



Performance & Energy Efficiency of Industrial Pumps protected with Duromar EAC – LV

Scenario Description

Four main pump sets are of the vertical split casing double suction type. Supported at floor level R.L.56.25 in a dry pit, pumps operate on an open system, drawing river water.

The pumping station consists of a 20m diameter concrete well, 18.75 deep complete with a superstructure which contains the four variable speed pumping sets.

The two aqueduct pump sets are designed for pumping coarse screened river water which is fed to the Pumping Station through a 1100mm main.

The two river pump sets are used for pumping river water abstracted from the river intake structure. If not required to pump aqueduct water, the aqueduct pumps are capable of pumping river water in addition to the river pumps should river conditions be suitable and if such operation is required.

All pumps deliver into an external pumping main which is connected to a tunnel entering the reservoir at IL149m, A.H.D.

The pumps are direct coupled to electric motors by means of cone ring type flexible couplings. The motor half coupling is keyed and held in position by a locknut. The pump half coupling is also keyed, it butts up against the thrust bearing collar and is held in position by a locknut. The motors are mounted on fabricated steel stools at floor level R.L. 60.190.

Pump Casing Description

The cover half casing has three inspection openings and a support carriage for a specially designed maintenance trolley.

Guide rails are grouted into the pump floor to enable the cover to be removed on a maintenance trolley in the event of major overhaul of the pump.

Both suction and delivery branches are integral parts of the branch half casing and have a common horizontal centre line.

The double volute design provides greater strength and reduces to a minimum the radial loads on the shaft caused by cutwater reactions.



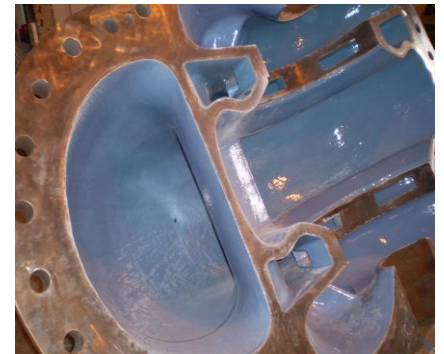
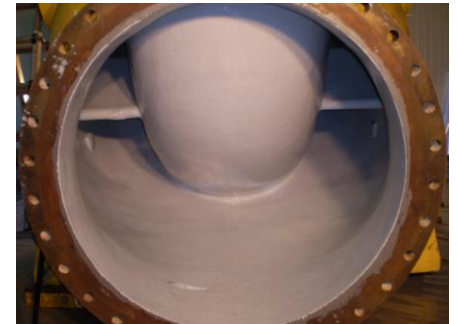


Solution/Application

Surface preparation is by far the most crucial function of any coating installation. The surface of the pump casing was prepared by copper slag blasting as per SA 2.5 to achieve a profile of 75-90 microns.

The ceramic epoxy putty **Duromar SAR** was applied all through the casing as a base coat – This was built up to a thickness of 1 mm, thus providing a solid foundation for the topcoat and filling up any cavities present.

Duromar EAC – LV was then applied on top of the cured SAR base coat, to provide a smooth & glossy finish that would help enhance fluid circulation.



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Results

Application of **Duromar EAC – LV** on the pump casings ensured **Increased Efficiency** of Water Pumps, **Lowered Consumption of Power** and **Reduced Operating Costs**.

i. Energy Saving

Before coating, it was noticed that the pump required 1.91 megawatts to move 201 megalitres of water. Upon application of **Duromar EAC – LV**, 1.91 megawatts moved 217 megalitres of water. As a result, an **extra 17 megalitres** of water per day is pumped with **no additional power consumption**.

This indicated an **8% increase** in **flow rate** when protected with **Duromar EAC – LV**.

ii. Cost Saving

Assuming the pump operates *24 hrs/day, 7days/week, 46 weeks/year at \$.0.055/kWh*,

- Before coating, power cost per megalitre equal approximately **\$12.54/megalitre** ($1.91 \times 1000 \times 24 \times 0.055/201$).
- After coating, power cost per megalitre reduced to **\$11.62/megalitre** ($1.91 \times 1000 \times 24 \times 0.055 /217$).

The average amount of water pumped per day amounts to **200 megalitres**.

$$\text{Cost Before Coating} = 200 \times \$12.54 = \mathbf{\$2,508/day}$$

$$\text{Cost After Coating} = 200 \times \$11.62 = \mathbf{\$2,324 / day}$$

Application of Duromar EAC - LV helped save approximately \$184/day, therefore helping the operating unit save approximately \$60,000 each year for their pump operations.

Before Coating					After Coating						
Flow	Power	Speed	Level	Efficiency	Flow	Power	Speed	Level	Efficiency	% Gain Efficiency	
(MI/d)	(MW)	(RPM)	(m)	(%)	(MI/d)	(MW)	(RPM)	(m)	(%)	Flow	Gain %
191	1.85	519	174.9	71.98	212	1.85	519	175	80.08	11	8
195	1.88	520	174.9	72.31	214	1.86	520	175	80.94	9.7	8
197	1.89	521	175	72.78	214	1.88	521	175	79.49	8.6	6.7
201	1.91	522	174.9	73.36	216	1.89	522	174.9	79.67	7.5	6.3
200	1.9	523	175.1	73.62	217	1.91	523	175	79.33	8.5	5.7
206	1.92	525	174.8	74.68	218	1.94	525	174.9	78.34	5.8	3.7
210	1.99	528	174.9	73.57	223	1.98	528	175	78.64	6.2	5.1
210	1.99	529	175	73.69	224	1.99	529	175	78.6	6.7	4.9

Duromar EAC - LV also provides outstanding **resistance to corrosion** related issues under varying operating conditions – Thereby also helping enhance the **Asset Life of the pumps** by several years. 100% solid epoxies are highly flexible in nature and can be very easily repaired in the instance of mechanical damages. **Duromar R&M products** such as **Duromar SAR** are often used to repair any such damages. This flexibility greatly helps in reducing operational downtime & maintenance costs.



PUMP TEST DATA

LOCATION: Burd. Irrig. Area PUMP STATION: Dalbeg 'A'
PUMP UNIT: 5 cusec TYPE: Thompson SERIAL No: 12371
IMPELLER DIAM: DATUM POINT: Horizontal centre of impeller
MOTOR: L.S.E. KW: 60 FLC: 98.5 VOLTS: 415 SERIAL No: 235550

TEST:	1	2	3
DATE:	22.04.91	30.04.91	11.09.91

HEAD:

SUCT GAUGE:	-3	-3.3	-4.7
Suct Pipe Diam	0.2036	0.2036	0.2036
(Zs) To Datum Point	0	0	0
Gauge Correction	0.4	0.4	0.4
Suct Velocity (Vs)	3.804	4.490	4.664
DISCH GAUGE:	24	24.4	24.5
Disch Pipe Diam	0.1782	0.1782	0.1782
(Zd) To Datum Point	0	0	0
Gauge Correction	-1	-1	-1
Disch Velocity (Vd)	4.968	5.864	6.092
VELOCITY HEAD:	0.521	0.726	0.784
TOTAL HEAD: MT (feet)	26.12 (85.7)	27.03 (88.7)	28.58 (93.7)

FLOW:

Secs for 10000 litres			
Secs for 10000 litres			
Differential (mm)	18	23	25
LITRES/SEC:	124 (1636GPM)	146 (1927GPM)	152 (2006GPM)
ML/DAY	10.70	12.63	13.12
Recorder Indicator (Ml/day)			

POWER:

Revs per KWh	10	10	10
Secs for 5/10 Revs	104.8	94.8	93.5
Secs for 5/10 Revs	103.6	93.4	92
Secs for 5/10 Revs	107.4	97.2	96
Amps			86
Input to Motor (KW)	51.3	56.76	57.55
Motor Effic	0.945	0.945	0.945
Input to Pump (KW)	48.48 (65HP)	53.64 (72HP)	54.38 (73HP)
Pump Output (KW)	31.75	38.77	42.60

PUMP EFFICIENCY :	65.49	72.28	78.32
OVERALL EFFIC:	61.89	68.30	74.02

COMMENTS:

Refer to attached pump performance Curve No. 67661