

Mining product & application spotlight

Sump pumping in mineral processing plants with Flygt 5000 series



Presenters & Agenda



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Mining Centre of Excellence



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Flygt Dewatering Pumps

- Guest Speaker introduction
- Application overview
- Product awareness
- Features & benefits
- Case stories
- Question & Answers

Slurry pumps in mineral processing

- Wet slurry is transport between the process stages using slurry process pumps.
- Collection sumps are built in the ground



01



02



03



04



05



06



07



08

Introduction – what is slurry

What is a liquid?

- In most applications the liquid is only the "carrier".
- In 98% of the applications the liquid is water.

What are solids?

- Hard
- Coarse
- Heavy
- Abrasive



Introduction – what is a slurry

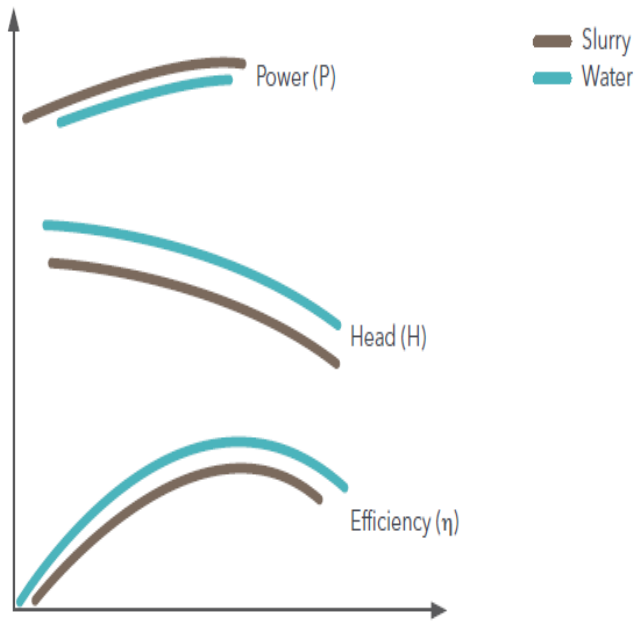
Definition of a slurry:

- The mixture of solids and liquids is normally referred to as a "Slurry"!
- A slurry can be described as a two-phase medium – Liquid / Solid.
- typical slurry characteristics are split into three main categories - light, medium and heavy from 10%-60% depending on the application.



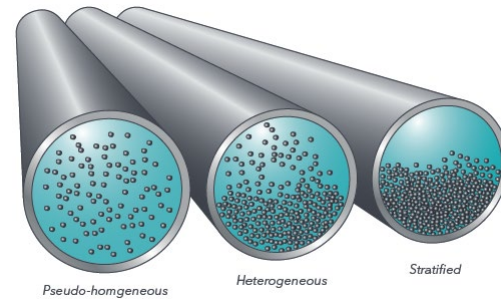
Slurry analysis

Sizing the pump

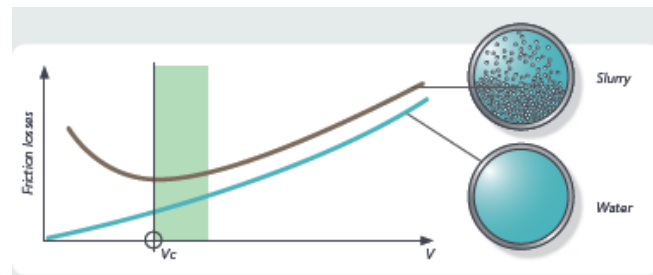


Slurry pump systems

Slurry characteristics



The diagram shows how different types of slurry behave, depending on particle size, and transport speed.



Critical velocity

Slurry Questionnaire

Contact information

- Company: _____
- Contact person: _____
- E-mail: _____
- Telephone no: _____

Application information

- Industrial segment: _____
- Pump application: _____

Pump duty

- Required flow [l/s , US gpm, m³/h]: _____*
- Required total dynamic head [m, ft]: _____* (or preferable)
- Static head + Pipe configuration: _____
- Static head [m, ft]: _____
- Pipe length [m, ft]: _____
- Inner diameter [mm, inch]: _____
- Number of valves : _____
- Number of bends : _____
- Pipe material: _____

Information about the slurry

- Particle size [d₅₀]: _____*
- Particle size [d₈₅]: _____*
- SG of particles : _____**
- SG of liquid : _____**
- Concentration by weight [%] : _____**
- Concentration by volume [%] : _____**
- SG of slurry: _____**
- Mass fraction [% of particles < 75 μm]: _____
- Particle shape [round or flat]: _____

* must be filled in

** three out of five must be filled in

Slurry properties

Slurry parameters

Liquid definitions





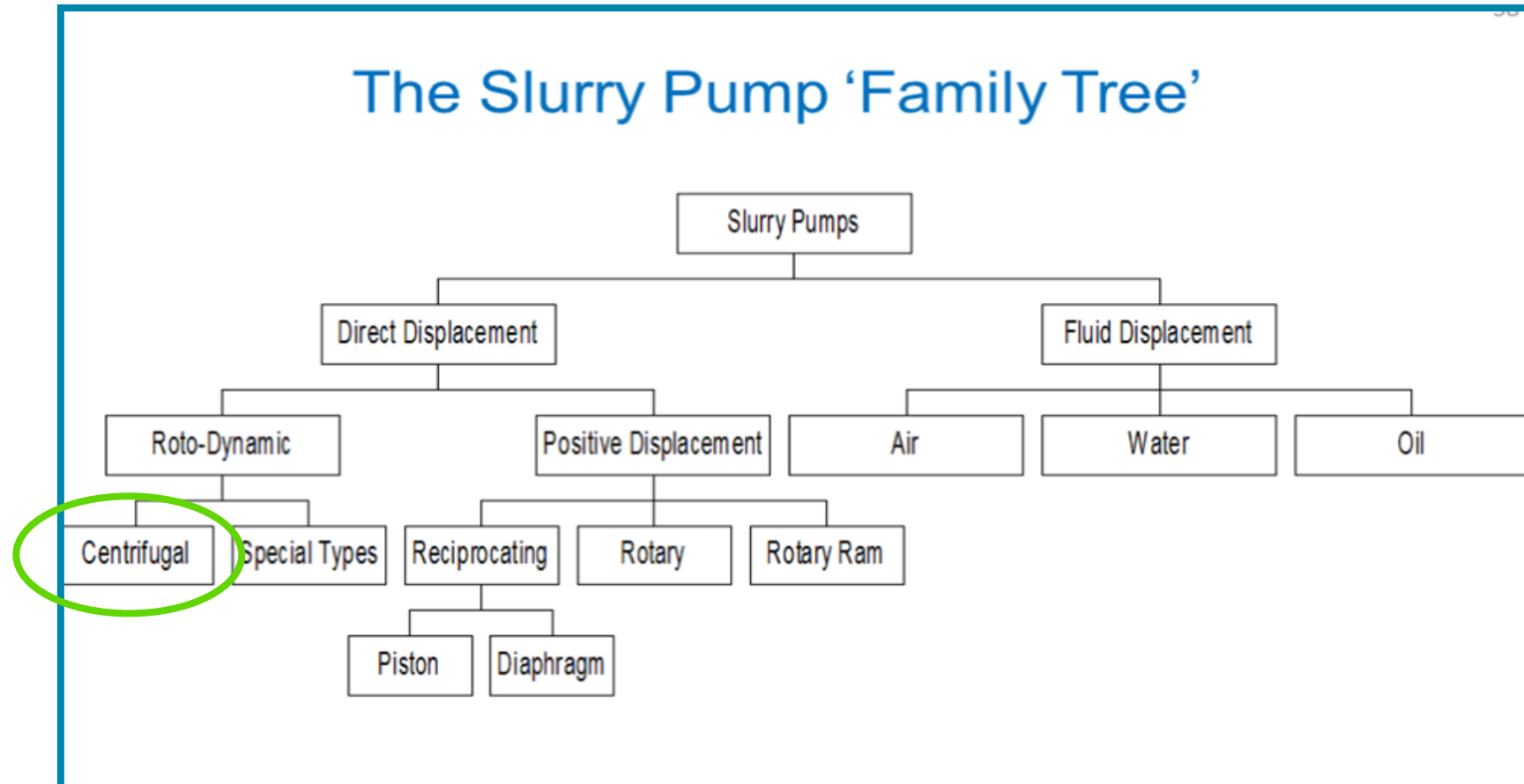
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Improving operational efficiencies with Flygt 5000 series slurry pumps

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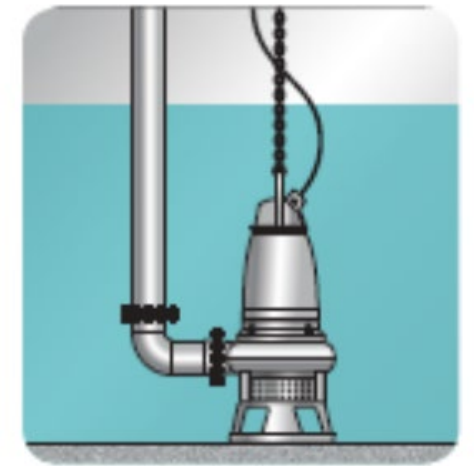
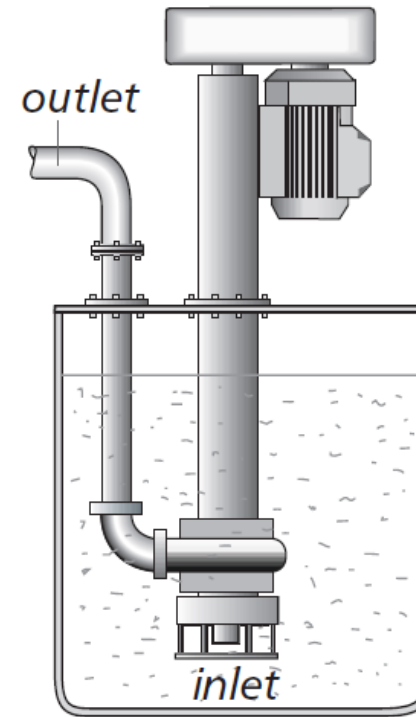
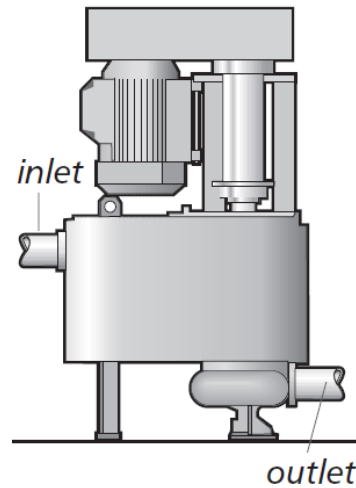
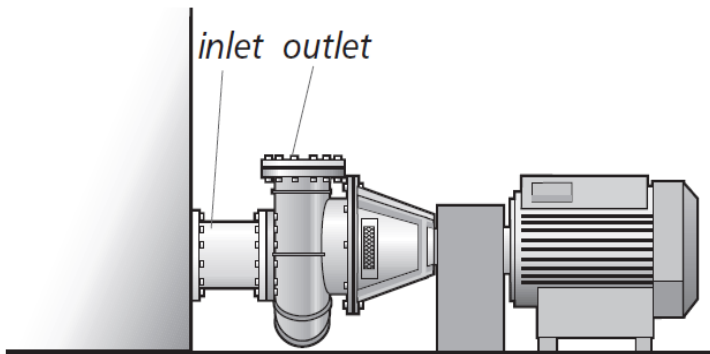


Slurry pump types



Centrifugal slurry pump types

- Horizontal
- Vertical
- Tank Pumps
- Vertical Sump pumps
- Submersible



Sump Pumps

Sump pumps – semi submersibles Vs submersibles

Semi submersibles

Long distance between motor and volute

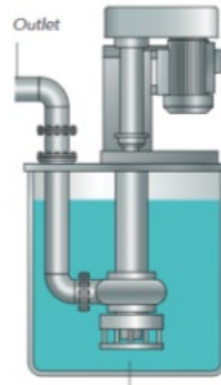
- Long and exposed mechanical shaft
- Bulky to handle

Dry installed design, superstructure of the pump and installation

- Complicated to install
- Not flexible

Submersed

- Not flood proof
- High noise level
- Shallow sumps
- Max depth approximately 2m for cantilever pumps
- Sediment build up when used on sumps deeper than 2 meter



vs.

Small and compact design

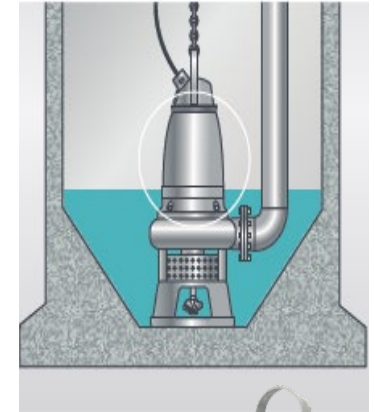
- Less space
- Easy to handle

Portable design

- Easy to install
- Flexible installation

Submersed

- Flood proof
- Low noise level
- Deep sump
- Clean sump



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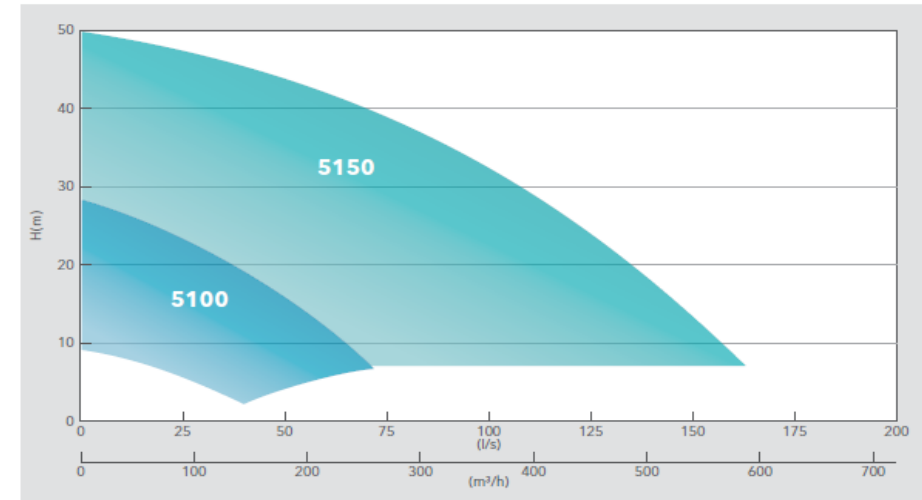
Ratings & performance

	5100 211	5100 251	5100 300	5150 300	5150 350	5520	5530	5570 600	5570 700
Voltage, V	400	400	400	400	400	400	400	400	400
Rating, [kW]	7.5–13.5	15–22	22–45	30–45	50–70	3.1	5.9	58–105	100–215
Rated current, A	9.4–28	17–41	25–82	32–82	59–132	6.3	7–12	118–200	202–395
Discharge Ø, in	4"	4"	4"	6"	6"	4"	6"	8"	8"
Strainer hole, mm	30	30	30	36	36	20	30	30	30
Max height, mm	978	1124	1296	1410	1537	848	848	1675–2068	1829–2312
Max width, mm	547	547	595	875	875	478	632	983–1225	983–1225
Weight, kg	215	277	585	585	817	122	203	1190–1350	1700–2000
Internal cooling	•	•	•	•	•	–	–	–	–
External cooling	•	•	•	•	•	–	–	•	•
Agitator	•	•	•	•	•	–	•	•	•
Warm liquid 70°C	•	•	•	•	•	•	•	–	–
Ex version	•	•	•	•	•	•	•	•	•



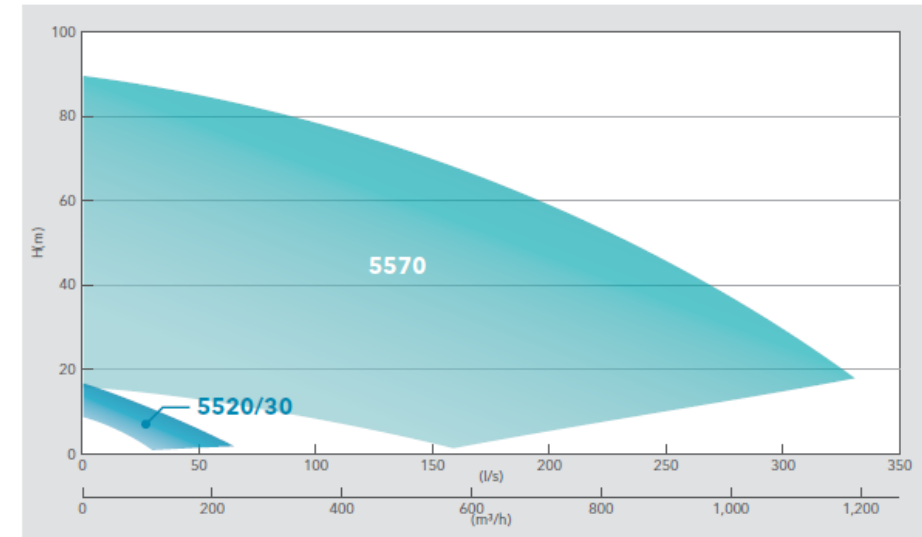
5100 series

50 Hz



5500 series

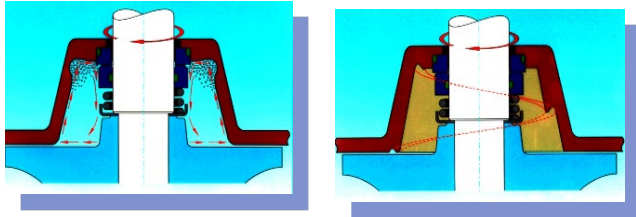
50 Hz



5000 Series features & benefits

Optional internal cooling for low level pumping. External option for high temp

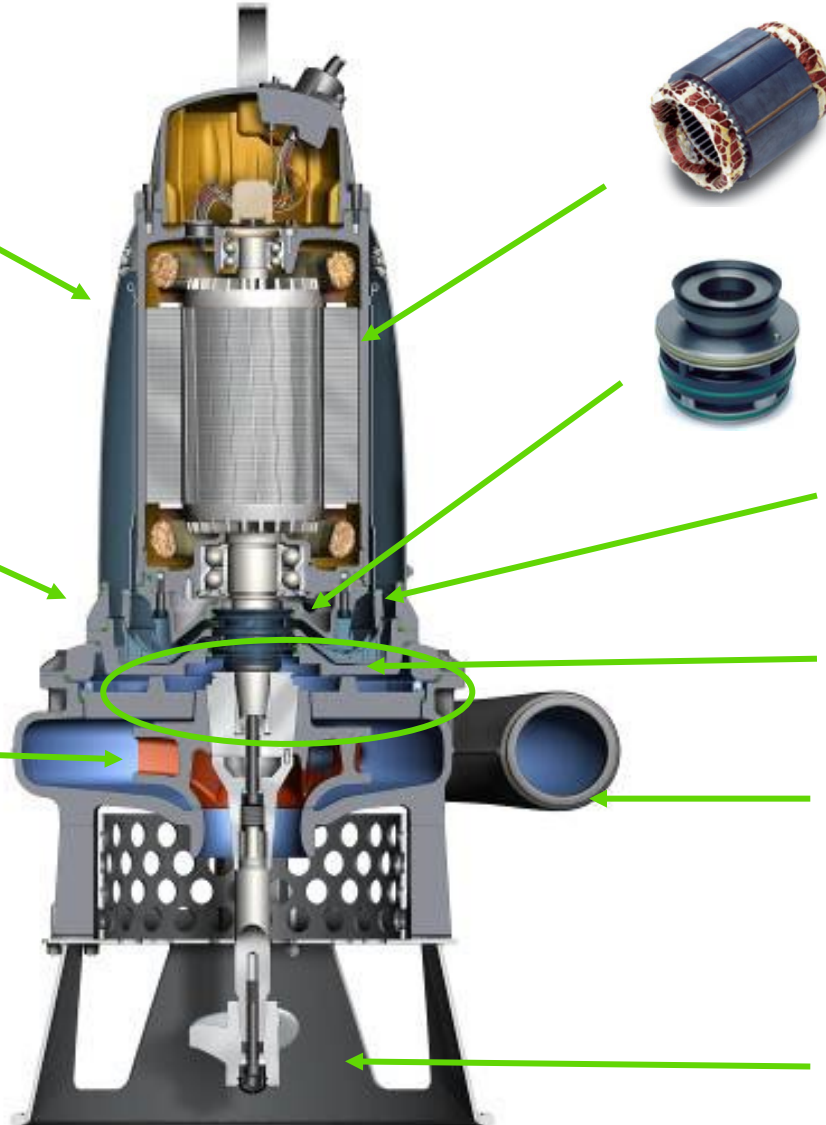
Spin-out



Large volute for reduced wall velocity.

Back swept impeller vane for homogenous flow, reduced wear & higher efficiencies.

Large throughlet 5100 – 40mm, 5500 – 50mm.



Class H, 180 deg C, insulation (5570 class F) with built in sensors.

Plug in seal.

Leakage detection option to prevent consequential damage

Low pressure zone for reduced seal wear. Seal flushing option.

High chrome wear materials.

Agitator option for solids suspension

Impeller design – closed or open?

Closed impeller

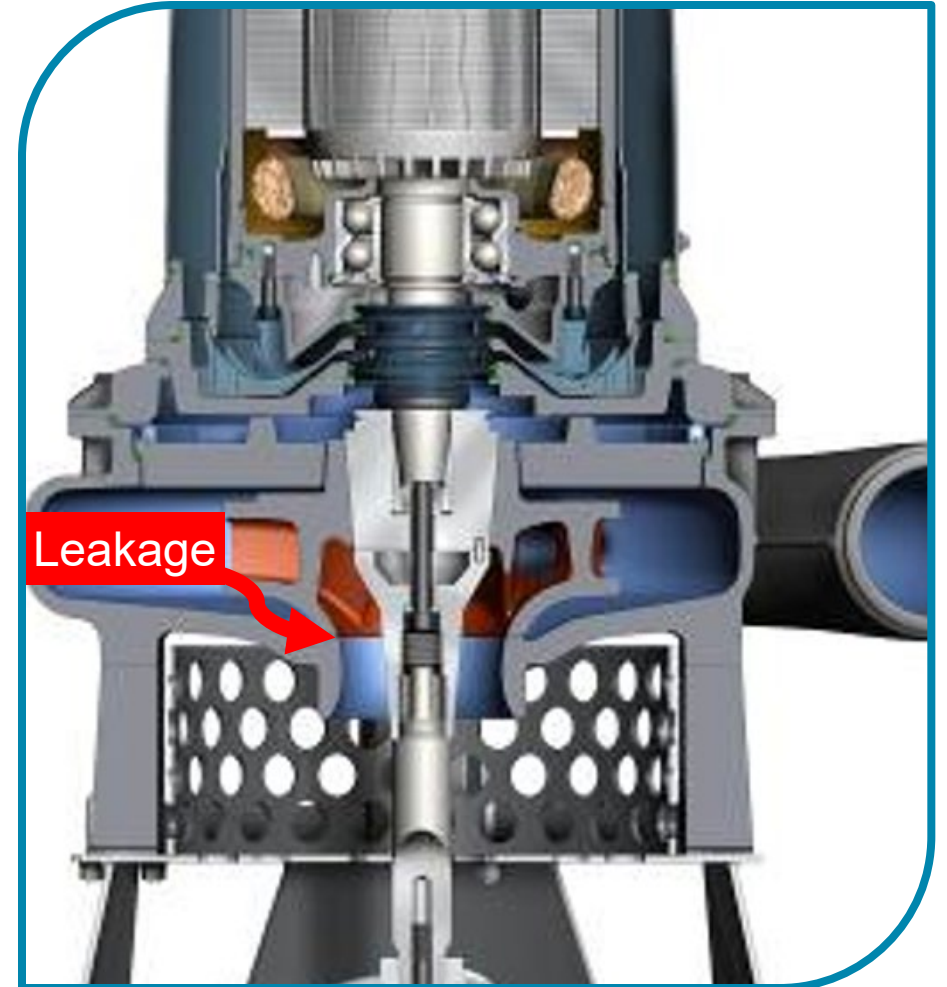
- A closed impeller is more efficient than an open impeller due to less leakage between the impeller and pump housing.
- A closed impeller is less affected by wear
- Can be trimmed back to almost full performance
- Use a closed impeller whenever possible!



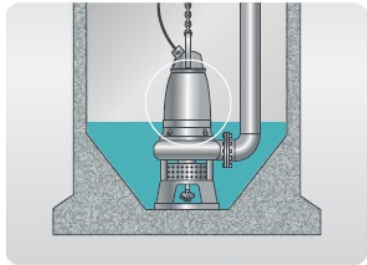
Closed impeller



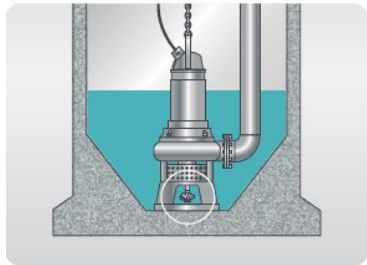
Open impeller



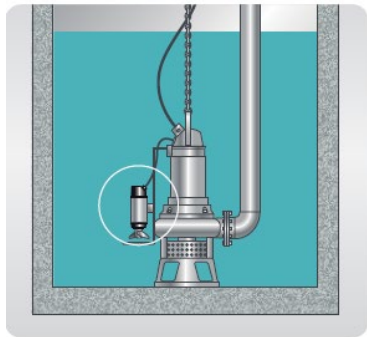
Keeping solids in suspension - clean sumps



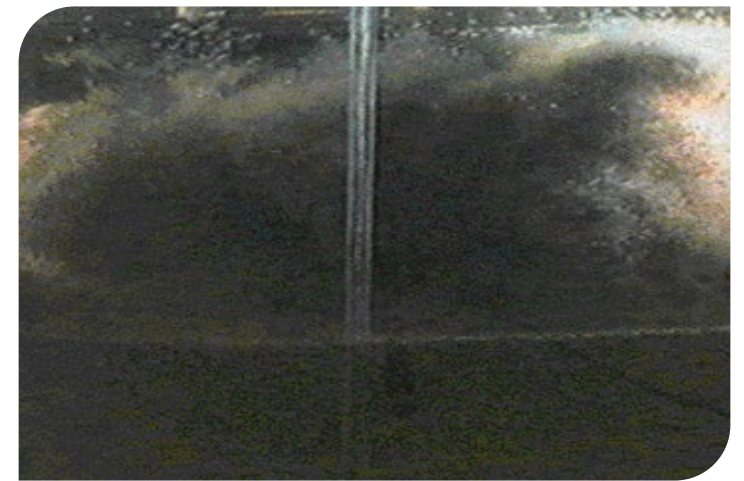
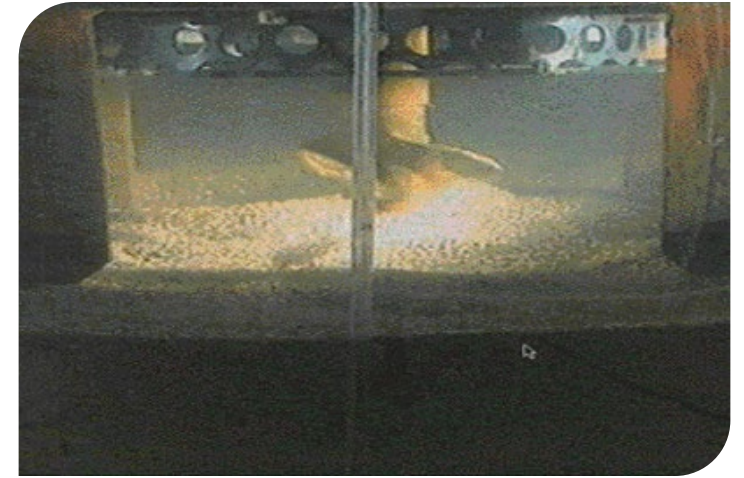
Internal cooling allows pumping down to very low levels.



Unique Flygt agitator creates strong vertical thrust.

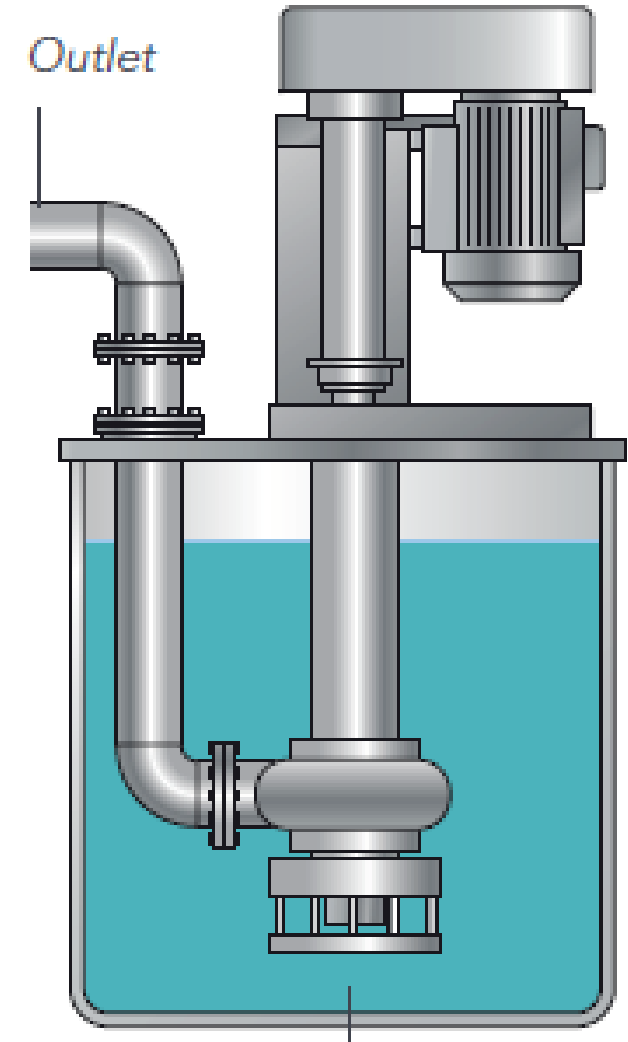
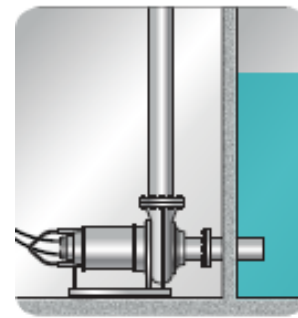
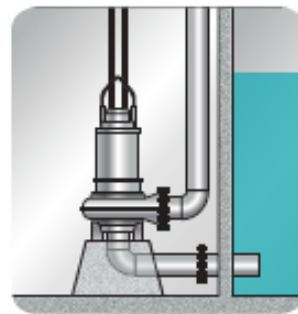
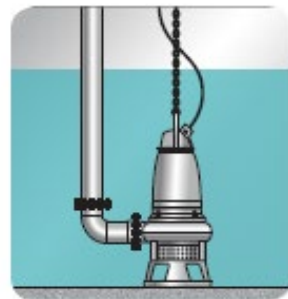


Agitation



Summary

- Keep your sump clean with agitator or mixer option
- Reliability – extend MTBF
- Smaller footprint, less bulky
- Easier to remove & replace – OH&S
- Flooding will not damage components
- Vertical, horizontal, submerged or dry mount
- No infrastructure required can be used in multiple locations
- The ideal choice for wash down sumps

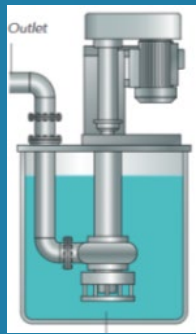




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North Queensland zinc concentrator slurry trials

Flygt submersible slurry Vs Cantilever pumps



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North Queensland zinc trial Flygt 5100 slurry pumps

Customer Pain Points



Wear components not lasting decreasing flow of the pumps



Pumps requiring constant unplanned maintenance



Build up of solids around sumps



Constant flooding



Noisy snoring pumps



Costly repairs and downtime



Long lead time for repairs

Tasks at hand & goals



Select correct pumps for duty



Implement mixers and agitators



Implement pumping controls



Utilise high chrome wearing components against abrasives



Floodproof and quite



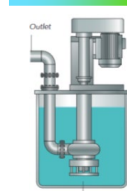
Spare parts holding



Reduce break downs & implement preventative maintenance

12 Week trial – 8 week interim

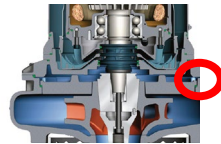
Flygt Submersible Slurry Pump solution has eliminated any flooding to area where constant flooding occurs



Life of replacement Cantilever pump 4 – 6 weeks



Performance maintained – No drop in flow



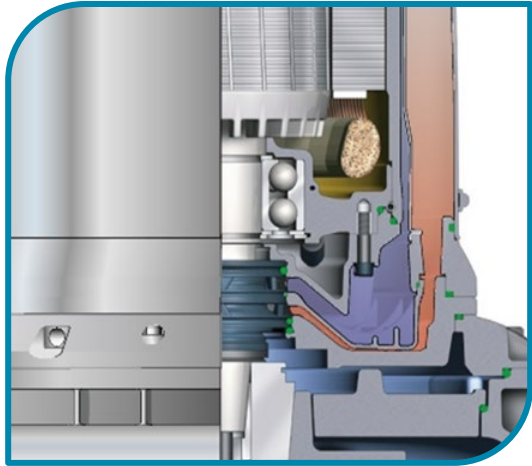
Seal leakage inspection chamber inspected (Clear)

Agitator demonstrated no wear over 8 weeks



After 8 weeks client expectations are exceeded & progressed with placing product orders. Currently 13 units on site.

12 Week trial evaluation



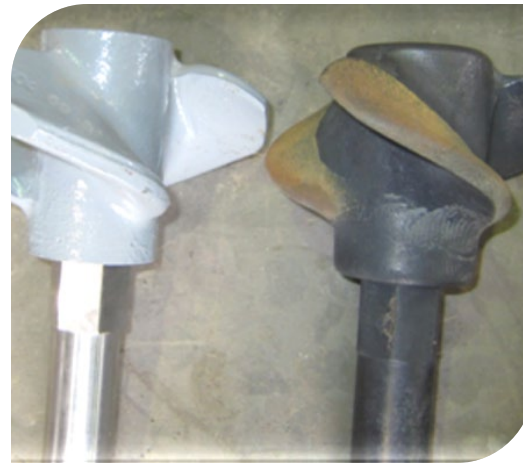
01

Glycol in cooling jacket clean



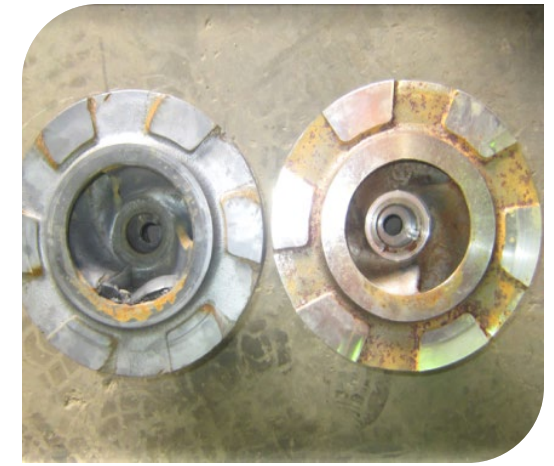
02

Volute - minimal signs of wear



03

Agitator <10% Wear 3.1 - 2.8kg

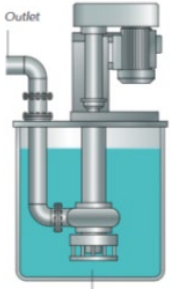


04

Impeller <2% Wear 18.15 – 17.8kg & 1.5mm diameter reduction

12 Week trial evaluation

Cantilever Pump - 2 x maintenance intervals



Services	\$ 4,000
removal of pump	\$ 500
Install of Pump	\$ 500
replacement of Parts	\$ 9,500
Transport	\$ 300
Total	\$ 14,800

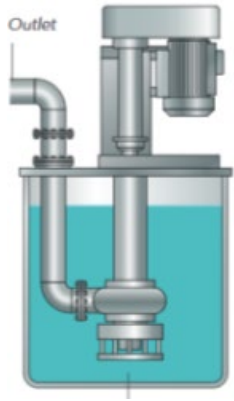
Total \$ 14,800 x 2 = \$29,600

Flygt submersible – Still going strong after 12 weeks



Service	\$4,000
Removal of pump	\$500
Install of pump	\$500
Replacement parts	\$13,600
Transport	\$300
Total	\$ 15,150

Annual OPEX costs



Service costs per pump = \$14,800

Number of services per pump annually = 9

Number of pumps on site = 13

Total annual OPEX spend = \$1,731,600

Service costs per pump = \$15,150

Number of services per pump annually = 4

Number of pumps on site = 13

Total annual OPEX spend = \$787,800

Annual saving = \$943,800



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Coal loading terminal 6 year OPEX overview operating Flygt submersible slurry pumps

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Coal terminal installation overview

Change management review conducted for Flygt Submersible Slurry Pumps

>50 sumps in operation with Flygt HS5100 13.5kW

Average cost per sump per year \$3,215.00

Approx 10% rotatable spare pump sets with site stores additional to Xylem holding strategic stock

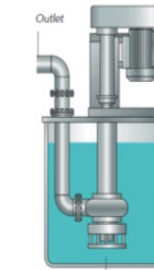
Applications across all site sumps

- Floor Sump
- Access Roads
- Train Load Out
- Conveyors
- Ship Loading



Site specific specifications

- Agitator
- Side Mounted Mixer for Self Cleaning Sump
- Seawater Paint to site spec and color
- Sacrificial Zinc Anode Kit

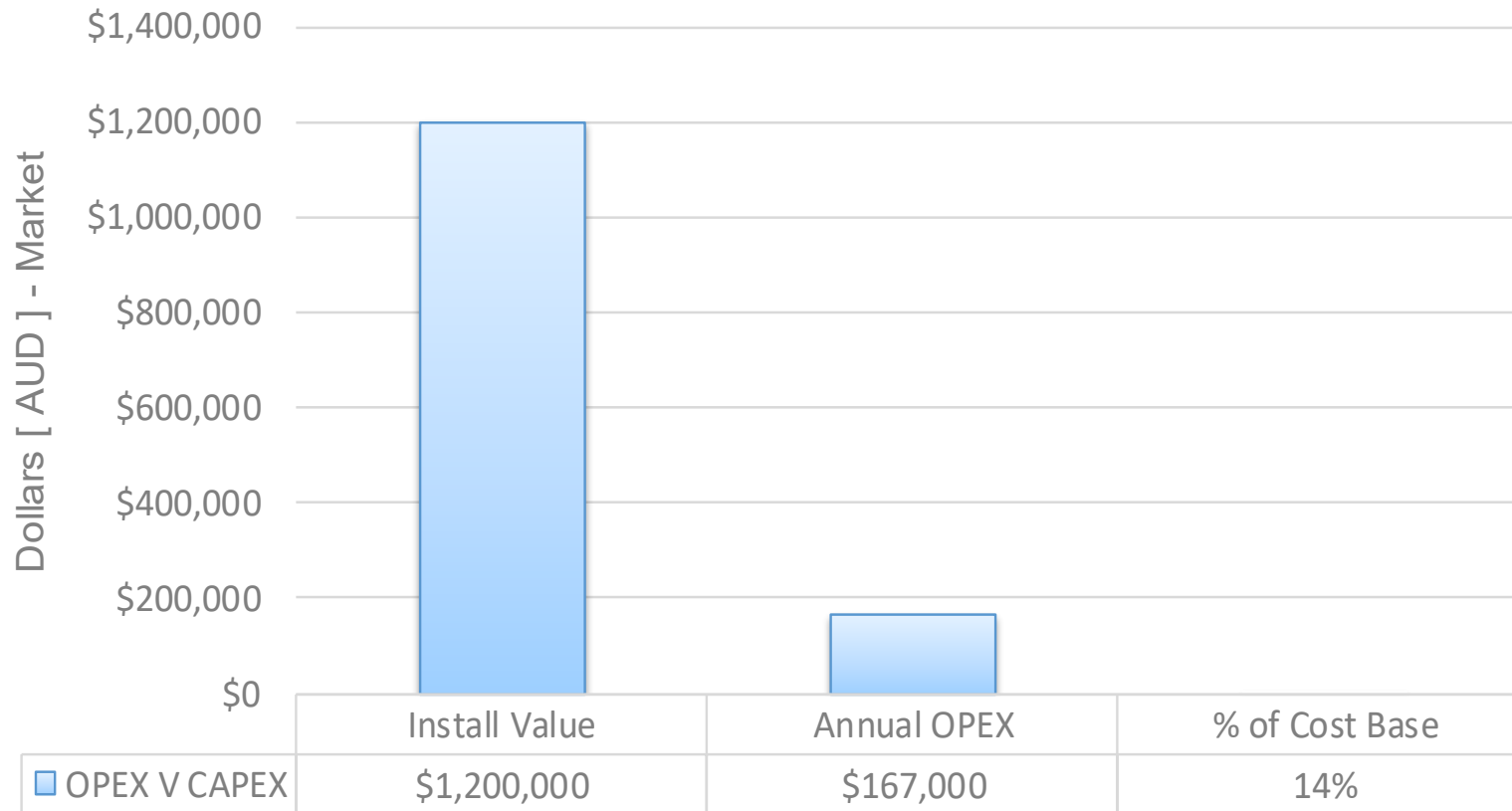


Xylem OEM Service and Aftermarket Support with back to base preventative maintenance and service intervals

CAPEX & ongoing OPEX evaluation

Install Base : 52 Pumps

OPEX Spend Annualised as a % of Capital Installed
Asset Base [52 Sumps]





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Pareo monitoring & control system

Pareo monitoring & control system

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What is in the box?



Equipment

- Pareo Box
- Pareo Sensor Module



M&C

- CCI Communication System
- Built in snoring / dry running control and automatic rotation control
- Built in motor protection for amperage, thermal, phase imbalance/loss and over/under voltage



Services

- Status led light on the Pareo Box
- Bluetooth, connection to App in mobile device
- Wifi, prepared for SCADA connection
- Modem, for connection to xylem.com



Contact us for more information!



Xylem - Mining Center of Excellence

miningcoe@xylem.com

www.xylem.com

Flygt 5000 Series
Slurry Pumps

