free self cleaning and non-blinding wedge-wire screen
- Low pressure drop across the screen make it possible to retrofit (horizontal or vertical) into most existing pipelines
- Cylindrical screen manufactured from stainless steel wedge-wire to reduce wear and consequent maintenance
- Standard design for standard screen lengths
- Replaceable screen cartridge

- All wetted parts are rubber lined to assist in sealing as well as to assure durability
- Can be fully automated to integrate into existing control philosophy
- Pressure indicators upstream and downstream for pressure drop calculations (optional)

CLIMAX$_X$ Magnetic Separator

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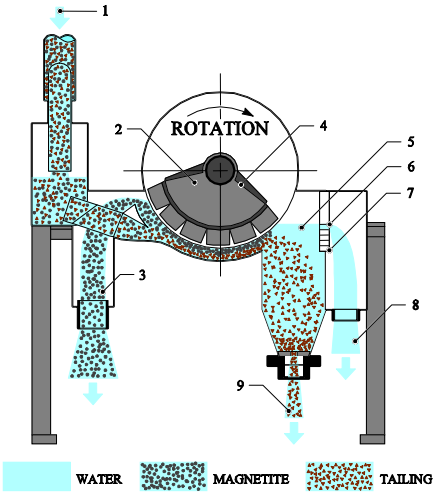
The CLIMAX$_X$ Magnetic Separator

The CLIMAX$_X$ Magnetic Separator--Legend

1 Feed 2 Greater arc radius for magnets 3 Magnetics 4 High-efficiency magnet design
5 Submergence level 6 Overflow 7 Weir bars to vary overflow level
8 Overflow product to tailings (approx. 25%) 9 Underflow product to tailings (approx. 75%)



Technical Data

Drum Diameters	**30”**	**36”**
Drum Width	**4’-10’**	**4’-10’**

- **750 Gauss Interpole Magnetic Element**
- **Extended Arch, 6 Main Pole and 5 Interpoles**
- **All Stainless Steel Construction**
- **Greaseable Bearings**
- **16 Gauge Wear Wrap**

Operating Parameters

Percent Solids in Feed	**10 – 20 %**
Feed Slurry Volume	**120–140 gpm/ft drum width**
Magnetic Load (max)	**5.5 tph mag/ft drum width**
Magnetic Concentration (max.)	**2.6 lb/gal**
Percent Nonmagnetics in Feed Solids	**10 – 60 %**
Specific Gravity of Concentrates	**2.2 – 2.6 SG**

Performance

- **Typical Magnetics Loss in Tailings is < 1 g/gal of Tailings**

PrepTech, Inc., under license to CLI Corporation/Climax$_x$ Equipment Company, sells the patented CLIMAX$_X$ line of high-efficiency wet drum magnetic separators. The separator recovers magnetic media (magnetite or ferrosilicon) in dense media applications. The CLIMAX$_X$ separator features a wide-angle magnet, assembled in a specially-designed tank, which improves recovery of fine magnetite or ferrosilicon. The magnetic media is then discharged at a higher than normal density. High concentrations of magnetic and nonmagnetic material in the feed are easily handled.

The patented design of the tailings removal system prevents plugging of the tailings spigots. Level control is flexible and does not require operator attention.

CLIMAXX
EQUIPMENT CO., INC.
Pittsburgh, Pennsylvania