

# Transformer and Coils (For Electronic Applications)

PRODUCT CODE (ASICC)	: Radio and TV Coils-78989, Transformer-78989
QUALITY AND STANDARDS	: IS 7741
PRODUCTION CAPACITY	: Qty. : 30,000 Nos. (per annum) Value : Rs. 34,50,000
YEAR OF PREPARATION	: 2002–2003
PREPARED AND UPDATED BY	: Small Industries Service Institute, Bamunimaidan, Guwahati-21 And Office of the Development Commissioner (Small Scale Industries), Electronics and Electrical Division, 7th Floor, Nirman Bhavan, New Delhi-110011

## INTRODUCTION

Transformer is an electro mechanical device which transfers electrical energy from one circuit to another by means of changing magnetic field, without changing the frequency. Different types of transformers are used for different electronic applications. Advancement in the field of electronics has influenced change of design and use of new type of core materials. The transformer depending on application can be classified into power transformer, current transformer, constant voltage transformer, impedance matching transformer, driver transformer, audio output transformer, ignition transformer, pulse transformer, fly back transformer, ferrite core transformer, IF transformer etc. The main difference among

transformer is the type of core used and number of turns in primary and secondary side. Ferrite core transformers are used in switch mode power supply, electronic choke etc. Dynamo type core to silicon grade cold rolled steels are used for general type. Nickel iron alloy and ferrite core are used for high quality and high reliability. RF/IF coils used in electrical and electronic chokes are popular coils. This project profile is prepared for step down power transformer, generally used in consumer electronics.

## MARKET POTENTIAL

As mentioned earlier, Transformer and Coils are used in almost all electric fields like Consumer Electronics, Process Control Instruments, Power

Electronics, Medical Electronics, Computer, Industrial Electronics, in Defence, Telecommunications to perform various functions. The total performance of any electronic equipment depends on the quality of transformer. Because of increase in growth of Electronic industries, the demand for transformers has increased. The plant and machinery and raw material for manufacture of transformer are indigenously available. For economic inability the new entrepreneur has to manufacture different type of transformers and should have marketing tie up with manufacturers of electronic product. With high quality and competitive cost, there is a scope for transformer and coil industry.

### 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 Guwahati. 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 16% 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) set up by the State Governments and STQC Directorate of the Department of Information Technology, Ministry of Communication and Information Technology, to manufacture products conforming to Bureau of Indian Standards.

### 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.	Name of Activity	Period in Months (Estimated)
1.	Preparation of project report	1
2.	Registration and other formalities	1

Sl. No.	Name of Activity	Period in Months (Estimated)
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

- Many of the above activities shall be initiated concurrently.
- Procurement of raw materials commences from the 8th month onwards.
- 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 incoming raw materials are tested for required quality before released for production. The super enamelled copper wire are wound on bobbins or former as per required specification by using CNC winding machine. The coils are then stalked with core material, terminated and clamped. The completed transformer and coils are vacuum impregnated by using varnish and baked in an Oven at a particular temperature.

Then Transformers are tested for electrical specification before packing.

### Quality Control and Standards

Primary Voltage	Secondary Voltage
230V, 50 Hz	18V-0V-18V, 3 Amps

### Production Capacity (per annum)

Quantity (Nos.)	Value (Rs.)
30,000	34,50,000

Motive Power 10 KVA.

### Pollution Control

The Govt. 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 Sept. 1992, the production and use of Ozone Depleting Substances (ODS) like Chlorofluoro Carbon (CFC), 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.

The following steps are suggested which may help to control pollution in electronics industry wherever applicable:

- In electronic industry fumes and gases are released during hand soldering / wave soldering/Dip soldering, which are harmful to people as well as environment and the end products. Alternate

technologies may be used to phase out the existing polluting technologies. Numerous new fluxes have been developed containing 2-10% solids as opposed to the traditional 15-35% solids.

- ii) Electronic industry uses CFC, Carbon Tetrachloride and Methyl Chloroform for cleaning of printed circuit boards after assembly to remove flux residues left after soldering, and various kinds of foams for packaging.

Many alternative solvents could replace CFC-113 and Methyl Chloroform in electronics cleaning. Other Chlorinated solvents such as Trichloroethylene, Perchloroethylene and Methylene Chloride have been used as effective cleaners in electronics industry for many years. Other organic solvents such as Ketones and Alcohols are effective in removing both solder fluxes and many polar contaminants.

### 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 Govt. 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 desoldering 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.

### C. Total Capital Investment

Fixed Capital	Rs. 4,56,000
Working Capital for 3 months	Rs. 7,05,000
Total	Rs. 11,61,000

## FINANCIAL ASPECTS

### A. Fixed Capital

#### (i) Land and Building

Built up area	300 Sq. Mts.
Office and Stores	50 Sq. Mts.
Workshop and Assembly	250 Sq. Mts.
Rent payable (per annum)	Rs. 48,000

#### (ii) Machinery and Equipments

Sl. No.	Particulars	Imp/ Ind.	Qty.	Amount (Rs.)
<i>(a) Machinery</i>				
1.	CNC Winding Machine	Ind	2	1,00,000
2.	Semi Automatic Winding machine	Ind	1	35,000
3.	Oven (3.5 kW)	Ind	1	30,000
4.	Vacuum Impregnation Plant (30 Ltrs cap)	Ind	1	80,000

Sl. No.	Particulars	Imp/ Ind.	Qty.	Amount (Rs.)
<i>(b) Testing Equipment</i>				
5.	Digital LCR-Q Meter	Ind	1	13,000
6.	Oscilloscope (0-20 MHz)	Ind	1	20,000
7.	Insulation Tester	Ind	1	6,000
8.	High Voltage break down tester	Ind	2	15,000
9.	Megger	Ind	1	4,000
10.	Digital Multimeter 4.5 digit	Ind	1	8,500
11.	Analog Multimeter	Ind	1	8,000
	Total			3,19,500
12.	Electrification @ 10% of total cost of machinery and equipment			31,950
13.	Tools, Jigs, Fixtures and Soldering Iron station			45,000
14.	Office equipment and furniture			50,000
15.	Pre-operative expenses			10,000
	Total			4,56,450
	or Say			4,56,000

## B. Working Capital (per month)

### (i) Staff and Labour

Sl. No.	Designation	Nos.	Salary (Rs.)	Total (Rs.)
1.	Manager	1	5,000	5,000
2.	Supervisor	1	3,500	3,500
3.	Clerk/Typist	1	2,500	2,500
4.	Peon	1	1,500	1,500
5.	Watchman	1	1,500	1,500
6.	Skilled Worker	4	2,000	8,000
7.	Semi-Skilled worker	4	1,500	6,000
	Total			28,000
	Add perquisites @ 15% of salary			4,200
	Total			32,200
	or Say			32,000

### (ii) Raw Material Requirement (per month)

Sl. No.	Particulars	Price for 2,500 Nos./ month (Rs.)
1.	Super enamelled copper wire (different gauges)	65,000
2.	Core material (laminations)	1,00,000
3.	Bobbins and forms	6,000
4.	Clamps/base plates/ bolts and nuts	4,000
5.	Flexible leads/sleeves	1,000
6.	Impregnative materials (including varnish)	5,000
7.	Insulating material	2,000
8.	Consumables (solder, flux, packing material)	2,000
	Total	1,85,000

(iii) Utilities per month (Rs.)	
Power	2,500
Water	500
Total	3,000

(iv) Other Contingent Expenses (per month) (Rs.)	
Rent	4,000
Postage and Stationery	500
Repair and maintenance	1,000
Telephone	1,000
Transport charges	3,000
Advertisement/Publicity	3,000
Insurance	500
Misc. expenses	2,000
Total	15,000

(v) Total Recurring Expenditure Rs. 2,35,000 (per month) (i+ii+iii+iv)

## FINANCIAL ANALYSIS

(1) Cost of Production (per annum) (Rs.)	
Total recurring expenditure	28,20,000
Depreciation on machinery and equipment @ 10%	31,950
Depreciation on office equipment/ and furniture @ 20%	10,000
Depreciation on tools, jigs and fixtures @ 25%	11,250

Interest on total capital investment @ 16%	1,85,760
Total	30,58,960
or Say	30,59,000

(2) Turnover (per annum)

Item	Qty.	Rate	Value (Rs.)
Transformer and Coils	30,000	115	34,50,000

(3) Profit Rs. 3,91,000

(4) Net Profit Ratio

$$= \frac{\text{Profit (per annum)} \times 100}{\text{Sales (per annum)}}$$

$$= \frac{2391000 \times 100}{3450000}$$

$$= 11.33\%$$

(5) Rate of Return

$$= \frac{\text{Profit (per annum)} \times 100}{\text{Total capital investment}}$$

$$= \frac{391000 \times 100}{1161000}$$

$$= 33.68\%$$

(6) Break-even Point

Fixed Cost (per annum)	(Rs.)
Rent	48000
Depreciation on machinery and equipment @ 10 %	31950
Depreciation on tools, jigs and fixtures @ 25%	11250
Depreciation on office furniture @ 20%	10000
Interest on total capital investment @ 16%	185760
Insurance	6000
40% Salaries and wages	153600
40% other contingent expenses and utilities (excluding rent and insurance)	64800
Total	511360
or Say	511000

B.E.P.

$$= \frac{\text{Fixed Cost} \times 100}{\text{Fixed Cost} + \text{Profit}}$$

$$= \frac{511000 \times 100}{511000 + 391000}$$

$$= 56.65\%$$

### Additional Information

- 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.
- The Electronics 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.
- 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.
- 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 Raw Material Suppliers

1. M/s. Genius Electrical and Electronics Pvt. Ltd.  
G 1- 104, Mayapuri Industrial Area, Phase-II  
New Delhi-110064  
*(Super Enamalled Copper Wire.)*
2. M/s. Narula Engineering Co.  
Narula Factory, Loni Road,  
Delhi-110093  
*(Super Enamalled Copper Wire.)*
3. M/s. Dytran ( India) Ltd.  
Tivoli court, 1 C,  
Ballygunge Circular Road,  
Kolkata-700019  
*(Lamination, Core, Bobin former, Wire, Sleeve.)*
4. M/s. Choudhary Trading Co.  
A-91/3, Naraina Industrial Area,  
Phase-I,  
New Delhi-110028  
*(Lamination, Core, Bobin former, Wire, Sleeve.)*
5. M/s. AdhityaTrading Co.  
26/2 Begur Road,  
Hongasandra,  
Bangalore-61  
*(Lamination, Core, Bobin former, Wire, Sleeve.)*
6. M/s. Yam Industries  
No.5, 4th Cross,  
New Madivila Extn.  
Near Fatima School,  
Bangalore-68  
*(Lamination, Core, Bobin former, Wire, Sleeve.)*
7. M/s. Mica Manufacturing Co. Pvt. Ltd.  
P.O. Box 9052,  
Kolkata-700016  
*(Insulating Material)*
8. M/s. North East Chemicals Corporation  
S.C. Goswami Road,  
Pan Bazaar,  
Guwahati-1  
*(Chemicals and Varnish.)*