



**NEWCREST – LIHIR  
OPERATIONS,  
LONDOLOVIT WEIR  
PUMPS**

# SUMMARY

**Industry:** Gold Mining / Mineral Processing

**Product:** 4 off Vertical Turbine Pumps

**Location:** Lihir island, New Ireland Province, PNG

**Summary:** Manufacture, supply and install vertical turbine pumps



# PUMP OVERVIEW



- Pumps are currently used for the Pumping of Freshwater from the Londolovit Weir on Lihir Island to the Process Plant and are considered a critical asset.
- 4 Pump Stations available on Pump Platform, 2 Pumps running continually with 3<sup>rd</sup> Pump running when demand requires, 4<sup>th</sup> Pump Station is a Spares situation.
- Pumps are not performing in line with clients expectations in regard to service life and performance.
- OEM Parts are very expensive and are on long lead time supply. (Expensive Inventory situation)
- Lack of support from OEM to on site issues.

# FACTORS AFFECTING PUMP PERFORMANCE

## Column Alignment

Shaft Alignment is maintained by location between spigot location diameter & counter bore on Flange ends of Column, These are used as a centralising device to ensure alignment to the central spider bushing, Imatech found there to be excessive clearance between these diameters, resulting in a miss-alignment causing uneven wear in Spider Bushing Bearing and Shaft. This detail will create excessive vibration within the Assembly, (Flange PCD holes were the locating device – smaller Bolts).

## Abrasion/Corrosion properties of medium flowing through Pump

Inspection of Parts and Pump Weir determined that product flowing through pump is river sand / Silt base that will also result in increased abrasive operational conditions within the pump leading to accelerated wear on components when no protective coatings are applied.

## Other Possible Factors

Assembly of Parts on Site, Wrong configuration, Horizontal – Vertical

No detailed assembly process found.

Availability of Spare Parts on Site (OEM Lead Times)

Maintenance practises (RTF rather than PM)

Need for regular dredging and cleaning of Pump Pit.

# QUOTATION OFFER TO IMATECH

Imatech was invited to perform a survey of Pumps to obtain an operational and mechanical assessment in order to offer a quotation for the supply of 4 new Pumps.

The quotation must address the following criteria:

- Improved supply lead time from OEM (40 Weeks)
- Incremental design changes to increase the MTBF
- Design changes must assist site maintenance personnel to perform future maintenance to the Pump Assembly in more efficient timeframe.
- To Improve upon flow rates on current designed Pump and also be mindful of energy saving program initiative on all Newcrest Site's
- Parts must have design interchangeability with current OEM Pump.
- Documented Assembly procedure in form of Pump Manual to enable training of Site personnel.
- Complete Spare Parts list Inventory to be supplied for Spares.
- Continuous Improvement program initiated to improve performance of Pump.

# IMATECH QUOTATION OFFER

Imatech offer was (2 Pumps - 16 Week lead time) + (2 Pumps 22 Week lead time)

Below is a list of Design changes and initiatives that were implemented into the Imatech Quotation offer

- SHAFT COUPLING ASSEMBLY
  - COUPLING
  - SEALING ARRANGEMENT
  - WEAR RINGS
  - BUSHING - BRONZE
  - COLUMN
  - COLUMN BEARINGS
  - COLUMNS
  - PUMP CASES
  - IMPELLER
  - SUCTION BELL
  - DISCHARGE HOUSING
  - COMPLETE ASSEMBLY
  - REDUCE POWER CONSUMPTION
  - INCREASE EFFICIENCY
  - FULLY ASSEMBLED WET END ASSEMBLY
  - FULL TRACABILITY ON MANUFACTURED PARTS
  - REGULAR PUMP STATUS BUILD REPORTS
  - PUMP ASSEMBLY MANUAL
  - IMATECH REPRESENTATION DURING COMMISSIONING
- Incorporate Split Collars with Fitted Keys
  - Stepped Key Design
  - Spiral Track & Restriction Bush Design
  - Change to Flange Head Design, Bolt on design
  - Change Material & Flange Head Design
  - Design Change to eliminate misalignment
  - Material Change & Flange Head Design
  - Ceramic Coating
  - Ceramic Coating
  - Ceramic Coating
  - Ceramic Coating
  - Ceramic Coating Pipe Internals
  - Coating of External Surfaces
  - Ceramic Coating Application
  - Ceramic Coating Application
  - Assembled in Imatech Pump Assembly Facility, with Newcrest Personnel
  - For Quality control
  - To Assist site with Installation date
  - With Video hyperlinks for training of site personnel
  - To assist with correct Assembly procedure

# COATINGS SELECTION

All External of Pump were coated with **Chesterton® ARC S1**



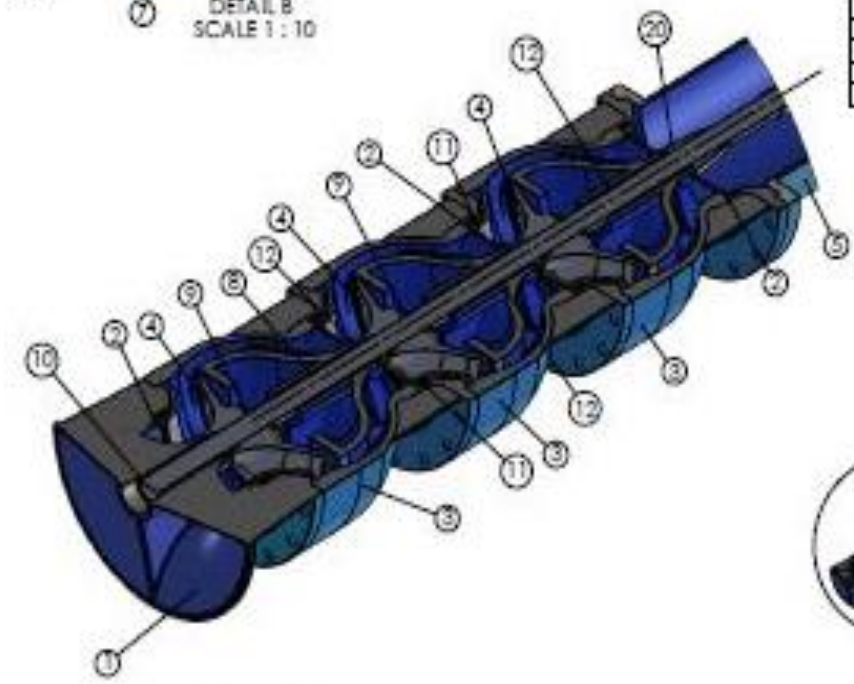
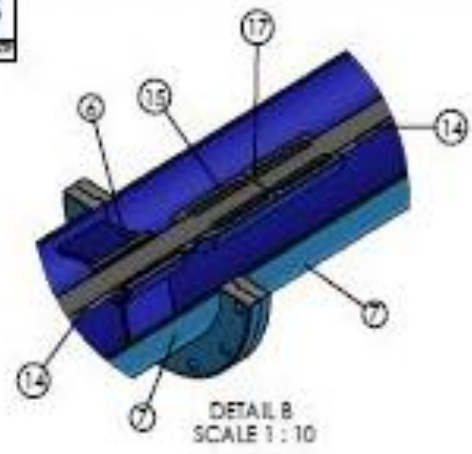
All Internal wetted parts of Pump were coated with **Chesterton® ARC SD4i**



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REVISED

Y Inotech Engineering Solutions Department Petroleum Crystallized Drawings 1000-1000-1000

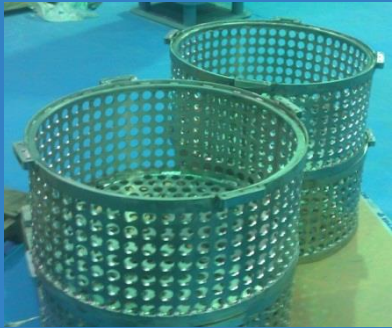


ITEM No.	PART No.	DESCRIPTION	QTY.
1	IS1256	Suction Bell	1
2	IS1299	Flanged Wear Ring	4
3	IS1280	Sowl	3
4	IS1254	Impeller	3
5	IS1250	Lower Column	1
6	IS1262	Column bearing	4
7	IS1289	Column - Intermediate / Upper	3
8	IS1297	Pump Shaft	1
9	IS1292	Impeller Split Ring	3
10	IS1300	Suction Bell bearing	1
11	IS1303	Impeller Wear Ring	3
12	IS1304	Sowl bearing	3
13	IS1305	Lower Shaft	1
14	IS1306	Intermediate Shaft	2
15	IS1309	Split Coupling Counter Bored	4
16	IS1308	Split Coupling Threaded	4
17	IS1307	Coupling Split Ring	8
18	IS1311	Discharge Shaft	1
19	IS1314	Threaded Coupling	1
20	IS1319	Deflation Cone	1
21	IS1312	Top Shaft	1

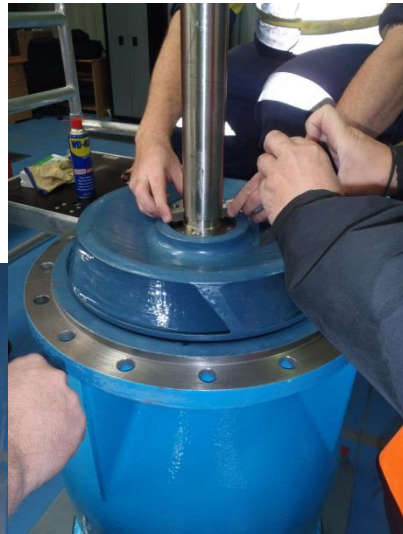


IF IN COURT AIR  
STUDY INSTRUCTIONS  
KEEP CLEAN

# Imatech Manufacture of all Pump Parts & Coating



# Wet End Assembly & Inspection by Newcrest



- As per contractual arrangements all the Wet End Assemblies would be assembled in our Geelong pump repair facility by Imatech to ensure correct procedure is followed.
- Newcrest Representatives from the Lihir site were in attendance whilst all assemblies were built

# ASSEMBLY ON SITE

- Imatech travelled to Lihir site to view installation of first 2 Pumps that arrived on site
- It was decided that only 1 Pump would be installed and run to confirm its performance for around 4 Weeks then the 2<sup>nd</sup> Pump would be installed on site
- Imatech performed flow rate (m<sup>3</sup>) readings of all 3 OEM londo Pumps that were running before installation of Imatech Pump
- During Assembly process Imatech viewed areas where fixtures and assembly tooling needed to be manufactured to assist assembly procedure
- Once Pump was installed and running on site flow readings were taken of Imatech Pump



# FLOW, POWER CONSUMPTION AND SAVINGS (NEWCREST DATA)

	Pump Number				Ave (old)
	161 (Imatech)	162 (OEM)	163 (OEM)	164 (OEM)	
<i>Average kw's/hr</i>	407.73	422.34	429.17	405.74	419.08
<i>Average Flow m<sup>3</sup>/hr</i>	1298.88	1160.75	1300.65	1141.00	1200.80
<i>How many kw's to pump 1m<sup>3</sup></i>	0.3139	0.3639	0.3300	0.3556	0.3498
<i>Price to pump 1m<sup>3</sup>@ \$0.185 per kw/hr</i>	\$ 0.0581	\$ 0.0673	\$ 0.0610	\$ 0.0658	\$ 0.0647
<i>Hourly energy cost to pump water @3000 m<sup>3</sup>/hr</i>	\$ 174.22	\$ 201.94	\$ 183.13	\$ 197.36	\$ 194.14
<i>Annual energy Cost to pump water</i>	\$1,526,468.15	\$1,770,237.27	\$1,604,209.95	\$1,736,313.61	\$ 1,703,586.94
<b><i>Annual energy savings of Londo Pump upgrade (Per Running Pump)</i></b>	\$177,118.80				

Annual Energy Savings running:

1 Pump	\$177,118.80
2 Pumps	\$354,237.60
3 Pumps	\$531,356.40
4 Pumps	\$708,475.20
5 Pumps	\$885,594.00

**Approximate ROI on New Pumps**

**14 Months**



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