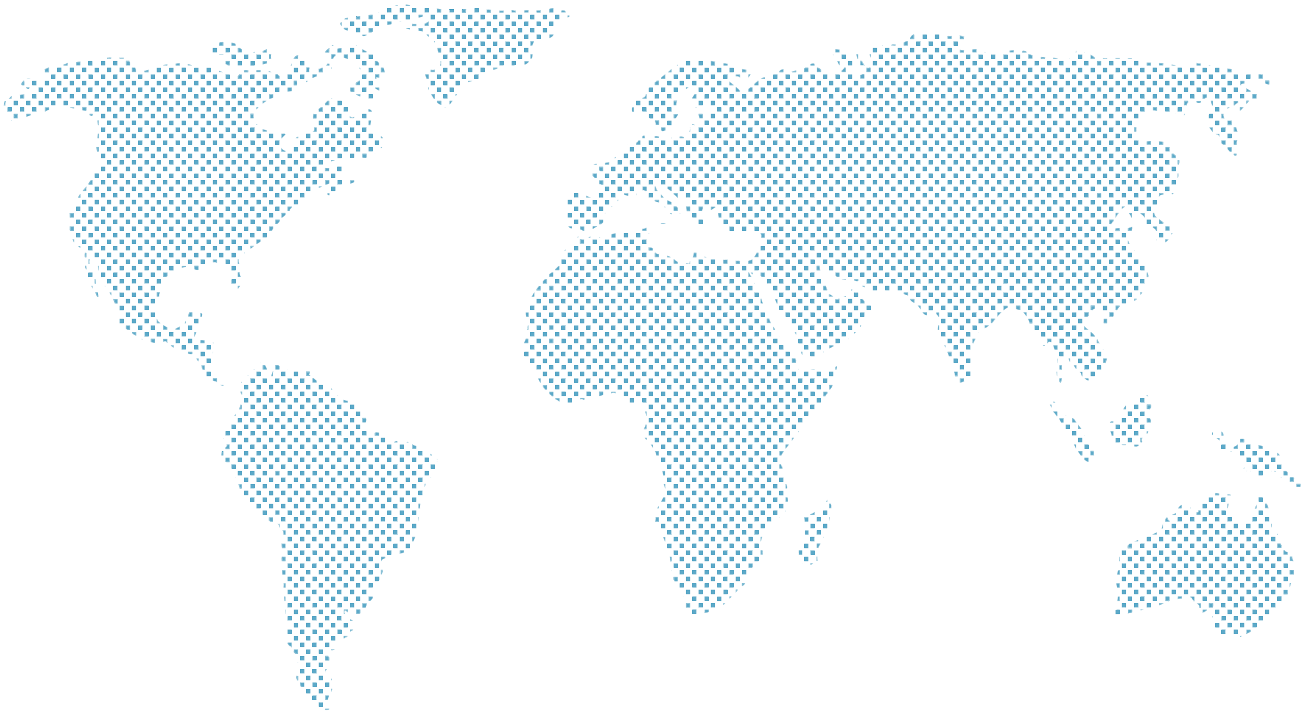
INTERNSHIP TRAINING REPORT M. Tech 3rd SEM (PED)

(Batch 2020-2022)

A one week (September 11th, 2021 - September 17th, 2021) Industrial Internship was organized for M. Tech 3rd Sem (Power Electronics & Drives) Electrical students of J C Bose University of Science& Technology, YMCA, Faridabad in collaboration with Alumni **of Electrical Department**. These aluminous are established entrepreneurs. The internship was planned to provide Industrial platform to students for their bright future in industry. **MOU's** have also been signed with two industries namely **Belz Instruments and Fuji Gemco.**



INTERNSHIP REPORT

A report submitted in partial fulfillment of the requirements for the award of the degree of

MASTER OF TECHNOLOGY

in

POWER ELECTRONICS AND DRIVES

Submitted by

(_____)

Under Supervision of Mr. Anil Bareja, MD, BAREJA SOLAR & PROJECTS PVT. LTD

(September 11th ,2021 - September 17th ,2021)

DEPARTMENT OF ELECTRICAL ENGINEERING

FACULTY OF ENGINEERING AND TECHNOLOGY

J.C. BOSE UNIVERSITY OF SCIENCE AND TECHNOLOGY, YMCA FARIDABAD, HARYANA-121006

SEPTEMBER, 2021

ACKNOWLEDGEMENT

First, I would like to thank Mr. Anil Bareja, Managing Director, BAREJA SOLAR & PROJECTS PVT. LTD. for giving me the opportunity to do an internship within the organization. I also would like all the people that worked along with me at BAREJA SOLAR & PROJECTS PVT. LTD, New Delhi with their patience and openness they created an enjoyable working environment. It is indeed with a great sense of pleasure and immense sense of gratitude that I acknowledge the help of these individuals. I am highly indebted to Chairperson Dr. Poonam Singhal and Program Coordinator Dr. Shakuntala Boora, for the facilities provided to accomplish this internship & I would like to thank them for their constructive criticism throughout my internship. I am extremely great full to my department staff members and friends who helped me in successful completion of this internship.

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INTERNSHIP OBJECTIVES

- Internships are generally thought of to be reserved for college students looking to gain experience in a particular field. However, a wide array of people can benefit from Training Internships in order to receive real world experience and develop their skills.

- An objective for this position should emphasize the skills you already possess in the area and your interest in learning more.

- Internships are utilized in a number of different career fields, including architecture, engineering, healthcare, economics, advertising and many more.

- Some internship is used to allow individuals to perform scientific research while others are specifically designed to allow people to gain first-hand experience working.

- Utilizing internships is a great way to build your resume and develop skills that can be emphasized in your resume for future jobs.

- When you are applying for a Training Internship, make sure to highlight any special skills or talents that can make you stand apart from the rest of the applicants so that you have an improved chance of landing the position.

WEEKLY OVERVIEW OF INTERNSHIP ACTIVITIES

DATE	DAY	ACTIVITY
11/09/2021	SATURDAY	INTRODUCTION
12/09/2021	SUNDAY	STRUCTURE ERECTION
13/09/2021	MONDAY	FOUNDATION
14/09/2021	TUESDAY	PANEL INSTALLATION
15/09/2021	WEDNESDAY	WIRING
16/09/2021	THURSDAY	INVERTER INSTALLATION
17/09/2021	FRIDAY	TESTING

INTRODUCTION

BAREJA SOLAR & PROJECTS PVT. LTD is a professionally managed company with years of industry experience in developing and delivering Enterprise solar solutions. Quality is the buzz word in today's world without which no organization can survive and flourish in this technology driven era.

It deals in industrial solar installation and commissioning firm which handles various projects in solar viz grid and storage type at Delhi – NCR, Haryana, Gujrat, etc.

It deals in estimation, inventory, installation & commissioning of the solar projects as and when required.

63 kW SOLAR PLANT (Actual Site)

We worked at the actual site at SR ELECTROSTEEL PRIVATE LIMITED, Z-64 OKHLA, NEW DELHI. Installed capacity of this plant is 63 KW.

There we learned about the various phases in installation and commissioning of the grid connected solar system viz. Foundation formation, Erection of support structure, Installation of solar panels, wiring them, Connecting them to the grid controller.

- **FOUNDATION FORMATION**

To make the foundation ready for the structure (Steel) four holes about 5”-7” had been drilled for each leg and tightened with wedge bolts.

WEDGE BOLTS

- **SUPPORT STRUCTURE ERECTION**

Steel structure has been erected to act as a base for panels which are to be mounted on them over a certain progressive height.

This structure keeps the panels intact to it & keeps them safe form thunderstorms, strong winds, vibrations, etc.

Hexa Steel bolts were used to tighten them.

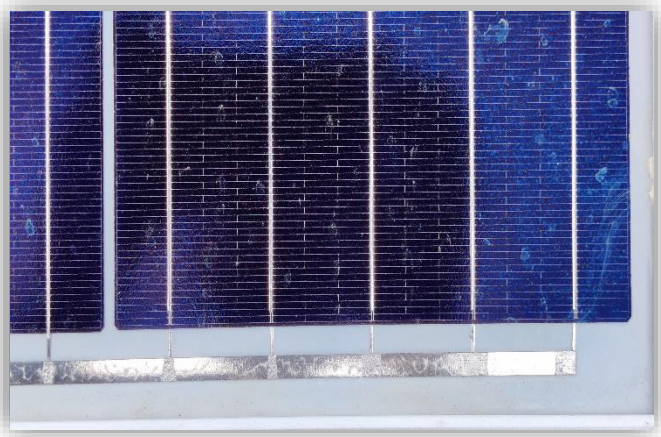
HEXA BOLTS

ERECTED STRUCTURE

- **SOLAR PANELS**

Solar panels are an array of solar cells connected in a string encased in the steel/aluminum frame with a toughened glass protection.

SOVA SOLAR panels had been fitted with ratings as provided below:



CELL ARRAY

For residential and commercial applications commonly two types of solar panels are used

- Monocrystalline solar panels
- Polycrystalline solar panels.

1. MONOCRYSTALLINE SOLAR PANELS

As the name suggests in monocrystalline solar panels, the solar cells are made up of single silicon crystal.

To make solar cells for monocrystalline solar panels, silicon is formed into cylindrical bars called as 'Silicon Ingot'. Then the silicon ingot is cut into squares with chamfered edges know as silicon wafers. These silicon wafers are solar cells which are then assembled in rows and columns to form a solar panel.

Monocrystalline solar cell manufacturing process is called 'Czochralski Process'. It is a complex and expensive manufacturing process which results in lot of wastage of silicon crystals, which makes them more expensive than polycrystalline solar panels.

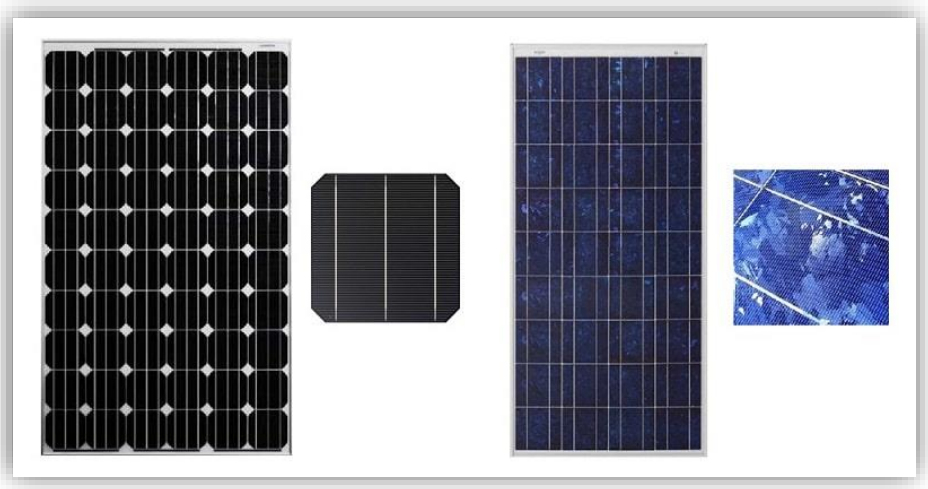
Monocrystalline solar panels can be easily distinguished by their black color appearance, they are normally used in places where the area available is less and power requirement is more or places where there are few sunny days or less sun hours.

M0NOCTRYSTALLINE SOLAR CELLS

2. POLYCRYSTALLINE SOLAR PANELS

Polycrystalline solar panels are the most widely used solar panels in the world today. We have seen a roof with solar panels on it then chances are it is polycrystalline.

Polycrystalline solar cells are made by melting fragments of different silicon crystals, pouring it in a mold and then cutting it in square shape to form a solar cell also called as wafers.



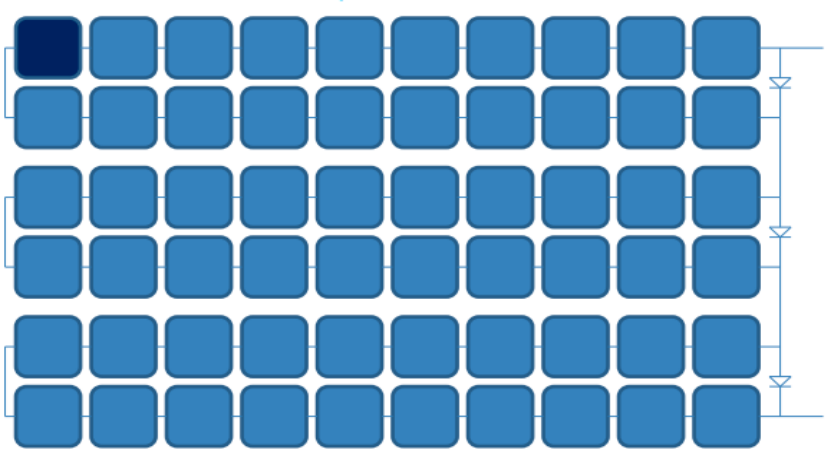
POLYCRYSTALLINE SOLAR CELLS

These solar cells are then arranged in rows and columns to form a solar panel, which are then arranged in series and parallel arrangement to form solar array and thus a solar power plant.

Solar panels with hot spots and see-through holes have a drop of over 50 % in power generation whereas the panels which just have their glass shattered see a dip in only 10 % power generation.

To present a rough idea dust deposition and unclean solar panels can easily cause up to 30% loss in power production. If our solar is generating 100 units of electricity in a month then it might only generate 70 units due to dust, that's a loss of 30 units or Rs 300 (assuming tariff Rs 10) every month, which adds up to 360 units or Rs

3,600 annually. When it comes to the warranty of solar panels almost all the major solar panels manufacturer offers 10 years product warranty and 25 years performance warranty.



CELL ARRAY (SCHEMATIC)

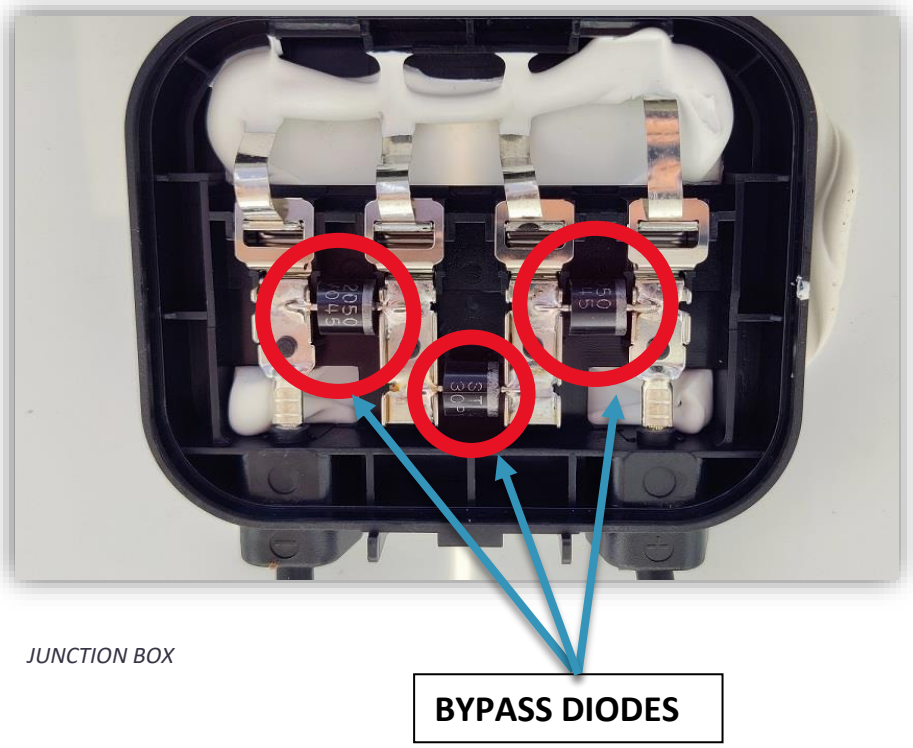
In the hail test **(IEC 61215**), the solar panels are bombarded with 11 ice pellets each **25 mm (1 inch)** in diameter at a velocity of **23 m/s (82.8 Kmph).** To successfully pass the test the solar panel should have no visual defect and should also pass the insulation test.

Ideal angle of inclination of the solar panels should be in the range of **18-23** degrees.

Here at this site, it was 12 degrees due to the surroundings and topology present here.

Bypass diodes are a standard addition to any crystalline PV module. The bypass diodes' function is to eliminate the hot-spot phenomena which can damage PV cells and even cause fire if the light hitting the surface of the PV cells in a module is not uniform.

The bypass diodes are usually placed on sub-strings of the PV module, one diode per up to 20 PV cells. This configuration eliminates the creation of hot-spots and enables the PV modules to operate with high reliability throughout their lifetime. In addition to effectively fulfilling this function, many people believe the bypass diodes are also effective in reducing power loss due to shading in PV installations. This is far from the truth. In this document we will analyze several everyday scenarios and show how the bypass diodes can actually cause great power loss. Here at this site **MONOPERV** solar modules were used which is a technological advancement in this field having high efficiency then the earlier ones.



MANUFACTURER	**SOVA SOLAR**
RATED PEAK POWER (Pmax)	**400 W**
RATED VOLTAGE (Vmp)	**41.03 V**
RATED CURRENT (Imp)	**9.76 A**
OPEN CIRCUIT VOLTAGE (Voc)	**48.01 V**
SHORT CIRCUIT CURRENT (Isc)	**10.31 A**
WEIGHT	**21.80 KGS**
MODULE TYPE	**SS40072MP**

- **WIRING**

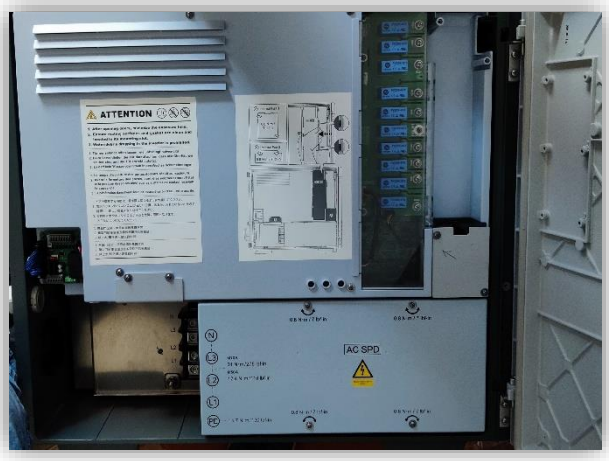
Since the controller installed here has the capacity to handle voltage ratings in the range of (700-1000) Volts.

So according to the symmetry a series of 18 panels were made in order to get a balance of power. Thus, a total of 5 wires per structure had been taken to the grid controller.

CONNECTORS

- **CONTROLLER**

A 3-phase online grid controller was installed here to convert the power that we get from the solar array into the 3- Phase power feed directly into the distribution system.



3-PHASE GRID INVERTER

MEASURING INSTRUMENTS

The solar radiance is an instantaneous power density in units of kW/m^2. The solar radiance varies throughout the day from 0 kW/m^2 at night to a maximum of about 1 kW/m^2. The solar radiance is strongly dependent on location and local weather. Solar radiance measurements consist of global or direct radiation measurements taken periodically throughout the day. The solar insolation is the total amount of solar energy received at a particular location during a specified time period, often in units of KWh/m^2 day.

RAIDANCE METER

While the units of solar insolation and solar irradiance are both a power density (for solar insolation the "hours" in the numerator are a time measurement as is the "day" in the denominator), solar insolation is quite different than the solar irradiance as the solar insolation is the instantaneous solar irradiance averaged over a given time period. Solar insolation data is commonly used for simple PV system design while solar radiance is used in more complicated PV system performance which calculates the system performance at each

point in the day. Solar insolation can also be expressed in units of MJ/m^2 per year.

Irradiance Meter provides digital read-outs related to photovoltaic (PV) panels. It measures and reads:

• Solar irradiation (W/m2) on the surface of a photovoltaic (PV) panel

• Temperature (°F or °C) on the surface of a photovoltaic (PV) panel

• Inclination (degrees) of a photovoltaic (PV) panel

• Cardinal degrees with the compass function

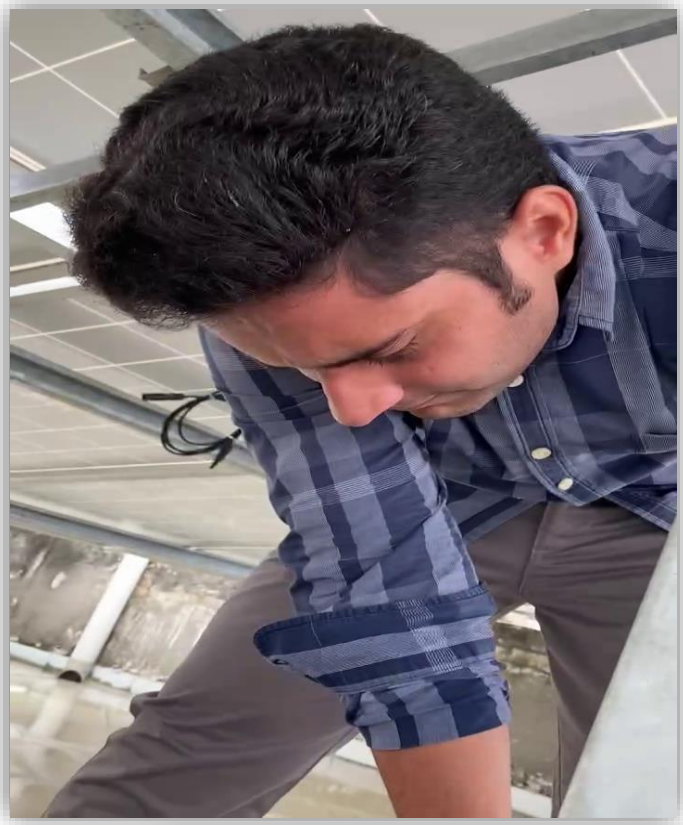
The read-outs provided by the Meter help determine optimum positioning of the photovoltaic (PV) panel for best performance.

RADIANCE METER (MEASURING TEMP.)

Comparing and diagnosing Even when installed correctly, a photovoltaic system may not be producing the expected electrical output. In order to produce the expected output, the system needs to receive the correct amount of irradiance energy to generate the DC voltage that is fed into the inverter.The solar resource is measured in peak sun hours: the number of hours per day with 1,000 watts generated per square meter of solar array. Location, time of day, season, and weather conditions all influence peak sun hours to determine the actual solar irradiance ($Watts/m^2$) and shading at the site to develop a baseline.

CONCLUSION

In this internship at live project site is a great opportunity to learn and gain hands on experience in various calculations, dealing with live tools and instruments. It was a great experience in dealing, understanding & implementing those which we learnt in the classroom programme.



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TO WHOMSOEVER IT MAY CONCERN

This is to certify that SUMIT KUMAR YADAV has done his internship at BAREJA SOLAR & PROJECTS PRIVATE LIMITED, from September 11th 2021 to September 17th 2021.

He has worked on a live project. This project was aimed at installation of SOLAR POWER SYSTEM. As part of the project, he has completed all the duties & responsibilities with full enthusiasm.

During his internship he has demonstrated his skills with self-motivation to learn new skills. His performance exceeded our expectations and he was able to complete the project on time.

We wish him all the best for his upcoming career.

ANIL BAREJA
MANAGING DIRECTOR

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This is to certify that ATUL CHAUHAN has done his internship at BAREJA SOLAR & PROJECTS PRIVATE LIMITED, from September 11th 2021 to September 17th 2021.

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This is to certify that MANISHA SINGH has done her internship at BAREJA SOLAR & PROJECTS PRIVATE LIMITED, from September 11th 2021 to September 17th 2021.

She has worked on a live project. This project was aimed at installation of SOLAR POWER SYSTEM. As part of the project, she has completed all the duties & responsibilities with full enthusiasm.

During her internship she has demonstrated her skills with self-motivation to learn new skills. Her performance exceeded our expectations and she was able to complete the project on time.

We wish him all the best for her upcoming career.

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