DETAILED PROJECT REPORT
ON
SPECTROMETER FOR ANALYSING THE MOLTEN METAL
(BATALA, JALANDHAR, LUDHIANA FOUNDRY CLUSTER)

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SPECTRO METER FOR ANALYSING THE MOLTEN METAL

BATALA, JALANDHAR, LUDHIANA FOUNDRY CLUSTER

BEE, 2011

Detailed Project Report on **Spectrometer for Analyzing the Molten Metal**

Foundry SME Cluster, Batala, Jalandhar , Ludhiana (Punjab) (India)

New Delhi: Bureau of Energy Efficiency

Detail Project Report No.: **BJL/CAP/PF/01**

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We take this opportunity to express our appreciation for the excellent support provided by Foundry 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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CII – AVANTHA Centre for Competitiveness for SMEs
Confederation of Indian Industry
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List of Abbreviations

BEE	Bureau of Energy Efficiency
SME	Small and Medium Enterprises
DPR	Detailed Project Report
GHG	Green House Gases
DSCR	Debt Service Coverage Ratio
NPV	Net Present Value
IRR	Internal Rate of Return
ROI	Return on Investment
ROI	- Return on Investment
MoP	- Ministry of Power
MSME	- Micro Small and Medium Enterprises
MoMSME	- Ministry of Micro Small and Medium Enterprises
SIDBI	- Small Industrial Development Bank of India

EXECUTIVE SUMMARY

Confederation of Indian Industry is executing BEE-SME program in Batala, Jalandhar and Ludhiana Foundry Cluster, supported by Bureau of Energy Efficiency (BEE) with an overall objective of improving the energy efficiency in cluster units.

Batala, Jalandhar and Ludhiana Foundry cluster, is one of the largest Foundry clusters in India; accordingly this cluster was chosen for energy efficiency improvements by implementing energy efficient measures / technologies, so as to facilitate maximum replication in other Foundry clusters in India. The main energy forms used in the cluster units are grid electricity and fuel such as furnace oil, coal, and Diesel.

Most of the Industrial installations in the country have large electrical loads which are severely inductive in nature, such as motors, large machines etc which results in power high consumption. An Induction Furnace is the main energy consumers in any Foundry unit.

Molten metal analysis is an important process through which, the quality of the castings is established from material composition point of view. During the study period it was found that presently molten metal is being analysed by conventional method which takes too much time about 30 min for one time inspection and during the inspection period molten metal was kept on hold. Melting and holding time of molten metal can be reduced by reducing the time taken for metal analysis. This can be achieved by installing a spectrometer for analyzing the quality of molten metal.

Installation of spectrometer for analysing quality of molten metal would reduce the total inspecting and holding time which will further lead to energy saving of about 10 unit/tonne. For the annual production of 10,000 tonne molten metal, energy saving would be 1,00,000 kWh per year.

This DPR highlights the details of the study conducted for assessing the potential for replacement of existing material inspecting system by spectrometer, possible energy saving, and its monetary benefit, availability of the technologies/design, local service providers, technical features & proposed equipment specifications, various barriers in implementation, environmental aspects, estimated GHG reductions, capital cost, financial analysis, sensitivity analysis for three different scenarios and schedule of Project Implementation.

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.	Particular	Unit	Value
1	Project cost	`(in lakh)	13.45
2	Power saving	MW/Year	100
3	Total monetary benefit	`(in lakh)/year	5.00
4	Debit equity ratio	Ratio	3 : 1
5	Simple payback period	Years	2.69
6	NPV	`(in lakh)	4.54
7	IRR	%age	19.72
8	ROI	%age	24.57
9	DSCR	Ratio	1.50
10	Process down time	Days	Nil
11	CO_2 emission reduction	Tonne/year	81

The projected profitability and cash flow statements indicate that the project implementation will be financially viable and technically feasible.

ABOUT BEE'S SME PROGRAM

Bureau of Energy Efficiency (BEE) is implementing a BEE-SME Programme to improve energy performance in 29 selected SMEs clusters. Batala, Jalandhar and Ludhiana Foundry Cluster is one of them. The BEE's SME Programme intends to enhance 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:

Activity 1: Energy Use and Technology Audit

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.

Activity 2: 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.

Activity 3: 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.

Activity 4: 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 Introduction about the Cluster

Indian foundry industry is very energy intensive. The energy input to the furnaces and the cost of energy play an important role in determining the cost of production of castings. Major energy consumption in medium and large scale foundry industry is the electrical energy for induction and Arc furnaces. Furnace oil is used in rotary furnaces. In Small foundry industry, coal is used for metal melting in Cupola furnaces. The energy costs contribute about 25 - 30% of the manufacturing cost in Indian foundry industry.

There are approximately 450 units, engaged in Foundry Cluster (automobile parts, agricultural implements, machine tools, diesel engine components, manhole covers, sewing machine stands, pump-sets, decorative gates and valves) production. The major locations wherein the units are spread are G.T. Road, Industrial area, Focal Point in Batala. In Jalandhar Dada Colony Industrial Area, Focal point, Focal Point Extn, Udyog Nagar, I.D.C, Kapurthala Road & Preet Nagar. In Ludhiana Focal Point Phase 5 to 8, Janta Nagar, Bhagwan Chowk Area & Industrial area – A/B. .

Availability of Electricity in Batala – across Dhir Road, GT Road is an issue; power is available from the grid for maximum 12/14 hours a day. There are some units in Jalandhar and Ludhiana having induction furnace in the range of 500 kg to 1 ton capacity whereas other units which are using local scrap as well as have high melting temperatures are having cupola and rotary furnace and has a capacity of minimum 5 ton per day.

The foundry produces a wide variety of castings such as manhole covers, pipe and pipe fittings, sanitary items, tube well body, metric weights, automobile components, railway parts, electric motor, fan body etc. 90% of the castings produced are from the SSI sector.

Energy Usage Pattern

Major energy sources being used in foundry cluster are electricity and fuels such as Coal, Furnace Oil, and Diesel. Electrical energy is being used in melting of iron in induction furnaces, operation of electrical utilities and thermal energy is being used in cupola furnaces operation.

Classification of Units

Broadly units are classified with respect to production capacity;

- Large Scale Units
- Medium Scale Units
- Small Scale Units

Production wise unit breakup

Foundry cluster at Batala, Jalandhar and Ludhiana can be broken into three categories viz. small, medium and large size unit. Table 1.1 shows that production wise breakup of Foundry cluster.

Table 1.1 production wise unit breakups

S. No.	Type of Unit	Production Capacity
1	Large scale unit	More than 1500 MT
2	Medium scale unit	250 to 1500 MT
3	Small scale unit	Less than 250 MT

Products Manufactured

Foundry SME cluster at Batala, Jalandhar and Ludhiana produces a wide variety of castings such as manhole covers, pipe and pipe fittings, sanitary items, tube well body, metric weights, automobile components, railway parts, electric motor, fan body etc.

A general process flow diagram of foundry cluster is shown in figure below:

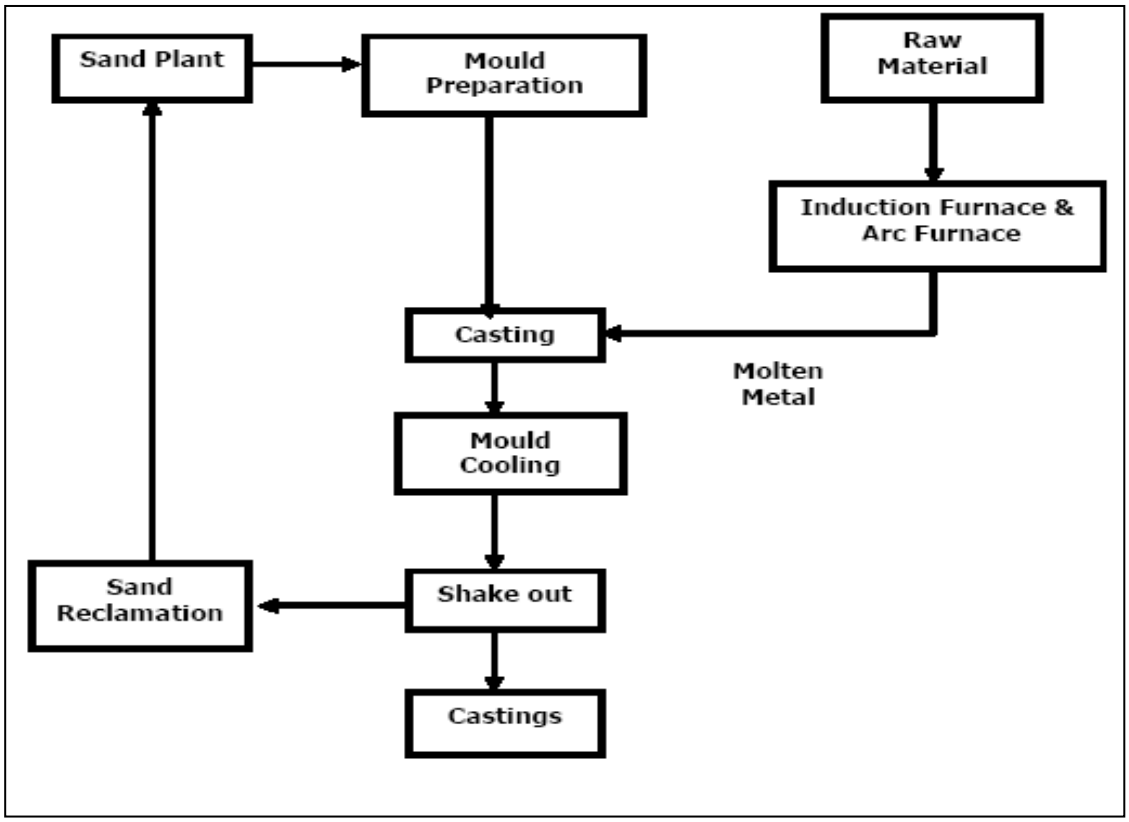

Figure 1.1: Process Flow diagram of a Foundry Cluster

The manufacturing process is described as below;

Melting Section:

The raw material is melted in melting furnace. The melting furnace can be an induction furnace or rotary or arc furnace or cupola furnace. Molten metal from the melting furnace is tapped in Ladles and then transferred to the holding furnaces. Typically the holding furnaces are induction furnaces. The holding furnace is used to maintain the required molten metal temperature and also acts as a buffer for storing molten metal for casting process. The molten metal is tapped from the holding furnace whenever it is required for casting process.

Sand Plant:

Green sand preparation is done in the sand plant. Return sand from the molding section is also utilized again after the reclamation process. Sand Millers are used for green sand preparation. In the sand millers, green sand, additives and water are mixed in appropriate proportion. Then the prepared sand is stored in bunkers for making moulds.

Pattern Making:

Patterns are the exact facsimile of the final product produces. Generally these master patterns are made of aluminum or wood. Using the patterns the sand moulds are prepared.

Mould Preparation:

In small-scale industries still the moulds are handmade. Modern plants are utilizing pneumatic or hydraulically operated automatic molding machines for preparing the moulds. After the molding process if required the cores are placed at the appropriate position in the moulds. Then the moulds are kept ready for pouring the molten metal.

Casting:

The molten metal tapped from the holding furnace is poured into the moulds. The molten metal is allowed to cool in the moulds for the required period of time and the castings are produced. The moulds are then broken in the shake out for removing the sand and the used sand is sent back to the sand plant for reclamation and reuse. The castings produced are sent to fettling section for further operations such as shot blasting, heat treatment etc. depending upon the customer requirements.

1.2 Energy performance in existing situation

Major energy sources being used in foundry cluster are electricity and fuels such as Coal, Furnace Oil, and Diesel. Electrical energy is being used in melting of iron in induction

furnaces, operation of electrical utilities and thermal energy is being used in cupola furnaces operation.

1.2.1 Average Production

The Average Production of the Foundry Units is represented in figure 1.2 below during Year 2009-10 are as follows;

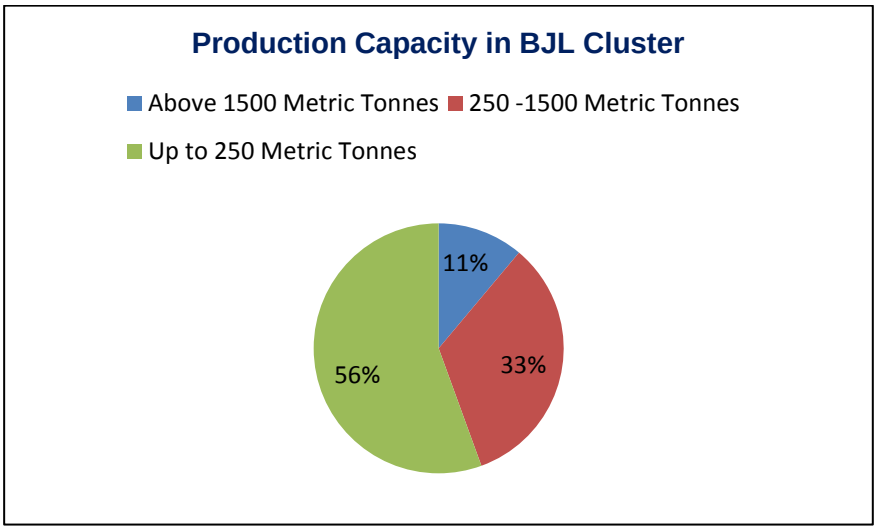

Figure 1.2: Production Capacity BJL Foundry cluster

1.2.2 Energy Consumption

Energy consumption (electrical) in a typical Foundry plant for different types of products is given in Table 1.2 below:

Table 1.2: Annual Energy Consumption

Electricity Consumption Pattern	Unit Consumed in kWh	Total Unit Consumption kWh
Blower Motor for Cupola	962100	26.92 Lakhs
Rotary Motor for Rotary Furnace	330000	
Melting material in Induction Furnace	1400000	

Table 1.3: Annual Thermal Energy Consumption

Thermal Energy Consumption Pattern	Consumption per Year
Coal for Cupola	5000 Metric Tonnes
Furnace Oil for Rotary Furnace	17.8 Lakh Litter

1.2.3 Specific Energy Consumption

Specific energy consumption of Foundry units depends upon the production capacity & their corresponding power consumption. Specific energy consumption also depends on type of furnace. A brief summary of specific energy consumption depending upon type of furnace is shown in below table;

Table 1.3: Annual Thermal Energy Consumption

Sl. No	Types of Furnace	Types of Fuel	Specific Fuel Consumption / One kg Molten Material	In Terms of Rupees
1	Cupola	Coal	0.2 kg	` 3.00
2	Rotary Furnace	Furnace Oil	0.15 Lt	` 4.20
3	Induction Furnace	Electricity	0.72 kWh	` 3.60

*Assuming Coal rate ` 15.0/kg
*Assuming F.O rate ` 28.0 /Lt.
*Assuming electricity rate ` 5.0/kWh

1.3 Proposed Technology/Equipment

1.3.1 Description about the existing technology

Molten metal analysis is an important process through which, the quality of the castings is established from material composition point of view. In a large number of Foundry plants of Batala, Jalandhar and Ludhiana the molten metal sampling is done and then tested in the laboratory. The metal sampling and testing takes about 30 min. This adds to the holding time of the molten metal in the furnace.

Melting and holding time of molten metal can be reduced by reducing the time taken for metal analysis. This can be achieved by installing a spectrometer for analyzing the quality of molten metal.

1.4 Establishing the Baseline for the Proposed Technology

Presently almost all the Foundry plants at Batala, Jalandhar and Ludhiana are using conventional method for metal testing. Operating condition and specific energy consumption of existing large furnace has been furnished in table 1.4 below:

Table 1.4: Base line for proposed technology

S.No	Parameters	Details
1	Capacity of furnace	4-5 Tonne Dual track
2	Total operating days	250 days
3	Total batch time	1 hr

S.No	Parameters	Details
4	Metal pouring time	5-10 Min
5	Total annual production	10,000tonne
6	Temperature of molten metal	1400 – 1600 ^{O}C
7	Specific power consumption	590-600 kWh/ton

1.5 Barriers in adoption of propose technology

1.5.1 Technological Barrier

- Lack of awareness and information of the loss in terms power wastage due to high melting and holding time for checking the molten metal quality
- Due to lack of technical knowledge and expertise, spectrometer is not commonly used in the cluster.
- In this cluster, like many others, there is lack of leadership to take up the energy efficiency projects in the plant.

1.5.2 Financial Barrier

Implementation of the proposed project activity requires an investment of ` 13.45 Lakh, which is a significant investment for small industries and not commonly seen in the cluster for the implementation of energy efficiency projects. Also implementation of proposed technology requires regular maintenance and checkups which requires technically skilled and competent workman.

1.5.3 Skilled Manpower

In Foundry cluster at Batala, Jalandhar and Ludhiana, the availability of skilled manpower is one of the limitations; this issue gets further aggravated due to more number of foundry units as compared to the availability of skilled manpower.

2 PROPOSED TECHNOLOGY

2.1 Detailed Description of Technology

2.1.1 Description of Technology

Molten metal analysis is an important process through which, the quality of the castings is established from material composition point of view.

In a large number of Foundry plants of Batala, Jalandhar and Ludhiana the molten metal sampling is done and then tested in the laboratory. The metal sampling and testing takes about 30 min. This adds to the holding time of the molten metal in the furnace.

Melting and holding time of molten metal can be reduced by reducing the time taken for metal analysis. This can be achieved by installing a spectrometer for analyzing the quality of molten metal. The spectrometer analysis takes only about 5-10 mins. The quantity of the sample is between 20 – 50 gm. The number of samples to be taken is at the discretion of the plant team, however it is recommended to take at least one sample per batch.

It leads to significant reduction in holding time of the molten metal in the Induction furnace and hence reduction in energy consumption. Installation of spectrometer for the molten metal analysis minimizes the time taken for the analysis by 60-70%.

It will results in overall reduction in metal holding time and hence reduction in energy consumption of about 10 units per ton of molten metal in the Induction Furnaces.

(Source: IREDA Investor manual for energy efficiency Page no. 419)

2.1.2 Technology Specification

Technical specification of proposed spectrometer for inspecting molten metal is given in Annexure 6.

2.1.3 Suitability or Integration with Existing Process and Reasons for Selection

This is the simplest and widely accepted measure for energy cost reduction in all the industries. It does not affect the process but improves the process efficiency since these types of furnaces have low specific power consumption

2.1.4 Availability of Technology

As far as technology is concerned Spectrometers are available in local/ national market. It is well proven technology which is adopted in many of the other similar and dissimilar units. Local vendors can arrange Spectrometers at order. Local service providers are also available in Punjab. More details of service provider are given in annexure 5.

2.1.5 Source of Technology

With use of Spectrometers, power consumption for each batch production will be reduced due to reduction in the melting and holding time of the furnace.

2.1.6 Terms and Conditions after Sale

Warranty period of one year will be provided from the date of invoice against any manufacturing defects.

2.1.7 Process down Time during Implementation

Technology provider will bring the complete setup for the proposed project from their site and make all the arrangements for implementation at the client's site.

2.2 Life Cycle Assessment

Life of the proposed Spectrometers will be around 8 to 10 years which depends on the operating conditions and maintenance at client's side.

2.3 Suitable Unit for Implementation of the Identified Technology

Proposed technology is suitable for implementation in large capacity furnace.

3 ECONOMIC BENEFITS FROM PROPOSED TECHNOLOGY

3.1 Technical Benefits

3.1.1 Electricity savings per year

Project of Installation of Spectrometers in Induction Furnace will result in savings of power consumption of about 10 units per ton of molten metal by reducing the metal holding time in Foundry plants. Hence for total production of 10,000 tonne per annum, power saving would be about 1,00,000 kWh per annum.

3.1.2 Improvement in product quality

Analysis of molten metal through a Spectrometer will definitely improve the product quality.

3.1.3 Increase in production

This project is not contributing for increasing in production in Foundry plant. But it reduces the power consumption for producing same amount of castings. .

3.1.4 Reduction in raw material consumption

Raw material consumption will be the same after the implementation of the proposed project.

3.1.5 Reduction in other losses

This project does not contribute to any reduction in any loss.

3.2 Monetary Benefits per year

Monetary benefit after implementation of this technology is shown in Table 3.1 below.

Table 3.1: Energy cost saving

S. No.	Particular	Details
1	Production	10,000 tonne
2	Power saving due to installation of Spectrometer	10 unit/Tonne
3	Total power saving	100 MW/year
4	Rate of electricity	` 5/kWh
5	Total annual monetary benefit	` 5.00 lakh

3.3 Social Benefits

3.3.1 Improvement in Working Environment in the Plant

There is no significant impact of this project in the working environment in the plant.

3.3.2 Improvement in Skill Set of Workers

The technical skills of workers will definitely improve. Training on the regular inspection/maintenance will help in improving the technical understanding of the workers.

3.4 Environmental Benefits

The major GHG reduction would be in Co_2 reduction. The technology will reduce grid electricity consumption and emission reductions are estimated at 81 tons of Co_2 per annum.

4 INSTALLATION OF THE PROPOSED TECHNOLOGY

4.1 Cost of Technology Implementation

4.1.1 Technology Cost

Cost of the equipment is ` 12.95 lakh (1 British Pound = ` 70.0) which includes the cost of the CCD desktop as per the quotation provided by the vendors at Annexure 6.

4.1.2 Other Cost

Other costs required will be ` 0.50 lakh which includes taxes, commissioning, manpower cost, transportation etc. Details breakups are provided in the Table 4.1 below:

Table 4.1 Details of Proposed Technology Installation Cost

S. No.	Particular	Cost (Lakh)
1	Equipment cost	12.95
2	Other cost	0.50
3	Total Cost	13.45

4.2 Arrangements of Funds

4.2.1 Entrepreneur's Contribution

Entrepreneur will contribute 25% of the total project cost which is ` 3.36 Lakh.

4.2.2 Loan Amount

Remaining 75% cost of the proposed project will be borrowed from bank which is ` 10.09 Lakh.

4.2.3 Terms & Conditions of Loan

The interest rate is considered at 10% which is normal rate of interest for energy efficiency 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

Profitability and cash flow statements have been worked out for a period of 8 years. The financials have been worked out on the basis of certain reasonable assumptions, which are outlined below.

- The Operation and Maintenance cost is estimated at 4 % of cost of total project with 5 % increase in every year as escalations.
- Interest on term loan is estimated at 10 %.
- Depreciation is provided as per the rates provided in the companies Act.

Based on the above assumptions, profitability and cash flow statements have been prepared and calculated in Annexure-3.

4.3.2 Simple Payback Period

The total project cost of the proposed technology is ` 13.45 Lakh and monetary savings due to reduction in electricity consumption is ` 5.00 Lakh hence, the simple payback period works out to be 2.69 years.

4.3.3 Net Present Value (NPV)

The Net present value of the investment at 10% works out to be ` 4.54 Lakh.

4.3.4 Internal Rate of Return (IRR)

The after tax Internal Rate of Return of the project works out to be 19.72%. 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 24.57%.

Table 4.2 Financial Indicators of Proposed Technology

S No	Particular	Unit	Value
1	Simple Payback	Years	2.69
2	NPV	` In Lakh	4.54
3	IRR	%age	19.72
4	ROI	%age	24.57
5	DSCR	Ratio	1.50

4.4 Sensitivity analysis in realistic, pessimistic and optimistic scenarios

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

- Optimistic scenario (Increase in power savings by 5%)
- Pessimistic scenario (Decrease in power savings by 5%)

In each scenario, other inputs are assumed as a constant. The financial indicators in each of the above situation are indicated along with standard indicators.

Table 4.3 Sensitivity Analysis in Different Scenarios

Scenario	IRR (%)	NPV (in Lakh)	ROI (%)	DSCR
Pessimistic	17.75	3.58	24.18	1.42
Base	19.72	4.54	24.57	1.50
Optimistic	21.66	5.49	24.90	1.58

4.5 Procurement and Implementation Schedule

Procurement and implementation schedule required for implementation of this technology is about 7 weeks. Further detail breakups of procurement and implementation schedules are shown in Annexure 4.

ANNEXURES

Annexure -1: Energy audit data used for baseline establishment

S.No	Parameters	Details
1	Capacity of furnace	4-5 Tonne Dual track
2	Total operating days	250 days
3	Total batch time	1 hr
4	Metal pouring time	5-10 Min
5	Total annual production	10,000 tonne
6	Temperature of molten metal	1400 – 1600^{O}C
7	Specific power consumption	590-600 kWh/ton

Annexure -2: Detailed Technology Assessment Report

S. No.	Particular	Unit	Value
1	No. of operating days	Days	250
2	Annual Production	Tonne	10000
3	Power saving due to installation of Spectrometer	kW/tonne	10
4	Annual power saving	MWh/Year	100
5	Rate of Electricity	`/ kWh	5
6	Total monetary saving	`in lakh	5.00
7	Total investment required	`in lakh	13.45
8	Simple payback period	Years	2.69

Annexure -3: Detailed Financial Calculations

Name of the Technology	Spectrometer		
Rated Capacity			
Details	**Unit**	**Value**	**Basis**
Installed Capacity	--	--	
No of Annual working days	Days	250	
Proposed Investment			
Plant & Machinery	` (in lakh)	12.95	
Misc. Cost	` (in lakh)	0.50	
Total Investment	` (in lakh)	13.45	
Financing pattern			
Own Funds (Equity)	` (in lakh)	3.36	Feasibility Study
Loan Funds (Term Loan)	` (in lakh)	10.09	Feasibility Study
Loan Tenure	Years	5.00	Assumed
Moratorium Period	Months	6.00	Assumed
Repayment Period	Months	66.00	Assumed
Interest Rate	%age	10.00%	
Estimation of Costs			
O & M Costs	% on Plant & Equip	4.00	Feasibility Study
Annual Escalation	%age	5.00	Feasibility Study
Estimation of Revenue			
Electricity Saving	MWh/Year	100	
Cost of electricity	`/MWh	5000	
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	10.09	0.50	9.58	1.17
2	9.58	1.51	8.07	0.89
3	8.07	2.02	6.05	0.72
4	6.05	2.52	3.53	0.49
5	3.53	2.52	1.01	0.24
6	1.01	1.01	0.00	0.03
		10.09		

WDV Depreciation **`(in lakh)**

Particulars / years	**1**	**2**
Plant and Machinery		
Cost	13.45	2.69
Depreciation	10.76	2.15
WDV	2.69	0.54

Projected Profitability **` (in lakh)**

Particulars / Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Electricity savings	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Total Revenue (A)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Expenses								
O & M Expenses	0.54	0.56	0.59	0.62	0.65	0.69	0.72	0.76
Total Expenses (B)	0.54	0.56	0.59	0.62	0.65	0.69	0.72	0.76
PBDIT (A)-(B)	4.46	4.44	4.41	4.38	4.35	4.31	4.28	4.24
Interest	1.17	0.89	0.72	0.49	0.24	0.03	0.00	0.00
PBDT	3.29	3.55	3.69	3.89	4.11	4.28	4.28	4.24
Depreciation	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
PBT	2.58	2.84	2.98	3.18	3.40	3.57	3.57	3.53
Income tax	0.00	0.47	1.25	1.32	1.40	1.46	1.45	1.44
Profit after tax (PAT)	2.58	2.36	1.73	1.86	2.00	2.12	2.11	2.09

Computation of Tax **` (in lakh)**

Particulars / Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Profit before tax	2.58	2.84	2.98	3.18	3.40	3.57	3.57	3.53
Add: Book depreciation	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Less: WDV depreciation	10.76	2.15	-	-	-	-	-	-
Taxable profit	(7.47)	1.39	3.69	3.89	4.11	4.28	4.28	4.24
Income Tax	-	0.47	1.25	1.32	1.40	1.46	1.45	1.44

Projected Balance Sheet **` (in lakh)**

Particulars / Years	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Share Capital (D)	3.36	3.36	3.36	3.36	3.36	3.36	3.36	3.36
Reserves & Surplus (E)	2.58	4.94	6.67	8.53	10.53	12.65	14.76	16.85
Term Loans (F)	9.58	8.07	6.05	3.53	1.01	0.00	0.00	0.00
Total Liabilities (D)+(E)+(F)	15.53	16.38	16.09	15.42	14.90	16.01	18.12	20.21
Assets	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Gross Fixed Assets	13.45	13.45	13.45	13.45	13.45	13.45	13.45	13.45
Less Accumulated Depreciation	0.71	1.42	2.13	2.84	3.55	4.26	4.97	5.68
Net Fixed Assets	12.74	12.03	11.32	10.61	9.90	9.19	8.48	7.77
Cash & Bank Balance	2.79	4.35	4.77	4.81	5.00	6.82	9.64	12.44
TOTAL ASSETS	15.53	16.38	16.09	15.42	14.90	16.01	18.12	20.21
Net Worth	5.94	8.31	10.03	11.89	13.89	16.01	18.12	20.21
Debt Equity Ratio	2.85	2.40	1.80	1.05	0.30	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	3.36	-	-	-	-	-	-	-	-
Term Loan	10.09								
Profit After tax		2.58	2.36	1.73	1.86	2.00	2.12	2.11	2.09
Depreciation		0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Total Sources	13.45	3.29	3.07	2.44	2.57	2.71	2.83	2.82	2.80
Application									
Capital Expenditure	13.45								
Repayment Of Loan	-	0.50	1.51	2.02	2.52	2.52	1.01	0.00	0.00
Total Application	13.45	0.50	1.51	2.02	2.52	2.52	1.01	0.00	0.00
Net Surplus	-	2.79	1.56	0.42	0.04	0.19	1.82	2.82	2.80
Add: Opening Balance	-	-	2.79	4.35	4.77	4.81	5.00	6.82	9.64
Closing Balance	-	2.79	4.35	4.77	4.81	5.00	6.82	9.64	12.44

IRR **` (in lakh)**

Particulars / months	0	1	2	3	4	5	6	7	8
Profit after Tax		2.58	2.36	1.73	1.86	2.00	2.12	2.11	2.09
Depreciation		0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Interest on Term Loan		1.17	0.89	0.72	0.49	0.24	0.03	-	-
Cash outflow	(13.45)	-	-	-	-	-	-	-	-
Net Cash flow	(13.45)	4.46	3.96	3.15	3.06	2.95	2.86	2.82	2.80
IRR	19.72 %								
NPV	4.54								

Break Even Point **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8
Variable Expenses								
O & M Expenses (75%)	0.40	0.42	0.44	0.47	0.49	0.51	0.54	0.57
Sub Total(G)	0.40	0.42	0.44	0.47	0.49	0.51	0.54	0.57
Fixed Expenses								
O & M Expenses (25%)	0.13	0.14	0.15	0.16	0.16	0.17	0.18	0.19
Interest on Term Loan	1.17	0.89	0.72	0.49	0.24	0.03	0.00	0.00
Depreciation (H)	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71
Sub Total (I)	2.01	1.74	1.57	1.36	1.11	0.91	0.89	0.90
Sales (J)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Contribution (K)	4.60	4.58	4.56	4.53	4.51	4.49	4.46	4.43
Break Even Point (L= G/I)%	43.82%	38.04%	34.54%	29.92%	24.66%	20.32%	19.97%	20.29%
Cash Break Even {(I)-(H)}%	28.37%	22.52%	18.95%	14.25%	8.91%	4.49%	4.04%	4.27%
Break Even Sales (J)*(L)	2.19	1.90	1.73	1.50	1.23	1.02	1.00	1.01

Return on Investment **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8	Total
Net Profit Before Taxes	2.58	2.84	2.98	3.18	3.40	3.57	3.57	3.53	25.65
Net Worth	5.94	8.31	10.03	11.89	13.89	16.01	18.12	20.21	104.41
									24.57%

Debt Service Coverage Ratio **` (in lakh)**

Particulars / Years	1	2	3	4	5	6	7	8	Total
Cash Inflow									
Profit after Tax	2.58	2.36	1.73	1.86	2.00	2.12	2.11	2.09	12.65
Depreciation	0.71	0.71	0.71	0.71	0.71	0.71	0.71	0.71	4.26
Interest on Term Loan	1.17	0.89	0.72	0.49	0.24	0.03	0.00	0.00	3.53
Total (M)	4.46	3.96	3.15	3.06	2.95	2.86	2.82	2.80	20.44

DEBT

Interest on Term Loan	1.17	0.89	0.72	0.49	0.24	0.03	0.00	0.00	3.53
Repayment of Term Loan	0.50	1.51	2.02	2.52	2.52	1.01	0.00	0.00	10.09
Total (N)	1.67	2.40	2.73	3.01	2.76	1.04	0.00	0.00	13.62
DSCR (M/N)	2.67	1.65	1.15	1.01	1.07	2.75	0.00	0.00	1.50
Average DSCR	1.50								

Annexure:-4 Procurement and implementation schedule

Procurement and Implementation Schedule

S. No.	Activities	Weeks						
		1	2	3	4	5	6	7
1	Issue of Purchase Order							
2	Receipt of Equipment							
3	Commissioning							
4	Testing							

Annexure -5: Details of technology service providers

Energy Conservation measure	Source of product	Details of Local vendor / service provider
1. Spectrometer	Spectro Lab Equipments Pvt. Ltd	**Mr. Suneil Dua** -41, Okhla Industrial Area, Phase-II, New Delhi-110020 Ph. 011-40522053, 41611000 Mobile +91-9953999353
2. Spectrometer	M/S ENCON INTERNATIONAL (P) LTD.	**Mr. R.P. Sood** 14/6, Mathura Road, Faridabad - 121 003 (Haryana) Tel: +91-129-2275307 Fax: +91-129-2276448 E mail: encon@ndb.vsnl.net.in
3. Spectrometer	MACRO FURNACES PVT. LTD.	16/2, mathura road, faridabad -121002 Tel:+ 91-129-5260004 Fax: + 91-129-5260146 E-mail: aastha10@rediffmail.com

Annexure–6: Quotations/Techno-commercial bids for new technology/equipment

SPECTRO Lab Equipments Pvt. Ltd.	E-41, Okhla Industrial Area, Phase-II, New Delhi-110020 Ph.: 91-11-41611000, 40522000 Fax.: 91-11-40503150 E-mail : prashant@spectro.in www.spectrolabequipments.com

M/s Confederation of Indian Industry CII - AVANTHA Centre for Competitiveness Block - 3, Sector - 31/A, Chandigarh - 160030 Phone- 09872600687, 91-172-5080784(D), Fax - 91-172-2606259 E-Mail: gagandeep.mohey@cii.in	**Date:** 15th July, 2011 **Quotation No.** 2739 **Reference No.**

Kind Attn: **MR. Gagandeep Mohey**

Dear Sir/ Madam.

With Reference to the discussion/ mail, we have pleasure in submitting our quotation for the following:

S.No.	Description	Rate (inGBP)	Qty	Amount
1.	**MetalScan PolySpek-J** **CCD based desktop spectrometer for the quantitative analysis of metals. Flushed or non-flushed optic depending on application.** **Includes one matrix calibration in one base with all relevant re-standardisation samples and basic spares kit.** **CALIBRATION:** Each matrix calibration is supplied with relevant Setting up Samples (SUS) **Fe Base with Fe-903 LOW ALLOY STEELS** **Software Items** **Archiving, retrieval & transfer of results via USB**	**£18000** **Included** **Included**	**01** **01** **01**	**£18000** **Included** **Included**
	TOTAL FOB/FCA PRICE			**£18000**
	INSURANCE AND FREIGHT CHARGES			**£500**
	TOTAL CIF PRICE			**£18500**

For any clarification please contact -	*Mr. Rajeev Sharma (09873001545) Email: met@spectrogrp.com* *Mr. Suneil Dua (9953999353) Email: sd@spectro.in*

SPECTRO
Lab Equipments Pvt. Ltd.

E-41, Okhla Industrial Area,
Phase-II, New Delhi-110020
Ph.: 91-11-41611000, 40522000
Fax.: 91-11-40503150
E-mail : prashant@spectro.in
www.spectrolabequipments.com

SYSTEM DESCRIPTION

OPTICAL SYSTEM

- Flushed or non-flushed miniature optic spectrometer system.
- Holographic flat field diffraction grating.
- Sealed, dust-proof optical system.
- Wavelength range: - 170-410nm.
- CCD Linear array detector

EXCITATION SOURCE

- Unipolar spark discharge.
- High energy pre-spark.
- Computer controlled excitation parameters.
- Peak current up to 200A

SAMPLE STAND

- Open spark stand for large or small samples.
- Argon flushed with minimised argon use.
- Removable clamp and stand cover.
- Tungsten electrode.

CONTROL & DATA PROCESSING

- Integrated fan-less panel PC
- Colour 10.4" TFT LCD high luminance display
- Windows XP operating system
- Touch Screen operation
- IP65 compliant front panel
- Multiple USB ports for communications, external printer & other USB devices.
- 16-bit Analogue to Digital Converter

SOFTWARE

- A-PLUS or SPARCS especially created by ARUN Technology for MetalScan units.
- Simple operation.
- Single 'Go' button operation.
- Password protected set-up mode

ANALYSIS

- Factory calibrated.
- Selectable number of burns for average.
- Deletion of bad burns from average.
- Display of mean and RSD.
- Automatic switching of spectral lines.

For any clarification please contact - *Mr. Rajeev Sharma (09873001545) Email: met@spectrogrp.com*
Mr. Suneil Dua (9953999353) Email: sd@spectro.in

SPECTRO
Lab Equipments Pvt. Ltd.

E-41, Okhla Industrial Area,
Phase-II, New Delhi-110020
Ph.: 91-11-41611000, 40522000
Fax.: 91-11-40503150
E-mail : prashant@spectro.in
www.spectrolabequipments.com

- Automatic additive and multiplicative corrections.
- User standardization

ELECTRICAL AND PHYSICAL SPECIFICATIONS

- 90-260 VAC 60/50 Hz.
- Physical size of console 560 x 395 x 537mm.
- Packing Weight - Gross 35-40Kgms depending on accessories

Terms & Conditions:

1. The prices quoted are on CIF Basis..
2. 100% payment by T.T. transfer or By Irrevocable L/C payable at sight in U.K.
3. All custom duties levied by Govt. of India at your account.
4. Packing and forwarding charges: included.
5. Country of origin: U.K. unless otherwise stated.
6. Warranty: 12 months
7. This quotation is valid for a period (in days): 30
8. Delivery period: 45 days formal P.O. with 100% advances T.T.

For any clarification please contact - ***Mr. Rajeev Sharma (09873001545) Email: met@spectrogrp.com***
Mr. Suneil Dua (9953999353) Email: sd@spectro.in

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(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

Confederation of Indian Industry
CII – AVANTHA Centre for Competitiveness
Block No.3, Dakshin Marg
Sector 31-A, Chandigarh - 160030
Tel: 0172-5080784 (D) / 2666517-19
Fax: 0172-2606259 / 2614974
E-mail: harinder.singh@cii.in
Website: www.ciicfc.org

India SME Technology Services Ltd
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