

ELECTRICAL MOTOR WINDING/ REWINDING

1. INTRODUCTION:

Electrical motors are everywhere; as they are the basic prime mover for all types of industrial machines and equipments viz, pumps, dryers, machine tools, fans, blowers' conveyors/ hoist, lifting cranes etc. These are also used for various domestic and kitchen appliances and even computer, printer, fax, Xerox machines have electric motors for cooling fans and even hard disks. Automobiles also have several min/ micro motors for wind screen, wipers etc.

Of these, the domestic appliances and water pumps, submersible pumps, etc. form a very large segment that are rated for mostly intermittent duty conditions and if run for longer periods or with over loading or if its installation is incorrect, leads to its failure due to several factors like overheating, the motor circuits shorting /burn out, water ingress in motor body etc. The motors can be repaired by rectification of faults and partial or full coil rewinding of the motor.

2. PRODUCT & ITS APPLICATION:

The electrical motors are electro-mechanical device that converts electrical energy to mechanical energy and they are used in wide variety of industrial and domestic equipments to provide motive power. The motors uses either Alternating current or Direct Current and have several types of winding designs to get different operating speed (rpm) and load conditions or motive power ratings normally (HP or KW). Most common motors are Induction winding coil design as it offers many advantages. The motors are either operated on single phase type or 3- phase depending on duty and according winding coils are designed.

Single phase motors operate at 250 volt and are mostly used for low power rating up to 1000 Watts, viz large number of domestic and kitchen and other handheld appliances including the domestic pump sets used in houses or buildings. The 3-phase motors are high power rated up to 500 KW used mostly in industrial

application. The most of equipment and machines use 3 phase motors in range of 2 kW to 50 kW for pumps, compressors, blowers, machines and equipments. Some submersible pumps used in irrigation are also 3 phase motors.

3. DESIRED QUALIFICATIONS FOR PROMOTER:

Any ITI electrician, Diploma or Graduate with engineering background and experience.

4. INDUSTRY OUTLOOK/ TREND

With large electricity grid and increasing power generation and distribution network in the country, population of electrical motors are increasing very rapidly in the country in rural, semi urban and urban centers. While urban centers have several large small and very small motor winding centers for repair and servicing centers for very small to large multi KW electric motors and generators.

5. MARKET POTENTIAL AND MARKETING ISSUES. IF ANY:

Just the pump industry is estimated that pumps sale alone is of the order of Rs. 3500 crores serving new and replacement needs. This it indicates motor rewinding market demand. Also there is need for very many centers in rural and semi urban centers in the country.

Irrigation water pump market is witnessing an impressive rate of growth on the back of depleting ground water level. These augers well for motor rewinding for newly electrified rural areas and villages. Domestic appliances and even pump sets have very good market potential as its demand emerges mostly from new and replacement needs of domestic users. In view of ever growing use of several new domestic appliances there is need rewinding and repair have good market potential in Govt. sector as well as in semi urban and rural sector.

There is new trend of use of automatic/ CNC winding / rewinding process. This is however suitable for large units having large volume like new motor production units. However the rewinding unit with small investment has to use manual process.

6. RAW MATERIAL REQUIREMENTS:

The main raw material consists of electrical stamping and enameled / plastic insulated winding wires of copper in different gauges. Other mechanical repair activity may use parts like ball bearings or bushes of brass/ bronze, carbon brushes etc.

7. MANUFACTURING PROCESS:

The following items are main process steps:

- Dismantling motor body and removal of rotor assembly
- Checking the electrical circuit and electrical Stamping. In case of damage to enameled copper wire winding, the specific coil or complete is removed from the core slots by special scrapping tools and cutters.
- The new coil is wound with exact same gauge and insulation grade. The motor coil design is followed in terms of no of winding turns and lay in the core slot. The coils are checked for insulation, taped with insulation tapes/fillers and packed properly in the stator/rotor slots with wooden hammers followed by varnishing. The finished stator/ rotors are checked for insulation integrity.
- The stampings are checked and repaired or replaced partially as per original design.
- The bearing damage is assessed and repaired or replaced. The rotor shaft if damaged may be replaced.
- The motor is assembled with due care and free rotation and alignment of rotor is checked. After mechanical checks, mugger test is carried out to see the electrical integrity before powering and checking the speed in rpm. Limited power rating is checked with load before dispatch to customer.

8. MANPOWER REQUIREMENT:

The unit shall require highly skilled service persons. The unit can start from 2 employees initially and increase to 9 or more depending on business volume.

Sr. No	Type of Employees	Monthly Salary	No of Employees				
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Skilled Operators	15000	1	1	1	2	2
2	Semi-Skilled/Helpers	7000	1	2	3	4	6
3	Supervisor/Manager	25000					1
4	Accounts/ Marketing	15000			1	1	1
5	Other Staff	7000	1	1	1	1	1
	TOTAL		3	4	6	8	11

9. IMPLEMENTATION SCHEDULE:

The unit can be implemented within 3 months from the serious initiation of project work.

Sr. No	Activities	Time Required in Months
1	Acquisition of Premises	1
2	Construction (if Applicable)	0
3	Procurement and Installation of Plant and Machinery	1
4	Arrangement of Finance	1
5	Manpower Recruitment and start up	1
	Total Time Required (Some Activities run concurrently)	3

10. COST OF PROJECT:

The unit will require total project cost of Rs 17.49 lakhs as shown below:

Sr. No	Particulars	In Lakhs
1	Land	0.00

2	Building	0.00
3	Plant and Machinery	1.92
4	Fixtures and Electrical Installation	0.55
5	Other Assets/ Preliminary and Preoperative Expenses	0.25
6	Margin for working Capital	1.17
	TOTAL PROJECT COST	3.89

11. MEANS OF FINANCE:

The project will require promoter to invest about Rs 1.85 lakhs and seek bank loans of Rs 2.04 lakhs based on 70% loan on fixed assets.

Sr. No	Particulars	In Lakhs
1	Promoters Contribution	1.85
2	Loan Finance	2.04
	TOTAL:	3.89

12. WORKING CAPITAL REQUIREMENTS:

Working capital requirements are calculated as below:

Sr. No	Particulars	Gross Amount	Margin %	Margin Amount	Bank Finance
1	Inventories	0.49	40	0.20	0.30
2	Receivables	1.00	50	0.50	0.50
3	Overheads	0.28	100	0.28	0.00
4	Creditors	0.50	40	0.20	0.30
	TOTAL	2.26		1.17	1.10

13. LIST OF MACHINERY REQUIRED:

Sr No	Particulars	UOM	Quantity	Rate	Total Value
	Main Machines/ Equipment				
1	Drilling machine	Nos	1	5000	5000

2	Coil winding machine	Nos	1	15000	15000
3	Assembly/ dismantling Tables with machine vice	Nos	2	8000	16000
4	Hand tool sets - Spanners/ Screw drivers, Hacksaw etc.	Nos	1	25000	25000
Sr No	Particulars	UOM	Quantity	Rate	Total Value
5	Varnish curing oven - 3' x 5'	Nos	1	35000	35000
6	Test bench for motor with rpm meter/ stroboscope, Ammeter, voltmeter	Nos	1	45000	45000
7	Electrical insulation mugger tester	Nos	2	8000	16000
8	Spray Painting Station	Nos	1	20000	20000
	<u>subtotal :</u>				<u>177000</u>
	Tools and Ancillaries				
1	Bench and Belt Grinders	LS	1	10000	10000
2	Gauges and Tools		1	5000	5000
	<u>subtotal :</u>				<u>15000</u>
	Fixtures and Elect Installation				
	Storage racks	LS	1	5000	5000
	Other Furniture	LS	1	10000	10000
	Telephones/ Computer	LS	1	25000	25000
	Electrical Installation	LS	1	15000	15000
	<u>subtotal :</u>				<u>55000</u>
	Other Assets/ Preliminary and Preoperative Expenses	LS	1	25000	25000
	TOTAL PLANT MACHINERY COST				272000

All the machines and equipment are available from local manufacturers. The entrepreneur needs to ensure proper selection of product mix and proper type of machines and tooling to have modern and flexible designs. It may be worthwhile to look at reconditioned imported machines, dies and tooling. Some of the machinery and dies and tooling suppliers are listed here below:

1. Ace Tech Tools Private Limited
New No. 217, Old No. 95,
Lake View Road West Mambalam,
Chennai-600033, Tamil Nadu, India

2. Naugara Exports
6148/6, Guru Nanak Marg,
Ambala Cantt, Haryana,

3. Swan Machine Tools Private Limited
Krupal ShahMenit House,
Kadia Kui, Relief Road, Ahmedabad - 380001

4. Shalimar Enterprises
Near Bal Bhavan,
Khokhara Maninagar East,
Ahmedabad-380008, Gujarat, India

5. Seallence
No. 3, Nanjappa Layout,
Near Aiyappa Temple Road,
Off. JC Industrial Area,
Kanakapura Main Road, Konanakunte,
Bengaluru-560062, Karnataka, India

6. Om Industries
Plot No. 1-A, Pt. Kishori Lal Complex,
Wazirpur Road Naher Par,
Faridabad-121002, Haryana, India

14. PROFITABILITY CALCULATIONS:

Sr	Particulars	UOM	Year Wise estimates
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No							
			Year 1	Year 2	Year 3	Year 4	Year 5
1	Capacity Utilization	%	40	50	60	70	80
2	Sales	Rs Lakhs	12.00	15.00	18.00	21.00	24.00
3	Raw Materials & Other Direct Inputs	Rs Lakhs	5.93	7.41	8.89	10.38	11.86
4	Gross Margin	Rs Lakhs	6.07	7.59	9.11	10.62	12.14
5	Overheads Except Interest	Rs Lakhs	3.02	3.02	3.02	3.02	3.02
6	Interest	Rs Lakhs	0.29	0.29	0.29	0.29	0.29
7	Depreciation	Rs Lakhs	0.33	0.33	0.33	0.33	0.33
8	Net Profit Before Tax	Rs Lakhs	2.44	3.96	5.48	6.99	8.51

The basis of profitability calculation:

Unit will have capacity of 2000 nos per year of motor rewinding and repair of various sizes and ratings with average copper coil weight of 2 Kg/ motor. The sale price is taken from Rs. 900 to Rs 5000 or more per motor unit. The material requirements are copper winding wire, varnish, insulation tapes/ filler etc. The cost of winding wires cost in range of Rs 450 per Kg to Rs 600 per kg and varnish costs from 150 to 300 per liter. Other items like cables, insulation tapes etc. are bought out at market rates. The unit may generate scrap of burnt copper winding etc. which is to be sold at @ Rs 300 ~ 400 per Kg. The income of same is added. Consumables costs also considered based on prevailing rate. Energy Costs are considered at Rs 7 per Kwh. The depreciation of plant is taken at 10 % and Interest costs are taken at 14 to 15 % depending on type of industry.

15. BREAK EVEN ANALYSIS

The project is can reach break-even capacity at 42.72 % of the installed capacity as depicted here below:

Sr No	Particulars	UOM	Value
1	Sales at Full Capacity	Rs Lakhs	30.00
2	Variable Costs	Rs Lakhs	14.82
3	Fixed Cost incl. Interest	Rs Lakhs	3.63
4	Break Even Capacity	% of Inst Capacity	23.92

16. STATUTORY/ GOVERNMENT APPROVALS

The unit will require state industry unit registration with District Industry center. No other procedures are involved. For export, IEC Code and local authority clearances. The industry registration and approval for factory plan, safety etc. is required as per factory inspectorate and labor laws. Other registration are as per Labor laws are ESI, PF etc. Before starting, GST registration will be required for procurement of materials as also for sale of goods. As such there is no pollution control registration requirement, however the unit will have to ensure safe environment through installation of chimney etc. as per rules. Solid waste disposal shall have to meet the required norms. Entrepreneur may contact State Pollution Control Board where ever it is applicable.

17. BACKWARD AND FORWARD INTEGRATION

The machines and equipment offer scope for little diversification scope in repair and resale of scrapped to micro motors of computer peripherals and Automobiles/ etc. where used for automation. As such there is not much scope for organic backward or forward integration. The entrepreneur needs to ensure proper skills and knowledge is obtained for each of motor designs and also be careful in maintaining product parameters in terms of wire gauges, dimensions, tolerances and geometric profiles along with final weights of products. The workshop business needs building up reputation, ensuring reliability and quality of services rendered. Also personal rapport of key persons can generate good business volumes from OEM units and ancillary component unit. The location

with good catchment area ensures good market potential to new business units.

18. TRAINING CENTERS/COURSES

There are no specific training centers for product technology. The Prototype Development Centers can provide some assistance for precision machining, Tools development, etc. Other centers of excellence viz Indo German Tool Room at Ahmedabad, Rajkot, Chennai, etc. shall be helpful. The most important scope of learning is in product design and development by study of the new product designs, product range, features and specifications of leading Brands / competitors across the world by scanning the Internet and downloading data from websites.

Udyamimitra portal (link: www.udyamimitra.in) can also be accessed for hand-holding services viz. application filling / project report preparation, EDP, financial Training, Skill Development, mentoring etc.

Entrepreneurship program helps to run business successfully is also available from Institutes like Entrepreneurship Development Institute of India (EDII) and its affiliates.

Disclaimer:

Only few machine manufacturers are mentioned in the profile, although many machine manufacturers are available in the market. The addresses given for machinery manufacturers have been taken from reliable sources, to the best of knowledge and contacts. However, no responsibility is admitted, in case any inadvertent error or incorrectness is noticed therein. Further the same have been given by way of information only and do not carry any recommendation.

Source:- Udyami Mitra/Sidbi