Business Setup for LED Lighting Assembly

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Light-emitting diodes (LEDs) are semiconductor devices that emit visible light when electric current passes through them. Compared to conventional lighting systems, these are smaller, have a longer operating life and involve a lower cost of ownership. Available in a wide range of colours, LED light bulbs are more durable and offer comparable or better light quality than other types of lighting.

Residential LED lights, especially Energy Star rated products, consume at least 75 per cent less energy and last 25 times longer than incandescent lights. These also use significantly less power—a typical 84-watt fluorescent light can be replaced with a 36-watt LED to give the same level of light output.

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Full-scale LED light manufacturing requires setting up of a large-scale factory with a complex production process. However, it is possible for small-scale entrepreneurs to set up LED light assembly units as a small- or medium-scale manufacturing operation.

TABLE I
TOTAL FIXED CAPITAL

1. MACHINERY AND EQUIPMENT COST

Description	Quantity	Value (₹)
Component forming machine	2	100,000
Soldering machine	10	5000
Digital multimeter	2	8000
Continuity tester	10	1000
Sealing machine	1	10,000
Packaging machine	1	15,000
LCR meter	2	20,000
Small drilling machine	1	10,000
Lux meter	1	40,000
Oscilloscope	1	60,000
Personnel computer with UPS and printer	1	80,000
Miscellaneous items	–	10,000
Total	–	**359,000**

2. OTHER FIXED ASSETS

Description	Value (₹)
Electrification charges @ 10 per cent of machinery cost	35,900
Office equipment, furniture and working tables, etc	20,000
Tools, jigs and fixtures	20,000
Pre-operative expenses	5000
Miscellaneous items	5000
Total	**85,900**
Total fixed capital (1+2)	**444,900**

Process

1. LED-based lighting system cum LED lamp assembly consists of the following steps:
2. Procure/import mill watt-rated LED chips, circuit and other mounting devices
3. Embed mill watt-rated LED chips on the PCB board with the rectifier circuit, filter circuit, etc
4. Fit the PCB board with a holder cap and plastic modules fitted with Smokey reflector to form a compact unit
5. Test the assembled LED lighting system and package

Raw materials

For assembly of LED-based lighting systems up to 10W you may require:

1. LED chips
2. Rectifier circuit with filter
3. Heat-sink devices
4. Metallic cap holder
5. Plastic body
6. Reflector plastic glass
7. Connecting wire
8. Soldering flux
9. Miscellaneous items
10. Packaging material

Equipment required

LED light manufacturing or assembly is a complex process. Machines need to be selected on the basis of the specific LED type that is being produced and the raw material being used. However, major machines include:

1. LED PCB assembly machine
2. LED lights assembly machine
3. High-speed LED mounting machine
4. LED chip SMD mounting machine
5. Candlelight assembly machine for LED
6. LED tube light assembly machine

Other equipment that may be required:

1. Soldering machine
2. Sealing machine
3. Small drilling machine
4. Packaging machine
5. LCR meter
6. Digital multi meter
7. Continuity tester
8. Lux meter
9. Oscilloscope

TABLE II
WORKING CAPITAL PER MONTH

1. STAFF AND LABOUR

Description	No. of persons	Salary per month (₹)	Total salary per month (₹)
Supervisor cum manager	1	25,000	25,000
Skilled worker	5	18,000	90,000
Accountant	1	22,000	22,000
Total	–	–	**137,000**

2. RAW MATERIALS

Description	Quantity	Rate	Value (₹)
LED chips	45,000	4	180,000
Rectifier circuit with filter	3750	20	75,000
Heat-sink devices	3750	5	18,750
Metallic cap holder	3750	10	37,500
Plastic body	3750	10	37,500
Reflector plastic glass	3750	10	37,500
Connecting wire	–	–	5000
Soldering flux	–	–	5000
Miscellaneous	–	–	10,000
Packaging material	–	–	10,000
Total	–	–	**416,250**

3. UTILITIES

Description	Value (₹)
Power	3000
Water	500
Total	**3500**

4. OTHER EXPENSES

Description	Value (₹)
Rent	10,000
Postage and stationery	500
Telephone/fax	2000
Repair and maintenance	1000
Transport and conveyance charges	1500
Advertising and publicity	1000
Insurance and taxes	1000
Miscellaneous expenditure	1000
Total	**18,000**
Total recurring expenditure per month (1+2+3+4)	**574,750**

Pollution control requirements

The following steps may help to control pollution wherever applicable:

1. Fumes and gases are released during hand soldering/wave soldering/dip soldering, which are harmful to people as well as the environment and end products. Alternative technologies may be used to phase-out the existing polluting technologies. Numerous new fluxes have been developed, which contain 2-10 per cent solids as opposed to the traditional 15-35 per cent solids.
2. CFCs, carbon tetrachloride and methyl chloroform are used 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 compounds such as trichloroethylene, per chloroethylene and methylene chloride have been used as effective cleaners in the electronics industry for many years. Other organic solvents such as ketenes and alcohols are effective in removing both solder fluxes and many polar contaminants.

TABLE III
PRODUCTION COST PER ANNUM

Description	Value (₹)
Total recurrent expenditure	6,897,000
Depreciation on machinery and equipment@10 per cent	35,900
Depreciation on tools, jigs and fixtures @25 per cent	5000
Depreciation on office equipment and furniture @ 20 per cent	4000
Interest on total capital investment @ 13 per cent	240,259
Total	**7,182,159**

TABLE IV
TURNOVER PER ANNUM

Item	Quantity	Unit price	Total value (₹)
LED lamp	50,000	175	8,750,000

LED light manufacturing business registration

The entrepreneur needs to obtain following registrations and licences from government authorities:

1. Company registration with ROC
2. Trade licence from municipal authority
3. Udyog Aadhaar MSME registration
4. BIS certification
5. Bureau of Energy Efficiency certification
6. NOC from Pollution Control Board
7. GST registration

However, specific licence and registration requirements will depend on the manufacturing process and the type of LED light that is being produced.

Disclaimer

1. The project profile may change for individual entrepreneurship qualities/ capacity, production programme and also location characteristics, wherever applicable.
2. On an average, the margin money recommended is 25 per cent of the working capital requirement. However, the percentage of margin money may vary at the bank's discretion.

Business economics

Under Modified Special Incentive Package Scheme (M-SIPS), the Indian government provides a special incentive package to promote large-scale manufacturing in the electronic system design and manufacturing (ESDM) sector. This scheme was amended on August 3, 2015. Salient amendments to the scheme include:

1. The term of the scheme has been extended up to 27-07-2020.
2. The scope of the scheme has been extended to cover additional verticals.
3. The procedure for grant of approval has been simplified and streamlined.

Incentives are now available for investments made in a project within a period of 10 years from the date of application.

Land and building

1. Built-up area: 280sq.m (3000sq.ft) office
2. Store: 93sq.m (1000sq.ft)
3. Assembly and testing: 185sq.m (2000sq.ft)
4. Rent payable per month: ₹ 10,000

Financial analysis

- Profit per annum (before taxes) = Turnover per annum–Production cost per annum= ₹1,567,841
- Net profit ratio=(Profit per annum)×100/(Sales per annum)
- Rate of return=(Profit per annum) ×100/(Total capital investment)
- Breakeven point.
- Breakeven point=(Fixed cost) ×100/(Fixed cost + Profit)

References

1. http://muvsi.in/led-light-manufacturing-small-scale/
2. http://meity.gov.in/esdm/incentive-schemes
3. http://www.dcmsme.gov.in/reports/electronic/Project per cent20profile per cent20on per cent20LED per cent20based per cent20Lighting per cent20System.pdf

https://www.electronicsb2b.com/important-sectors/leds-led-lighting/business-setup-led-lighting-assembly/

meity.gov.in/esdm/incentive-scemes

dcmsme.gov.in/reports/electronic/