We are a manufacturer and provider of advanced racking solutions for the global utility-scale solar PV market.

Our fixed-tilt and solar tracker product lines, are designed and engineered by experienced professionals to offer the lowest total installation cost while providing unparalleled customer service and support throughout all phases of the project.

Our factories in Valencia, Spain, have a production capacity of more than 6 GW per year (20 MW/per day).

Furthermore, we have our own tax exempt area and an Innovation Center where we optimize the performance of our solar trackers.
WHO WE ARE

Worldwide experience

170+ PV PLANTS PROVIDED IN 5 CONTINENTS

60+ PV PLANTS ABOVE 50 MW

9+ GW PROVIDED WORLDWIDE

6+ GW OF ANNUAL PRODUCTION CAPACITY
WHO WE ARE

Global organization

Our global success is based on our professionals and individualized attention to our clients. To make this possible, we have a high qualified team of professionals dedicated to each of the areas in which we provide our services.

The proximity to the client, the special knowledge of the regulations, climatology and specific characteristics of each region, allow us to offer individualized solutions to the needs of each area. In this way, we can offer professional on-site support, advice and supervision of our projects in an autonomous and decentralized manner.

To strengthen this organizational system, we have a global communication system that allows a direct contact between the Chief Operating Officer and the Country Managers, and allows the entire team to access the knowledge acquired and the solutions developed in the rest of the world, reinforcing our know-how and our ability to anticipate possible contingencies.
WHO WE ARE

Working process

At PVH we take special care to ensure the agility and coordination of all departments involved in your project.

With the involvement of the heads of each department, we can offer record execution times, and a quick and effective response to changes that may occur during its development.
PVH strives for its client’s project success

**TRANSPORT AND LOGISTICS**
We can coordinate delivery of materials according to client’s requirements, making rolling deliveries which are organized to facilitate construction.

**MANUFACTURING**
We have invested in state-of-the-art metal works to ensure competitive price points, as well as providing tighter quality controls and more timely fabrication.

**COMPREHENSIVE ENGINEERING SERVICE & SITE SUPPORT**
Site layout, geotechnical review and foundation design, permit support, and on-site construction and commissioning support.

**TURNKEY CONSTRUCTION**
In addition to standard delivery of trackers, we offer comprehensive construction services, which include foundations, tracker assembly, and mechanical mounting of PV modules.

**THIRD-PARTY STRUCTURAL ENGINEERING & QUALITY CONTROL**
Partnerships with various structural engineering firms to ensure compliance with local codes regarding structures, foundations, etc.

**ASSEMBLY**
Possibility of assembling the installations with a large team of own and local professionals, who always verify that all the work is carried out in accordance with the provisions of the installation manual and in compliance with quality standards.
Tracking systems
PVH TRACKING SYSTEMS

Technology timeline

NEW GENERATION
- MONOLINE 2V BIFACIAL
  - 60 panels per row
- MONOLINE 2V
  - 60 panels per row
- MONOLINE 3H
  - 90 panels per row
- SELF POWER & WIRELESS CONNECTION
- STRING POWER

SOLARFIX
- AXONE 1.0
- AXONE 4.0
- MONOLINE

AXONE DUO

Upcoming launch

2008
2016
2017
2018
2020
Monoline: Single-row solution to fit any plot shape

Monoline is our single motor per row tracker which has been designed in two configurations: - **ML2V** - 2 modules in portrait (up to 62 modules per row) or – **ML3H** - 3 modules in landscape (up to 93 modules per row), to maximize the energy production of the plot, even in irregular or hilly terrains.

Its single motor per row configuration improves its response to strong winds, optimizes backtracking by avoiding shaded areas and facilitates access between rows reducing maintenance costs.

In addition, Monoline 2V – **ML2V** - is compatible with bifacial modules, avoiding shadows of posts and torque tube and obtaining an improved performance in areas of high albedo.

- **Highest GCR, ideal for sites with space constraints**
- **Optimal 3D backtracking**
- **High ratio modules / foundation**
Axone: Multi-row solution for flat terrains

- **Up to 1,116 modules per motor**
- **Less motors and actuators**
- **Optimal for flat terrains**

Axone is our multi-row single-axis tracker, able to move up to 18 rows of 62 modules, capable of moving more than 1,000 PV modules, with a single motor. It reduces the use of electronic components, actuators and motors by a factor between 15 and 20 compared to most single-row solar tracker solutions on the market.

This minimizes the maintenance cost and the unavailability due to breakdowns, particularly important in areas with extreme temperatures. In addition, Axone is designed to last under extreme conditions with minimal maintenance, helping recover investment from day one. Axone is the optimal solution for regular plots with flat terrain and extreme weathers.
Axone Duo: The perfect combination of both single and multi-row benefits

Axone DUO is our single-axis tracker in dual row, developed by our engineering team to bring together the advantages of our Monoline and Axone trackers. It combines the ability of single-row trackers to adapt to the terrain with the reduction in the number of motors of multi-row trackers.

In this way, a single motor is capable of moving 128 modules in a dual-row, allowing the modules to remain in working position with stronger winds than a single row tracker would admit. The low height of the posts facilitates assembly and maintenance, and it’s fewer motors reduce operation and maintenance costs.

- 128 modules per-motor
- Easy installation and accessibility
- Minimal maintenance
- Works with high wind speeds
EASY ASSEMBLY AND LOW MAINTENANCE

Large team of global and local professionals

At PVH we strive to make our clients' projects a success, that is why we offer them the possibility of setting up the facilities with a large team of global and local professionals.

Our production engineers and assembly coordinators are responsible for verifying that all work is carried out in accordance with the provisions of the installation manual and in compliance with quality standards.

The assembly process of our fixed structures and solar trackers is optimized and ranges from topographic marking, structure assembly and module placement, meeting delivery deadlines.

For greater peace of mind for our clients, we also offer the 'turnkey' construction option so that the only concern of the client is their return on their investment.
### DECISION MAKING POINTS

<table>
<thead>
<tr>
<th></th>
<th>Monoline</th>
<th>Axone Duo</th>
<th>Axone</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Model</strong></td>
<td>(Single motor per row)</td>
<td>(Dual row tracker)</td>
<td>(Multi row tracker)</td>
</tr>
<tr>
<td><strong>Number of rows per motor (Modules per motor)</strong></td>
<td>1 (62)</td>
<td>2 (128)</td>
<td>18 (1.116)</td>
</tr>
<tr>
<td><strong>Number of posts per tracker (Modules per post)</strong></td>
<td>5 (~12)</td>
<td>19 (~7)</td>
<td>180 (~6)</td>
</tr>
<tr>
<td><strong>Controllers per tracker (Modules per controller)</strong></td>
<td>1 (62)</td>
<td>1 (128)</td>
<td>1 (1.116)</td>
</tr>
<tr>
<td><strong>Backtracking</strong></td>
<td>Individual row backtracking</td>
<td>Individual row backtracking</td>
<td>Limited. Backtracking in blocks of 18 rows</td>
</tr>
<tr>
<td><strong>O&amp;M accessibility</strong></td>
<td>No limitation</td>
<td>Access every two rows</td>
<td>Limited access. There is no crossing between trackers</td>
</tr>
<tr>
<td><strong>Tractor cleaning</strong></td>
<td>Possible</td>
<td>Possible</td>
<td>Limited access. There is no crossing between trackers</td>
</tr>
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**PVH FIXED TILT STRUCTURE**

*SolarFix: The cost-effective solution for any project*

*Solarfix* is our fixed tilt structure for solar plants. A solid and robust solution that ensures a perfect adaptation to any terrain and plot shape. With no moving parts,

It is completely configurable, supports any type of module, including the *bifacial*, and its structure requires less maintenance. *Solarfix* is the economical, fast and cost-effective solution for PV solar plants of any size, wind load or snow load.

- Ready for bifacial
- Cost-effective solution
- No maintenance
- Perfect adaptation to plot
Monitoring and communications
PVH CONTROLLERS

Dbox: Leading technology in PV tracking

DBox 3.1 Wireless Tracker Control Unit, is our new tracker controller, capable of controlling the DC motor of the tracker directly from the box and communicating with the network controller of the plant to allow maximum power gain.

DBox 3.1 communications with Network Controller Unit (TBox) of the plant are established through LoRa protocol, to set the same setpoint and status across the plant. It also feeds back its status and real position with the help of an inclinometer, which is monitoring the real tilt position, ensuring and improving the tracking energy output of the plant.

- Wireless communication reduces the cable requirement
- 3D Algorithm and AI (Artificial Intelligence)
- Self-powered to avoid power interruption
- PVH controller, manufactured in-house
- Prepared for high and low temperatures
PVH CONTROLLERS

SBox: The ultimate gain-maximizing device

SBox is equipped with current sensors which monitor the amperage in the strings of the modules and one inclinometer that measures the tilt position of the structure in real-time, for the improvement of the tracking of the sun.

The SBox is powered by the DBox, which does not depend on the grid connection since it is self-powered with its own additional solar module. Performance interruptions from power cuts are prevented.

Installed in the torque tube, it does not need grounding because of its lower voltage. The SBox is available in two models: SBox 3S y SBox 4S, allowing to read strings respectively through the connection of its quick in and out MC4 connectors.

- Increases plant performance up to 5%, maximum in the market
- Measures each tracker string providing detailed plant generation
- Reduces maintenance times
- Quick connectors to facilitate commissioning
- Capable of reading strings and measuring up to 20A
- Quick in and out connectors
- Inclinometer to measure tilt position and improve performance
This configuration must be considered as an example for PVH wireless communications controller. The example is made in single row structure.

LoRa is the new IoT technology used by PVH controllers to connect the entire plant wirelessly to the main network, allowing our clients to dedicate more time to the plant engineering design.
PVH SCADA SYSTEM

PVPC Performance Control® is a customized SCADA solution to monitor, analyze, control and maintain PV solar plants. With a user-friendly and task-focused interface, PVPC is a scalable and multiplatform solution, accessible on computers, tablets and smartphones. With unlimited licensing, you get unlimited number of SCADA clients, tags and connections with only one SCADA server license.

The projects are designed following the standard IEC 61724 for PV Systems Performance Monitoring, and IEC62443 for Cybersecurity in Control Systems.

Now PV Performance Control integrates powerful advanced data analytics to predict and improve outcomes, and transform monitoring data into profitable insights.

- **Accessible**
  Web-based cross-platform solution accessible anytime and anywhere

- **Vendor-Agnostic**
  Integration with many equipment manufacturers providers

- **Secure**
  Protect your critical infrastructure systems against vulnerabilities and cyberattacks

- **Flexible**
  Designed to meet customers’ needs

- **Scalable**
  Add more PV solar plants to your system and control them easily

- **Easy**
  User-friendly interface, easy to use and to understand
PVH DRY CLEANING ROBOTS

Our experience in the desert has led us to develop dry cleaning robots specifically designed for our trackers. Our PV cleaners can work autonomously and are capable of jumping up to 60 cm between rows, which makes them easy to implement without needing to adjust the structure.

The use of our PV cleaning systems optimises the maintenance work, reduces to a minimum the personnel required and doesn’t require the addition of any extra structural components such as rails or bridges.

- Operates in desert plants
- No water needed
- Increases plant productivity up to 5%
- Jumps 60 cm between motor gap
CORROSION RESISTANCE

Protected with Magnelis

We supply solar structures to photovoltaic plants all over the world and have participated in all types of projects with different terrains and climates. In recent years, our projects in South Africa, the United Arab Emirates, Jordan and Egypt have provided us with greater knowledge in this kind of projects, understanding their own needs and improving our products to be more productive and resilient in desert areas.

A key factor that we guarantee is the quality and resistance of our solar trackers, no matter where they are installed. We protect our components with Magnelis®, offering an excellent corrosion resistance, three times better than galvanized steel on the entire surface and on cutting edges.

**Capable of self-healing:** when exposed to the environment, it forms a very dense zinc-based protective film, which makes it almost impossible for the environment to penetrate the film, extending the useful life of solar structures, guaranteeing durability of up to 25 years, free of maintenance costs and offering greater long-term profitability.

- **Self-healing effect solving site handling problems**
- **Optimal protection when posts are rammed**
- **Up to 25-year warranty directly from Arcelor Mittal**
**IN-HOUSE CONTROL**

*Traceability, Labelling, Packaging, Loading, Logistics*

Our traceability and labelling system continues from receiving the raw materials to the delivery of the finished product.

Once we receive the raw material, we check and label it. We identify all pallets by references, units, volume, assigned raw material and location of the material. At the end of the manufacturing process, we package it and assign its corresponding label with the raw material used together with the quality certificates of our suppliers.

Every movement in the warehouses or output of material is registered in our SAP system to **guarantee the client our control** over all raw materials and finished products.

When we have already manufactured the product, it is ready to be loaded and shipped through our logistics chain. To **reduce loading and unloading times** up to 66%, at PVH we have an **automatic unloading platform**, which allows us to unload materials in 10 minutes, minimizing accidents, blows or breaks.

**66%**

Manhours savings

**15%**

Container reduction
Certified Quality

Reliability in all our trackers and structures

At PVH we are committed to the highest standards of quality in the manufacture of our trackers and fixed structures. We have the most prestigious certifications worldwide to guarantee that all our components have been manufactured under strict quality controls and are adapted to the most rigorous regulations.

All our trackers have been tested in strict static and full aeroelastic wind tunnels by CPP. These controls allow us to adapt the response of our motors and controllers, optimizing the stow position to avoid aeroelastic instabilities, like fluttering, and damage to the structures.
FLUTTER FREE

Protected against strong winds

Wind Tunnel Tests carried out by CPP Consultant and our experience, allow us to ensure that our trackers withstand extreme weather conditions better than most of our competitors. Our plants, spread all over the planet, have withstood typhoons, hurricanes, sandstorms and strong winds without suffering major damage to plant production.
VERIFIED STRUCTURAL ENGINEERING

Based on over a decade of global construction and solar experience, we design optimized solar solutions that are robust, cost-effective and easy to build.

From the start, our structures are designed to the requirements prescribed by local codes applicable in each project (25-year structural design life). Each component of the structural system is designed to resist the wind pressures prescribed by the code.

Since each project is unique, we rely on third-party engineering firms in order to adapt each structure to local codes and standards, in addition to the requirements of each project, such as geotechnical and topographical studies, seismic ratings, etc.

PVH complies with the four main focuses with specific standards that must be met in order to install a tracker in the corresponding country:

- **USA**
  - ASCE 7

- **EUROPE**
  - Eurocode

- **SOUTH AFRICA**
  - SANS 10160 & AS

- **AUSTRALIA**
  - AS/NZS 1170
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At PVH we work to continue as one of the world’s leading manufacturers, suppliers and installers of PV solar structures. Our work is focused on research, development and innovation of our solar trackers at the PVH Innovation Center, a dedicated area for R&D to increase the effectiveness of our products and ensure a higher return on investment (ROI) to our clients.

Our constant growth is due to our production capacity, our logistic services, the integration of our PV Performance Control SCADA software for the monitoring, control and data analysis of solar plants, as well as our ability to provide service in all stages of the process of a solar plant from the assembly, to the commissioning of its structures, technical assistance, service-support or turnkey project delivery. We have the most powerful solar trackers on the market.

Emilio J. García
COO at PVH
THANK YOU FOR YOUR INTEREST

Please do not hesitate to contact us with any questions