

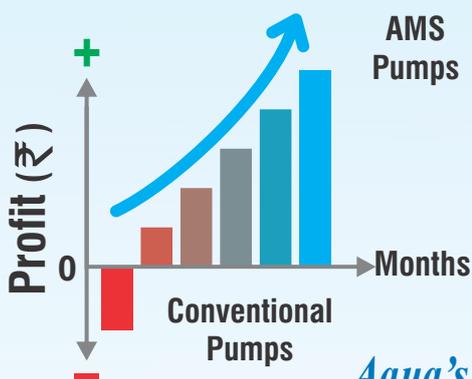
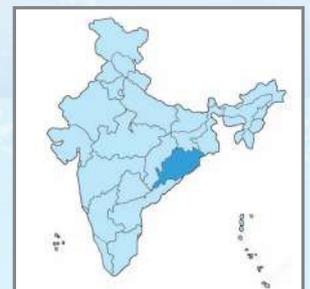
*The World's Largest (Open Cast) Mine (Chromite).....*  
*...The Biggest Mine to Metal (Private Sector) Company...*  
*.....The Most Reliable Dewatering Pumps*



## Sukinda



**Tata Steel** operates World's Largest Open Cast Chromite Ore Mines at the Sukinda Valley in Odisha producing chrome ore which is subsequently converted it to **Ferro Chrome** and sold to customers across the world.



*Thanks to improved output & ultra low maintenance, since 2017; m/s Tata Steel have shifted over from Horizontal Centrifugal pumps to Aqua's AMS Horizontal Submerged Mine Dewatering pumps*

## Situation :



The Sukinda Valley experiences about **110cm to 180cm** of rainfall annually, of which 80% of the rainfall is during the monsoon season i.e. between June and September. Groundwater is a common problem when mining, and developing a mine below groundwater level presents many challenges. Poorly controlled seepage & groundwater will have negative impacts on the safety, efficiency and economics of mining operations. To continue the mine working below water table & with the mine working going deeper the water inrush due to seepage is likely to go up.

A large quantity of water needs to be handled during the mining operations.

## Problem :

Tata Steel Ltd. (TSL) were using **Horizontal Centrifugal Pumps** in TWO stage dewatering system - i.e. 80m Dry Installed, Coupled pumping through Centrifugal Pump on floating pontoon and put another Booster Inline Centrifugal pump to push water for balance (further) 60m .



Horizontal Centrifugal Pumps require **Constant Monitoring**, is Labourious & calls for **Frequent Shifting** which is not only Costly but also causes **Huge Down Time** & occasional **Damage** (either by submergence &/or by manhandling during shifting).



Pumping Machinery in Mines is exposed to **hot & humid** ambience. Even Minor Rains deposit humongous volumes of water on the pumps causing **Catastrophic Damage** putting them **out of action** for a long time.



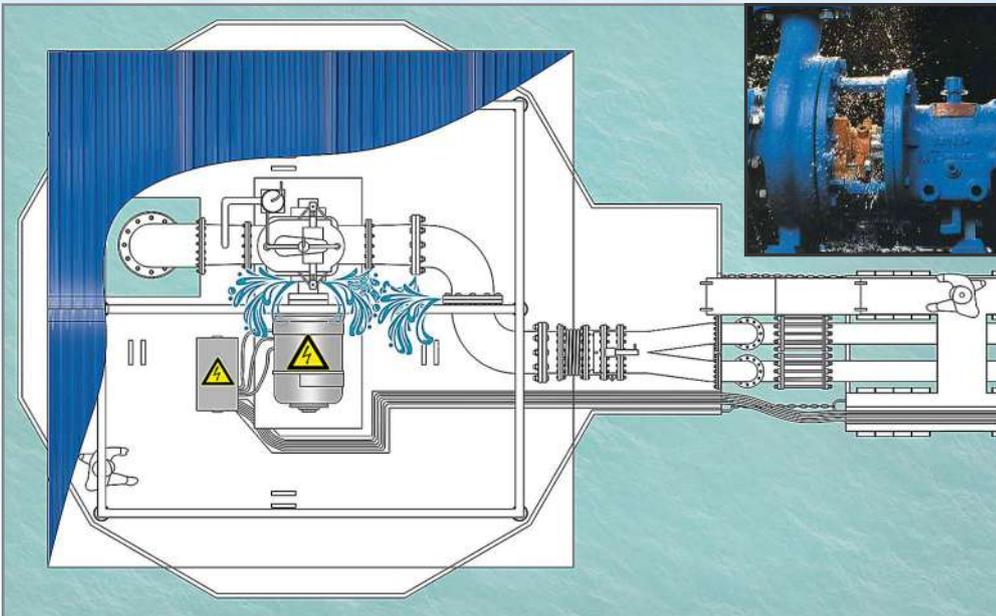
Horizontal Centrifugal Pumps are fitted with **Rope Packed Glands** which unavoidably suffer from Water Leakage (often the mine waters are corrosive & erosive) which unavoidably suffer from **Water Leakage** (often the mine waters are corrosive & erosive) which aggravates Bearing Corrosion (& it's Pre-Mature Failure), causes Frequent Shaft & Sleeve damage which not drastically Increases Pump Downtime & Costs.



TSL were facing major problems in **Priming & Maintenance** & had to depute dedicated staffs. Due to rain, gland leakage of water & unbalanced load of Bare Shaft Horizontal pumpset mounted above pontoon; the floating pontoon was frequently tilting on one side.

In monsoon operating of floating pontoon centrifugal pumpsets were difficult & also needed to covered motor through roof top.

Horizontal Centrifugal pump - motor's **misalignment** caused heavy vibrations & required frequent Coupling, Bearings & Gland Maintenance.



Horizontal Centrifugal Pumps have **Leaking Glands** while **Pipe Joints** will develop **leakage at Gaskets** which cause **frequent water ingress** into the Motor thereby damaging it.

**Aqua's Solution :** **AMS Horizontal Submerged Mine Dewatering Pumpsets**

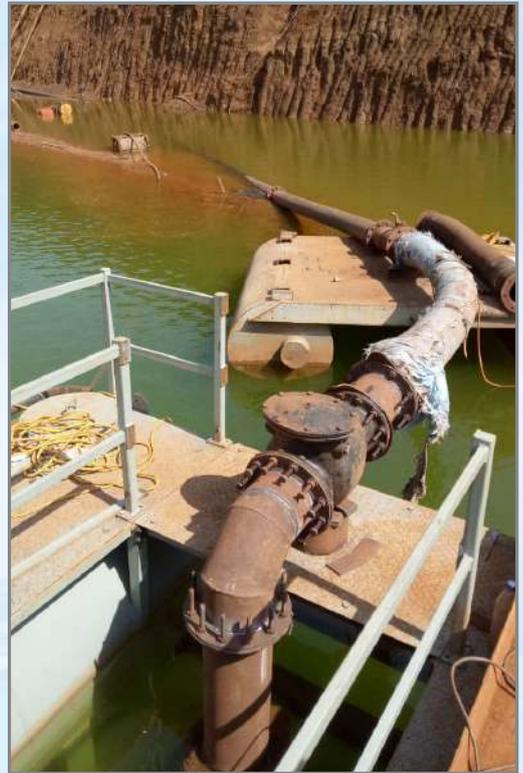


475hp @ 3.3kV;  
Head 145m  
Discharge: 600m<sup>3</sup>/hr.

175hp @ 415Volt;  
Head 145m  
Discharge: 175m<sup>3</sup>/hr.

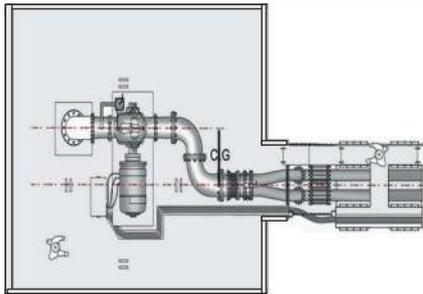
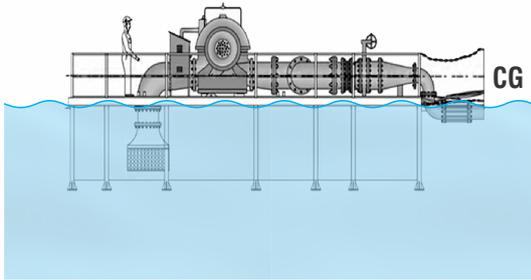
120hp @ 415Volt;  
Head 80m  
Discharge: 175m<sup>3</sup>/hr.

180hp @ 415Volt;  
Head 110m  
Discharge: 200m<sup>3</sup>/hr.

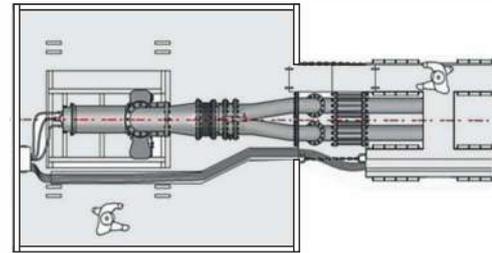
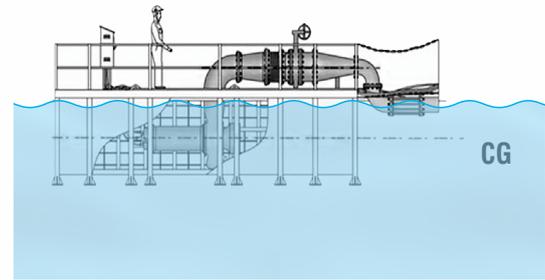


## Pros & Cons of Various Pontoon mounted Pumps

### Horizontal Centrifugal Pump



### Horizontal Submerged Pump



	Horizontal Pump	Submerged Pump
<b>Risk of Toppling &amp; Lateral Stability</b> due to Lower <b>Center of Gravity (CG)</b> & Low <b>Roll Center (LRC)</b>	<b>Above the Deck</b> <i>...leads to mild oscillations</i>  <b>Unstable</b> ☹️	<b>Below Deck</b> <i>...so no oscillations</i>  <b>Stable</b> 😊
<b>Size of Pontoon</b>	Very Bulky 	Compact 
<b>Lubrication of Pumpsets</b>	<b>Periodic Oiling &amp;/or Greasing is required.</b> <i>...is Costly &amp; Tedious to Operate &amp; Maintain</i> ☹️	<b>Not required.</b> 😊
<b>Installation &amp; Operating Manpower:</b> <b>Skill level required &amp; Quantity</b>	<b>Highly Skilled</b> ☹️	<b>Medium Skilled</b> 😊
<b>Conducive to Remote Operation</b>	<b>No</b> ☹️	<b>Yes</b> 😊
<b>Need for Operator to go to Pontoon Frequently</b> <i>...for Priming, Alignment of Shaft/Coupling; Gland Packing Replacement / Tightening; Valve Opening / Closing; Forced Water Lubrication; Re-Oiling, Re-Greasing; Sleeve Replacement; etc.</i>	<b>Yes</b>  	<b>Not Required.</b>  

## Summary

Aspect		Horizontal Centrifugal Pumpset	Horizontal Submerged Pumpset
Startup	Suction Priming	<b>Mandatory</b> <i>tedious &amp; requires the operator to go upto the pump during each startup; adds to overall Maintenance</i>	<b>Not required</b>
	Suction Vacuum Pump <i>Operation during Pump Start Stop</i>		
	Need of Vacuum Pump/ Foot Valves		
	Installation & Operating <b>Manpower: Skill level</b> required & <b>Quantity</b>	<b>Highly Skilled</b>	<b>Medium Skilled</b>
	Time Consumed	15-30mins*	approx 5mins
	Ease of Operation	Very Cumbersome	Easy
	Conducive to Remote Operation	<b>No</b>	<b>Yes</b>
<b>Risk of Bearings Damage</b> <i>(due to Ash &amp;/or Water Ingress)</i>		<b>High Risk</b>	<b>No Risk</b> <i>(as bearings are sealed off by 2 mechanical seals)</i>
Routine / Daily Check Up	Shifting of Pumpsets to Save from Submergence/ Sustain Suction Prime	<b>Very Frequently</b>	Very Rare
	Recommended Mean Time between Maintenance of Gland : Rope / Mechanical Seal	approx Fortnightly	5 to 7.5 Years
	Recommended Mean Time between Alignment Check <i>(if)</i> & Maintenance of Couplings <i>(if)</i> & Shaft	approx monthly	Not Required
	Vibration & Noise Check Up	Every Week	Not Required
	Suction Manifold Cleaning	Monthly	Not Required
Periodic Maintenance	Spare Parts : nos/ types of Spare Parts to be kept in Stock as per <b>DIN 24296</b> for 2y of operation	<b>36nos</b>	<b>12nos</b>
	Lubrication Durations	<b>Weekly/ Monthly</b>	30 to 60 months
	Shaft Sleeve Replacement	Every 6 months	60 months
	Discharge Valves Maintenance	Every 4-6 months	Every 4-6 months
	Mean Time Between Maintenance/ Replacement of Bearings	<b>2½ Years</b>	<b>10 Years</b>
Operational Energy Cost (kW/hr)		<b>100%*</b>	<b>98.5% to 96.5%</b>
Pumping Plant Load Factor (PPLF)		<b>~0.74*</b>	<b>~0.98*</b>
Total Water Actually Dewatered in LifeTime		<b>100%*</b>	<b>~133%*</b>

\* refer marketing@aquapumps.com for detailed Case Studies

## Aqua's Benefits :



**Saves (upto 45%-75%) Spare Parts\***



**Saves (upto 66%) Man Power\***



**Saves (upto 70%) Consumables\***



### Robust & Reliable

No breakdown even in high silt levels & rust proof bearings against long periods of Idling.



### Zero Maintenance

**Mechanical Shaft Seals** are Silt & Rust resistant.

**Bearings** are Greased for Life.



### Plug & Pump

No base Plate or Coupling to align; No priming to startup



### Low Life Cycle Costs (LCC)

Zero Consumables, Minimal Maintenance & Good Wire to Water Efficiency.



### Ultra Low ManPower requirement

- **Requires No Special Pre – Post / Ancillary-Auxillary Operations** (like Valve Opening- Closing, starting-stopping-monitoring etc.)
- **Requires No Consumables** (like Oil, Grease, Gland Ropes, Bush, Pins, Couplings, Sleeves, etc)
- **Requires No Routine Maintenance** (like Oiling, Greasing, Gland Tightening, Gland Rope replacement, Shaft Alignment etc.)



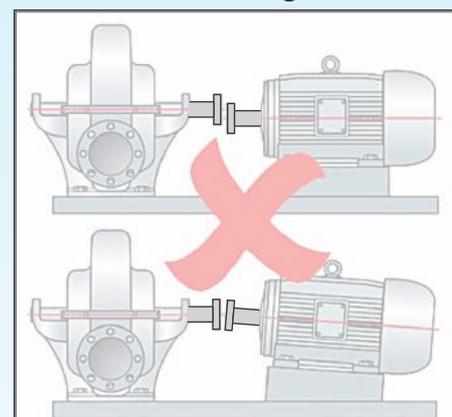
### Weather Proof

No Damage due to rain



Being safely tucked away **under water**, Submerged pumpsets are exposed to **Lower Risks of damage by Flying Debris loosened during blasting & excavation.**

### • No Shaft Alignment



### • No Coupling or Base Plate Maintenance

**TO WHOM IT MAY CONCERN**

Date:20/03/2023

This is to certify that we are using “Aqua; Make Submerged Turbine pump sets:

**❖ HT Pump set**

1. Model: ASS\_H\_PS\_2ST\_Bo\_2552\_M\_M\_0475\_3300\_NJ  
Motor Rating: 475hp @3.3 kV; Head 145 m. × Discharge: 600 m3/hr.  
No of pump set: 02; Commissioning year: 2017

**❖ LT Pump set**

1. Model: ASS\_H\_PS\_3ST\_BO\_1543\_M\_M\_175\_415\_NJ  
Motor Rating: 175hp @415 Volt; Head 145 m. × Discharge: 175 m3/hr.  
No of pump set: 02; Commissioning year: 2018
2. Model: AMS\_H\_PS\_2ST\_DR\_ES\_1543\_MQ\_4P\_120N\_415\_NJ  
Motor Rating: 120hp @415 Volt; Head 80 m. × Discharge: 175 m3/hr  
No of pump set: 03; Commissioning year: 2021
3. Model: AMS\_H\_PS\_2ST\_DCR\_ES\_2052\_M\_4P\_180W\_415\_NJ  
Motor Rating: 180hp @415 Volt; Head 110 m. × Discharge: 200 m3/hr.  
No of pump set: 02; Commissioning year: 2022

The said pump sets are installed on the Pontoons & have been running very smoothly & giving satisfactory performance since commissioning.

As compared to the earlier used (Horizontal Split Casing Centrifugal) pump sets, these submerged Mine Pump sets are the following advantages:

- Are very Simple to Operate (require no priming or Valve operation) & require Lower Manpower.
- Require nearly No Maintenance or Consumables (no alignment, no gland rope maintenance, no re-greasing, no re-oiling, no spare parts etc.).
- Don't required any daily monitoring of heat, vibration etc.

Due to (relatively) Increased Pump Uptime Availability; our Mine's Output & Productivity both are increased. The dewatering problem in the mines by using these pumps are solved.

We are also satisfied with the Technical Support & Services of Aqua when ever we call, they responses quickly and act immediately. I mean the performance of the pump and the support by the supplier is very good.

  
ADM Electrical  
Twins Mines  
Tata Steel Mining limited.

**TATA STEEL MINING LIMITED**  
(Formerly known as T S Alloys Limited)

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CIN U27109OR2004PLC009683 Website www.tsalloys.com

# Aqua Machinerics Private Limited

[www.aquapumps.com](http://www.aquapumps.com)

**Registered Office & Manufacturing Plant**

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