

Detailed Project Report (DPR) On Ball Mill Automation

Excel Ceramic Private Limited
Morbi (Gujarat)

Prepared for

Bureau of Energy Efficiency
(13/GEF-UNIDO-BEE/LSP/14/4562)



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This DPR has been originally prepared by TERI as a part of 'Capacity Building of LSPs' activity under the GEF-UNIDO-BEE project 'Promoting Energy Efficiency and Renewable Energy in selected MSME clusters in India'.

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“Capacity Building of Local Service Providers”

For more information

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New Delhi

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List of abbreviations

BEE	:	Bureau of Energy Efficiency
CO ₂	:	Carbon Dioxide
D/E	:	Debt /Equity
DPR	:	Detailed Project Report
DSCR	:	Debt Service Coverage Ratio
EE	:	Energy Efficient
GEF	:	Global Environmental Facility
GHG	:	Green House Gas
HSD	:	High Speed Diesel
IDC	:	Investment without interest defer credit
IGBT	:	Insulated-gate Bipolar Transistor
IGDPR	:	Investment Grade Detailed Project Report
IRR	:	Internal Rate of Return
kW	:	Kilo Watt
kWh	:	Kilo Watt Hour
LSPs	:	Local Service Providers
MSME	:	Micro, Small and Medium Enterprises
MT	:	Metric Tonne
NG	:	Natural Gas
NPV	:	Net Present Value
O&M	:	Operation and Maintenance
PCB	:	Pollution control board
RE	:	Renewable Energy
ROI	:	Return On Investment
SCM	:	Standard Cubic Meter
SME	:	Small and Medium Enterprises
SPP	:	Simple Payback Period
TERI	:	The Energy and Resources Institute
Toe	:	Tonnes of oil equivalent
UNIDO	:	United Nations Industrial Development Organization
WACC	:	Weighted Average Cost of Capital

Executive summary

The overall aim of the GEF-UNIDO-BEE project 'Promoting Energy Efficiency (EE) and Renewable Energy (RE) in selected MSME clusters in India' is to develop and promote a market environment for introducing energy efficiency and enhancing the use of renewable energy technologies in process applications in selected energy-intensive MSME clusters in India. This would help in improving the productivity and competitiveness of the MSME units, as well as in reducing the overall carbon emissions and improving the local environment.

Under the GEF-UNIDO-BEE Project, TERI has been entrusted to undertake Capacity building of Local Service Providers (LSPs) to BEE. The Scope of Work under the project,

- Organizing 4 one-day training/capacity building workshops for LSPs in each cluster.
- Development of 10 bankable DPRs for each cluster, based on mapping technology needs with capacities of local technology suppliers/service providers, and also replication potential and applications to banks in each cluster.

Brief introduction of the MSME unit

Name of the unit	M/s Excel Ceramic Private Limited
Constitution	Private Limited
MSME Classification	Medium
No. of years in operation	17
Address: Registered Office:	8-A, National Highway, At - Makansar, Morbi - 363 642, Gujarat
Industry-sector	Ceramic
Products manufactured	Wall, Floor & Vitrified tiles
Name(s) of the promoters/directors	Mr. Suresh Patel (Director)
Existing banking arrangements along with the details of facilities availed	NA

A detailed assessment study was undertaken in the identified area with the use of the sophisticated handheld instruments. Energy consumption pattern and production data were collected to estimate the specific energy consumption of the unit. The unit level baseline of the unit was also estimated using the historical data. The plant is consuming about 26,46,846 kWh of electricity per year. The annual consumption of the coal is 6,000 MTs and NG is about 2.81 lakh SCM. The total energy consumption of the unit during last 12 months is estimated to be 4,967 toe which is equivalent to 762 lakh rupees. The total CO₂ emission during this period is estimated to be 13,559 tonnes. Electricity, coal and NG were considered for CO₂ emission estimation.

The unit manufactures the wall tiles. The total annual production of the unit during 2017-18 is estimated to be 33,75,000 boxes. The major source of energy is electricity, coal and NG, consume in the kiln, motor drives and lighting.

Accepted/ recommended technology implementation

The recommended technology considered after discussion with the plant personnel for implementation in the unit is given below.

Technology	Annual energy saving	Investment ¹	Monetary savings	Simple payback period	Emission reduction
	Electricity (kWh)	(Rs lakh)	(Rs lakh/year)	(Months)	(tonnes of CO ₂)
Ball mill automation & installation of energy efficient IE3 standard motors	3,09,976	8.97	27.35	3.90	254

Other benefits

- The proposed project is not expected to bring in any change in process step or operating practices therefore no change expected in the product quality.
- Implementation of the selected technology in the unit may result in reduction in CO₂ emissions.

Cost of project & means of finance

S. No.	Particulars	Unit	100% equity	D/E- 70:30	D/E- 50:50
1	Cost of Project	Rs. In Lakh	8.97	9.30	9.21
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	256.95	243.20	247.03
4	NPV	Rs. In Lakh	62.79	60.12	60.87
5	DSCR	-	-	12.67	17.70

¹ Investment including the IE3 standard motor- Rs. 7.60 lakh (with discount), & taxes and other miscellaneous- Rs. 1.37 lakh

1.0 Details of the unit

1.1 Particulars of unit

Table 1.1: Particulars of the unit

1	Name of the unit	M/s Excel Ceramic Private Limited	
2	Constitution	Private Limited	
3	MSME Registration No/UAN	NA	
4	PCB consent No.	NA	
5	Date of incorporation / commencement of business	2001	
6	Name of the Contact Person	Mr. Suresh Patel (Director)	
7	Mobile / Ph. No	+91 - 9825223476	
8	Email	hexaceramic@yahoo.com / export@hexaceramic.com	
9	Address: Registered Office	8-A, National Highway, Near Nava Jambudiya, Morbi-2, Gujarat	Owned
10	Factory	8-A, National Highway, Near Nava Jambudiya, Morbi-2, Gujarat	Owned
11	Industry / Sector	MSME/Manufacturing	
12	Products Manufactured	Wall tiles	
13	No of hours of operation/shift	8	
14	No of shifts/ day	03	
15	No of days/year	300	
16	Installed Capacity	15,000 boxes per day	
17	Whether the unit is exporting its products (Yes/ No)	Yes	
18	Quality Certification, if any	ISO 9001 : 2008 MS ISO 13006 : 2012	

2.0 Energy profile

2.1 Process flow diagram

Manufacturing of ceramic item uses wide range of raw material combination to produce different shape, size and colour. It requires both electrical and thermal energy at different stages of the process to operate the ball mill, casting/moulding, kilns, cutting & finishing machines and utilities such as motors, pumps air compressor etc. Ceramic manufacturing process primarily consists of mould preparation, body material preparation, shaping, drying and firing. Typical process flow chart is shown with figure 2.1.

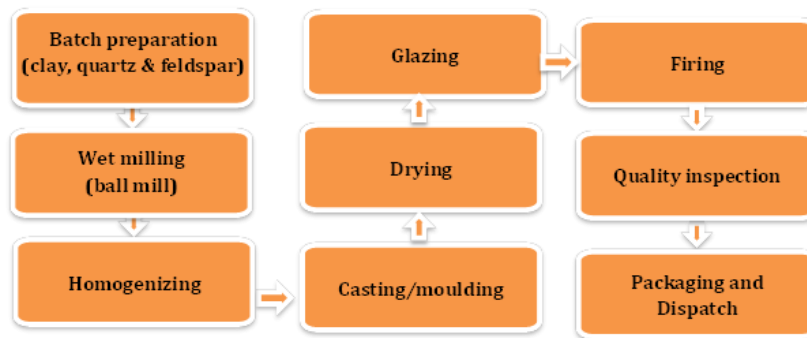


Figure 2.1: Process flow chart

2.2 Details of technology identified

The details of the existing technology installed in the unit are given in table 2.2.

Table 2.2: Details of existing technology

Parameters/ Equipment ID	Value
Equipment	Ball Mill
Number of mills	2
Rated Capacity	40 tonnes
Speed	11.5 rpm
Type of grinding media	Natural/High alumina pebbles
Mode of operation (batch/continuous)	Batch
Batch Duration	7 hours
Batches per day	2
Motor rating	160 kW
Fuel Details	Type Electricity

2.3 Energy used and brief description of their usage pattern

The unit uses grid power supplied by Paschim Gujarat Vij Company Ltd. under tariff category of HTP-1. Table 2.3 provides the details of energy uses.

Table 2.3: Energy used and description of use

S. No.	Energy source	Description of use
--------	---------------	--------------------

S. No.	Energy source	Description of use
1	Electricity	Motive power for different drives in different process sections and utilities
2	NG	Kiln
3	Coal	Kiln

2.4 Energy sources, availability & tariff details

Different energy sources, availability of listed energy types and their respective tariffs are given in table 2.4.

Table 2.4: Energy sources, availability and tariffs

Source	Remarks	Price
Electricity (PGVCL)	HTP-1	Demand charges: <ul style="list-style-type: none"> For first 500 kVA of billing demand: Rs. 150/- per kVA per month For next 500 kVA of billing demand: Rs. 260/- per kVA per month Energy charges: @ Rs. 4.20/kWh Power factor penalty: <ul style="list-style-type: none"> 1% of energy charges for every point drop in PF between 0.85 to 0.90 2% of energy charges for every point drop in PF below 0.85 Power factor rebate: <ul style="list-style-type: none"> 0.5% of energy charges for every point increase in PF over 0.95.
Natural gas	Gujarat Gas Ltd.	<ul style="list-style-type: none"> Minimum Guaranteed Offtake (MGO): Rs. 32.70/SCM Non - Minimum Guaranteed Offtake (Non-MGO): Rs. 35.97/SCM

2.5 Analysis of electricity consumption

Table 2.5: Electricity consumption profile

Month & Year	Electricity consumption (kWh)	Contract Demand (kVA)	Maximum Demand (kVA)	Minimum Billing Demand (kVA)	Demand Charges, Rs./month	Energy Charges, Rs./month	Power factor (PF)	Total electricity bill (Rs)
Jul-17	2,34,393	1,600	953	1,360	3,76,000	9,51,552	1.0	20,63,987
Aug-17	2,06,748	1,600	692	1,360	3,76,000	8,42,298	1.0	18,28,012
Sep-17	5,48,633	1,600	1,354	1,360	3,76,000	22,20,362	1.0	41,79,911
Nov-17	7,29,775	1,600	1,341	1,360	3,76,000	29,67,173	1.0	54,35,289
Dec-17	6,39,803	1,600	1,329	1,360	3,76,000	26,00,749	1.0	48,15,793
Jan-18	6,02,928	1,600	1,148	1,360	3,76,000	24,49,810	1.0	45,61,310
Feb-18	5,35,889	1,600	1,214	1,360	3,76,000	21,78,779	1.0	40,56,107
Average	2,20,571	1,600	823	1,360	3,76,000	8,96,925	1.0	19,46,000
Total	26,46,846	-	-	-	-	-	-	2,33,51,995

2.6 Analysis of other energy forms/ fuels

The analysis of the other fuels/forms of energy used in the unit is given in table 2.6.

Table 2.6: Analysis of other energy/ fuel consumption

Parameters	NG (SCM)	Coal (MT)
Consumption unit/year	2,81,494	6,000
Calorific value per unit	8,500	7,500
Equivalent toe per year	239.3	4,500
Price (Rs per unit)	28	7.5
Total price per year	78,81,821	4,50,00,000

The share of various energy forms used in the unit is given in figure 2.6.

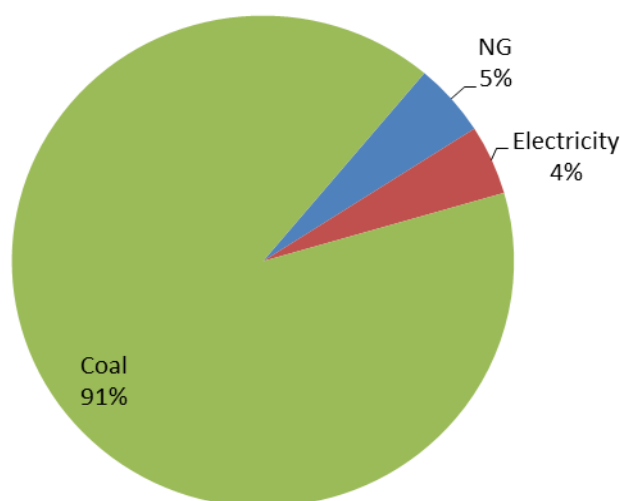


Figure 2.6: Percentage share of various fuel types in the unit

The plant is consuming about 26,46,846 kWh of electricity per year. The annual consumption of the coal is 6,000 MTs and NG is about 2.81 lakh SCM. The total energy consumption of the unit during last 12 months is estimated to be 4,967 toe which is equivalent to 762 lakh rupees. The total CO₂ emission during this period is estimated to be 13,559 tonnes. Electricity, coal and NG were considered for CO₂ emission estimation.

3.0 Proposed technology for energy efficiency

Based on the measurements, observations/ findings during detailed assessment study conducted in the unit, the following technology has been identified for energy efficiency improvement. The detail is given below.

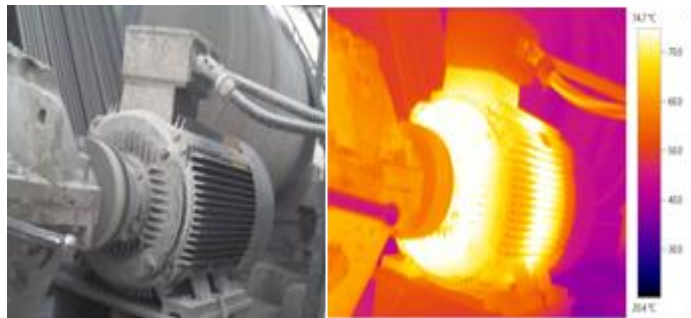
3.1 Ball mill automation with installation of energy efficient IE3 standard motor

3.1.1 Background

The Excel Ceramic Pvt. Ltd. is manufacturing wall, floor and vitrified tiles. To prepare the raw material for body casting, wet grinding technology has been used in which two ball mills of capacity of 40T each with 90kW electric motor are installed in the plant. The operational parameters including the electricity consumption, batch timing and material loaded were measured during the detailed assessment study.

3.1.2 Observations and analysis

During the detailed assessment study of the ball mill, electricity consumption and residue of material for both the ball mills was recorded with respect to batch timing for evaluating the existing performance. Ball mills were operated using with manual control with judgement of the operating personal with his past experience. The ball mills were observed to be operated in the range of 6.8 to 7.5 hours per batch which is higher than the recommended value for the similar ball mills. The specific quality of material in ball mills is generally achieved with batch timing of 6.5 hours.



The electrical motor drives associated with ball mills were found to be rewinded multiple times because of which the body temperature and electricity consumptions was observed to be very high as compare to similar size ball mill motor.

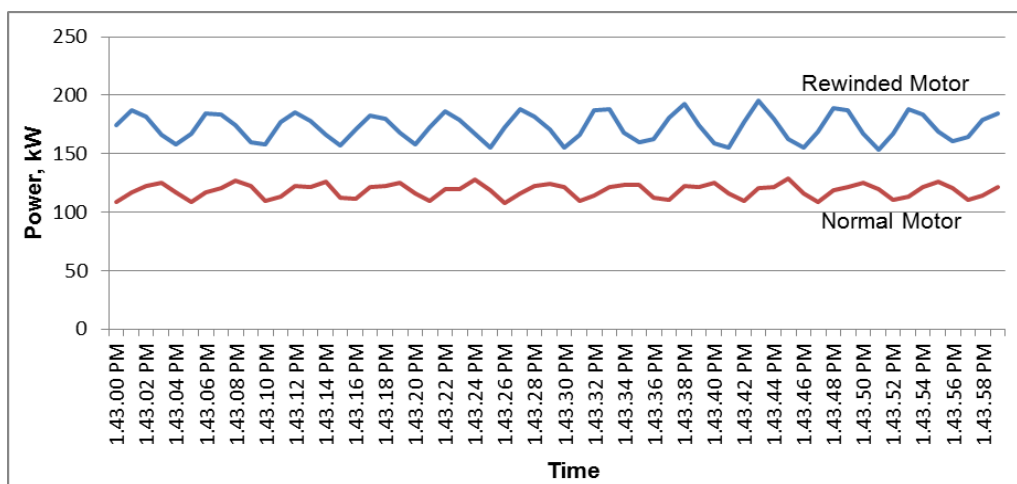


Figure 3.1.2: Power consumption of rewinded motor and regular motor

3.1.3 Recommendation

It is recommended to install timer for ball mill batch operation to optimise batch timing and replace existing 90kW rewinded motor drives with energy efficient IE3 standard motor drives of same rating. Timer will fix the batch operation of the ball mill eliminating additional electricity consumption based on manual judgement of the operator, whereas IE3 standard motors will improve motor operating efficiency as compared to old rewinded motors.

3.2 Cost benefit analysis

The estimated annual energy saving by installation of timer and replacing of existing rewinded motors with energy efficient IE3 standard motors is 32,202 kWh which is equivalent to about Rs. 2.16 lakhs. The investment requirement is Rs 4.43 lakh with a simple payback period of 2 years. The detailed calculations of the recommended energy conservation measures for DPR are provided in table 3.2

Table 3.2: Cost benefit analysis for recommended energy savings measures

Description	Unit	Value
Existing		
Capacity	tonne/batch	40.0
Speed	rpm	12
Type of grinding media	-	River stone /High alumina pebbles (68%)
Average running hours	hours/batch	7
Batches per day	No.s	2
Number of ball mills	Numbers	2
Number of operating days	days/year	300
Average power input	kW	178.7
Average unit consumption	kWh/batch	1,251
Annual electricity consumption	kWh/year	12,48,975
Proposed		
Capacity	tonne/batch	40
Speed	rpm	11.5
Type of grinding media	-	460
Average running hours	hours/batch	6.5
Batches per day	No.s	2
Number of operating days	days/year	300
Average power input	kW	118.7
Average unit consumption	kWh/batch	783
Annual electricity consumption	kWh/year	9,39,000
Electricity savings	kWh/year	3,09,975
Cost of electricity	Rs./kWh	8.82
Monetary savings	Rs./year	27,34,783
Total investment ²	Rs.	8,97,200
Simple Payback	Months	4

²Quotation - 1 has been considered for estimation of investments

3.3 Pre-training requirements

The training would be required on preventive maintenance of new IE3 standard electrical motors. Best practices to be adopted for housekeeping near location of installation.

3.4 Process down time for implementation

The estimated process down time required for implementation of recommended measure is estimated to be 1 day.

3.5 Environmental benefits

3.5.1 CO₂ reduction³

Implementation of the selected energy conservation measures in the unit may result in reduction in CO₂ emissions due to reduction in overall energy consumption. The estimated reduction in GHG emission by implementation of the recommended energy conservation measures is 254 tonnes of CO₂ per year.

3.5.2 Reduction in other pollution parameters (gas, liquid and solid)

There is not significant impact on the reduction in other pollution parameters including gas, liquid and solid.

³ Source for emission factor: 2006 IPCC Guidelines for National Greenhouse Gas Inventories & for electricity; CO₂ Baseline Database for the Indian Power Sector, user guide version 12.0, May 2017 (CEA)

4.0 Project financials

4.1 Cost of project and means of finance

4.1.1 Particulars of machinery proposed for the project

The particulars of machinery proposed for the project is given in table 4.1.1.

Table 4.1.1: Particulars of machinery proposed for the project

S. No.	Name of machinery (Model/Specification)	Name of manufacturer, contact person	Advantage	Disadvantage
1	IE3 standard premium efficiency motors	Shaildeep Enterprise, ABB motors	Reputed supplier	-
2	IE3 standard premium efficiency motors	Aakash Powertech Pvt. Ltd, Marathon Teramax	Reputed supplier	-
3	IE3 standard premium efficiency motors	Crompton Greaves (Online supplier-easysparepart.com)	Reputed supplier	-

4.1.2 Means of finance

The means of finance for the project is shown in table 4.1.2.

Table 4.1.2: Means of finance

S. No.	Details	100% equity	D/E- 70:30	D/E- 50:50
1	Additional (Share) Capital	8.97	2.69	4.49
2	Internal Accruals	-	-	-
3	Interest free unsecured loans	-	-	-
4	Term loan proposed (Banks/FIs)	-	6.28	4.49
5	Others	-	-	-
	Total	8.97	8.97	8.97

4.2 Financial statement (project)

4.2.1 Assumptions

The assumptions made are provided in table 4.2.1.

Table 4.2.1: Assumptions made

Details	Unit	100% equity	D/E - 70:30	D/E - 50:50
General about unit				
No of working days	Days		300	
No of shifts per day	Shifts		3	
Annual operating hours	hrs/year		7,200	
Installed production capacity	boxes/year		45,00,000	
Production in last financial years	boxes/year		33,75,000	
Capacity utilization factor	%		75	
Proposed investment (Project)				
Total cost of the project	Rs. (Lakh)	8.97	8.97	8.97

Details	Unit	100% equity	D/E - 70:30	D/E - 50:50
Investment without interest defer credit (IDC)	Rs. (Lakh)	8.97	8.97	8.97
Implementation time	Months	6.0	6.0	6.0
Interest during the implementation phase	Rs. in lakhs	-	0.33	0.24
Total investment	Rs. in lakhs	8.97	9.30	9.21
Financing pattern				
Own funds	Rs. in lakhs	8.97	3.02	4.72
Loan funds (term loan)	Rs. in lakhs	-	6.28	4.49
Loan tenure	Years	-	5.0	5.0
Moratorium period (No EMI (interest and principal amount))	Months	-	6.0	6.0
Total repayment period	Months	-	66.0	66.0
Interest rate	%	-	10.5	10.5
Estimation of costs				
Operation & maintenance costs	%		5.0	
Annual escalation rate of O&M	%		5.0	
Estimation of revenue				
Reduction in energy cost	Rs. lakh/year		27.35	
Total saving	Rs. lakh/year		27.35	
Straight line depreciation	%		16.21	
IT depreciation	%		80.0	
Income tax	%		33.99	
Period of cash flow analysis	Years		5.0	

4.2.2 Payback

The simple payback period on the investments made are shown in table 4.2.2.

Table 4.2.2: Payback

Details	100% equity	D/E- 70:30	D/E- 50:50
Total project cost (Rs. In lakh)	8.97	9.30	9.21
Cash flow as annual saving (Rs. In lakh/year)	27.35	27.35	27.35
O&M Expenses for first year (Rs. In lakh/year)	0.45	0.47	0.46
Net Cash flow (Rs. In lakh/year)	26.90	26.88	26.89
SPP (months)	4.00	4.15	4.11

4.2.3 NPV and IRR

Table 4.2.3a: NPV and IRR (100% equity)

Particulars / years	0	1	2	3	4	5
			(Rs. in lakhs)			
Profit after tax	-	25.44	10.07	16.37	16.27	16.24
Depreciation	-	1.45	1.45	1.45	1.45	1.45
Cash outflow	8.97	-	-	-	-	-
Net cash flow	-8.97	26.90	11.53	17.82	17.73	17.70
Discount rate % @ WACC	9.30	9.30	9.30	9.30	9.30	9.30
Discount factor	1.00	0.92	0.84	0.77	0.70	0.64
Present value	-8.97	24.62	9.66	13.67	12.45	11.37
Net present value		62.79				
Simple IRR considering regular cash flow		256.95%				

Table 4.2.3b: NPV and IRR (D/E- 70:30)

Particulars / years	0	1	2	3	4	5
	(Rs. in lakhs)					
Profit after tax	-	25.06	9.86	16.02	16.00	16.07
Depreciation	-	1.51	1.51	1.51	1.51	1.51
Cash outflow	9.30	-	-	-	-	-
Net cash flow	-9.30	26.56	11.37	17.52	17.51	17.57
Discount rate % @ WACC	10.10	10.10	10.10	10.10	10.10	10.10
Discount factor	1.00	0.91	0.83	0.75	0.68	0.62
Present value	-9.30	24.13	9.38	13.13	11.92	10.87
Net present value	60.12					
Simple IRR considering regular cash flow	243.20%					

Table 4.2.3c: NPV and IRR (D/E- 50:50)

Particulars / years	0	1	2	3	4	5
	(Rs. in lakhs)					
Profit after tax	-	25.17	9.92	16.12	16.08	16.12
Depreciation	-	1.49	1.49	1.49	1.49	1.49
Cash outflow	9.21	-	-	-	-	-
Net cash flow	-9.21	26.66	11.41	17.61	17.57	17.61
Discount rate % @ WACC	9.90	9.90	9.90	9.90	9.90	9.90
Discount factor	1.00	0.91	0.83	0.75	0.69	0.63
Present value	-9.21	24.27	9.46	13.28	12.07	11.00
Net present value	60.87					
Simple IRR considering regular cash flow	247.03%					

4.3 Marketing & selling arrangement

The marketing and selling arrangements of the unit are given in table 4.3.

Table 4.3: Marketing & selling arrangements

Items	Remarks
Main Markets (locations)	Pan India
Locational advantages	-
Any USP or specific market strength	-
Whether product has multiple applications	NA
Distribution channels (e.g. direct sales, retail network, distribution network)	Direct sales
Marketing team details, if any.	NA

4.4 Risk analysis and mitigation

The risk analysis and mitigation for the proposed options are given in table 4.4.

Table 4.4: Risk analysis and mitigation

Type of risk	Description	Mitigation
Technology	The equipment/technology provided by the supplier may not be of high quality, which may result in underperformance.	The equipment/technology should be procured from standard/reputed vendors only.
Market /Product	Demand of the product manufactured by the unit may change resulting in lower capacity utilization.	Regular vigilance/tab on the market scenario by the SME will help in better understanding of new substitute product. The unit may modify the product line based on the emerging market trend.
Policy/Regulatory	Changes in government regulation/policy related to pollution and taxes & duties can affect the viability of the unit.	Local industrial association may play a role in discussing these issues with the relevant governmental bodies on a regular basis, so that any concerns of the unit are brought to their notice.

4.5 Sensitivity analysis

A sensitivity analysis for various scenarios which may affect the return on investment is given in table 4.5.

Table 4.5: Sensitivity analysis

S. No.	Scenario	D/E ratio	Payback period (months)	NPV (Rs lakh)	IRR (%)	DSCR	ROI (%)
1	10% increase in estimated savings	100% equity	3.60	69.84	285.63	-	41.58
		70:30	3.80	67.03	270.77	13.91	45.57
		50:50	2.70	67.81	274.91	19.43	44.34
2	10% reduction in estimated savings	100% equity	4.50	55.74	228.50	-	40.15
		70:30	4.60	53.22	215.88	11.43	44.83
		50:50	4.60	53.92	219.4	15.96	43.37
3	10% rise in interest rates	70:30	4.20	58.84	241.87	12.38	45.21
		50:50	4.10	59.92	246.06	17.29	43.88
4	10% reduction in interest rates	70:30	4.10	61.46	244.54	12.97	45.27
		50:50	4.10	61.83	248.00	18.12	43.92

5.0 Conclusions & recommendations

The DPR prepared for automation of ball mill batch operation to optimise batch timing and replace existing rewinded motor drives with energy efficient IE3 standard motors based on the performance assessment study conducted at unit and the acceptance of the unit management. The brief of selected energy conservation measure is given below;

5.1 List of energy conservation measures

The brief summary of the energy conservation measures are given in table 5.1.

Table 5.1: Summary of the energy conservation measures

Technology	Annual energy saving	Investment	Monetary savings	Simple payback period	Emission reduction
	Electricity (kWh)	(Rs lakh)	(Rs lakh/year)	(Months)	(tonnes of CO ₂)
Ball mill automation with installation of energy efficient IE3 standard motor	3,09,976	8.97	27.35	3.90	254

The measure has an estimated investment of 8.97 lakh rupees and can yield a savings of 27.3 lakh rupees per year. The total annual reduction in emission by implementation of recommended measure is estimated to be 254 tonnes of CO₂. The financial indicators provided above in the table shows the project is financially viable and technically feasible.

5.2 Summary of the project

The summary of the project is given in table 5.2.

Table 5.2: Summary of the project

S. No.	Particulars	Unit	100% equity	D/E- 70:30	D/E- 50:50
1	Cost of Project	Rs. In Lakh	8.97	9.30	9.21
2	D/E Ratio	-	-	7:3	1:1
3	Project IRR	%	256.95	243.20	247.03
4	NPV	Rs. In Lakh	62.79	60.12	60.87
5	DSCR	-	-	12.67	17.70

5.3 Recommendations

The financial indicators provided above show the project is financially viable and technically feasible. It is recommended that the implementation of the identified the energy conservation measures may be undertaken by the unit.

6.0 Financing schemes for EE investments for MSME sector

Government of India has many schemes to provide concessional finance for EE technologies among MSMEs. Some major government schemes are summarised in table 6.1.

Table 6.1: Major government schemes

Name of the scheme	Brief Description and key benefits
ZED assessment and certification	<p>Assessment process, fee and subsidy are as follows: Online (e-Platform) self-assessment: Nil fee Desk Top assessment : Rs 10,000 per SME Complete assessment : Rs 80,000 ZED rating per SME; Rs 40,000 for additional ZED defence rating; Rs 40,000 for re-rating The rating costs will include cost of Rs 10,000/- as certification cost by QCI. Subsidy for Micro, Small and Medium Enterprises are 80%, 60% and 50% respectively.</p>
Credit Linked Capital Subsidy Scheme (CLCSS) (2000-ongoing)	<p>15% capital subsidy of cost of eligible plant and machinery / equipment for adoption of proven technologies for approved products / sub-sectors for MSE units subject to ceiling of INR 15 lakhs</p>
Credit Guarantee Fund Scheme for Micro and small Enterprises (in partnership with SIDBI) (2000-ongoing)	<p>This scheme was launched by MoMSME and SIDBI to alleviate the problem of collateral security and enable micro and small scale units to easily adopt new technologies. Under the scheme, collateral free loans up to Rs 1 crore can be provided to micro and small scale units. Additionally, in the event of a failure of the SME unit which availed collateral free credit facilities to discharge its liabilities to the lender, the Guarantee Trust would guarantee the loss incurred by the lender up to 75 / 80/ 85 per cent of the credit facility.</p>
Technology and Quality Up gradation Support to MSMEs (TEQUP) (2010-ongoing)	<p>The benefits available to SMEs under TEQUP include –technical assistance for energy audits, preparation of DPRs and significant capital subsidy on technologies yielding an energy savings of over 15%. The scheme offers a subsidy of 25% of the project cost, subject to a maximum of Rs. 10 lakhs. TEQUP, a scheme under NMCP, focuses on the two important issues in enhancing competitiveness of the SME sector, through EE and Product Quality Certification.</p>
Technology Upgradation Fund Scheme (TUF) (1999-ongoing)	<p>Interest subsidy and /or capital subsidy for Textile and Jute Industry only.</p> <ol style="list-style-type: none"> To facilitate Technology Up gradation of Small Scale (SSE) units in the textile and jute industries. Key features being: <ul style="list-style-type: none"> Promoter's margin -15%; Subsidy - 15% available on investment in TUF compatible machinery subject to ceiling of Rs 45 lakh; Loan amount - 70% of the cost of the machinery by way of Term Loan

Name of the scheme	Brief Description and key benefits
	<ul style="list-style-type: none"> Interest rate: Reimbursement of 5% on the interest charged by the lending agency on a project of technology upgradation in conformity with the Scheme Cover under Credit Guarantee Fund Scheme for Micro and Small Enterprises (CGMSE) available <p>2. To enable technology upgradation in micro and small power looms to improve their productivity, quality of products and/ or environmental conditions</p> <ul style="list-style-type: none"> 20% margin subsidy on investment in TUF compatible specified machinery subject to a ceiling of Rs 60 lakhs or Rs 1crore (whichever is applicable) on subsidy amount to each unit - released directly to the machinery manufacturer.
Tax incentives	<ul style="list-style-type: none"> Accelerated depreciation is provided to the customers / users of the energy saving or renewable energy devises under the direct tax laws. Under indirect taxes, specific concessional rates of duty are only available to CFLs and not to all energy efficient products A further waiver of import tariffs and taxes for EE technology imports are dealt on a case to case basis, meaning higher costs for those imported technologies that are not available in the domestic markets at present.

Two financing schemes have been created by Bureau of Energy Efficiency (BEE) under The National Mission for Enhanced Energy Efficiency (NMEEE) for financing of energy efficiency projects - Venture Capital for Energy Efficiency (VCFEE) and Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE). These funds seek to provide appropriate fiscal instruments to supplement the efforts of the government for creation of energy efficiency market. Highlights of these two schemes are provided in the table 6.2.

Table 6.2: BEE's VCFEE and PRGFEE scheme

Venture Capital for Energy Efficiency (VCFEE)	<ul style="list-style-type: none"> This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase. A single investment by the fund shall not exceed Rs 2 crore Fund shall provide last mile equity support to specific energy efficiency projects, limited to a maximum of 15% of total equity required, through Special Purpose Vehicle (SPV) or Rs 2 crore, whichever is less
Partial Risk Guarantee Fund for Energy Efficiency (PRGFEE)	<ul style="list-style-type: none"> A PRGF is a risk sharing mechanism lowering the risk to the lender by substituting part of the risk of the borrower by granting guarantees ensuring repayment of part of the loan upon a default event. Guarantees a maximum 50% of the loan (only principal). In case of default, the fund will: <ul style="list-style-type: none"> Cover the first loss subject to maximum of 10% of the total guaranteed amount Cover the remaining default (outstanding principal) amount on

Venture Capital for Energy Efficiency (VCFEE)	<ul style="list-style-type: none"> This fund is to provide equity capital for energy efficiency projects in Government buildings and Municipalities in the first phase. A single investment by the fund shall not exceed Rs 2 crore Fund shall provide last mile equity support to specific energy efficiency projects, limited to a maximum of 15% of total equity required, through Special Purpose Vehicle (SPV) or Rs 2 crore, whichever is less
	<p>partial basis upto the maximum guaranteed amount</p> <ul style="list-style-type: none"> PFI shall take guarantee from the PRGFEE before disbursement of loan to the borrower. The Guarantee will not exceed Rs 300 lakh per project or 50% of loan amount, whichever is less. Maximum tenure of the guarantee will be 5 years from the date of issue of the guarantee

Indian Renewable Energy Development Agency (IREDA), a non-banking financial institution established by the government also extends financial assistance for setting up projects relating to new and renewable sources of energy and energy efficiency/conservation. The detailed financing guidelines for energy efficiency projects are provided in table 6.3.

Table 6.3: IREDA's financing guidelines

Eligible companies who can apply	Private Sector Companies/ firms, Central Public Sector Undertaking (CPSU), State Utilities/ Discoms/ Transcos/ Gencos/ Corporations, Joint Sector Companies which are not loss making.
Minimum loan amount	<ul style="list-style-type: none"> Rs. 50 lakh
Type of projects considered for term loans	<ul style="list-style-type: none"> Replacement / retrofit of selected equipment with energy efficient equipment Modification of entire manufacturing processing Recovery of waste heat for power generation
Incentive available	<ul style="list-style-type: none"> Rebate in central excise duty Rebate in interest rate on term loan Rebate in prompt payment of loan instalment
Interest rate	<ul style="list-style-type: none"> 10.60% to 11.90% depending upon the grading of the applicant with prompt payment rebate of 15 bps if payment is made on / before due dates Interest rates are floating and would be reset on commissioning of the project or two years from the date of first disbursement. Thereafter, the rates will be reset after every two years. Rebate of 0.5% in interest rates are available for projects set up in North Eastern States, Sikkim, J&K, Islands, Estuaries. Rebates of 0.5% in interest rates are also available for projects being set up by SC/ST, Women, Ex Servicemen and Handicapped categories involving project cost of upto Rs. 75.00 lakh.
Loan	Upto 70% of the total project cost. Promoter's contribution should be Minimum 30% of the total project cost
Maximum debt	3:1

equity ratio	The project cash flow should have a minimum average Debt Service Coverage Ratio of 1.3
Maximum repayment period	12 years with moratorium of maximum 12 months
Procurement procedures	The borrower is required to follow the established market practices for procurement and shall demonstrate that the quality goods and services are being purchased at reasonable and competitive prices. Wherever the loan is sanctioned against international lines of credit such as the World Bank, Asian Development Bank, KfW, etc., the relevant procedures will have to be followed and requisite documents will have to be submitted by the borrower

Small Industries Development Bank of India (SIDBI) has several schemes and focused lines of credit for providing financial assistance for energy efficiency and cleaner production projects for SMEs. Highlights of some of the major financial assistance schemes/projects managed by SIDBI are given in table 6.4.

Table 6.4: Major EE financing schemes/initiatives of SIDBI

End to End Energy Efficiency (4E) Program	<p>Support for technical /advisory services such as:</p> <ul style="list-style-type: none"> • Detailed Energy Audit • Support for implementation • Measurement & Verification <p>Financing terms:</p> <ul style="list-style-type: none"> • Terms loans upto 90% • Interest rate upto 3% below normal lending rate.
TIFAC-SIDBI Revolving Fund for Technology Innovation (Srijan Scheme)	<p>To support SMEs for up-scaling and commercialization of innovative technology based project at flexible terms and interest rate.</p> <p>Preference accorded to sustainable technologies / products. Soft term loan with an interest of not more than 5%.</p>
Partial Risk Sharing Facility for Energy Efficiency (PRSF) Project (supported by World Bank)	<p>Sectors covered:</p> <ul style="list-style-type: none"> • Large industries (excluding thermal power plants) • SMEs • Municipalities (including street lighting) • Buildings <p>Coverage:</p> <ul style="list-style-type: none"> • The minimum loan amount Rs 10 lakh and maximum loan amount of Rs 15 crore per project. • The extent of guarantee is 75% of the loan amount
JICA-SIDBI Financing Scheme	<ul style="list-style-type: none"> • The loan is used to provide SMEs with funds necessary to invest in energy-saving equipment (and some medical equipment) in the form of two-step loans through SIDBI or three-step loans through intermediary financial institutions.

	<ul style="list-style-type: none"> • Project uses an Energy Saving Equipment List approach • Equipment/machinery with energy saving potential less than 10% is not eligible. • Interest rate: As per credit rating and 1% below the normal lending rate • Separate technical assistance component which is used for wetting of loan applications, holding seminars to raise awareness of energy saving among SMEs and to improve the ability of financial institutions to screen loan applications for energy-saving efforts
KfW-SIDBI Financing Scheme	<p>Coverage</p> <ul style="list-style-type: none"> a) SMEs for energy efficiency projects b) SMEs and clusters for cleaner production and emission reduction measures, waste management and Common Effluent Treatment Plant (CETP) facilities <p>Interest rate</p> <p>As per credit rating and 1% below the normal lending rate</p> <p>Eligible criteria</p> <p>3 t CO₂ emission reduction per year per lakh invested</p> <p>List of eligible equipment/technology and potential suppliers developed for guidance</p>

State Bank of India (SBI) has been provided a green line of credit by Japan Bank for International Cooperation (JBIC) for financing of energy efficiency investments. Highlights of the line of credit are given in table 6.5.

Table 6.5: JBIC-SBI Green Line

<p><u>Key Features</u></p> <ul style="list-style-type: none"> • Amount : USD 90 million • Repayment Schedule: First repayment on May 30, 2017 and final repayment date May 30, 2025 (equal instalment) <p><u>Eligibility Criteria</u></p> <ul style="list-style-type: none"> • Projects contributing to preservation of global environment, i.e. significant reduction of GHG emissions • Acceptance of JBIC-MRV (“J-MRV”) by the project proponent in terms of the numerical effect of the environment preservation. To ensure effective GHG reduction emissions in Green financed projects, JBIC reviews such effects through simple and practical Measurement Reporting Verification (MRV) process both in (a) prior estimation and (b) ex-post monitoring. • Procurement in line with the “Guidelines for Procurement under Untied Loans by Japan Bank for International Cooperation”
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Canara bank has a dedicated scheme for financing EE investment among SME sector as mentioned in table 6.6.

Table 6.6: Canara bank scheme of EE SME loans

Purpose	For acquiring/adopting energy conservation/savings equipment/measures by SMEs
Eligibility	Units under Small and Medium Enterprises Cost of energy for the unit should constitute not less than 20% of the total cost of production Unit should possess energy audit report issued by an approved energy Consultant/Auditor. Borrowal a/cs-ASCC code S1 or S2 during previous review. Current account holders having dealings exclusively with us satisfactorily for a period of last one year
Maximum loan	Maximum Rs 100 lakhs in the form of term loan
Security	Prime: Assets created out of loan Collateral: Upto Rs.5 lakhs – NIL Above Rs.5 lakhs, as determined by the bank
Repayment	Maximum 5-7 years including moratorium of 6 months
Guarantee cover	Cover available under CGMSE of CGTMSE available for eligible loans
Margin	10% of the project cost
Rate of interest	1% less than the applicable rate
Upfront fee	1% of the loan
Insurance cover	Assets acquired and charged as security to Bank to be insured
Special offer, if any	Grants : Bank provides 25% of the cost of Energy Audit / Consultancy charges with a maximum of Rs 25000/- to the first 100 units on a first come first served basis which is in addition to the grant of Rs 25000/- being provided by IREDA(First 100 units)

Among the private sector banks in India, Yes Bank is also active in financing of renewable energy and energy efficiency projects. The bank has an MOU with SIDBI for providing funding for EE through PRSF.

Most commercial banks charge interest rate between from 11% to 13% from MSMEs depending upon general criteria such as credit ratings, references, past lending record, balance sheet for last 3 years and so on. Interest rebate is offered for a few customers whose collateral value is around 125% of the loan amount. Further 0.5% concession in interest rate was offered to women entrepreneurs

Annexures

Annexure 1: Budgetary offers / quotations

Quotation 1 : Magnus Power Protection Systems



MAGNUS POWER PROTECTION SYSTEMS

205, Gangamai Industrial Complex, Ambad MIDC, Nashik.

M : magnus.india205@gmail.com 📞 : 9822697084 / 8149629055

Digital Cyclic Timer

Digital Cyclic Timers is used to manage electrical devices which require regular ON & OFF on particular time.



Features

1. Programmable for 24Hrs and comes with 4 digit display(Hrs,Minute) and 6 digit display (Hour, Minute, Second)
2. This timer is available for both single phase and three phase electrical devices
3. Supply voltage-
 - 230v AC for single phase
 - 440v AC for three phase
4. Max output load is **15amp** at 230V AC
5. Idle power consumption is **3VA**
6. Inbuilt battery (**3.6Vdc**) to support clock in power fail.
7. For three phase devices following protection available-
 - Single phase preventer
 - Reverse phase protection
 - Dim light protection
 - Over voltage protection
8. This system is available on **one year warranty** with affordable cost.



Magnus Time Switch, Model No.: Mg10021
Rs 900/Piece



Magnus Power Protection Systems

MIDC Ambad, Nashik, Maharashtra

Send to my mobile

Call this Supplier
08071592333

Response Rate: 96%
Nature of Business: Manufacturer
Delivery Location: All Over India

Contact Supplier
Have a question?

Get Latest Price
Request a quote

Product details:

Brand	Magnus
Display	Digital
Model No.	Mg10021
Power/Voltage	230v

//www.indiamart.com/magnus-power-protection-systems/

Quotation 2 : Shaildeep Enterprise



Shaildeep Enterprise

Plot No.1, Survey No.235, Nr.Galaxy Agrico, B/H, Hotel Pitrukrupa, Veraval (Shapar) Dist.Rajkot-360024,
Ph.:02827-252479, Cell: - 07201977277, 7201877277 E-mail: shaildeepent@gmail.com

To, M/S. VIVEK SHARMA Kind Attention :Mr. Vivek Sharma Contact: 09850366248 Email ID: vivek_honest@yahoo.co.in	Our Reference: SD/QTN/025/18-19 Date: 28-06-2018 Rev.: Enquiry Reference: E-mail Enquiry date:27-09-2018
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Dear Sir,

This is with reference to your enquiry of electric motors; we are pleased to submit our offer as below

A. GENERAL TECHNICAL SPECIFICATIONS

- ABB make totally Enclosed Fan Cooled (TEFC) Squirrel Cage, Induction Motors, Continuously rated (S1) suitable for operation on 415 Volt $\pm 10\%$ 3 phase, 50 Hz $\pm 5\%$, A.C. supply with Class F insulation for 50° C ambient temperature, IP55 and as per IS_325 and IS 12615:2011.
- IE3 motors. Standard test certificate is available with every motor. Motor Datasheet and GA Drawing attached.
- Offered Motors are suitable for Direct On Line starting. In case application calls for VFD. It is recommended to use VFD Duty Motors. Extra charges @ 5% on quoted prices for VFD Duty Motors.
- Offered Motors are suitable for Direct Coupling. In case your application calls for V belt and Pulley, It is recommended to use Roller bearing at NDE side. Roller bearing Charges Extra for 160 TO 200 Frame INR 1500 225 to 250 Frames is INR 3000 per Motor.

B. PRICE SCHEDULE

ABB MAKE IE3 TEFC MOTOR SUITABLE DIRECT COUPLING									
Sr. No.	Qty	KW/HP	RPM	Mount	Type Of Starting	Frame Size	Unit Price	Total Amount	Delivery
1	1	160/215	1500	B3-FOOT	DOL	315L	448600	448600/-	6-8 WEEK





Shaildeep Enterprise

Plot No.1, Survey No.235, Nr.Galaxy Agrico, B/H, Hotel Pitrukrupa, Veraval (Shapar) Dist.Rajkot-360024,
Ph.:02827-252479, Cell:- 07201977277, 7201877277 E-mail: shaildeepent@gmail.com

C. Terms and Conditions:

Testing Charge	:	Motors will be supplied with Routine Test Certificate. However any witness testing required. Same will be charged extra as per Manufacturers price list
Taxes / Surcharge	:	GST extra as applicable. Present Rate of GST will be 18%
Validity	:	15 Days from the date of our offer
Payment	:	100% Invoice prior to dispatch within 2 day
P&F / Insurance	:	NIL
Price	:	Ex Rajkot. Freight To pay
Warranty	:	Limited to a period of 12 months from the date of installation or 18 months from the date of dispatch, ex-works whichever is earlier.
Delivery	:	As mentioned in above price schedule

D. Our GST Details are as below

Company Name	:	Shaildeep Enterprise
GSTIN	:	24ACTFS1580L1ZJ

E. Bank Detail :

Bank Name	:	Central Bank Of India
Branch	:	Main Branch Rajkot
A/C No.	:	3468387369
A/C Type	:	CC
NEFT CODE	:	CBIN0280571

We hope it will be in line with your requirement, incase if you have any query please feel free to contact us.

Thanking you once again and assuring you of our best services at all times.

Truly Yours,

For, Shaildeep Enterprise

Dipen Devani


7600053277



Quotation 3 : Aakash Powertech Pvt. Ltd

2 -Pole 3000 RPM			4 - Pole 1500 RPM			6 - Pole 1000 RPM		
Frame	KW	Price	Frame	KW	Price	Frame	KW	Price
						90S	0.75	10865
80	0.55	8345	80	0.55	8860	90L	1.1	11915
80	0.75	8625	80	0.75	8990	100L	1.5	15295
80	1.1	9415	90S	1.1	10210	112M	2.2	18280
90S	1.5	10785	90L	1.5	11175	132S	3	26695
90L	2.2	13855	100L	2.2	14815	132S	3.7	27800
100L	3	16280	100L	3	15665	132M	5.5	28905
112M	3.7	17205	112M	3.7	18910	160M	7.5	51645
132S	5.5	28085	132S	5.5	26170	160L	11	64325
132S	7.5	29070	132M	7.5	30360	180L	15	79424
160M	11	50805	160M	11	48640	200L	18.5	103421
160M	15	59520	160L	15	60460	200L	22	112404
160L	18.5	76495	180M	18.5	83764	225M	30	175201
180M	22	80233	180L	22	84759	250M	37	251627
200L	30	119187	200L	30	115995	280S	45	301279
200L	37	145473	225S	37	148411	280M	55	342527
225M	45	187217	225M	45	175343	315S	75	411181
250M	55	269439	250M	55	249660	315M	90	516112
280S	75	335037	280S	75	305406	315L	110	575130
280M	90	388056	280M	90	354318	315L	132	673170
315S	110	489174	315S	110	428948	355M	160	698307
315M	132	600113	315M	132	505020	355M	200	798371
315L	160	658749	315L	160	591005	355L	250	860444
315L	200	770942	315L	200	717345			
355M	250	858038	355M	250	790590			
355L	315	934224	355L	315	907155			
355L	355	1121065	355L	355	1125978			
355L	375	1233167	355L	375	1238553			


Quotation 4: Easy Spare Parts



All Categories | IE3 motor | 0 item(s) - Rs. 0

VIEW ALL CATEGORIES | ELECTRICAL | HAND TOOLS | POWER TOOLS | TEST & MEASURE | SAFETY | f | t | g+ | e

Home » Search » CROMPTON GREAVES Motor 215HP(1500/1440RPM) IE3 (Foot Mounted)



38% CROMPTON GREAVES MOTOR 215HP(1500/1440RPM) IE3 (FOOT MOUNTED)

Free Shipping
This product qualifies for free air shipping.

Brand: CROMPTON GREAVES | Views: 68
Product Code:
Price Per Piece/Box: Per Piece
Availability: **In Stock**

Shipping To:

Check

0 Product(s) Sold

~~Rs. 700,330~~ **Rs. 434,205**

Annexure 2: Instruments used

Instruments	Model/Make	Application	Accuracy
Power analysers	Fluke: 435, Krykard ALM 10,	Electrical Parameters, Harmonics analysis	$\pm 0.5\%$
Thermal imager	Testo: 875-2	Surface Temperature & Image	$\pm 2\%$