



GREEN SKILL DEVELOPMENT PROGRAMME (GSDP)

Report on Course :

Certified Laboratory Technicians /Technical Assistants
for Electrical Testing for Environmental Criteria

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT,
FOREST AND CLIMATE CHANGE (MoEF&CC),
NEW DELHI



Laboratory Technicians /Technical Assistants for Energy Efficiency, Star Labeling and Other Electrical Testing for Environmental Criteria

Shweta Mahajan

Training In Charge and General Manager - Electrical
Consumer Education and Research Centre, Ahmedabad.

Green skills for electrical engineering are inseparable because energy efficiency skills and renewable energy skills helps in achieving sustainable development goals and thus contribute to the environmental preservation. Our curriculum is oriented towards environmental sustainability.

In our training programme of 264 hrs, we are providing knowledge about minimizing energy consumption, reducing greenhouse gases and also providing hands on training for developing self-motivation to preserve natural resources for lowering carbon foot prints. The aim of this programme is to produce competent engineers and technicians who can understand and practice green skills and later contribute to the development and utilization of energy that is more environmentally friendly.

By acquiring knowledge on skills to design and adopt technologies, products and processes to improve climate resilience candidates become competent to take energy efficiency measures at household and also at industry level.

Selection of Candidates:

An advertisement for the training course was given in the newspaper, on website and all other social media platforms. A total of 139 applications were received for this course. Candidates with relevant qualifications were shortlisted and final interviews were conducted by selection committee (offline and also through e-platforms). The candidates were selected based on their technical & core capabilities.



GREEN SKILL DEVELOPMENT PROGRAMME
Government of India
Ministry of Environment Forests and Climate Change, (MoEF&CC)
CERC-ENVIS Resource Partner, Ahmedabad

In line with the Skill India Mission of Hon'ble Prime Minister, Ministry of Environment, Forest & Climate Change (MoEF&CC) took up an initiative for skill development in the environment and forest sector to empower India's youth. The programme endeavours to develop green skilled workers. CERC being a Resource Partner of ENVIS (Environment Information System) is offering a Free certificate course to upgrade the skill sets and enhance the employability of the aspirants.

The certificate course offered by CERC-ENVIS RP is:
"Laboratory Technicians / Technical Assistants for Energy Efficiency, Star Labeling and other Electrical Testing for Environmental Criteria"

Minimum Educational Qualification:
ITI (Electrician, Turner/Machinist)/
Diploma/Degree (Electrical, Mechanical)

It is a two-month certificate course(Max 264 hrs) with FREE Training, Boarding and lodging. The Course module comprises of Classroom Lectures, Practical Training, Field Visits, Entrepreneurship sessions, Assessment and Related Exercises.

How to Apply:
Apply online at: <http://www.gsdp-envis.gov.in/Default3.aspx>
Mail the application to: cerc-env@nic.in, cerc@cercindia.org
For any other details contact: Ms. Divya Namboshiri, Ms. Mayuri Tank
Ms. Apelksha Sharma 079-68181600/28/29

Selection of Candidates:
Mode of selection is based on written test and interview

Evaluation and Assessment:
The candidates will be assessed and evaluated based on their written and practical examination. They will also be graded based on their respective field reports, Journals, performance in their viva voce and individual excellence in performing relevant test with interpretation of standards.

Certificate felicitation:
Certificates will be issued to all trainees after successful completion of course.



Ministry of Environment, Forest &
Climate Change certified free course on

"Laboratory Technicians / Assistants for Energy Efficiency, Star Labeling and other Electrical Testing for Environmental Criteria".

Boarding & Lodging free for out-station candidates

Course offered by CERC-ENVIS Ahmedabad, supported by Ministry of Environment Forest and Climate Change, Government of India to empower youth to get gainful employment and/or self-employment. Unemployed youth seeking employment opportunities will be preferred.

QUALIFICATION :
ITI (Electrician/ Turner/ Machinist) and Diploma / Degree - Electrical, Mechanical

DURATION : 2 months

Apply before 12-03-2022
at <http://www.gsdp-envis.gov.in/Default3.aspx>
Website : www.cercenvis.nic.in
Email Id: cerc-env@nic.in, cerc@cercindia.org

CERC
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CONSUMER EDUCATION AND RESEARCH CENTER A/BAD
Contact no : 079-68181600/28/29

Inauguration of the Training programme:

Inauguration ceremony was held at conference hall of CERC on 7th of February, 2022. The ceremony was started with a welcoming address by Shri UdayMawani, CEO & Board Secretary, CERC. Chief Guest of the programme, Dr. Ashoka Ghosh, Advisory Member CERC-ENVIS addressed the participants through e –platform about the structure of GSDP and its benefits, green skills and Sustainable Development Goals. She motivated students and encouraged them to contribute to the sustainable future. Ms. Divya Namboothiri, Programme Officer CERC ENVIS briefed students about the activities taken under ENVIS project at CERC and the importance of eco-labeling and eco-friendly products. Ms. Shweta Mahajan, GM, Electrical & Course-In charge addressed students on the importance and advantages of acquiring green skills with technical skills through this course. The candidates were also given an orientation on the vision of CERC by the department heads.



Training:

Duration of training programme was from 07/02/2022 to 05/04/2022.

All Trainees were given bags with course material containing training manual, screw driver set, safety helmets, stationary items, mask and a sanitizer. The Training Manual covers topic like introduction of laboratory tools required for preparation of test setup, introduction of instruments and equipments required for performing testing, consumables required during testing, knowledge on calibration of instruments, inspection of test system, primary maintenance & standardized formats for keeping records of every analysis including intermediate checks/cross verifications. It also covers mandatory safety requirements for electrical testing & laboratory operations and quality system for laboratory accreditation with simplified test procedures.

In the Manual, concepts of star labeling criteria and eco-friendly practices adopted by the industry for sustainable future are simplified with methods of identifying eco-friendly star labeled electrical products, details on electrical products covered under energy star labeling criteria by Bureau of Energy efficiency, testing techniques for environmental criteria, green skills for sustainable development with tips & habits to be cultivated to save energy to contribute towards global challenges of climate change. Another Manual on cleaner production and waste minimization was provided to the trainees by Gujarat Cleaner Production Centre, fellow ENVIS, and Resource Partner Gandhinagar.

Major topics covered:

The Curriculum is designed taking into account the expectations industry has from job seekers. Suggestions were taken from industry experts & subject experts to make it comprehensive, which covers a broad category of competence levels in terms of professional knowledge, professional skills, core skills, responsibility and process.

1. Mandatory Safety requirements for electrical products testing laboratory,
2. Quality system and Technical requirements,
3. Relevant test methods in details for conformity assessment,
4. Methods of identifying eco-friendly star labeled electrical products,
5. Details on electrical products covered under energy star labeling criteria by Bureau of Energy efficiency, Testing techniques for environmental criteria,
6. Green Skills for sustainable development with tips & habits to be cultivated to save energy cost to contribute towards global challenges of climate change.
7. Process of manufacturing of energy efficient motors for submersible pump sets, calculation of losses and finding efficiency.
8. Environmental pollution due to noise created by electrical products, home appliances and accessories.
9. Measurement of noise & methods of reduction of noise.
10. Green practices observed by manufacturers.
11. Recent trends in electrical machines.
12. Renewable energy products for green future (Types & basics)

**Hands on training on Electrical products and Home appliances:
Ms. Shweta Mahajan**

Practical training was systematically carried out according to the topics lined out in the course module. Candidates were given exposure to the tests for Sound level measurement, air flow measurement, energy consumption and derivations for star label with demonstration on electrical products; LED lamps, LED fluorescent tubes, LED night lamps, star rated fans, fan regulators, exhaust fans, fresh air fans, refrigerators, hand blenders, mixers/grinders & food processors.

Candidates gained clear knowledge on how reduction in power consumption causes reduction in demand of power and automatically reduces demand for fossil fuels (coal) which helps in reduction in carbon foot prints. Thus, clear understanding was given on natural philosophy of engineering including mathematical and scientific knowledge constituting the pure theory of engineering operations and philosophy of maintenance & attitude.

Demonstrations on testing of Submersible Pump sets.

Candidates were explained about the methodology of interpretation of Indian standards on submersible pump sets with other relevant references of main specification and amendments. They were introduced to test systems, equipments, instruments & test setup required for performing the tests. They were made well versed with instrumental analysis to obtain quantitative scientific data, spread sheets and graphs. They were given exposure to sequential type tests & D-section of products.

Internal and external faculty members:

Following Internal & External faculty members/experts have made the training programme interesting and successful with their presentations.

Internal Faculty:

Ms. Shweta Mahajan, Training In Charge and General Manager - Electrical
Mr. Jigar Dodiya, Assistant Engineer (Electrical)

External Faculty:

1. Mr. Mihir Vasavada (Subject expert)
Topic: Energy Efficient Machines (Latest trends)
2. Mr. G.T. Panchal (Industry Expert)
Topic: Power losses in motors
3. Mr. Govind Zala (Industry Expert-for demonstrations)
Topic: Testing techniques for measurement of energy efficiency of pump sets
4. Mr. Arvind Sotha (Industry Expert-for demonstrations)
Topic: Demonstration on tests as per IS 8034, IS9283 and IS11348.
5. Dr. Bharat Jain, Member Secretary GCPC and Project coordinator, GCPC ENVIS RP
Topic: Cleaner Production, Waste minimization & Greener Production
6. Mr. Hiren Seth (Startup)
Topic: start up on Product sustainability
7. Mr. Atul Shah (Subject expert)
Topic: Renewable energy - practical approach

8. Mr. Dharmendra Panchal (Industry Expert)
Topic: Modern CNC machines for energy efficiency in Industries.

Faculty members invited to give exposure to entrepreneurship:

1. Mr. Kashyap Vaccharajani,
Topic: Finance and banking for entrepreneurs.
2. Mr. Chandramauli Pathak, Entrepreneurship Development
Topic: Entrepreneurship and small business startups.



Practical Session:





Field Visits/Industrial Exposure:

- Visit to JK Lakshmi Cement Limited
- Visit to Mascot Pumps Limited
- Visit to Indo-German Tool Room
- Visit to BIS, Ahmedabad.
- Visit to Umiya Industries
- Visit to iHub Centre, LD Engineering College, Ahmedabad
- Visit to Innovation and start up centre of Gujarat Technological University, GISC centre, Ahmedabad.

J.K Lakshmi Cement Ltd, Kalol, Gandhinagar

Objective of the visit- to get the exposure on the green practices implemented in the factory. Producing cement is an energy intensive process where supply and efficiency becomes the key business drivers. Due to high energy requirement of clinkerisation and associated processes in cement production, the contribution of the cost of energy is a large part of the production cost of cement.



J.K. Lakshmi Cement Ltd has been recognized through awards such as CII industrial innovation award, make in India award for excellence and energy efficient unit award. This plant at present meets 30% to 32% of its energy needs from renewable energy, and it intends to increase this to about 60% to 66% over the next 3 years. J. K. Lakshmi cement ltd is progressing their fight against climate change by continually tweaking their manufacturing process. They are working on increasing the capacity of their internal renewable energy generation. Their commitment to sustainability is not limited to their main line of business, e.g. Cement (OPC & PPC) but it also extends to all other products, mainly value added products. Their foray into manufacturing and marketing of AAC blocks and replacement for red clay bricks was one such step. These AAC blocks are natural replacement of resources intensive red clay bricks and these not only conserve the resource consumption at the time of production but also save on energy and material costs for the entire life cycle of the building in which they have been used.

J.K Lakshmi Cement Ltd plant is also at the forefront of utilizing industrial waste such as fly ash, blast surface slag, chemical gypsum etc. in their products without sacrificing quality. J.K Lakshmi Cement Ltd is one of the most water efficient unit. All their units are water responsible and have implemented various innovating rainwater harvesting systems with storage water tank of 6 lac liter capacity which is used in cooling tower. Recycled water is used after treatment in most places. They have 1.5 KW windmill capacity (In house) and solar capacity of 500Kw (In house) with photovoltaic modules of poly crystalline, accuracy of 0.25 (L & T solar meter), Capacity of each photovoltaic module is 320 wp (Total modules = 1561 with delta inverter).



Their annual GHG emission reduction is 8, 15, 649 Kg of CO₂. They have planted 7618 trees with survival rate of 70% (bamboo, neem, gulmohar which require less water). Opacity monitor is installed on the gate which is digitally connected to GPCB and CPCB. It shows the SPM level throughout the day & night.



We observed 2.7mg/Nm³ (Required value is 30 mg/Nm³ max). They also have built greenhouse for vermi composting (paper waste and tree leaves). Waste food notice is kept in canteen to monitor and recycle the



wasted food. Their grinding unit plants at Kalol and Surat are 100% LED based plants. They also have E- Vehicle charging station. They have developed auto truck loader and automatic bag placer suitable for PP bags at Kalol Unit. The national and international standards implemented the plant are IS 9001, ISO 14001, ISO 50001, ISO 18001, ISO 14064-1 and NABL.

Their Focus area include reducing specific energy consumption, Increasing use of renewable energy in our total energy consumption, managing their water foot print and water conservation efforts, water Management and circular economy, tracking and monitoring of GHG emissions to combat climate change and effective use of land. J.K Lakshmi Cement Ltd. Is a company with lowest carbon foot print in terms of kgs of CO₂ equivalent to per ton of clinker and rupee of revenue. Thus JK Lakshmi Cement Ltd practices sustainability by striking the right balance between the planet, the people and the profit.

Visit to Mascot Pumps Ltd.

Main product of Mascot Pumps Ltd is stainless steel (SS-304) fabricated vertical pumps. They have motor manufacturing unit in GIDC area near Nana Chiloda and pumps manufacturing unit at Sarkari Vasahat area in Nana Chiloda.

We were informed that currently they are manufacturing ten to fifteen models of V4, V6, V8 & V10 categories up to 10 hp. Expected life of their pumps is 4 years. They are manufacturing both types of pumps, regular pumps and solar pumps. They have designed their pumps to start and work even at low supply voltage and to provide high discharge.

They manufacture pumps as per customer requirement. So far they have manufactured pumps from 3 stages to 90 stages with head range from 30m to 130m & 73 liters discharge. They focus on axial play of pumps as per NEEMA standard. Ms. Vishal Patel explained us the manufacturing processes at the pump factory. He showed us a store with a storage capacity of about 400 components/pieces/parts of pumps.



He informed that they are following 5S system of safety (sort, set in order, shine, standardize, sustain). They are assembling the pump by using fixing plate. Procedure used for assembling the pump is bowl with strainer at the first stage. Impellers are fitted with casing on pump shaft in second stage. Then allen key, bolt, shaft sleeve & locking is done. NRV (non-return valve) is fitted to avoid air to pass through the pump & to avoid the water to return. Pump fixtures are used to assemble the pump to maintain proper axial play.

Complete manufacturing process of impeller was shown & explained. For making impellers, round S.S sheet is molded into a shape of cup with the help of molding machine (200 tons capacity). Then opening is made in this cup to fit the bush in the neck ring. Then threading is done in the bowl. Strips are mounted around the impeller stages near neck ring and a solution is applied around each impeller stage to avoid the leakage. Bowl & impeller gap is fitted by vane. This vane is prepared with spot welding. Impellers rotate with speed of motor.

Projection welding process is used to form one complete part from neck ring, Impeller vane, sleeve & bottom. CNC machines are used for majority of the manufacturing processes in the factory. Rent of using CNC machines was Rs. 10,000/- per hour earlier but now it is Rs.300/hr. CNC machines are now affordable. Hence for precision and perfection in machining CNC machines are used. Some examples of custom made pumps are 75 stages, high discharge pumps. They are exporting pumps to Dubai, Oman, Egypt, Kuwait, Irac etc.

Visit to Umiya Industries

Objective of the visit was to learn about the CNC machines (Computer numerical Control) widely used by Industries for precise machining on components used in energy efficient products. Now a day these machines are fundamental part of modern manufacturing. CNC machines are automated machines, which are operated and controlled by computers. These machines provide a level of efficiency, accuracy and consistency that would not be impossible to achieve through a manual process.



These are used in the manufacturing industry for producing rectangular, square, rounded and even threaded jobs. These machines can control and carry out all processes, including milling, grinding, turning, boring & reaming, among others, using specific machine tools for each task. Advantages of using CNC machines are precise processing, increased production speed and efficiency & possibility of repeating the same function.

CNC operators are required to know the appropriate codes & instructions and how to use them. The energy efficient CNC, Datron M7 with 1.8 K watt spindle, draws approximately 1.0 Kwh. Major part of CNC machines are Input device, Machine control unit (MCU), Machine Tools, Driving System, Feedback System, Display unit, Bed, Headstock

A CNC machine processes a piece of material (metal, plastic, wood, ceramic or composite) to meet specifications by coded programmed instructions. Instructions to perform the operation are delivered to a CNC machines in the form of sequential programme of machine control instructions such as G-code and M-code.

The programme can be written by a person or far more often, generated by graphical computer – aided design (CAD) or computer-aided manufacturing (CAM) software. M code is a part of language used to give input instructions to CNC machines. G-code guides the machine to move in a line of process. G code & M code work together for positioning a work piece & guiding the machine actions. M - Codes are used to instruct the machine to change tools, turn on the spindle, load coolant, or open and close the function.

In the case of 3D printers, the part to be printed is sliced before the instructions (or the program)



are generated. 3D printers also use G code. The part's mechanical dimensions are defined using CAD Software and then translated into manufacturing directives by Computer aided manufacturing (CAM) software. The resulting directives are transformed (by “post processor” software) into the specific commands necessary for a particular machine to produce the components and then are loaded into the CNC machine. The series of steps needed to produce any part is highly automated and produces a part that closely matches the original CAD drawing.

In the factory, Isometric drawing was shown on paper and job was to be prepared on CNC machine. G-codes are used to command specific movements of the machine, such as machine moves or drilling functions. The format for a G-code is the letter G followed by two or three digits. For example; G00 Rapid motion positioning, G01 Linear interpolation motion, G02 circular interpolation motion-clockwise. M –Codes are miscellaneous machine command that do not command axis motion. The format for an M-code is the letter M followed by two or three digits. Examples are, M00 = stop the programme, M01= optional programme stop, M02 = end of

programme, M03 = Start spindle – clockwise, M04 = start spindle – backward, M06 = Coolant on, M07 = Coolant off, M08 = Tool change, M09 = Chuck open, M10 = Chuck close, M99 = end of programme.

Use of this M code varies from machine to machine. For smooth operation on product programming should be done accurately with correct speeds & feeds. During visit, a complete job was made for ball bearing housing of induction motor by using shield machining on turning CNC machine with an accuracy of 0.01. Bearing housing support the bearing, protect them from contaminants while keeping in lubricant, and can also house monitoring equipment. They provide customizable mounted bearing solutions and help maximize performance, service life and cost efficient maintenance of the incorporated bearing.



Visit to Indo German Tool Room

Indo German Tool Room has different sections like production, planning, quality control, CNC machining, precision machining, surface grinding etc. Mould & Dies of different types (made from metal, PVC & PP) prepared with injection molding were shown to candidates. Parts and components used in RO, Compressor, Fans were also shown. They have many CNC machines made in Germany (HAAS, 20 hp, vector dual drive, 1000 lpm) which can work on 5 axis like CNC turn mill, CNC milling etc.

CNC milling machine (BMV-60) can process sheets by size. They also have Robofil 290 machine. This is used for cutting of wire with 0.6 mm diameter & 0.25 mm diameter. Their quality control department has standard gauges (Many gauges of known diameter, profile projector, threads, angles, height master machine) Vernier caliper, depth vernier & gauges depth Micrometer, bevel protector & length bar, sine bar, plunger dial, bare gauges slip gauges, ring gauges, CMM machines to check the correctness of size of job & coordinate with the measuring machine.



Their milling machines (imported from Zeiss, Germany) were useful to find the incorrectness in dimensions of job. They also have a VMC training department, console lab for lathe & milling. They are running various job oriented training programmes (free of cost for SC/ST candidates). Candidates were shown injection molding section. Molded plastic mugs & buckets were under production. Plastic (PU) pads were used under the machine to decrease the vibrations. They also have 3D printers. Their Robotics dept has robots which are controlled by cameras. They can precision drilling.

Career counseling and placement of candidates

Career counseling sessions were held on professionalism and ethics, interpersonal interactions, quality consciousness, accountability and needs of industry for competence levels with

professional skills and leadership qualities. For giving opportunities and experience of company interviews, HR departments of companies such as LA-GAJJAR machineries Pvt. Ltd. Ahmedabad, Waterman industries Pvt. Ltd, Changodar, Solance Batteries, AmulFED Dairy, MBH Pumps Pvt Ltd, Nirmal Energy Pvt Ltd, Solar Industry, Vadodara, Solar Industry, Gandhinagar, Soleos Solar Power Ltd, Science city, MSEB, Ordnance factory, NTPC, Solar Panel Plant, Mundra.

With our placement efforts, we were successful in giving job opportunities to the following candidates during the last week of training:

- Mr.Tarun Makwana joined Perfect Automation and Innovation as Production Technician
- Mr. Mukit Akhunji joined LA-GAJJAR Machineries Pvt. Ltd. as Trainee - Apprentice, Maintenance Department at SS Division.

Final evaluation of trained candidates

Final evaluation of Trainees was made on the basis of assessment criteria for level 6 NSQF qualifications. Candidates were evaluated for competency on the basis of everyday interactions with them on learning capabilities, ability for working in groups, capacity of performing the tests independently and presentation of conclusion of test results with remarks. Successful Trainees were awarded with certificates during the valedictory function held at Hotel Page One.

Valedictory Function

The ceremony started with a welcoming address by Shri UdayMawani, CEO & Board Secretary, CERC.Valedictory speech was given by Shri Praful Amin, Chairmen CERC. The Chief Guest of the day was Shri Kalpit Gandhi, Director and CFO, Vadilal Industries Ltd. The Guest of honor was Shri Sumit Sengar, Head, BIS Ahmedabad. The Key note address was given by Ms, Sukanya Pondugala, Asst director FSSAI, Western region.



Ms. Shweta Mahajan, General Manager Electrical & Course In charge had given highlights on Electrical courses successfully conducted during last 3 years with placement details of candidates. Ms. Dipika Chauhan Project head CERC and Director Parishil Laboratory has given details on food course. Ms.Anindita Mehta, ENVIS coordinator and CGM CERC has given speech on GSDP 2022 new dimensions and way forward. Vote of thanks were delivered by Ms. Divya Namboothiri, Programme Officer CERC ENVIS. The entire event was anchored by Ms. Apeksha Sharma, Information Officer CERC ENVIS.



Feedback

I am Fenny Patel from Surat. Since I joined the GSDP Electrical course, I got to know more about electrical testing and how to calculate energy. I also enjoyed the expert lectures on startup. Hands on training were very informative and learnt new topics on energy resistance, electric shock test, measurement of eco parameters and sound level. Thank you so much for giving me this opportunity.

-Fenny Patel



After completing the GSDP course, I got to learn more about star labeling and energy efficiency. During the course many field visits were arranged to industries such as J.K Laxmi, Mascot pumps etc. After visiting these industries I realized that one can also run a successful business while saving the environment. The hands on training were very helpful in enhancing my practical knowledge. I thank the entire CERC team.

-Mukit Akhunji



I am Bhumesht Hatwar. I belong to a small town of Maharashtra. I got to know about this course from a friend of mine. The lectures delivered by the course in charge and the experts were very informative. The practicals were designed to enhance the knowledge on sustainability. The field visits were very insightful. Thanks to CERC and team for not only enhancing my knowledge but in also enhancing my confidence level. Thank you so much.

-Bhumesht Hatwar





Report Compiled by :

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