DETAILED PROJECT REPORT
ON
STENTER MACHINE (7 CHAMBER)
(SURAT TEXTILE CLUSTER)

ENERGY IS LIFE
BEE
CONSERVE IT

Bureau of Energy Efficiency

Prepared By

ZenithEnergy
Horizons Beyond Energy

Reviewed By

ISTSL

STENTER MACHINE (7 CHAMBER)

SURAT TEXTILE CLUSTER

BEE, 2010

Detailed Project Report on Stenter Machine (7 Chamber)

Textile SME Cluster, Surat, Gujarat (India)

New Delhi: Bureau of Energy Efficiency;

Detail Project Report No.: ***SRT/TXT/STT/11***

For more information

Bureau of Energy Efficiency

Ministry of Power, Government of India

4th Floor, Sewa Bhawan, Sector – 1

R. K. Puram, New Delhi -110066

Ph: +91 11 26179699 Fax: 11 26178352

Email: jsood@beenet.in

pktiwari@beenet.in

WEB: www.bee-india.nic.in

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Dr. Ajay Mathur, Director General, BEE

Smt. Abha Shukla, Secretary, BEE

Shri Jitendra Sood, Energy Economist, BEE

Shri Pawan Kumar Tiwari, Advisor (SME), BEE

Shri Rajeev Yadav, Project Economist, BEE

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We take this opportunity to express our appreciation for the excellent support provided by Textile Unit Owners, Local Service Providers, and Equipment Suppliers for their active involvement and their valuable inputs in making the program successful and in completion of the Detailed Project Report (DPR).

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Zenith Energy Services Pvt. Ltd.

Hyderabad

Content

List of Annexure

List of Table

List of Figure

LIST OF ABBREVATIONS

- BEE - Bureau of Energy Efficiency
- DPR - Detailed Project Report
- DSCR - Debt Service Coverage Ratio
- GHG - Green House Gases
- HP - Horse Power
- IRR - Internal Rate of Return
- ID - Induced Draft
- MoP - Ministry of Power
- NPV - Net Present Value
- ROI - Return On Investment
- SME - Small and Medium Enterprises
- TFH - Thermic Fluid Heater
- MoMSME - Ministry of Micro Small and Medium Enterprises

EXECUTIVE SUMMARY

Zenith Energy Services Pvt. Ltd is executing BEE - SME program in Surat textile cluster, supported by Bureau of Energy Efficiency with an overall objective of improving the energy efficiency in cluster units.

Surat is renowned for the synthetic Sarees and dress materials and there are about 450 above industries in the cluster. The major fuels used in the cluster units are Imported Coal, Lignite, Natural gas and Biomass (Groundnut husk briquettes and Wood). Lignite and imported coal are used in boilers for steam generation. Natural gas is used in Stenter (for heat setting) and Natural gas based generators. The cost of energy as a percentage of manufacturing cost varies anywhere between 12 to 15%, which includes electrical as well as thermal energy cost.

Stenter machine is mainly used for colour setting of fabrics and major electricity consuming equipments in Surat textile industries. Majority of the stenter are gas based and very few are working on thermic fluid heaters. Electricity and gas are two energy forms used in stenter. Electricity is used for driving fans/blowers, main drive, overfeed drive, plaited and mangle motors etc and natural gas is for hot air requirement. Generally, stenter installed are of locally fabricated by the local service providers. As per the detailed energy audits conducted, about 90% of the stenter installed in the cluster are of local make and the fans/blowers & motors installed are of local make and are less efficient.

This DPR is prepared for installation of new efficient stenter “Hot Air Stenter Machine” of 7 chambers suitable for processing of synthetic sarees and dress materials. Project activity i.e., installation of new stenter reduces electricity consumption by 4,12,608 kWh per annum.

This bankable DPR also found eligible for subsidy scheme of MoMSME for “Technology and Quality Upgradation Support to Micro, Small and Medium Enterprises” under “National Manufacturing and Competitiveness Programme”. The key indicators of the DPR including the Project cost, debt equity ratio, monetary benefit and other necessary parameters are given in table:

S.No	Parameter	Unit	Value
1	Project cost	₹ in lakh	60.60
2	Debit equity ratio	ratio	3:1
3	Monetary benefit	₹ (in lakh/annum)	23.11
4	Simple payback period	years	2.6
5	NPV	₹ in lakh	21.96
6	IRR	%age	20.34
7	ROI	%age	24.87
8	DSCR	ratio	1.57
9	Process down time during implementation	Weeks	2

The projected profitability and financial indicators shows that the installation of energy efficient stenter will be able to earn profit and make the project financially viable and technically feasible.

ABOUT BEE SME PROGRAMME

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve the energy performance in 25 selected SMEs clusters. Surat Textile Cluster is one of them. The BEE's SME Programme intends to enhance the energy efficiency awareness by funding/subsidizing need based studies in SME clusters and giving energy conservation recommendations. For addressing the specific problems of these SMEs and enhancing energy efficiency in the clusters, BEE will be focusing on energy efficiency, energy conservation and technology up gradation through studies and pilot projects in these SMEs clusters.

Major activities in the BEE -SME program are furnished below:

Energy use and technology studies

The energy use technology studies would provide information on technology status, best operating practices, gaps in skills and knowledge on energy conservation opportunities, energy saving potential and new energy efficient technologies, etc for each of the sub sector in SMEs.

Capacity building of stake holders in cluster on energy efficiency

In most of the cases SME entrepreneurs are dependent on the locally available technologies, service providers for various reasons. To address this issue BEE has also undertaken capacity building of local service providers and entrepreneurs/ managers of SMEs on energy efficiency improvement in their units as well as clusters. The local service providers will be trained in order to be able to provide the local services in setting of energy efficiency projects in the clusters

Implementation of energy efficiency measures

To implement the technology up gradation projects in clusters, BEE has proposed to prepare the technology based detailed project reports (DPRs) for a minimum of five technologies in three capacities for each technology.

Facilitation of innovative financing mechanisms for implementation of energy efficiency projects

The objective of this activity is to facilitate the uptake of energy efficiency measures through innovative financing mechanisms without creating market distortion.

1 INTRODUCTION

1.1 Brief about the SME cluster

The products manufactured in Surat Textile Cluster are synthetic sarees and dress materials which are renowned in the country as well as abroad and have good domestic market. The main raw material used for the cluster units is grey cloth which is procured by local weaving units and agents. The cost of energy (electrical and thermal energy) varies between 12 and 15% of total manufacturing cost.

Majority of the cluster units are of integrated type, where the raw material "grey cloth" is processed in-house to the final product like sarees and dress materials. Most of the units of the cluster are working on Job basis, where the textile agents will provide design and grey cloth and the grey cloth is processed as per design provided by the clients. The energy cost is next to the raw materials cost**.**

Production process

The main process operation for dyeing and printing process of synthetic sarees and dress materials adopted in cluster units are as follows:

Fabric pre-treatment

The main purpose of the fabric pre-treatment process is to remove oil, grease and other materials and to whiten the grey cloth though bleaching. The various process adopted in pre-treatment are scouring, bleaching and shrinking process.

Dyeing

Dyeing is the process of imparting colors to the material through a dye (color). In which a dye is applied to the substrate in a uniform manner to obtain an even shade with a performance and fastness appropriate to its final use. This process is mainly performed in Jet Dyeing Machines and Jigger machines.

Dyeing of fabric is carried out in jet dyeing machines. The temperature of the solution is raised to 50℃. Concentrated dyestuff solution is prepared separately and is added to the liquor. After the addition of dyes, the temperature is raised to 130℃ and maintained for about 60 minutes.

After whitening/dyeing, the fabric is unloaded from the machine and taken to the folding and rolling machines for improving the width of cloth, which gets shrunk during the washing and dyeing process.

Printing

In Surat cluster three types printing methods are used. Most of the units are following the flat bed printing, rotary printing and some units follows hand printing. Hand printing is the old method to print the fabric. The flat bed printing has provision for printing 10 to 14 colors simultaneously. The color print paste prepared is fed onto the screens from which it is transferred to the fabric fed in. The fabric after print paste transfer is passed through a drying chamber at 145℃. The dried and printed fabric is taken for further processing.

Drying and Error! Hyperlink reference not valid.Finishing

After printing, the drying process is performed in loop machine, where the temperature is maintained between 130℃ to 170℃ for better color setting. After passing through the loop machines, the printed fabric is washed in a series of normal water and hot water washing in the presence of chemicals for color setting. After completion of the washing process, the printed and washed fabric is subjected to heat setting process in Stenter and then pressing and finishing treatments.

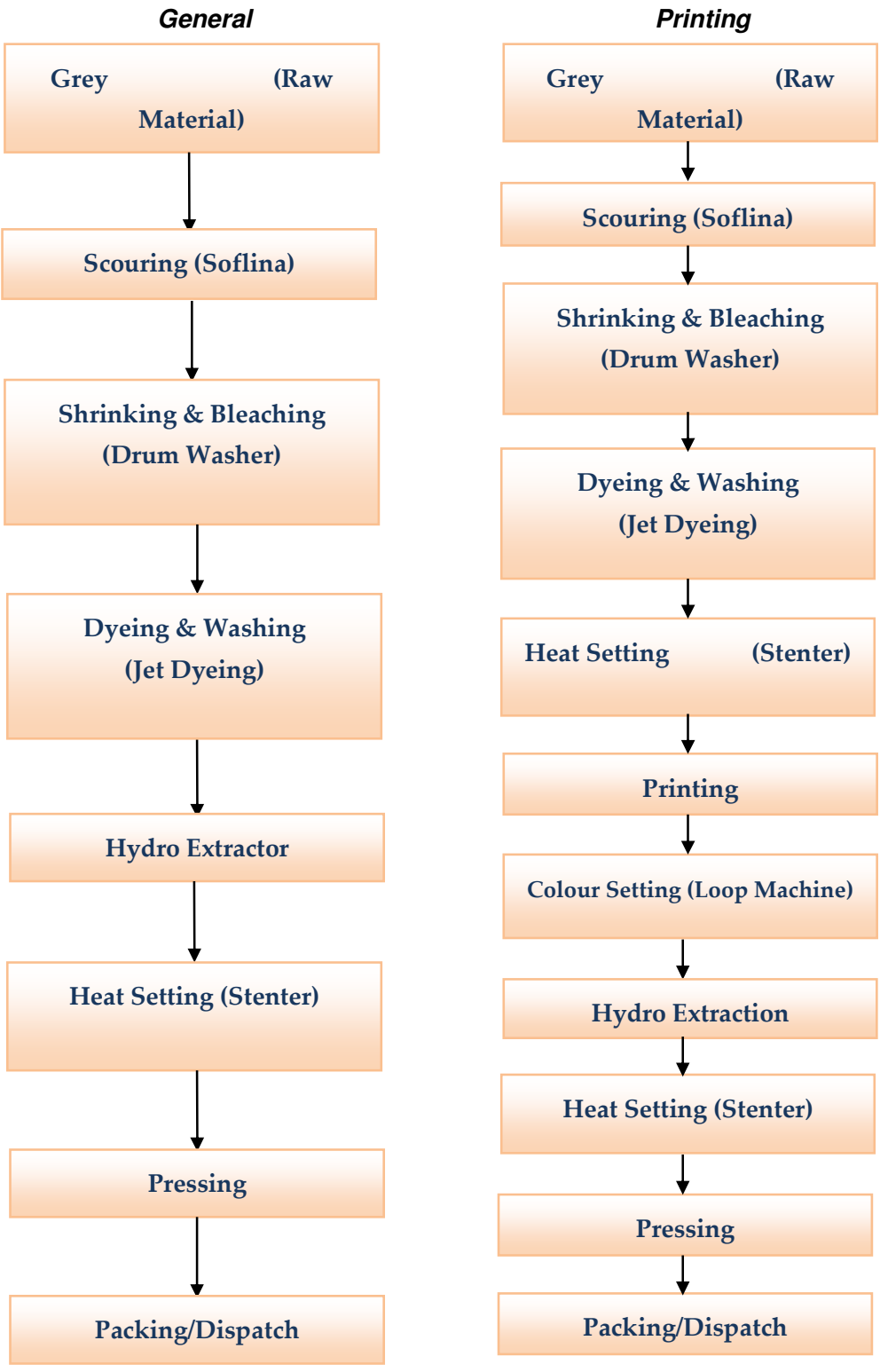


Figure 1: General process flowchart of a typical textile unit

1.2 Energy performance in existing situation

1.2.1 Fuel and electricity consumption of a typical unit

The main energy forms used in a typical unit in the cluster are electricity, coal/lignite and natural gas. Electricity is used for driving the prime movers of pumps, fans, stenter fans, ID and FD fans, conveyers, loop machines drives, lighting etc. Imported coal and lignite are used as fuel in boilers for steam generation whereas natural gas is used as fuel in electricity generation for stenter, printing and loop machines. The energy consumption of a typical unit in the cluster using local make pumps and having conventional stenter is furnished in Table 1.1 below:

Table 1.1 Energy consumption in typical units (*Vimlon Dyeing Printing Mills* Pvt. Ltd.)

S.No	*Details*	*Unit*	*Value*
1	Coal/lignite consumption	tonne/year	6360
2	Grid electricity consumption	MWh/annum	2274
3	Natural gas consumption	Million SCM/annum	1.14
4	Production (quantity processed)	mts(In lakh)/year	350

1.2.2 Average production by a typical unit in the cluster

The average production in a typical unit is 350 lakh meter of final product per year.

1.3 Identification of technology/equipment to be upgraded / changed

1.3.1 Description of current technologies

There are about 500 stenter in the entire cluster units and all the stenter are of local fabricated. As per the detailed studies undertaken in various units of the cluster, the stenter are less efficient and consuming more power than the efficient stenter available in the market. Power consumption is more due to inefficient blowers, less efficient motors, damper control of the air flow, in efficient main drive systems, and also due to poor insulation etc.

1.3.2 Its role in the whole process

Stenter is used in a typical textile unit for drying & heat setting before and after printing process of the synthetic cloth. In this process hot air is supplied through the blowers in different chambers of machine.

1.4 Establishing the baseline

1.4.1 Design and operating parameters/fuel consumption

The connected load for the stenter is 230 HP and actual power consumption varies as per the production required on daily basis. If the required production is low, some of the chambers are not operated and when full production is required all chambers are operated. The baseline specific power consumption of the stenter machine is 35-40 kWh per 1000 meter. The stenter machines are operated for 24 hours in a day.

1.4.2 Electricity Consumption

Electricity consumption of various stenter machines of three cluster units is furnished in Table 1.2 below:

Table 1.2 Electricity consumption in different unit

S. No	*Name of the unit*	*Stenter Machine Capacity (meters/day)*	*Power consumption (kWh/day)*	*specific power consumption/ 1000 meters*
1	Gupta Dye & Ptg Mills	1,00,000	3900	39.00
2	Jay Mata Di Dyeing & Printing Mills (P) Ltd	1,00,000	3750	37.50

1.5 Barriers for adoption of new and energy efficient technology/equipment

1.5.1 Technological Barriers

The major technical barriers that prevented the implementation of the energy efficient stenter in the cluster are:

- Lack of awareness about new energy efficient stenter and its benefit
- Lack of awareness of the losses and monetary benefit of energy efficient stenter
- Dependence on local equipment suppliers, who doesn't have technical knowledge about energy efficient equipment.

1.5.2 Financial Barrier

- High initial investment and lack of financial strength to the SME owners
- Unit owner are not willing to invest money for energy efficiency project.

1.5.3 Skilled manpower

Not applicable

1.5.4 Other barrier(s)

Information on the energy efficient technologies not available among cluster unit owners, though the suppliers are available locally, the information was not disseminated among cluster units.

2. TECHNOLOGY/EQUIPMENT FOR ENERGY EFFICIENCY IMPROVEMENTS

2.1 Detailed description of equipment selected

2.1.1 Description of equipment

The project activity is replacement of the stenter with new energy efficient stenter. The new stenter will reduce 35% power consumption than the existing stenter due to efficient blowers, efficient motors, efficient drive system, auto control of the flow etc.

In Surat Textile Cluster units, the stenter are consuming about 140 to 145 kW per hour of the similar production capacity of 1,00,000 meters/day and whereas the new efficient stenter consume 90 kW per hour reducing 50 kW per hour of operation.

Considering the above facts and for reducing electricity consumption in stenter, it is suggested to install energy efficient stenter.

Figure 2.1 Variable Frequency Drives

2.1.2 Technology/equipment specifications

Technical specifications of the new energy efficient stenter are furnished in Table 1.3 below:

Table 1.3 Technical specifications of the new energy efficient stenter

S.No.	Particular	Details
1	Model	LUCY

2	Type	Close circuit heat setting pin type stenter machine
S.No.	***Particular***	***Details***
3	No. of chamber	7
4	Working width	1600mm working width & 1800mm roller face
5	Mechanical machine speed	0 to 100 mtrs / min
6	Driving method	A.C. Inverter drives
7	Heating media	Gas
8	Power requirement	380-V/440-V/500-V 3 phase, 50 Hz.
9	Interiors	High temperature heat resistant silver chamber
10	Type of blower	High efficiency radial fans 2 Nos. per chamber
11	Insulation	Rockwool
12	Mangle	3-bowl inclined (10 ton capacity)
13	Outlet arrangement	Painter big matching
14	Inlet arrangement	High entrance

Further details are provided in the Annexure 7.

2.1.3 Justification of the equipment selected & Suitability/integration with existing process

The present power consumption for the same production capacity stenter is high and new stenter will consume 36% less power than the existing stenter hence, new stenter selected will give same or more output with low input.

2.1.4 Superiority over existing technology/equipment

The new energy efficiency stenter has superior features than the existing stenter as follow:

Overfeed Pinning Device

This effective uncurling device used in textile machines ensures that their reliability on woven or knitting fabrics with the curl either face upwards or downwards full opened edges give high pinning accuracy to textile machine at optimum processing speed misprinting is avoided and machine down time reduced

High Efficiency Blower Device of Drying

Special designed textile machine heat exchanger most effective hot air circulation system and unique nozzle make high efficiency of drying. Circulation fan if of well balanced radial propeller

and volume of hot air with quit rotation. Repairs checking & cleaning are easy thanks to big opening doors on both side of chamber and able to be moved up and down nozzle for easy maintenance.

Stenter Chain Mechanism

The stenter chain glides through the cast iron rails which provide long service life, Low co-efficient of friction between sintered bronze chain bottoms and special grade cast machined and ground rails reduces lode on the main drive motor and gears. The choice of chain type depends on the process and fabrics. The chain is available in alternative types of pin only, clip only and pin clip combination

Gas Burner

The system of heating by direct gas works with two Burners in each field. The temperature regulators are chosen to a maximum Precision and readability. They are complemented by an analogue thermometer in each field.

Structure of Nozzle

For drying, setting of thin thick and delicate woven fabrics or knit fabric a special designed nozzle makes fabric even touches by adjustable pressure & volume of hot air circulation.

Outlet Arrangement

Cloth Cooling Unit, cloth take off device, small Batch winder 600 mm, Big Batching 1500 mm for Big Batching trolley, plaited arrangement for cloth outer Trolley & Declutching arrangement for sudden stoppage of outlet Roller.

In-feed Arrangement With Cockpit

Inlet Desk & Cockpit with machine control Switches Board over-feed under-feed variable speed with PIV drive & A.C. Inverter drive, clutch de-clutch arrangement, selvedge tension control, Selvedge three fingers uncurler, pinning device with rubber brush assembly, post pin brushes & platform.

Mangle

Bharat make 2/3 bowls padres are manufacture in horizontal, vertical, inclined or semi-inclined versions. High fabric entrance with smooth running roller in the entry section ensures that low tension fabric in feed and crease free cloth runs.

2.1.5 Availability of the proposed equipment

The suppliers for energy efficient stenter are available in Surat and the details of the suppliers are provided in Annexure 6.

2.1.6 Source of technology/equipment

The technology is locally available.

2.1.7 Service/technology providers

Details of service providers are in Annexure 6.

2.1.8 Terms and condition in sales

-: TERMS & CONDITIONS :-

1.	Prices	:	Above Prices ex-our works unpacked exclusive of all taxes.
2.	Taxes & Duties	:	Will be charged extra at actual as applicable at the time of dispatch.At present Central Excise @ 10%, Ed. Cess @ 2% on Excise Duty, H.S. Ed. Cess @ 1% on Excise Duty, VAT @ 5% & CST @ 2% against Form-'C'.
3.	Packings	:	@ 3% extra on above quoted price.
4.	Freight & Insurance	:	At customer's Account.
5.	Delivery	:	Within 1 to 2 Months on receipt of technically / commercial clear order along with advance.
6.	Payment Terms	:	40 % advance along with order. 60 % against Performa Invoice prior dispatch.
7.	Guarantees	:	Our Guarantees is for a period one year from the date of dispatch against any manufacturing defect. We are not responsible for any transit loss/damages. The above guarantee does not cover normal wear and tear. No guarantee is given for any switchgear items.
8.	Erection.	:	The Price does not include the cost of erection. It is recommended that the erection is carried out by our specialized erection engineers by entering into a contract. You should bear accommodation food and all other daily expenses for our erection engineers. The guarantee for trouble free working of the machine is only subject to the erection being supervised by our specialized erection engineers.
9.	Validity	:	15 Days from the date here of.

2.1.9 Process down time during implementation

Two week process down time required in implementation of proposed project and detail breakup are given in Annexure 5.

2.2 Life cycle assessment and risks analysis

The operational life of the energy efficient stenter is considered to be15 years.

2.3 Suitable unit/plant size in terms of capacity/production

Proposed machine is Suitable for unit having production is about 1,00,000 meter per day.

3. ECONOMIC BENEFITS OF NEW ENERGY EFFICIENT STENTER

3.1 Technical benefits

3.1.1 Fuel savings per year

Though, there is possibility of fuel savings due to improved design, the equipment supplier is not giving guarantee due to implementation of the project activity.

3.1.2 Electricity saving

Based on the detailed studies carried out in various units of the cluster, the average electricity consumption in conventional 7 chamber stenter machine is 140 kWh per day for 24 hour of operation and 11,76,000 kWh per annum for 350 days of operation while for the same production capacity, electricity consumption for new stenter machine would be only 7,63,392 kWh per year thereby, electricity savings is estimated as 4,12,608 kWh per year. Detail electricity saving calculation is given in Annexure 2.

3.1.3 Improvement in product quality

The product quality may improve, as the stenter has special features.

3.1.3 Increase in production

Production may improve as the proposed new stenter will have less break downs due to easy cleaning mechanism and improved design.

3.1.4 Reduction in raw material consumption

No significant impact on the reduction of raw materials consumption ***directly or indirectly.***

3.15 Reduction in other losses

There is no significant reduction in other losses ***directly or indirectly.***

3.2 Monetary benefits

Monetary benefit due to installation of new energy efficient stenter is estimated ₹ 23.11 lakh per annum due to reduction in electricity consumption.

3.3 Social benefits

3.3.1 Improvement in working environment in the plant

As installation of new efficient stenter will have less radiation losses due to improved insulation and hence working environment may improve.

3.3.2 Improvement in skill set of workers

The technology selected for the implementation is new and energy efficient. The training provided by equipment suppliers will improve the technical skills of manpower for better operation and maintenance; hence the technology implemented will create awareness among the workforce and improves the skill.

3.4 Environmental benefits

3.4.1 Reduction in effluent generation

There is no significant impact in effluent generation due to implementation of the project.

3.4.2 Reduction in GHG emission such as CO_2, NO_x, etc

The major GHG emission reduction source is CO_2. The technology will reduce grid electricity consumption and emission reductions are estimated at 350 tonne of CO_2 per annum due to implementation of the project activity.

3.4.3 Reduction in other emissions like SO_x

No significant impact on SO_x emissions.

4 FINANSIAL ANALYSIS OF NEW ENERGY EFFICIENT EQUIPMENT

4.1 Cost of equipment implementation

4.1.1 Cost of equipments

Total cost for installation of the stenter machine is estimated at ₹ 60.00 lakh(including taxes after considering suitable discount) for the entire system.

4.1.2 Other costs

Erection and commissioning charges is considered at 1% of the equipment cost and is estimated as ₹.0.60 lakh.

Table 4.1 Details of project cost

S. No.	Details	Cost (₹ in lakh)
1	Plant equipment and machinery and electrical works	60.00
2	Erection & Commissioning	0.60
3	Interest during implementation (preliminary & pre- operative expenses)	0.00
Total		**60.60**

4.2 Arrangement of funds

4.2.1 Entrepreneur's contribution

The entrepreneur's contribution is 25% of total project cost, which works out at ₹ 15.15 lakh.

4.2.2 Loan amount

The term loan is 75% of the total project, which is ₹ 45.45 lakh.

4.2.3 Terms & conditions of loan

The interest rate is considered at 10% which is SIDBI's rate of interest for energy efficient projects. The loan tenure is 5 years excluding initial moratorium period is 6 months from the date of first disbursement of loan.

4.3 Financial indicators

4.3.1 Cash flow analysis

Considering the above discussed assumptions, the net cash accruals starting with ₹ 12.69 lakh in the first year operation and increases to ₹ 60.40 lakh at the end of eight year.

4.3.2 Simple payback period

The total project cost of the proposed technology is ₹ 60.60 lakh and monetary savings due to reduction in fuel consumption is ₹ 23.11 lakh and the simple payback period works out to be 2.6 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10.00% interest rate works out to be ₹ 21.96 lakh

4.3.4 Internal rate of return (IRR)

The after tax Internal Rate of Return of the project works out to be 20.34%. Thus the project is financially viable.

4.3.5 Return on investment (ROI)

The average return on investment of the project activity works out at 24.87%. The average DSCR is 1.57.

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

A sensitivity analysis has been worked out to ascertain how the project financials would behave in different situations like there is an increase in power savings or decrease. For the purpose of sensitive analysis, two scenarios are considered are.

- Increase in power savings by 5%
- Decrease in power savings by 5%

In each scenario, other inputs are assumed as constant. The financial indicators in each of the above situation are indicated along with standard indicators are shown in Table 4.2 below:

Table 4.2 Sensitivity analysis at different scenarios

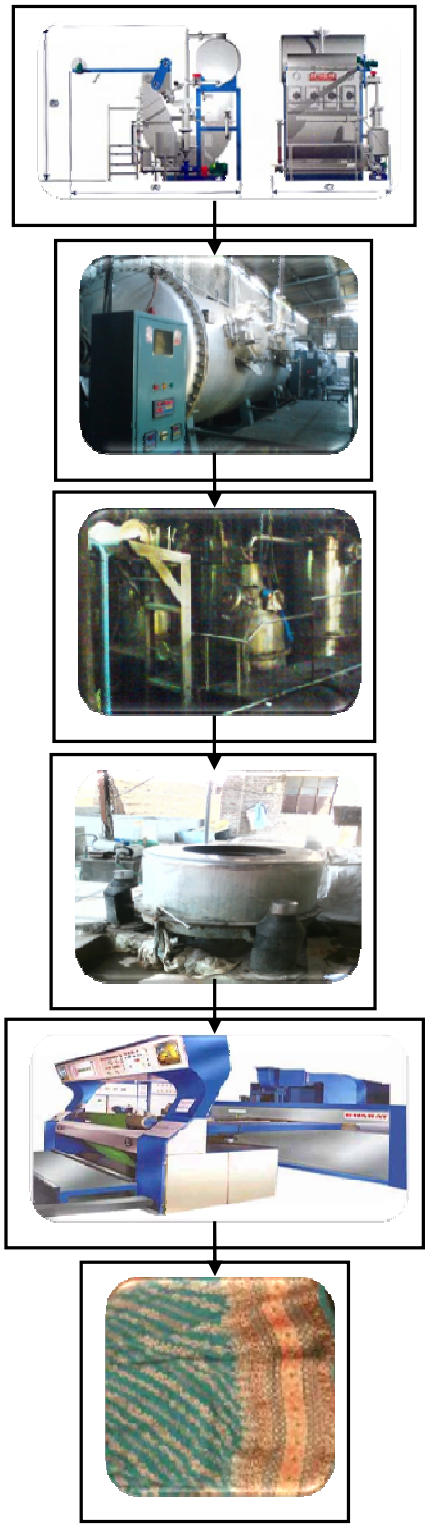
Particulars	*IRR %*	*NPV*	*ROI*	*DSCR*
Normal	20.34	21.96	24.87	1.57
5% decrease in electricity savings	18.34	17.53	24.52	1.49
5% increase in electricity savings	22.30	26.38	25.18	1.65

4.5 Procurement and implementation schedule

The project is expected to be completed in 8 week from the date of financial closure. The detailed schedule of project implementation is furnished in Annexure 5.

Annexure

Annexure 1: Process flow diagram



Annexure 2: Detailed technology assessment report

The project activity is replacement of the stenter with new energy efficient stenter. The new stenter will reduce 36% power consumption than the existing stenter due to efficient blowers, efficient motors, efficient drive system, auto control of the flow etc.

In Surat Textile Cluster units, the stenter are consuming about 140 kW per hour of the similar production capacity of 1,00,000 meters/day and whereas the new efficient stenter consume 90.88 kW per hour reducing 49.12 kW per hour of operation for full load. Considering the above facts and for reducing electricity consumption in stenter, the installation of the energy efficient stenter is financially and technically viable.

Particulars	*Existing Stenter*	*Proposed Stenter*
Number of chamber	7	7
Connected load	173 kW	136 kW
Actual load	140 kW	90.88 kW
Total operating hours	24	24
Total operating days	350	350
Electricity saving	-	49.12 kWh
Total electricity saving annually	-	412608 kWh
Cost of electricity	-	₹ 5.6/kWh
Total monetary saving	-	₹ (In lakh) 23.11

Annexure 3: Drawings for proposed civil works

No civil works are envisaged

Annexure 4: Detailed financial calculations & analysis for financial indicators

Assumption

Name of the Technology	***Stenter Machine (7 Chambers)***		
Rated Capacity	***7 Chambers***		
Details	***Unit***	***Value***	***Basis***
Installed Capacity	Meters per day	100000	
Proposed Investment			
Plant & Machinery	₹ (in lakh)	60.00	
Erection & Commissioning	₹ (in lakh)	0.60	
Total Investment	₹ (in lakh)	60.60	
Financing pattern			
Own Funds (Equity)	₹ (in lakh)	15.15	Feasibility Study
Loan Funds (Term Loan)	₹ (in lakh)	45.45	Feasibility Study
Loan Tenure	years	5	Assumed
Moratorium Period	Months	6	Assumed
Repayment Period	Months	66	Assumed
Interest Rate	%	10.00	SIDBI Lending rate
Estimation of Costs			
O & M Cost	% on Plant & Equip	4	Feasibility Study
Annual Escalation	%	5	Feasibility Study
Estimation of Revenue			
Power Saving	kWh	412608	
Cost	₹/kWh	5.6	
St. line Depn.	%age	5.28	Indian Companies Act
IT Depreciation	%age	80.00	Income Tax Rules
Income Tax	%age	33.99	Income Tax

Estimation of Interest on Term Loan ***(₹ in lakh)***

Years	***Opening Balance***	***Repayment***	***Closing Balance***	***Interest***
1	45.45	3.90	41.55	4.09
2	41.55	8.40	33.15	3.77
3	33.15	8.80	24.35	2.97
4	24.35	9.40	14.95	2.05
5	14.95	9.80	5.15	1.07
6	5.15	5.15	0.00	0.15
		45.45		

WDV Depreciation

Particulars / years	***1***	***2***
Plant and Machinery		
Cost	45.45	9.09
Depreciation	36.36	7.27
WDV	9.09	1.82

Projected Profitability

Particulars / Years	1	2	3	4	5	6	7	8
Revenue through Savings								
Power savings	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11
Total Revenue (A)	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11
Expenses								
O & M Expenses	2.42	2.55	2.67	2.81	2.95	3.09	3.09	3.09
Total Expenses (B)	2.42	2.55	2.67	2.81	2.95	3.09	3.09	3.09
PBDIT (A)-(B)	20.68	20.56	20.43	20.30	20.16	20.01	20.01	20.01
Interest	4.09	3.77	2.97	2.05	1.07	0.15	-	-
PBDT	16.59	16.79	17.47	18.25	19.09	19.86	20.01	20.01
Depreciation	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
PBT	13.39	13.59	14.27	15.05	15.89	16.66	16.81	16.81
Income tax	-	3.23	5.94	6.20	6.49	6.75	6.80	6.80
Profit after tax (PAT)	13.39	10.35	8.33	8.85	9.40	9.91	10.01	10.01

Computation of Tax

₹(in lakh)

Particulars / Years	1	2	3	4	5	6	7	8
Profit before tax	13.39	13.59	14.27	15.05	15.89	16.66	16.81	16.81
Add: Book depreciation	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Less: WDV depreciation	36.36	7.27	-	-	-	-	-	-
Taxable profit	(19.77)	9.52	17.47	18.25	19.09	19.86	20.01	20.01
Income Tax	-	3.23	5.94	6.20	6.49	6.75	6.80	6.80

Projected Balance Sheet

₹(in lakh)

Particulars / Years	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*
Liabilities								
Share Capital (D)	15.15	15.15	15.15	15.15	15.15	15.15	15.15	15.15
Reserves & Surplus (E)	13.39	23.75	32.08	40.92	50.32	60.23	70.24	80.25
Term Loans (F)	41.55	33.15	24.35	14.95	5.15	0.00	0.00	0.00
Total Liabilities D)+(E)+(F)	70.09	72.05	71.58	71.02	70.62	75.38	85.39	95.40

Assets								
Gross Fixed Assets	60.60	60.60	60.60	60.60	60.60	60.60	60.60	60.60
Less: Accm. Depreciation	3.20	6.40	9.60	12.80	16.00	19.20	22.40	25.60
Net Fixed Assets	57.40	54.20	51.00	47.80	44.60	41.40	38.20	35.00
Cash & Bank Balance	12.69	17.85	20.58	23.22	26.02	33.98	47.19	60.40
Total Assets	70.09	72.05	71.58	71.02	70.62	75.38	85.39	95.40
Net Worth	28.54	38.90	47.23	56.07	65.47	75.38	85.39	95.40
Dept equity ratio	1.46	0.85	0.52	0.27	0.08	0.00	0.00	0.00

Projected Cash Flow: ***₹(in lakh)***

Particulars / Years	0	1	2	3	4	5	6	7	8
Sources									
Share Capital	15.15	-	-	-	-	-	-	-	-
Term Loan	45.45								
Profit After tax		13.39	10.35	8.33	8.85	9.40	9.91	10.01	10.01
Depreciation		3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Total Sources	60.60	16.59	13.55	11.53	12.05	12.60	13.11	13.21	13.21
Application									
Capital Expenditure	60.60								
Repayment of Loan	-	3.90	8.40	8.80	9.40	9.80	5.15	-	-
Total Application	60.60	3.90	8.40	8.80	9.40	9.80	5.15	-	-
Net Surplus	-	12.69	5.15	2.73	2.65	2.80	7.96	13.21	13.21
Add: Opening Balance	-	-	12.69	17.85	20.58	23.22	26.02	33.98	47.19
Closing Balance	-	12.69	17.85	20.58	23.22	26.02	33.98	47.19	60.40

Calculation of Internal Rate of Return

₹(in lakh)

Particulars / months	0	1	2	3	4	5	6	7	8
Profit after Tax		13.39	10.35	8.33	8.85	9.40	9.91	10.01	10.01
Depreciation		3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Interest on Term Loan		4.09	3.77	2.97	2.05	1.07	0.15	-	-
Cash outflow	(60.60)	-	-	-	-	-	-	-	-
Net Cash flow	(60.60)	20.68	17.33	14.50	14.10	13.67	13.26	13.21	13.21
IRR	20.34%								

NPV	21.96

Break Even Point ***₹(in lakh)***

Particulars / Years	1	2	3	4	5	6	7	8
Variable Expenses								
Oper. & Maintenance Exp (75%)	1.82	1.91	2.00	2.10	2.21	2.32	2.32	2.32
Sub Total (G)	1.82	1.91	2.00	2.10	2.21	2.32	2.32	2.32
Fixed Expenses								
Oper. & Maintenance Exp (25%)	0.61	0.64	0.67	0.70	0.74	0.77	0.77	0.77
Interest on Term Loan	4.09	3.77	2.97	2.05	1.07	0.15	0.00	0.00
Depreciation *(H)*	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20
Sub Total (I)	7.90	7.61	6.83	5.95	5.01	4.13	3.97	3.97
Sales (J)	23.11	23.11	23.11	23.11	23.11	23.11	23.11	23.11
Contribution (K)	21.29	21.20	21.10	21.00	20.90	20.79	20.79	20.79
Break Even Point (L= G/I)	37.09%	35.89%	32.38%	28.33%	23.97%	19.86%	19.11%	19.11%
Cash Break Even {(I)-(H)}	22.06%	20.80%	17.22%	13.10%	8.66%	4.46%	3.72%	3.72%
Break Even Sales (J)*(L)	8.57	8.29	7.48	6.55	5.54	4.59	4.42	4.42

Return on Investment *₹(in lakh)*

Particulars / Years	1	2	3	4	5	6	7	8	Total
Net Profit Before Taxes	13.39	13.59	14.27	15.05	15.89	16.66	16.81	16.81	122.47
Net Worth	28.54	38.90	47.23	56.07	65.47	75.38	85.39	95.40	492.39
									24.87%

Debt Service Coverage Ratio *₹(in lakh)*

Particulars / Years	1	2	3	4	5	6	7	8	Total
Cash Inflow									
Profit after Tax	13.39	10.35	8.33	8.85	9.40	9.91	10.01	10.01	60.23
Depreciation	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	19.20
Interest on Term Loan	4.09	3.77	2.97	2.05	1.07	0.15	0.00	0.00	14.10
Total (M)	20.68	17.33	14.50	14.10	13.67	13.26	13.21	13.21	93.54

Debt

Interest on Term Loan	4.09	3.77	2.97	2.05	1.07	0.15	0.00	0.00	14.10
Repayment of Term Loan	3.90	8.40	8.80	9.40	9.80	5.15	0.00	0.00	45.45
Total (N)	7.99	12.17	11.77	11.45	10.87	5.30	0.00	0.00	59.55
	2.59	1.42	1.23	1.23	1.26	2.50	0.00	0.00	1.57
Average DSCR (M/N)	1.57								

Annexure 5: Details of procurement and implementation plan with schedule/timelines

Project Implementation Schedule – Stenter Machines

S. No.	Activities	weeks							
		1	2	3	4	5	6	7	8
1	Placement of order and design finalization								
2	Fabrication works								
3	Erection and Commissioning								
4	trial runs								

Process down Time

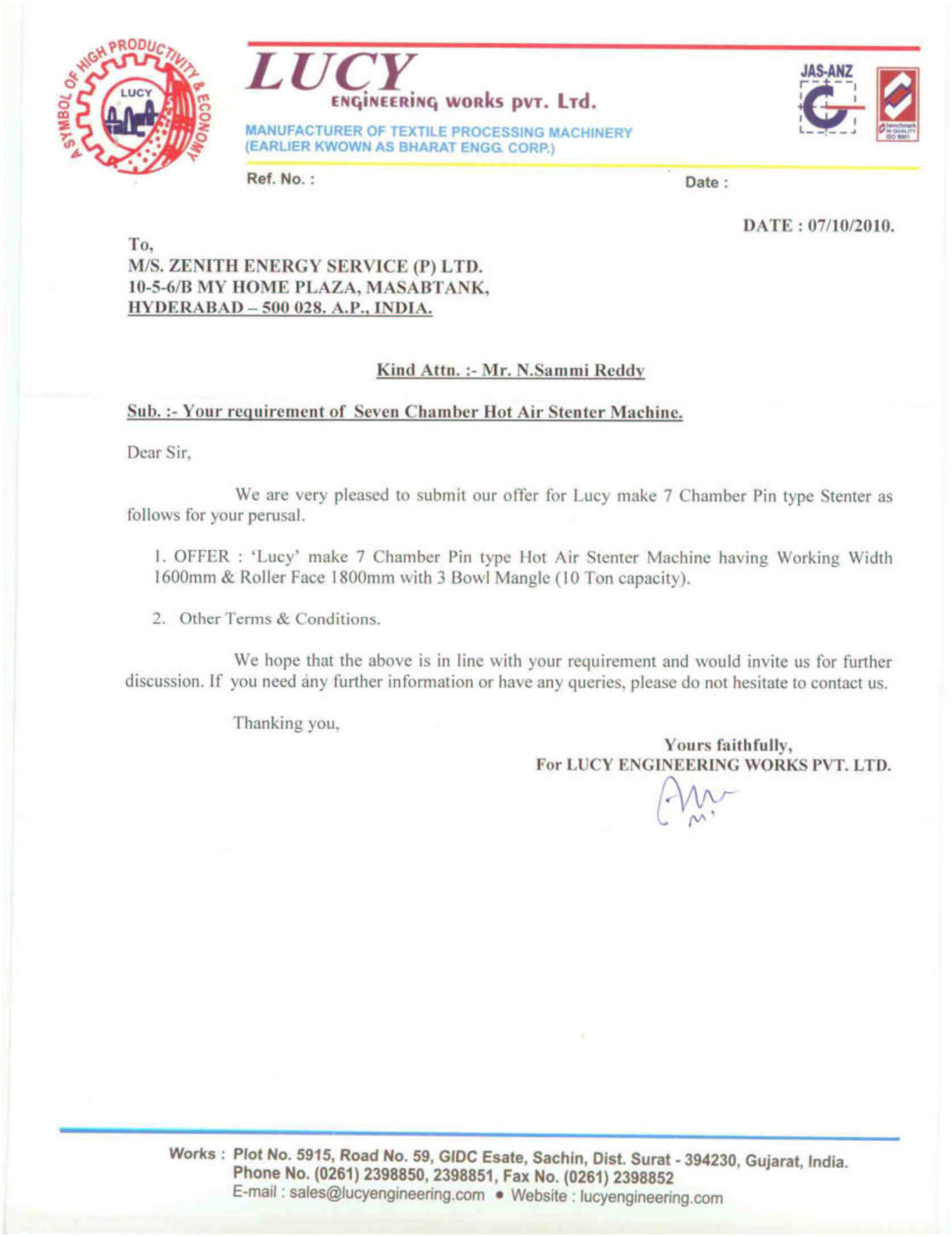
S. No.	Activities	Weeks							
		1	2	3	4	5	6	7	9
1	Dismantling of the Existing stenter								
2	Commissioning								
3	Trial runs								

Note: However, the process down time is considered for two weeks

Annexure 6: Details of technology/equipment and service providers

Equipment details	*Source of technology*	*Service/technology providers*
Energy Efficient Stenter	indigenous	Lucy Engineering Works Pvt Ltd Plot No.5915, Road No.59, GIDC Estate, Sachin District : Surat 394 230 Phone No.0261 2398850, 2398851 Fax No.0261 2398852 email::sales@lucyengineering.com Web::www.lucyengineering.com

Annexure 7: Quotations or Techno-commercial bids for new technology/equipment



LUCY
ENGINEERING WORKS PVT. LTD.
MANUFACTURER OF TEXTILE PROCESSING MACHINERY
(EARLIER KWOWN AS BHARAT ENGG. CORP.)

Ref. No. : Date :

DATE : 07/10/2010.

To,
M/S. ZENITH ENERGY SERVICE (P) LTD.
10-5-6/B MY HOME PLAZA, MASABTANK,
HYDERABAD – 500 028. A.P., INDIA.

Kind Attn. :- Mr. N.Sammi Reddy

Sub. :- Your requirement of Seven Chamber Hot Air Stenter Machine.

Dear Sir,

We are very pleased to submit our offer for Lucy make 7 Chamber Pin type Stenter as follows for your perusal.

1. OFFER : 'Lucy' make 7 Chamber Pin type Hot Air Stenter Machine having Working Width 1600mm & Roller Face 1800mm with 3 Bowl Mangle (10 Ton capacity).

2. Other Terms & Conditions.

We hope that the above is in line with your requirement and would invite us for further discussion. If you need any further information or have any queries, please do not hesitate to contact us.

Thanking you,

Yours faithfully,
For LUCY ENGINEERING WORKS PVT. LTD.

Works : Plot No. 5915, Road No. 59, GIDC Esate, Sachin, Dist. Surat - 394230, Gujarat, India.
Phone No. (0261) 2398850, 2398851, Fax No. (0261) 2398852
E-mail : sales@lucyengineering.com • Website : lucyengineering.com

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JAS-ANZ

Ref. No. : Date :

DATE : 07/10/2010.

OFFER : 'LUCY' MAKE HOT AIR STENTER MACHINE :

CONFIGURATION :

Model	:	**'LUCY'**
Type	:	Close Circuit Heat Setting Pin type Stenter Machine
No. of Chambers	:	Seven
Working Width	:	1600mm Working Width & 1800mm Roller face.
Mechanical Machine Speed	:	0 to 100 Mtrs./ Min.
Driving Method	:	A.C. Inverter Drive
Heating Media	:	Gas
Power Requirement	:	380-V/440-V/500-V 3 Phase, 50Hz.
Interiors	:	High Tenmperature Heat Resistant Silver Colour
Type of Blower	:	High efficiency Radial Fans 2 Nos. per Chamber
Insulation	:	Rockwool.
Mangle	:	3-Bowl Inclined (10 Ton Capacity)
Outlet Arrangement	:	Plaiter Big Batching.
Inlet Arrangement	:	High Entrance

PRICE SCHEDULE FOR STENTER :

One No. : "Lucy" make 7 Chamber Hot Air Stenter Machine consisting of

1600mm Working Width, 1800mm Roller face
Pin type Gas Fire
3 Bowl Inclined Mangle (10 Ton Capacity)
'E + L' make KR-43 Infeed Device & KE-2020 Cloth Guiders
AC Inverter Drive for Blower Motors, Overfeed, Fabric tension,
Selvedge tension, Main Drive, Take of Roller, Plaiter & Mangle.

Price : Rs.60,00,000
Each ex-our works unpacked exclusive of all taxes and duties, which will be charged extra at actual.

For LUCY ENGINEERING WORKS PVT. LTD.

Works : Plot No. 5915, Road No. 59, GIDC Esate, Sachin, Dist. Surat - 394230, Gujarat, India.
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Ref. No. : Date :

DATE : 07/10/2010.

-: Specification of various Gear Box, Invertors & Motors :-

Sr. No.	Particulars	Gear Box	Motor	Inverter
1.	Blower Motor	---	7.5 H.P. / 14 Nos.	15 H.P. / 7 Nos.
2.	Exhaust	---	5 H.P. / 03 Nos.	---
3.	Overfeed	Hollow	3 H.P./ 01 No.	3 H.P. / 01 No.
4.	Fabric	Hollow	3 H.P. / 01 No.	3 H.P. / 01 No.
5.	Selvedge	Hollow	1 H.P. / 02 Nos.	2 H.P. / 01 No.
6.	Expander Roller	---	2 H.P. / 01 No.	---
7.	Uncurler	---	1/2 H.P. / 02 Nos.	---
8.	Main Drive	---	25 H.P. / 01 No.	25 H.P. / 01 No.
9.	Take off Roller	Hollow	3 H.P. / 01 No.	3 H.P. / 01 No.
10.	Big Batching Unit	Hollow	3 H.P. / 01 No.	---
10.	Plaiter	Hollow	3 H.P. / 01 No.	3 H.P. / 01 No.
11.	Narrow Wide	---	3 H.P. / 01 No.	---
12.	Mangle	5 NU / 01 No.	10 H.P. / 01 No.	10 H.P. / 01 No.
13.	Bow & Weft		1/2 H.P. / 02 Nos.	---
14.	Cooling Zone	Hollow	2 H.P. / 01 No.	---

Total Connected load 136 KW approx. for 7-Chamber Stenter 1 No. + 3 Bowl Padding Mangle.

Works : Plot No. 5915, Road No. 59, GIDC Esate, Sachin, Dist. Surat - 394230, Gujarat, India.
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Ref. No. : Date :

DATE : 07/10/2010.

Other Materail of Machine :

1.	'E + L' make KR-43 Stenter Infeed Device 1 Set.
2.	'E + L' make Cloth Guider with Frame 1 Set.
3.	Electric Control Panel with A.C. Drive (Inverter).
4.	Digital type Meter Counter.
5.	Digital type Speedo Meter 75mm display.
6.	Blower RPM Meter.
7.	Main Chain with M.S. Pin Block & Pin Bar 'TECO' make.
8.	Cloth Cooling unit.
9.	One Side 1.5 Mtr. Additional Rail.

1.	All Motor 'Crompton' or 'Bharat Bijlee' make.
2.	Blower Motor Synchro(Empire) make.
3.	All Gear Hollow ' Rotomotive' make Except Mangle Elecon make.
4.	All Inverter Delta make.
5.	All Bearings ZKL make wherever it necessary.
6.	All Contactor, Relay & MCB 'T.C.' make.
7.	Blower fan 'Laxmi' make.
8.	All CRCA Sheet 'TATA' make.

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JAS-ANZ

Ref. No. : Date :

DATE : 07/10/2010.

-: TECHNICAL DETAILS & SPECIFICATION :-

A. Chamber :

1.	Close Circuit Chamber with Nozzle, Taper Box & Inside Ducting from 16swg & 18swg Sheet.
2.	Chamber Gallery with Front Back Insulation Panel 100mm Thick, 96 Kg Density Rockwool Slab & Shutter Set.
3.	Blower Panel 125mm Thick, 96 Kg Density Rockwool Slab, 18swg Sheet with 7.5 H.P. 1400 RPM Single Speed Blower Motor with Inverter.
4.	Heater Panel 125mm Thick, 96 Kg Density Rockwool Slab, 18swg Sheet.
5.	S.S Cone with ciramik Sheet **without** Temp. Control Panel.
6.	Side Insulation Panel 125mm Thick, 96 Kg Density Rockwool Slab, 18swg CRCA Sheet.
7.	Top Insulation Panel 100mm Thick, 96 Kg Density Rockwool Slab, 18swg CRCA Sheet.
8.	Bottom Insulation Panel 75mm Thick, 96 Kg Density Rockwool Slab, 18swg CRCA Sheet.
9.	Round type Exhaust Ducting 18swg Sheet with 5 H.P. Exhaust Fan 3 Nos.
10.	Normal Rail with Guard.(Graded)
11.	Screw Beam Trolley with Narrow Wide Gear & Pipe 8 Nos.
12.	All Packings & Fittings of Asbestos Rope & Patti.

B. Inlet Desk :

1.	Inlet Desk Wall 8mm thick with Beam Box.
2.	Overfeed unit with 3 H.P. A.C. Inverter, Motor & Hollow Gear .
3.	Fabric Tension Assembly with 3 H.P. A.C. Inverter, Motor & Hollow Gear.
4.	Selvedge 2 H.P. A.C. Inverter with H.P. Motor & Hollow Gear Box.
5.	Expander Roller with 2 H.P. A.C. Motor **without** Inverter.
6.	Inlet Rail with Spring Tension Assembly & Guard. (Graded)
7.	Pinning Unit with Three Fingures Uncurler.
8.	Cockpit & Platform.
9.	All Chain Wheels Hardened & Rolon make Chain.

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Ref. No. : Date :

DATE : 07/10/2010.

C. Outlet Desk :

1.	Outlet Desk Wall 8mm thick.
2.	Main Drive Gear Box Artos type with Spindle Shaft & Oil Deeping.
3.	Take off Roller with 3 H.P. A.C. Inverter, Motor & Hollow Gear Box.
4.	Main Drive 25 H.P. A.C. Inverter & Motor.
5.	Outlet Rail with Guard.
6.	Plaiter unit with 3 H.P. A.C. Inverter, Motor & Hollow Gear Box.
7.	Big Batching Unit with Hollow Gear & motor.
8.	3 H.P. 900 RPM Narrow Wide Motor.
9.	All Sprocket Wheel Hardened & Rolon make Chain.

D. Mangle :

1.	Mangle Wall 10mm thick with 125 X 65 'C' Channel Structure.
2.	Cloth feeding device with Tension Assembly.
3.	Three Nos. Main Rubber Roll Lathia Coated.
4.	S.S. Through 2 Nos. 304Q, 18g.
5.	Pneumatic Cylinder with Control Panel for Loading/Unloading main rolls.
6.	Drive A.C. Inverter and compensator for synchronizing with the next machine.
7.	Outlet arrangement with necessary ebonite guide rolls.
8.	10 H.P. A.C. Inverter & Motor.
9.	5 NU Reduction Gear Box.
10.	PVC Air Pipeline.
11.	Bow & Weft Straightner unit with 1/2 H.P. Motor & Gear 2 Nos.
12.	Ebonite Guide Roll 100mm O.D.
13.	Inside Mangle S.S. Cladding Cover.
14.	Lubricating & Air Filter.

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JAS-ANZ

Ref. No. : Date :

DATE : 07/10/2010.

-: NOT INCLUDED IN OUR SCOPE OF SUPPLY :-

1.	Foundation, Loading, Unloading, Erection& Civil work.
2.	Electrical Cables, Wires & Switch Gears from your D.B. to Panel & Panel to Machine.
3.	Gas Pipeline & Gas Burner.
4.	G.I. Ducting from exhaust fans to outside.
5.	Air compressor, air pipeline, air filter & lubricating unit.
6.	Liquor feeding tank.
7.	Feed equipment for liquor lifting & lowering mechanism of the toughs.
8.	Skaffolding structure & foundation bolt.
9	Tool Box & Grease Gun.
10.	Temperature Indicator & Controller Panel with sensors.

We hope you will find the above offer in line with your requirement and now we look forward to the pleasure of receving your valued order for the same.

Thanking you and assuring you of our best service and co-operation at all time.

Yours faithfully,
For LUCY ENGINEERING WORKS PVT. LTD.

Works : Plot No. 5915, Road No. 59, GIDC Esate, Sachin, Dist. Surat - 394230, Gujarat, India.
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(EARLIER KWOWN AS BHARAT ENGG. CORP.)

Ref. No. : Date :

DATE : 07/10/2010.

-: TERMS & CONDITIONS :-

1.	Prices	:	Above Prices ex-our works unpacked exclusive of all taxes.
2.	Taxes & Duties	:	Will be charged extra at actual as applicable at the time of dispatch.At present Central Excise @ 10%, Ed. Cess @ 2% on Excise Duty, H.S. Ed. Cess @ 1% on Excise Duty, VAT @ 5% & CST @ 2% against Form-'C'.
3.	Packings	:	@ 3% extra on above quoted price.
4.	Freight & Insurance	:	At customer's Account.
5.	Delivery	:	Within 1 to 2 Months on receipt of technically / commercial clear order along with advance.
6.	Payment Terms	:	40 % advance along with order. 60 % against Performa Invoice prior dispatch.
7.	Guarantees	:	Our Guarantees is for a period one year from the date of dispatch against any manufacturing defect. We are not responsible for any transit loss/damages. The above guarantee does not cover normal wear and tear. No guarantee is given for any switchgear items.
8.	Erection.	:	The Price does not include the cost of erection. It is recommended that the erection is carried out by our specialized erection engineers by entering into a contract. You should bear accommodation food and all other daily expenses for our erection engineers. The guarantee for trouble free working of the machine is only subject to the erection being supervised by our specialized erection engineers.
9.	Validity	:	15 Days from the date here of.

Works : Plot No. 5915, Road No. 59, GIDC Esate, Sachin, Dist. Surat - 394230, Gujarat, India.
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E-mail : sales@lucyengineering.com • Website : lucyengineering.com

Bureau of Energy Efficiency (BEE)
(Ministry of Power, Government of India)
4th Floor, Sewa Bhawan, R. K. Puram, New Delhi – 110066
Ph.: +91 – 11 – 26179699 (5 Lines), Fax: +91 – 11 – 26178352
Websites: www.bee-india.nic.in, www.energymanagertraining.com

Zenith Energy Services Pvt. Ltd
10-5-6/B, My Home Plaza, Masab
Tank HYDERABAD, AP 500 028
Phone: 040 23376630, 31,
Fax No.040 23322517
Website: www.zenithenergy.com

India SME Technology Services Ltd
DFC Building, Plot No.37-38,
D-Block, Pankha Road,
Institutional Area, Janakpuri, New Delhi-110058
Tel: +91-11-28525534, Fax: +91-11-28525535
Website: www.techsmall.com