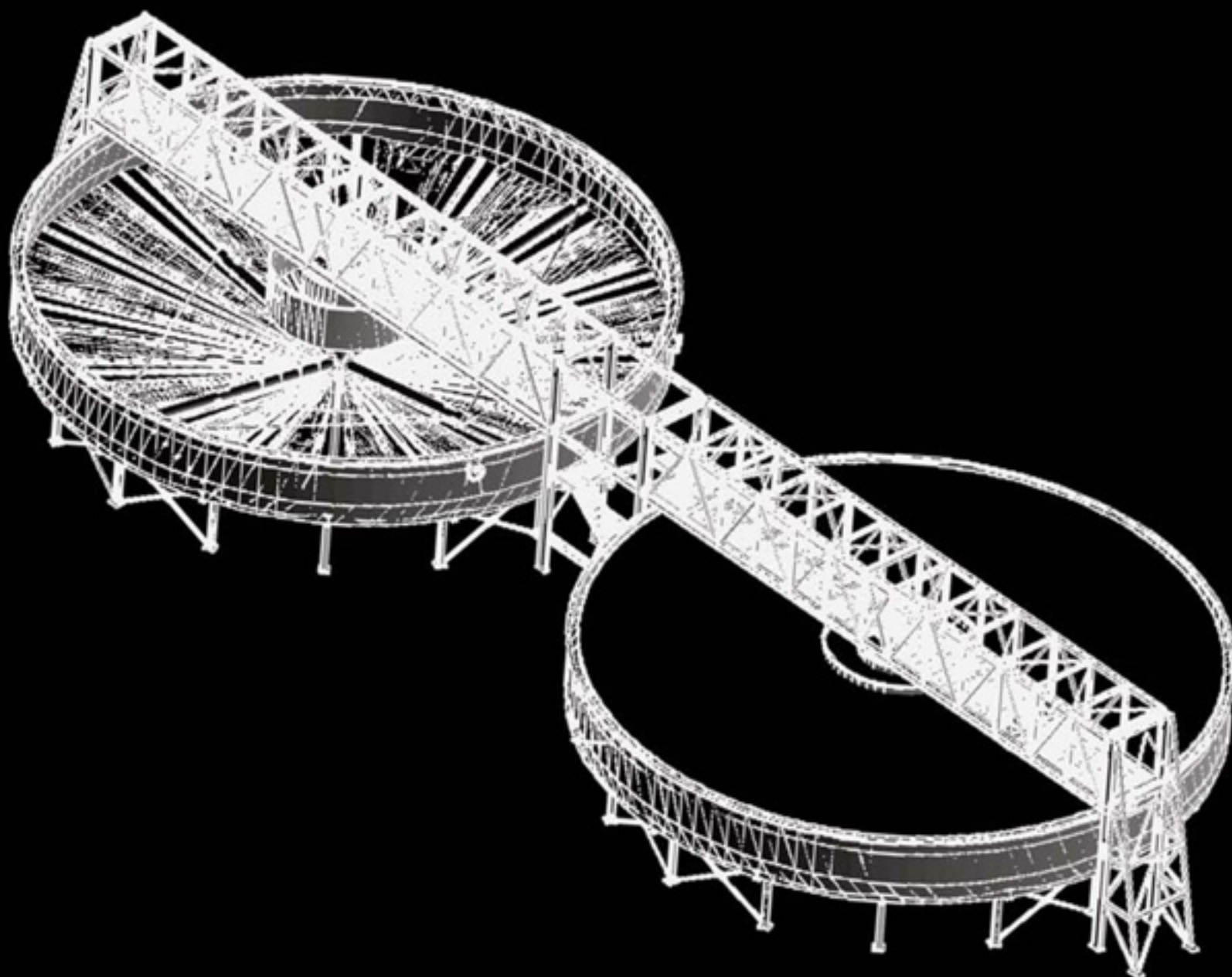




thickeners & clarifiers



unparalleled process solutions

www.mipprocess.com

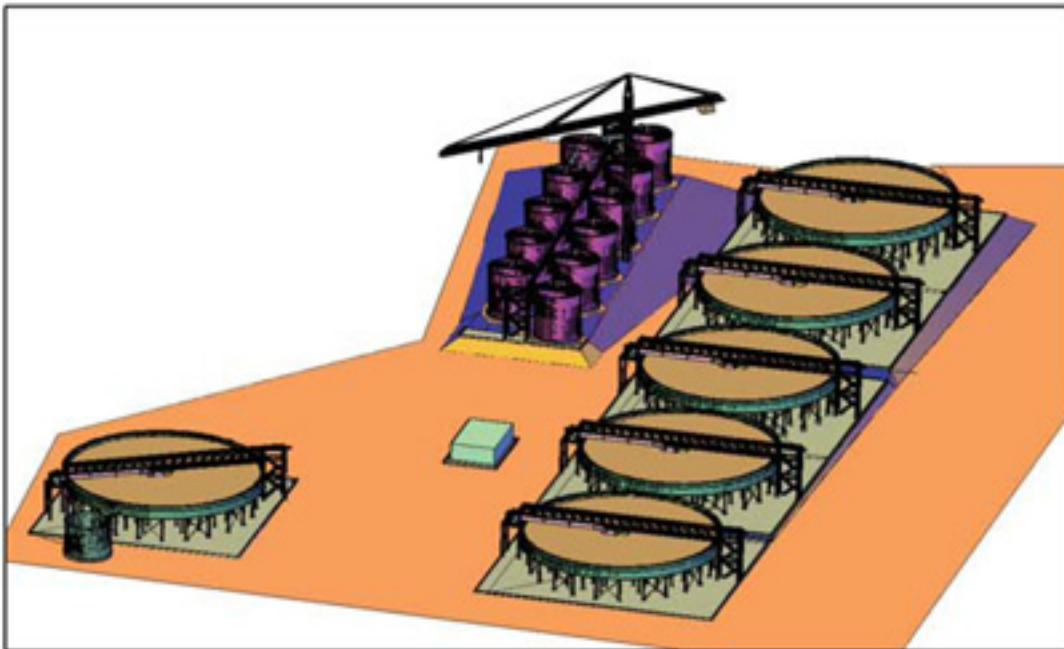
OUR COMPANY

MIP Process Technologies (Pty) Limited is a South African Process Equipment sales and manufacturing company offering customised and innovative process solutions for the Mining, Minerals Processing and related industries. The 100% black-owned and black-managed company was established in 2007. MIP Process is accredited with Level 1 BEE Status, which is the highest that can be achieved. We pride ourselves on being truly customer-centric with unsurpassed levels of customer service.

MIP Process Technologies (Pty) Limited's mission is to be the preferred supplier of process equipment with an offering that is underpinned by:

- customer focus
- reliability
- innovation
- continuous improvement

We specialise in the supply of Process Equipment, but have the capability to assist with plant design around our core technologies.



BACKGROUND TO THICKENING & CLARIFICATION

Thickeners are used in continuous process applications where liquid-solid separation by sedimentation is involved.

Thickening has three basic purposes:

- Concentration or raising the density of a mixture of solids and liquids
- Clarification, which involves recovering the overflow portion
- Hydro-separation, where a specific fraction of solids is removed from a mixture

In some applications, thickeners recover valuable solids whereas valuable liquids are recovered in others. Thickeners offer an economic solution for the recovery of process waters, whereas clarifiers are extremely efficient for the treatment of liquids.

Creating value
through innovative
superior designs and
building of strong
supply capabilities



•• APPLICATIONS

MIP Thickeners and Clarifiers can be supplied for a variety of applications from mineral processing to water treatment. Some applications where we have been involved in include:

- Tailings thickening for Platinum, Base Metals & Minerals
- Dewatering of Final Flotation Concentrates
- Treatment of Coal Slimes
- Gold Tailings Applications
- Phosphate Rock Treatment
- Counter Current Decantation (C.C.D)
- Clarification of Pregnant Liquor Solutions (P.L.S.)
- Water Treatment Applications
- Liquor Applications in the Pulp & Paper Industry
- Chemical Processing
- Neutralisation of Acid Mine Water

•• THICKENER & CLARIFIER TYPES AND SIZES

The following types are available:

- Clarifiers (customised feed well)
- Conventional units (low operating costs)
- High Rate thickener (special feed well design)
- High Density thickeners (deeper sidewall and more robust drive)
- Paste thickeners
- Ultra high rate thickeners

Our units are available in a variety of sizes starting from 1m diameter pilot scale to 90m diameter. We have standard "off the shelf" designs available. Thickener tanks, rakes and feedwells are custom designed, based on the feed conditions and raking capacity. A retrofit service is offered to enhance performance of existing thickeners and clarifiers.

•• THICKENER DESIGN

MIP Thickeners and Clarifiers are designed to operate continuously for 24 hours per day.

Process selections are based on test work coupled with our vast experience in the field of thickening. It is our belief that a thickener should not be designed on the limit since metallurgical operations are dynamic.

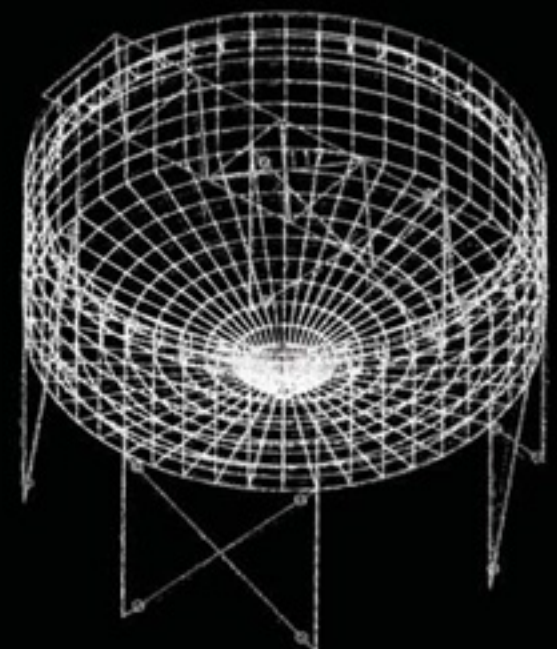
We believe that no two applications are the same. Conditions such as density and particle size vary from one operation to another. Instead of 'one-solution fits all', we ensure that equipment is designed to suit your application. Safety is considered a prime objective. All design, supply and installation of equipment complies with recognised international practices and standards.



15m ϕ Clarifier



We make use of finite element analysis to ensure optimum tank and bridge designs. The relevant seismic zone, potential wind loadings and process conditions present in the thickener are taken into account.



•• BENEFITS

A range of benefits is available to our business partners when purchasing equipment from us.

Test Facility

A comprehensive test facility is available to our customers. Preliminary sizing can be done using our extensive database.

Bench scale (cylinder) settling tests are used as a first "port-of-call". The optimum feed solids concentration can be established for use on the full size operation. We have the capability to conduct laboratory scale dynamic testwork in a 150mm diameter unit. Process guarantees are offered by MIP Process Technologies (Pty) Limited. For on-site or pilot scale testwork a one (1) metre diameter, skid mounted unit is available. With minimum changes we can conduct high density thickener testwork with the same device.

Final thickener/clarifier selection is based on the testwork and our process experience of similar applications. Research and development are one of our key business pillars. New products are fully tested prior to introduction in the market place.

Engineering Standards

All engineering, designs and construction are based on sound internationally approved engineering principles as well as practical applications.

Delivery Period:

Drawings of a variety of thickener sizes have been completed and we are able to start almost immediately with the manufacturing portion of a project.

We have project management capability available and only employ sub-contractors that have built similar sized equipment previously. They are thus familiar with all the intrinsic details required.

Certain thickener drives are kept in stock and can be airfreighted where a shorter delivery time is required.

Low Investment:

Capital costs - Our equipment design is conservative and robust to ensure it is still in operation many years from now. We understand that process conditions can change and make allowances for this.

Running costs – The MIP dilution system optimises flocculant consumption. This, coupled with our easy-to-operate control system, ensures minimum thickener operation fluctuation.

After-sales Service

All MIP Process Technologies (Pty) Limited's products have been designed to ensure minimal maintenance with easily replaceable parts for minimum downtime. All our products carry an eighteen (18) month warranty. This decreases the buying risk for customers, as most products are large capital investments.

We offer an after-sales service and our Technical and Service departmental staff is available on a continuous seven (7) days a week basis to offer assistance. A team of process and mechanical engineers are available, who have experience in sedimentation, coupled with skills in Coal, Base Metals, Platinum and Gold markets. Field service technicians provide further support.

Project Management

Owing to the high level of importance that MIP Process Technologies (Pty) Limited places on delivery, we ensure that each project has a world-class management team. This is coupled with the resources of highly experienced subcontractors, for the different aspects of each project.

EQUIPMENT COMPONENTS

The main components of the thickener/clarifier are the Tank and the Mechanism.

Tank

The tank is constructed from a variety of materials, the most common being carbon steel, stainless steel and concrete.

The following tank designs are available:

- Supported on legs, giving access to the underflow pumps and valves
- Supported on the ground with compacted soil, offering access via a tunnel
- Welded or bolted construction

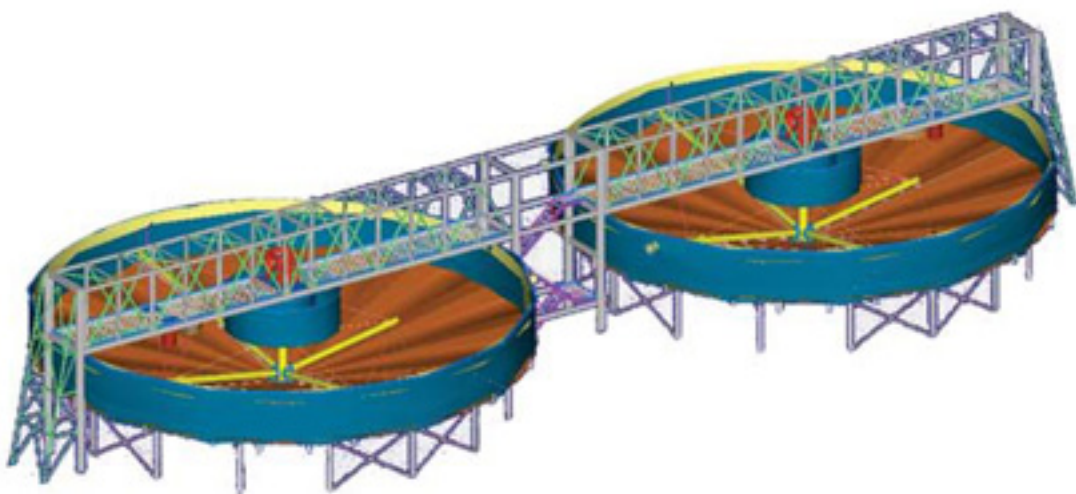
MIP's scalloped bottom tank design minimises capital expenditure, whilst at the same time offering superior strength.

The tank design is based on a density profile of the expected operating conditions.

A scum launder is used to prevent crud from reporting incorrectly to the clean overflow. This is specifically applicable to Coal tailings, Platinum and Base metal concentrate applications.

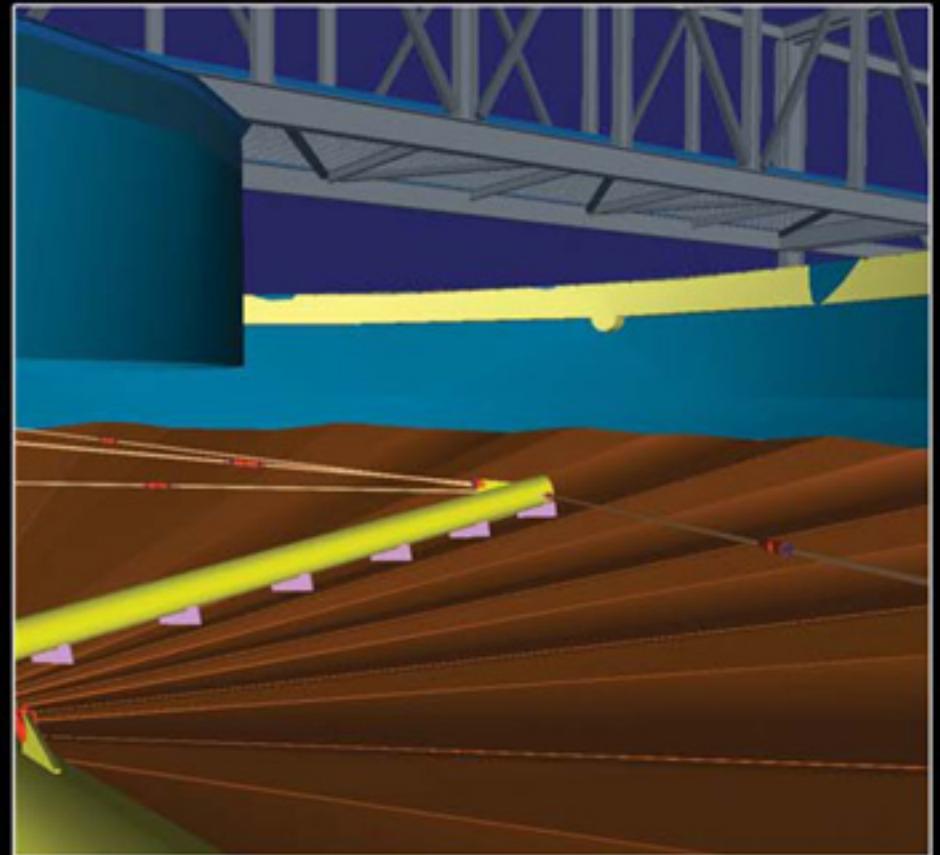
Thickener Mechanism

The mechanism consists of the bridge, drive and ancillaries, lifting device, feedwell, torque tube and rake arms with blades.



Bridge

Bridge designs are available in a truss type or castellated beam, based on the application, thickener diameter and location.



The MIP designs consider not only the customer's process data but also the long-term mechanical performance, maximum circuit efficiency, availability and minimised operating costs.



21m ϕ thickener from bolted construction

Drive Head

The MIP drive consists of a multi-stage planetary gearbox, hydraulic power pack as well as an optional lifting device. Electric drives are available for smaller thickener units. The lifting device is used to raise the rakes above the mud bed if the solids are not removed timeously. Single or multiple lifting cylinders can be employed for this purpose.

A lifting device promotes a dependable and continuous operation during plant upset conditions. The operator has time to correct the operation without impacting on production or damage to the thickener internals.

Hydraulic Power Pack

The reliability and ease of maintenance of hydraulics are legendary. The gearbox is driven via a hydraulic motor and powerpack. The hydraulic drive minimises shock loads thus extending drive service life. Hydraulic pressure is used for monitoring rake torque.

Three levels of protection exist for the drive mechanism:

- Alarm, which is initiated from the torque signal
- High torque trip activated by a pressure switch
- Relief valve - in the event of electrical systems failure, it bypasses a portion of the oil and prevents damage to the gearbox

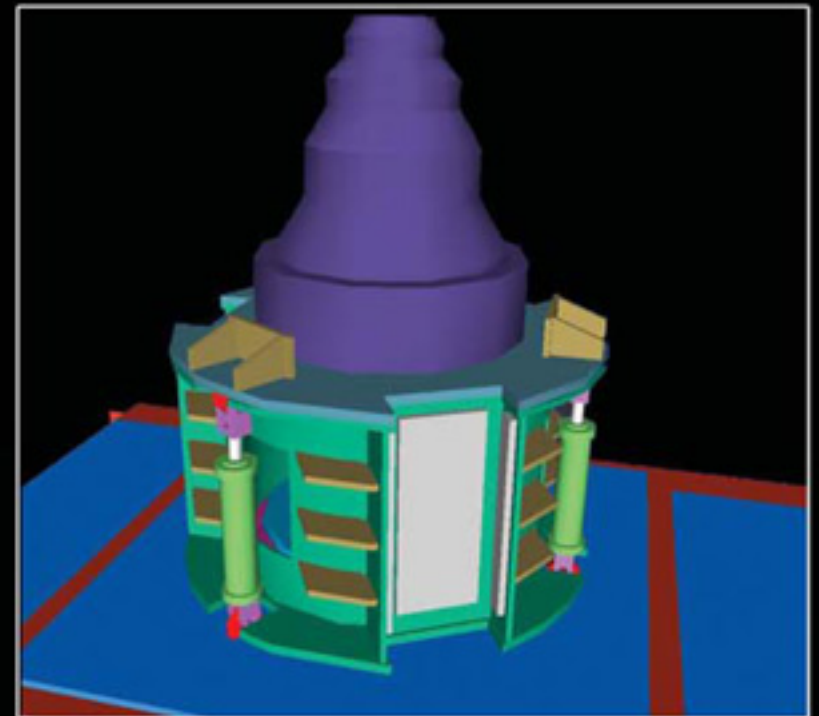
Feedwell

The initial energy of the feed is dissipated in the inner feedwell. A "quiet zone" is thus created to promote mixing of the feed with the supernatant and flocculant. The principle of dilution is simple yet plausible. It minimises the collision of particles, thus lessening the effect of hindered settling.

The upstream processes produce thickener feed that, in most cases, benefits from dilution thereof. Laboratory scale testwork provides the optimum feed solids percentage. The MIP dilution system ensures it occurs in the feedwell.

Rake Assembly

The rake assembly is attached to the drive by means of a thick walled torque tube and slew ring arrangement. It incorporates a cone to direct solids across the thickener floor to increase the efficiency of the settling area. The rake blades, attached to the tubular, low drag rake arms are designed to the raking capacity required for the treated material. Solids are moved towards the discharge cone. Pickets are fitted for removal of interstitial water, resulting in higher underflow densities. Trench scrapers, in the centre of the tank and attached to the raking assembly, keep the discharge area clean of potential blockages.



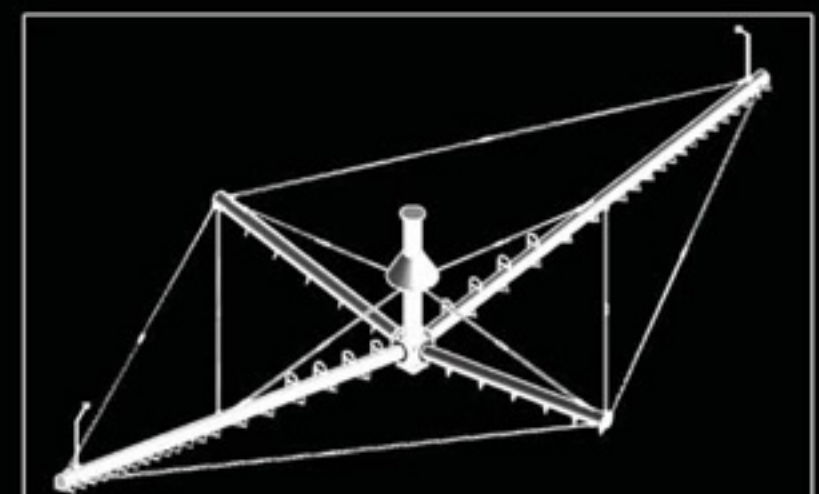
Drive Head



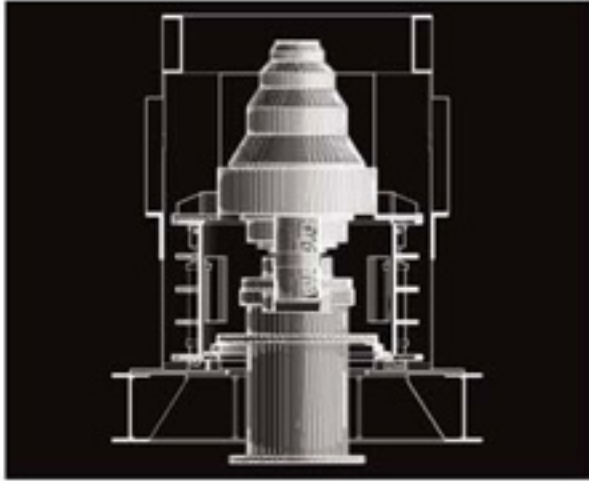
Power Pack



26m ϕ Thickener installation



Rake design



Slew Bearing Arrangement

A slew bearing arrangement is employed between the gearbox/drive and rakes with the following benefits:

- Less friction imposed on the system
- Gearbox can be replaced without disconnecting the rake assembly
- Rakes can be tested independantly of the drive
- Overhung loads are reduced

Control Panel

A local control panel or junction box is provided with voltage and frequency to suit each customer. It includes:

- Torque indication
- Alarm torque settings
- On/Off control
- Forward/Reverse
- Emergency stop
- 4 to 20 mA signals for remote monitoring



Chemineer HT Agitator



26m ϕ Thickener in operation



MIP-200 Flocculant Plant



30m² Linear Screen

PRODUCTS & SERVICES

MIP PROCESS TECHNOLOGIES strives to design and manufacture process equipment that is technically advanced, reliable and customised for each application. We believe that each ore body is different and a 'fit for all design', is not necessarily the optimum solution. Our designs are simple yet robust and reliable. Our philosophy is to minimise the customer's total operating costs, thus minimising capital and operating expenditure. The full product range includes:

- Attrition Scrubbers
- Clarifiers and Thickeners
- Chemineer range of Mixers and Agitators
- Flocculant and Reagent Make-up Plants
- Horizontal Linear Screens
- Moyno Progressive Cavity Pumps
- Slurry Samplers

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