



VEMC
VIJAY ENGINEERING AND MACHINERY CO.

BHANDUP COMPLEX
WATER WORKS, KHINDIPADA
CORROCOATING PROJECT
CASE STUDY

Project Report on Efficiency Improvement Coating
For
MCGM Bhandup Complex HSC Pump
(M&P Make 36/36 DV Spilt-Case)



Kirloskar Corrocoat Private Limited Kirloskarvadi.

Details -

Project title	Efficiency Improvement Coating for MCGM Bhandup Complex Pump
Customer	Municipal Corporation of Greater Mumbai A/c Vijay Engineering Mumbai.
Pump Model & Type	Mather and Platt make horizontal Split-case Pump 36/36 DV
Project duration	January 2015

Pump Design Duty Points	
Discharge	10250 m ³ / Hour
Head	17.30 meter
Power	536.57 kW
Efficiency	90 %
RPM	493 rpm
Delivery Size	900 mm
Direction of Rotation	Clockwise

Motor Details	
Make	BHEL Make Motor
Frame Size	620
Power	620 kW
Efficiency	95 %
RPM	493 rpm
Supply	3.3 kV
Current	150 Amperes

Coating System: - Corrosion protection and efficiency improvement coating	
For Top and Bottom Casings	Kirloskar Make Corroglass 202 / 232 and Fluiglidle system @ 1 mm DFT
For Impeller	Kirloskar Make Corrocoat EA/EB and Fluiglidle E system @ 1.5 mm DFT

Project scope
Removing the pump set from MCGM Bhandup - By M/s Vijay Engineering
Shifting the pump with job motor to KCPL Kirloskarvadi plant – By M/s Vijay Engineering
Before coating performance testing at KBL in presence of MCGM and Vijay Engg.
Shifting of the pump to KCPL shop for coating work.
Dismantling of the Pump at KCPL shop
Joint Inspection of pump condition with M/s MCGM officials and M/s Vijay Engineering and replacement of spares.
Grit-blasting and efficiency improvement coating for top casing, bottom casing and impeller of the pump
Dynamic balancing of the rotating assembly after coating of impeller.
Assembly of the pump after coating and shifting the pump to KBL for after coating performance testing.
After coating performance testing at KBL in presence of MCGM and Vijay Engg.
External painting of the pump with grey colour.
Dispatch of the pump with motor to MCGM Bhandup

Pump Receipt Photos

The pump and job motor received at Kirloskarvadi.



M/s Vijay Engineering Mumbai removed the pump from MCGM Bhandup Complex and dispatched the Pump with job motor to Kirloskar Corrocoat Pvt. Ltd. shop at Kirloskarvadi

KCPL shifted the pump to Kirloskar Brothers Limited for performance prior to coating at KBL Hydraulic Research Center – HRC.

The team of MCGM officials visited Kirloskarvadi for witnessing the before coating performance testing.



Pump testing arrangement



MCGM team witnessing Power readings

KIRLOSKAR BROTHERS LTD.
KIRLOSKARWADI-418308, DIST-SANGLI (INDIA)

36/36 DV PUMP PERFORMANCE TEST REPORT

General Data Order No : A0910A007 Pump Type : 36/36 DV Service : Delivery/Suction : 900 mm/900 mm Dir. of Rotation : CW		Motor Details Make : BHEL Frame : 820 kW/RPM : 520 kW / 483 RPM Supply : 3.3 KV Amps : 150 A Motor Eff : 95.95/95		Calculations / Formulas: $Q \times 102 = \text{NIMZ}$ $H \times 102 = (\text{NIMZ})^2$ $\text{BP} \times 1.825 = (\text{NIMZ})^3$ Pump Input = (Motor Input (IP) x Motor Efficiency) Pump Output = (Pump Discharge (Q) x Total Head (H)) / 102 kW (Q in (ps, H in meter) Pump Eff. = Pump Output/Pump Input	
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Sr. No.	Speed rpm	Height over Weir "H" mm	Discharge in lps	Discharge Ql	Del Gauge Reading	Section Head m	Gauge Diff. m	Velocity Head V ² /2g m	Total Head H m	Motor Voltage V	Motor Current I amps	Motor Input kW	Motor Output kw	Total Input BP kW	Total Output WP kW	Pump Eff. %	Discharge l/s	Discharge m ³ /hr	Total Head m	Pump Input kW	Pump Output kW	Pump Eff. %
1	494	615	2981.21	4.40	2.200	0	0.00	6.80	3164.40	118.08	489.82	448.14	162.90	43.24	2975.18	10770.8	6.57	446.14	43.24			
2	493	605	2905.29	10.30	2.200	0	0.00	12.50	3199.90	135.17	558.52	530.59	358.04	67.10	2905.29	10489.0	12.50	330.59	67.10			
3	493	551	2508.69	15.50	1.800	0	0.00	17.30	3220.50	142.94	598.00	568.10	423.49	74.90	2508.69	9031.3	17.30	568.10	74.90			
4	492	506	2195.74	18.30	1.800	0	0.00	20.10	3166.60	144.75	599.27	569.31	432.69	76.00	2200.20	7920.7	20.18	569.31	76.00			
5	493	427	1686.15	22.20	1.500	0	0.00	23.70	3228.30	141.81	583.12	563.46	391.78	69.53	1686.15	6070.1	23.70	563.46	69.53			
6	493	295	954.14	25.80	1.200	0	0.00	27.00	3221.50	130.81	538.76	511.82	252.57	49.35	954.14	3434.9	27.00	511.82	49.35			
7	494	0	0	30.20	1.000	0	0.00	31.20	3232.30	118.12	475.12	451.36	0.00	0.00	0.00	0.00	31.07	451.36	0.00			

Test Conditions

Date : 3/1/2015 Pump Start Time : 10.30 AM Pump Stop Time : 11.45 AM Pump Duty Parameters Pump Duty Head : 17.3 M Discharge : 16259 M ³ /Hr Pump Input : 536.568 kW Pump Efficiency : 90.00% Pump speed : 483RPM	Note:- Total Head (H) = Sum of figures in Column 8+10+11+12 Velocity Head, V ² /2g = Q ² x 0.0000000 Q in lps NOTE - PUMP TESTED BEFORE CORROSCAT.	For M/GM 1) Shri. S.J. Karambalkar - AEC PWA B-C 2) Shri. Sankar Ambarnani - SE PWA B-C 3) Shri. S.R. Sawad - SE PWA B-C SE PWA B-C	For KBL KIRLOSKAR BROTHERS LTD. KIRLOSKARWADI (M.V. Jadhav) SE PWA B-C
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03.01.2015
Maruti L. Nalavade
Group Leader, Application

Surface Preparation and Efficiency Improvement Coating for Pump Components *Condition before Blasting*



Top casing before blasting



Bottom Casing before Blasting

Note:

Heavy pitting inside the casings observed before blasting.
Bottom casing tongue portion found normal in condition.
No wear and tear observed on tongue.
Wear ring portions found normal in condition.

Impeller condition



Suction Cavitation marks observed at the eye of the impeller.

Blasting and coating



Coating in-Process:



Coating Inspection By MCGM Team:



DFT – Thickness measurement



Spark test

Impeller Balancing Witness by MCGM:

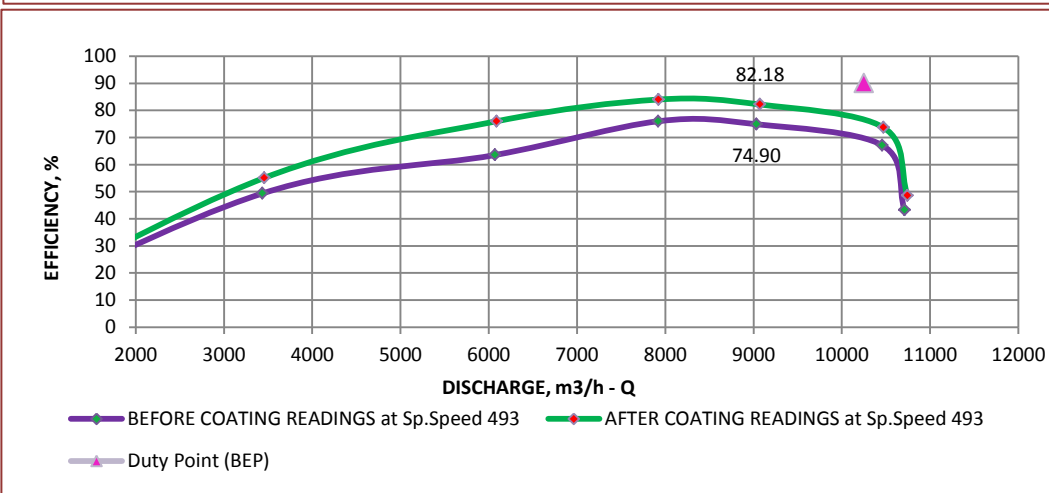
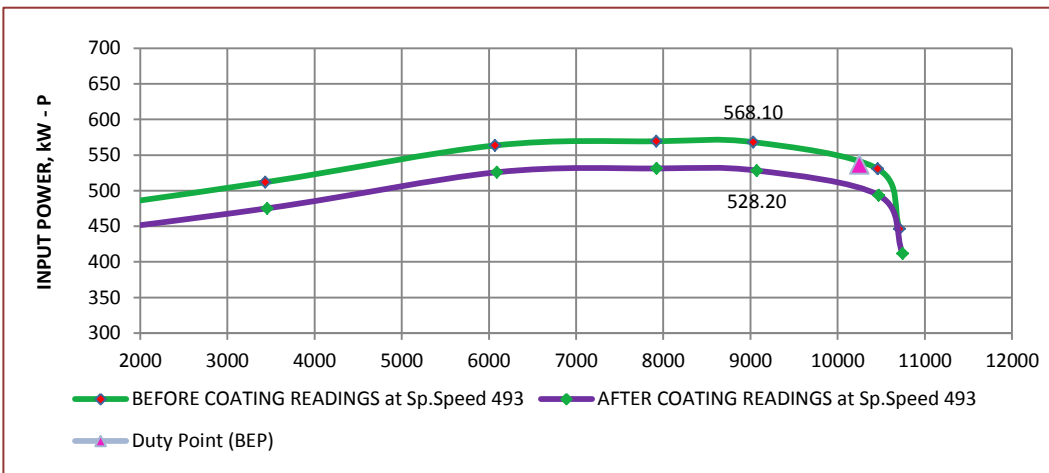
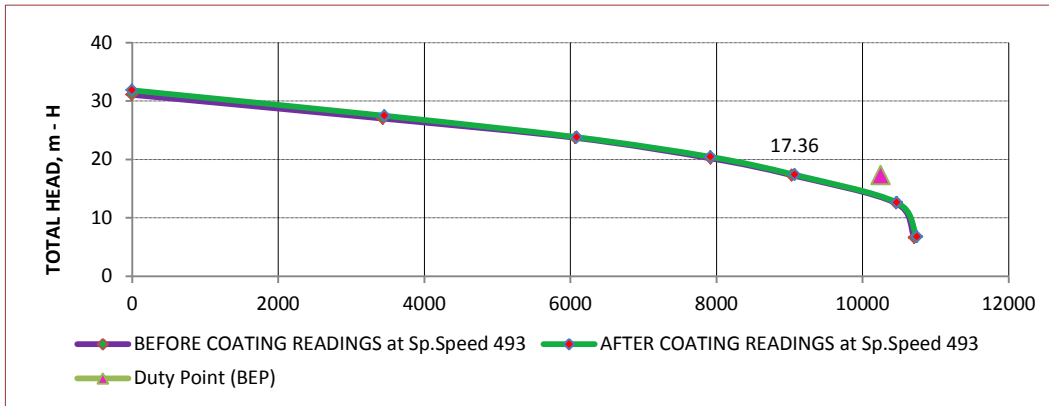
Balancing Type	Dynamic Balancing (double plane)
Balancing Standard	ISO 1940 G6.3
Balancing Carried Out	After Coating
Balancing Carried out	With shaft (Total Rotating Unit)
Impeller Diameter	910 mm
Rotating assembly weight	1500 kg.
RPM of Machine	500 rpm
Allowable Unbalance	200 gms / plane
Actual Residual Unbalance	2.5 gms @ 220 degree and 0.2 gms @ 33 degree.



MCGM Bhandup M&P 36" / 36" Pump Data

Description	Qty	Unit	Remark
Age of the Pump	30 +	Years	As per data provided by customer
Design Efficiency of the pump	90.00	%	As per data provided by customer
Before coating Efficiency of the pump	74.90	%	Pump tested at HRC Test Bed No.1
After coating Efficiency of the Pump	82.18	%	Pump tested at HRC Test Bed No.1
Improvement in Efficiency in points	7.28	Points	
Improvement in Efficiency in %	9.71	%	
Before coating power (Pump Input)	568.10	kW	Pump tested at HRC Test Bed No.1
After coating power (Pump Input)	528.20	kW	Pump tested at HRC Test Bed No.1
Saving in Power (Pump I/P)	39.90	kW	
Saving in Power (Pump I/P) %	7.02	%	
Average Unit Rate for Power in INR	7.10	INR	Average present unit rate is INR 7.10 / Unit as per data provided by MCGM
Saving in INR Per kWh	283.29	INR	This saving is per hour
Saving per 24 hrs.	6798.96	INR	
Saving per month (30 days working)	203968.80	INR	Pump running on 24 hrs. basis
Saving per annum (12 Months)	2447625.60	INR	

Comparison of Before and After coating performance curve:



Checked by : M.L.Nalavade

Checked by :

Drawn by : D.D.Bidnur

Drawn by :