SUPERIOR
FILTRATION

PRODUCT SHEET

GRAVIFILTER – NON-PRESSURISED SCREEN FILTER

SUPERIOR FILTRATION

Our GraviFilter is a highly efficient gravity (non-pressurised) screen filter with an integral, continuous cleaning mechanism (self-cleaning).

- It removes suspended solids from water.
- It effectively removes soft, fibrous, and organic solids, and operates efficiently in process systems with higher solids loads.

The GraviFilter provides extended flow intervals with minimal operator intervention.

Applications

The GraviFilter removes macro- and micro-solids from suspension in process lines, especially where solids loads are higher and solids are soft, organic, or fibrous. Key applications include:

1. Pre-Filtration

- Membrane separation processes
- Potable water and sewage wastewater treatment
- Industrial process water treatment

2. Final Filtration

- Protecting water spray systems or equipment
  - Water spray systems
  - Dust suppression
  - Irrigation
  - Filter presses
- Equipment protection, including gland service water and measuring/metering equipment
  - Cooling water for heat exchangers
  - Removing solids from water for general-purpose plant reuse.

Industries

Industries that use water in their processes widely rely on the GraviFilter to remove macro- and micro-particles from suspension. These include:

- **Industrial Process Water**
  - Agricultural and horticultural
  - Automotive
  - Brewing & distilling
  - Food & agri-processing
  - Nuclear
  - Pulp & paper
  - Power generation
  - Quarrying
  - Rubber processing
  - Textiles
- **Mining**
  - Mineral processing
  - Steel processing
  - Potable water
  - Sewage wastewater
- **Petrochemicals**
  - Refining
  - Pharmaceutical
  - Plastics
- **Oil and Gas**

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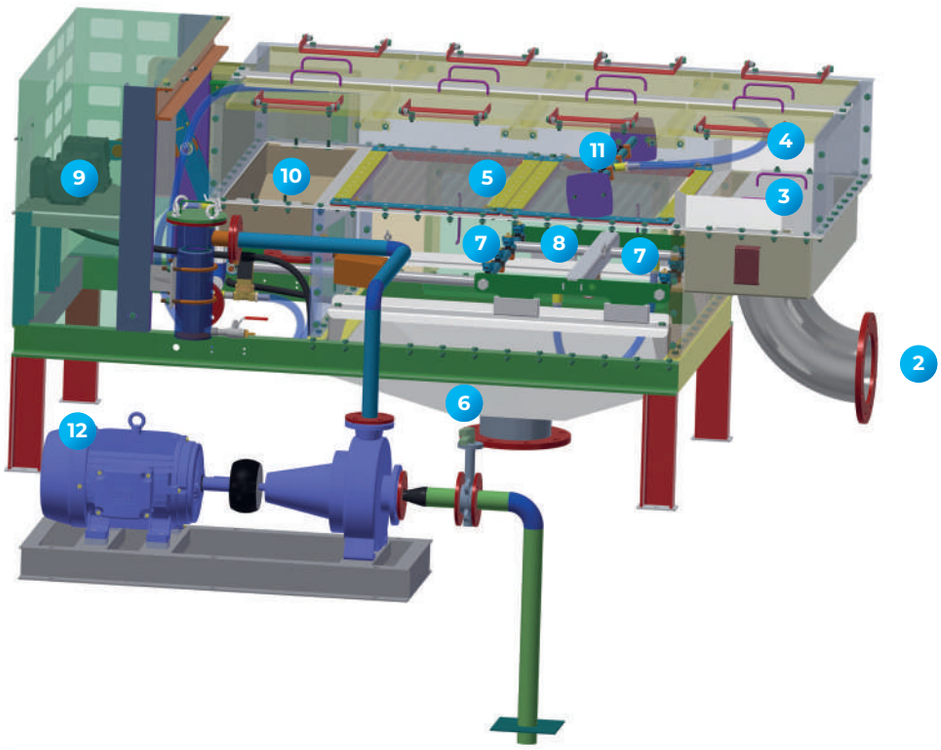

How it Works

The GraviFilter consists of:

- Flow control
- Inlet and balancing sections
- Filtration screen and clean water sump
- Self-cleaning mechanism including a high-pressure pump and drive motor
- Waste sump

You achieve flow control through a control valve or a dedicated feed pump. You can implement controls to activate and deactivate the filter based on the availability of dirty water or the level of the clean water sump.

Dirty water is introduced to the GraviFilter via the inlet 2. The baffle plate 3 calms the water as it enters the balancing chamber 4 and evenly distributes it across the width of the screens.

Water flows onto the screens and falls under gravity into the clean water sump underneath the screens 5. From the clean water sump 6, the filtrate flows under gravity into a reservoir, from where it is distributed to the service area(s). The screens retain solids that exceed the screen apertures.

Reciprocating spray nozzles 7, mounted on a trolley 8 below the screens, spray upwards. A small electrical motor and gearbox 9 or a pneumatic cylinder activate the reciprocal movement of the nozzles.

The spray nozzles continuously receive clean, filtered water, typically drawn from the filtrate reservoir and delivered by a high-pressure pump 12 or the central system pumps. The nozzles spray upward through the screens, lifting the retained solids back into the path of the forward-flowing water.

Top spray nozzles, mounted on a bar 11 spanning the width of the screens, periodically blast any remaining solids into the waste sump 10. The high-pressure pump 12 that supplies the reciprocating spray nozzles 7 also supplies the top spray nozzles. A solenoid valve controls the flow to the top spray nozzles, and you can set the duration and frequency of the pulses.

The actions of the reciprocating spray nozzles 7, in conjunction with the top spray nozzles 11, form an integral, continuous cleaning mechanism. Reusing filtered water to feed this cleaning mechanism minimises water loss.

Gravity filtration prevents permanent blockage or damage to the screens. The unforced filtration process also preserves flocculated particles and organic matter, avoiding break-up during filtration.

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SUPERIOR FILTRATION

CASE STUDY

GRAVIFILTER: SELF-CLEANING NON-PRESSURISED SCREEN FILTER

KLIPFONTEIN TAILINGS RETREATMENT PLANT, RUSTENBURG

Client: Sion Industrial Solutions for Sibanye-Stillwater
Industry: Mining and Mineral Processing
Region: Rustenburg, North-West, South Africa
Product: GraviFilter – 1 x VA4, 100 m^3/hr
Installation: 2024

Challenge

- Sibanye-Stillwater has been managing the Klipfontein Tailings Retreatment Plant since 2016
- These operations focus on retreating tailings to recover platinum group metals (PGMs) and other by-products like chromite
- During tailings retreatment, a mixture of finely ground leftover ore and water is mixed to form a slurry for easier handling
- Slurry pumps transfer the thick, abrasive mixture from the reclamation site or stockpile to processing units
- The plant relies heavily on these slurry pumps that require an uninterrupted supply of clean gland service water (GSW)
- Recycled process water (thickener supernatant or other) used as GSW often contains high levels of suspended solids. Dirty GSW or an interrupted water supply cause the slurry pump seals to seize rapidly, damaging the shaft, stuffing box, gland packing and follower – and possibly also the bearing unit
- The result is expensive downtime, additional labour and parts replacement costs.

Application

- Final Filtration – **Filtration of Gland Service Water** to protect multi-stage, high-pressure pumps and slurry pumps.

Solution

- Upon seeing the successful installations and smooth operation of our GraviFilters at other tailings retreatment facilities (Harmony Gold, DRD Gold, etc), Sibanye-Stillwater chose GraviFilter for their Klipfontein operation, relying on its established performance in similar critical environments
- GraviFilter is a uniquely designed, **non-pressurised**, gravity feed screen filter – the ideal filtration solution where solids loads are variable and where solids are prone to blind standard media, or pressurised screen filters
- The built-in continuous self-cleaning mechanism offers long, uninterrupted filter runs with limited operator intervention
- **1 x VA4 GraviFilter** was installed with a processing capacity of 100m^3/h @ 250µm.

Results

- After installing the GraviFilter, the client reports a significant decrease in breakdowns. Fitters and other maintenance personnel are freed up to focus on other areas
- Our GraviFilter safeguards the multi-stage and slurry pumps by reducing wear from abrasive particles and **extending operational life**. This means **less maintenance, more uptime**, and, ultimately, **a more efficient and cost-effective operation**
- GraviFilters are now critical components in slurry pumping systems, enabling these to perform as designed in extremely challenging conditions. No breakdowns. No downtime.

Client experience

"Our experience with Superior Filtration has been excellent during and after sales. Their team takes the initiative by visiting sites post-installation, provides ongoing support, and continuously improves their products with thoughtful modifications based on feedback."

Jurie Boshoff – owner, founder and Managing Director at SION Industrial Solutions. Jurie is a specialist on GSW systems and often provides technical consulting services to mining engineers.

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CASE STUDY

GRAVIFILTER: NON- PRESSURISED SCREEN FILTER

FINAL FILTRATION, GLAND SERVICE WATER, DRDGOLD FAR WEST GOLD RECOVERIES

Client: CURO Pumps for DRDGOLD
Industry: Mining and Mineral Processing
Region: Carletonville, Gauteng, South Africa
Product: GraviFilter, Model VA4, ±100 m3/hr
Installation: October 2023

Challenge

- DRDGold's Far West Gold Recoveries treats reclaimed material f rom tailings dams. As part of the process, water from the tailings dam flows into the process water dam where suspended solids are allowed to settle. Supernatant f rom the process water dam is re-used in general mining applications, including as Gland Service Water (GSW) for slurry pumps. Poor quality of the supernatant (high levels of suspended solids, TSS) causes damage to equipment. Specifically, dirty GSW will reduce the life of the gland service water pump (multistage pump), the slurry pump stuffing box components and gland packing
- At Far West Gold Recoveries, the client noticed excessive sliming on the pumps combined with higher-than-expected pump maintenance costs and frequent breakdowns. A solution was required to reduce TSS in the supernatant to drastically reduce maintenance costs and breakdown frequency.

Application

- Final Filtration / **Filtration of Gland Service Water** to protect gland service water pumps and slurry pumps.

Solution

- Following on the successful use of GraviFilters at Harmony Gold on the same application (four GraviFilters in operation at Harmony Gold on GSW), DRDGold decided to install a GraviFilter to reduce TSS on the process water line
- GraviFilters are non-pressurised screen filters with an integral (self) cleaning mechanism. This allows for long uninterrupted filter runs without any manpower requirements
- GraviFilters are versatile and are excellent at handling different types of solids. It is ideal for removal of soft-, organic- or fibrous suspended solids and is equally effective in removal of hard scale and sand. Depending on the nature of the solids, GraviFilters can achieve filtration down to 50µm and irregular – or oversized solids is easily processed
- 1 x **VA4 GraviFilter was installed with a processing capacity of 100m3/h @ 250µm**.

Results

- After installing the GraviFilter, the client reports a **significant decrease in breakdowns**. Fitters and other maintenance personnel are freed up to focus on other areas.

Client experience

"After installing the GraviFilter, we noticed a significant decrease in pump breakdowns.

The pumps ran for over three months before replacing the packing, and as a result, the spares consumption was reduced. Before installing the GraviFilter, they replaced the liners every two to three weeks. Now, they replace liners every 6 to 8 months, if need be."

This has freed up the mechanical fitter to give more attention to maintaining other sites."

JP Schoeman, Senior Sales Engineer – Pump and Process Equipment – Weir Minerals Agent

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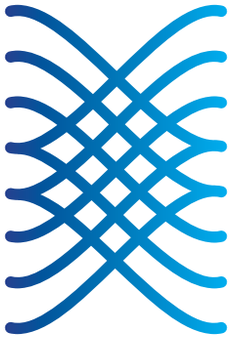

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