L.T. Power Capacitor

PRODUCT CODE (ASICC)	77226
QUALITY AND STANDARDS	IS 2834:1986
PRODUCTION CAPACITY	Qty. : 20,000 Nos. (per annum) Value : Rs. 31,00,000
YEAR OF PREPARATION	2002 _ 2003
PREPARED BY	Small Industries Service Institute Opp. Okhla Industrial Estate New Delhi-110020 and Office of the Development Commissioner Small Scale Industries Electrical and Electronics Division 7th Floor, Nirman Bhavan, New Delhi - 110 011.

Introduction

Power capacitor is basically an electrical device used for improving power factor of the electrical power system when the load is inductive. Most of the industries use induction motors, which results Low power factor in the neighbouring distribution line. This causes big KVAR loss and wastage of energy. Therefore, Improvement of power factor is considered to be one of the important measures of energy conservation. Use of power capacitors improves the power factor of the line to which they are connected and thereby improving power factor for neighbouring industry also. In certain applications, capacitors are used to store energy also, but with limited use.

Market Potential

Almost all the Electricity authorities have now made compulsory to install L.T. Power Capacitors in the case of all industrial loads. This implies for every induction motor, LT power capacitor is a must. Due to massive rural electrification and use of electric pumps in irrigation and industrial purposes the motor load is increasing day by day. Hence, demand for power capacitors is increasing.

At present, there are a number of units manufacturing LT power capacitors. However, as the demand for this item is ever increasing, there is scope for more units to come up.

Basis and Presumptions

i) The basis for calculation of production capacity has been taken on single shift basis on 75% efficiency.

ii) The maximum capacity utilization on single shift basis for 300 days a year. During first year and second year of operations the capacity utilization is 60% and 80% respectively. The unit is expected to achieve full capacity utilization from the third year onwards.

iii) The salaries and wages, cost of raw materials, utilities, rents, etc. are based on the prevailing rates in and around Delhi. These cost factors are likely to vary with time and location.

iv) Interest on term loan and working capital loan has been taken at the rate of 12% on an average. This rate may vary depending upon the policy of the financial institutions/agencies from time to time.

v) The cost of machinery and equipments refer to a particular make/model and prices are approximate.

vi) The break-even point percentage indicated is of full capacity utilization.

vii) The project preparation cost etc. whenever required could be considered under pre-operative expenses.

viii) The essential production machinery and test equipment required for the project have been indicated. The unit may also utilize common test facilities available at Electronics Test and

Development Centres (ETDCs) and Electronic Regional Test Laboratories (ERTLs) and Regional Testing Centres (RTCs).

Implementation Schedule

The major activities in the implementation of the project has been listed and the average time for implementation of the project is estimated at 12 months:

Sl. No.	***Activity***	***Period (In Months)***
1.	Preparation of project report	1
2.	Registration and other formalities	1
3.	Sanction of loan by financial institutions	3
4.	Plant and Machinery:	
a)	Placement of orders	1
b)	Procurement	2
c)	Power connection/ Electrification	2
d)	Installation/Erection of machinery/Test Equipment	2
5.	Procurement of raw materials	2
6.	Recruitment of Technical Personnel etc.	2
7.	Trial production	11
8.	Commercial production	12

Notes

1. Many of the above activities shall be initiated concurrently.

2. Procurement of raw materials commences from the 8th month onwards.

3. When imported plant and machinery are required, the implementation period of project may vary from 12 months to 15 months.

Technical Aspects

Process of Manufacture

The capacitor is manufactured using aluminium foil and condenser tissue paper. The aluminium foil used is of purity 99.7% or above. The aluminium foil and condenser tissue paper are wound in alternate layers using a foil-winding machine to manufacture the basic condenser unit. Numbers of such units (rolls of aluminium foil and condenser tissue paper) are stacked together. The number of rolls in a stack depends upon the voltage and capacitance required. The stack of the aluminium foil rolls is pressed together with M.S. plate. The two sides of the stack where the ends of the individual rolls are coming, are plastered using tin lead mixture of proper proportion for joining the alternate layer of aluminium foil. Connecting leads are soldered to the plastered ends of the stack. The stack assembly is housed in a can made of M.S. and the leads are connected to porcelain bushing terminals provided on the top of the can. The can is fabricated from M.S. plate separately and is decreased before using the stack assembly. After housing the stack assembly, the can is put under vacuum at a high temperature in vacuum impregnation plant. Subsequently, PXE oil (Synthetic Insulating Oil) is filled into the cans. The cans are then sealed. The capacitor is then tested as per the relevant standard.

Quality Control and Standards

The relevant specification of Bureau of Indian standards governing the power capacitors is IS 2834:1986. The unit shall have in-house testing facility for conducting the routine tests.

Production Capacity (per annum)

Description	**Quantity (Nos.)**	**Value (Rs.)**
Power Capacitors of various rating	20000	31,00,000

Motive Power 20 kW (Approx.)

Pollution Control

The Government accords utmost importance to control environmental pollution. The small-scale entrepreneurs should have an environmental friendly attitude and adopt pollution control measures by process modification and technology substitution.

India having acceded to the Montreal Protocol in September 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluore Carbon (CFCs), Carbon Tetrachloride, Halons and methyl Chloroform etc. need to be phased out immediately with alternative chemicals/solvents. A notification for detailed Rules to regulate ODS phase out under the Environment Protection Act, 1986 have been put in place with effect from 19th July 2000.

Energy Conservation

With the growing energy needs and shortage coupled with rising energy cost, a greater thrust in energy efficiency in industrial sector has been given by the Government of India since 1980s. The Energy Conservation Act, 2001 has been enacted on 18th August 2001, which provides for efficient use of energy, its conservation and capacity building of Bureau of Energy Efficiency created under the Act.

The following steps may help for conservation of electrical energy:

i) Adoption of energy conserving technologies, production aids and testing facilities.

ii) Efficient management of process/manufacturing machineries and systems, QC and testing equipments for yielding maximum Energy Conservation.

iii) Optimum use of electrical energy for heating during soldering process can be obtained by using efficient temperature controlled soldering and de-soldering stations.

iv) Periodical maintenance of motors, compressors etc.

v) Use of power factor correction capacitors. Proper selection and layout of lighting system; timely switching on-off of the lights; use of compact fluorescent lamps wherever possible etc.

Financial Aspects

A. Fixed CApital

(i) Land and Building

Built up Area	1000 Sq.ft.
Rent payable (per month)	Rs. 3,000

(2) Machinery and Equipments

(a) Production Unit

Sl. No.	Description	Qty./ Nos.	Rate (Rs.)	Total (Rs.)
1.	Vacuum Impregnation Plant	1	3,00,000	300,000
2.	Foil Winding Machine	1	65,000	65,000

3. Air conditioner with accessories	2	25,000	50,000
4. Drilling Machine	1	8,000	8,000
5. Hand Drilling Machine	1	5,000	5,000
6. Bench Grinder	1	4,000	4,000
7. Welding Set 200 Amps.	1	8,000	8,000
8. Spot Welder Machine 15 kVA	1	8,000	8,000
9. Sheet Bending Machine	1	9,000	9,000
10. Hand Shearing Machine	1	3,000	3,000
11. Baking Oven	1	20,000	20,000
12. Vapour Degreasing Plant	1	10,000	10,000
13. Spray Painting unit with compressor	1	10,000	10,000
Total			**500,000**

(b) Testing Equipments

Sl. No.	**Description/Range**	**Qty.**	**Rate (Rs.)**	**Total (Rs.)**
1.	High Voltage Tester (2.5 kV)	1	7,000	7,000
2.	Insulation tester multi range	1	5,000	5,000
3.	D.C. Over Voltage Tester	1	3,000	3,000
4.	Discharge device Tester	1	5,000	5,000
5.	Auto transformer 0-270V, 20 Amp	1	20,000	20,000
6.	Test panel with Ammeters, Volt meters, watt meters of different range, P.F. meter, capacitance bridge etc.	1	25,000	25,000
Total				**65,000**
Total (a+b)				**5,65,000**
Electrification and Other Charges				**(Rs.)**
1. Electrification and				56,500

installation charges @ 10% of cost of machinery and equipment			
2. Cost of tools, dies jigs and fixtures	LS	LS	20,000
3. Cost of office equipment	LS	LS	25,000
4. Pre-operative expenses	LS	LS	5,000
Total			**106,500**
Total fixed capital			**6,71,500**

B. Working Capital (per month)

(i) Raw Materials (per month)

Description	**Qty.**	**Rate (Rs.)**	**Value (Rs.)**
1. Condenser tissue paper (Kg)	450	100	45,000
2. Aluminium foil. (Kg)	200	175	35,000
3. PXE Oil (Synthetic Insulating Oil)(Kg)	300	50	15,000
4. MS sheets, screws press plain paper porcelain bushings, packing material	LS		50,000
Total			**1,45,000**

(ii) Salary and Wages (per month)

Sl. No.	**Description**	**Qty. (Set/No.)**	**Rate (Rs.)**	**Value (Rs.)**
1.	Manager cum Technical Supervisor	1	6,000	6,000
2.	Sales Supervisor	1	5,000	5,000
3.	Skilled worker	2	4,000	8,000
4.	Semi-skilled	3	3,500	10,500
5.	Un-skilled	2	3,000	6,000
6.	Peon-cum-Watchman	1	3,000	3,000
Total				**38,500**
Perquisite @ 15% of salary				5,775
Total				**44,275**

(iii) Utilities (per month) **(Rs.)**

1. Power	3,000
2. Water	100
Total	**3,100**
(iv) Other Contingent Expenses (per month)	**(Rs.)**
1. Rent	3,000
2. Postage and Stationery	800
3. Telephone	1,000
4. Advertisement	500
5. Repair and Maintenance	500
6. Transportation Expenses	1,000
7. Insurance	500
8. Consumble Stores	200
9. Other Misc. Expenses	500
Total	**8,000**
(v) Total Recurring Expenditure (per month) (i+ii+iii+iv)	**2,00,375**
(vi) Total Working Capital (3 months basis)	**6,01,125**

C. Total Capital Investment

Fixed Capital	Rs. 671,500
Working Capital (3 month basis)	Rs. 601,125
Total	**Rs. 1,2,72,625**

Financial Analysis

(1) Cost of Production (per year)	**(Rs.)**
i) Total recurring cost	2,404,500
ii) Depreciation on plant and machinery @ 10%	56,500
iii) Depreciation on jigs, fixtures, tooling etc. @20%	4,000
iv) Depreciation on office equipment @20%	152,715
Total	**2,6,22,715**

(2) Turnover (per year)

Sl. No.	**Item**	**Qty.**	**Rate (Rs.)**	**Value (Rs.)**
1.	LT Power capacitors of different ratings	20,000	155	3,100,000
Total				**3,100,000**

(3) Net Profit (per year) (Before Taxes) 477,285

(4) Net Profit Ratio

= Net Profit × 100
Total Turnover
=477285 x 100
31,00,000

= **15.40%**

(5) Return on Investment

= Net Profit x 100
Total Investment
= 477285 x 100
12,72,625

= **37.50%**

(6) Break-even Point

Fixed Cost	**(Rs.)**
i) Depreciation on plant and machinery @ 10%	56,500
ii) Depreciation on Jigs and Fixtures @ 20%	4,000
iii) Depreciation on office equipment @20%	5,000
iv) Interest on total capital investment @ 12%	152,715
v) 40% of salary and wages	212,520
vi) 40% of Other Contingent expenses and utilities (excluding rent and insurance)	36,480
vii) Rent + Insurance	42,000
Total	**509,215**
Say	**509,000**

B.E.P.

= Fixed cost × 100
Fixed cost + Profit
= 509000 × 100
509000 + 477285

= **51.61%**

Additional Information

a. The Project Profile may be modified/tailored to suit the individual entrepreneurship qualities/capacity, production programme and also to suit the locational characteristics, wherever applicable.

b. The Electrical Technology is undergoing rapid strides of change and there is need for regular monitoring of the national and international technology scenario. The unit may, therefore, keep abreast with the new technologies in order to keep

them in pace with the developments for global competition.

c. Quality today is not only confined to the product or service alone. It also extends to the process and environment in which they are generated. The ISO 9000 defines standards for Quality Management Systems and ISO 14001 defines standards for Environmental Management System for acceptability at international level. The unit may therefore adopt these standards for global competition.

d. The margin money recommended is 25% of the working capital requirement at an average. However, the percentage of margin money may vary as per bank's discretion.

Addresses of Machinery and Equipment Suppliers

1. M/s. Vacuum Plant and Instruments Mfg. Co. Ltd. 48-A, Mundhawa, Pune-411036.

(Vacuum Impregnation Plant, Fc Winding Machine, vapour degreasing plant)

2. M/s. Person Engg. Corporation
Great Western Compound, 37, Maharashtra Chamber of Commerce Lane,Fort,
Mumbai-400001.
(General purpose machines)

3. M/s. Manlik Engg. Works
Shed No. 9, R.K. Indl. Estate, Ajod Dairy Road,
Rakhial, Ahmedabad.
(General purpose machines)

4. M/s. Thoshnival Brothers (Bombay) Pvt. Ltd.
198, Jamshedji Tata Road, Mumbai-400020.
(Testing Equipment)

5. M/s. Rectifiers and Electronics
10/3, DLF Indl. Area, Moti Nagar,
New Delhi-110015.
(Testing Equipment)

6. M/s. Growers Pvt. Ltd.
228, Kaliandas Udyog Bhawan, Near Century Bazar,
Mumbai-400025.
(Ovens)

Raw Material Suppliers

1. M/s. Aluminium Foils
21/8, M. G. Road, Bangalore-1.
(Aluminium Foils)

2. M/s. Alcaps
A-143, DDA Sheds, Okhla Phase - II,
New Delhi - 110020
(Aluminium Foils)

3. M/s. Heri Inc.
Trading and Tanishq Enterprises, C-146, FFC, Okhla Phase - III,
New Delhi - 110020
(Aluminium Foils)

4. M/s. Ter Indian Agency
Trafford House, No. 6, Press Club Road,
Mumbai-400001.
(Condenser Tissue Paper)

5. M/s. Papeteries
Balnore, Paris, Arance, Dedex-16,
France.
(PXE Oil (Synthetic Insulating C)