EliteForm MANUFACTURING

CELEBRATING 50 Years Est. 1974

SOLAR MOUNTING FRAMES

About us

EliteForm, initially established in 1974 as V.Whyte & Son Ltd by Victor and Georgina Whyte, underwent a transformation in 2003 when we rebranded as EliteForm Manufacturing Ltd. Initially, our company's core focus centred on providing fabrication, repair, and maintenance services primarily for our local farming community.

Over the years, through substantial dedication and investment, we have evolved into a thriving specialised engineering firm, achieving remarkable growth and success.

Our Capabilities

At the core of our operations are two turret punch press machines, capable of processing steel sheets up to 8 x 1.5m and 6mm thick. Alongside, we have two advanced laser cutting machines.

Our CO2 laser cuts steel sheets up to 8 x 1.5m and 6mm thick, while our fibre laser handles sheets up to 20mm thick, delivering precision and speed for intricate designs.

We also have five press brakes, including 4m and 3m models with pressures up to 220 tonnes, ensuring precise material forming. Additionally, our facility includes five folding machines, an 8m double-folding machine, a 4m guillotine, and two decoiling and slitting lines.

Our in-house CAD team, made up of skilled designers and engineers, uses the latest software to create precise parts and machining instructions. Working closely with our mechanical engineer, we ensure every component meets the highest standards of quality and functionality through rigorous testing and analysis, optimising designs for performance and durability.

With over 70 staff, 25% of whom have been with us for more than 15 years, EliteForm provides comprehensive sheet metal fabrication solutions. Our facilities set the standard for efficiency, precision, and quality, empowering clients to achieve their vision with confidence.

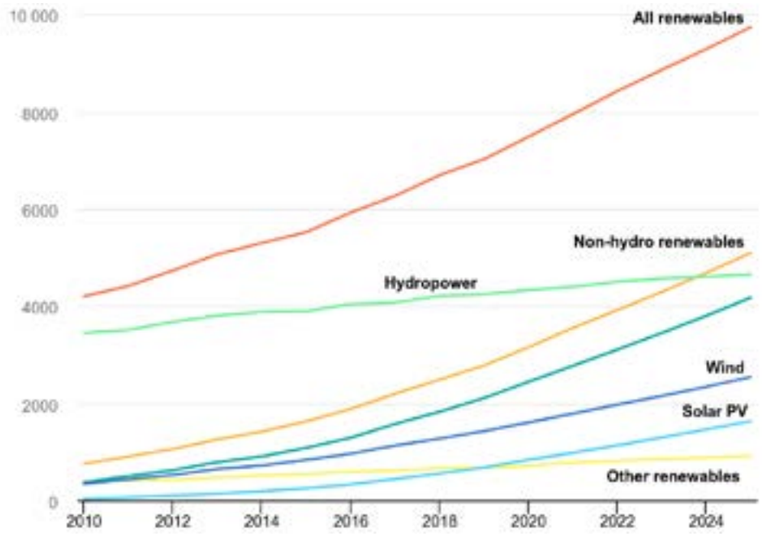
Need for solar mounting system

Improved efficiency
Well-designed mounting systems optimise the orientation and tilt angle of solar panels, maximising energy generation in residential and commercial spaces. Adjustable systems can further boost efficiency by following the sun's path, ensuring better use of available space.

Durability
High-quality mountings are built to withstand extreme weather, including strong winds, hail, and heat, lasting at least 25 years. Material selection based on the installation location, such as corrosion-resistant metals, ensures long-term durability and reduces the need for repairs.

Ease of installation and maintenance
Modular, pre-assembled structures reduce installation time, labour costs, and risks for installers. Their straightforward design simplifies maintenance and repairs, ensuring efficient system performance over its lifetime.

Aesthetic appeal
Mounting systems can be designed to integrate with a building's architecture or environment, minimising visual impact. Customised options blend solar installations seamlessly with roofs or façades, enhancing the aesthetic appeal for property owners.



Renewable Energy Growth 2010-2025 (IEA)

Why solar energy is important for Ireland

Diversification of Energy Sources
Diversifying energy sources enhances security by reducing reliance on fossil fuels and imports, creating a more stable energy supply. This is essential for Ireland to meet EU renewable energy targets and reduce vulnerability to global energy market fluctuations.

Cost-Effectiveness
The cost of solar photovoltaic (PV) technology has significantly decreased, making solar energy a more viable option for both residential and commercial energy needs. Solar now offers a strong return on investment, with long-term savings.

Environmental Impact
By increasing the share of solar in Ireland's energy mix contributes to climate goals by reducing greenhouse gas emissions and the reliance on fossil fuels. This aligns with global efforts to combat climate change and supports Ireland's journey toward carbon neutrality.

Government Support and Policy Framework
The Irish government offers strong support through grants, tax incentives, and feed-in tariffs. Schemes like the Microgeneration Support Scheme enable households and businesses to generate and sell excess solar energy, encouraging widespread adoption of solar technology.

Technological Advancements
Advances in solar technology, such as high-efficiency PV panels and improved storage solutions, are making solar more efficient and reliable. Integration with smart energy systems allows better energy management, ensuring consistent power supply and a more flexible energy future for Ireland.

Government renewable energy tagets

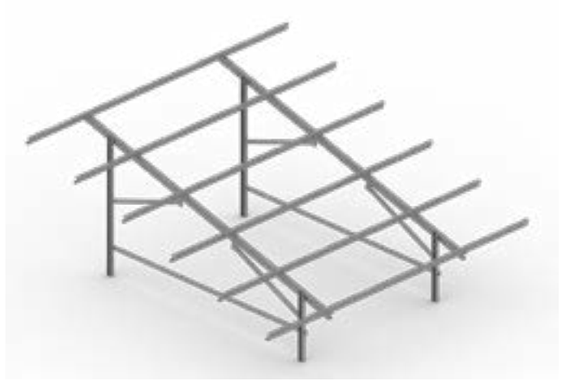
The price of electricity has been a key issue of concern for households and businesses in Ireland in the past 3 years. The root cause of volatility in electricity prices is Ireland's dependence on fossil fuels for electricity generation and the resultant exposure to unstable gas prices. This can be overcome by ensuring energy security. Ireland has a vast renewable resource in terms of wind and solar power in its oceans and land.

The Irish Govt aims to reach renewable electricity share of 50 percent (up to 5GW solar energy) by 2025 and 80 percent (up to 8GW solar energy) by 2030

Ireland is one of only three EU countries in which electricity demand increased in 2023: 3.0% from 2022, which is in stark contrast to a reduction of 3.4% for the EU. This growth is on top of high overall demand. The energy crisis reduced electricity demand in almost every country in Europe, but Ireland was one of only three countries in Europe to record an increase in electricity demand in 2023 compared with 2021 and 2022

> *We have already done an enormous amount of work to strengthen our planning, grid and markets for renewable electricity. The work that will continue over the next three to four years will be vital in ensuring Ireland meets our 2030 renewable electricity and carbon emission targets. Speedy delivery of onshore renewables is critical to Ireland's energy security and reducing energy costs to homes and businesses. We need to start putting in place the policies and measures now that will allow for the fast-tracked and increased deployment of onshore renewable electricity generation projects and accelerated delivery and development of the onshore electricity grid and electricity storage facilities.*
>
> **Eamon Ryan July 12, 2024**

Design overview

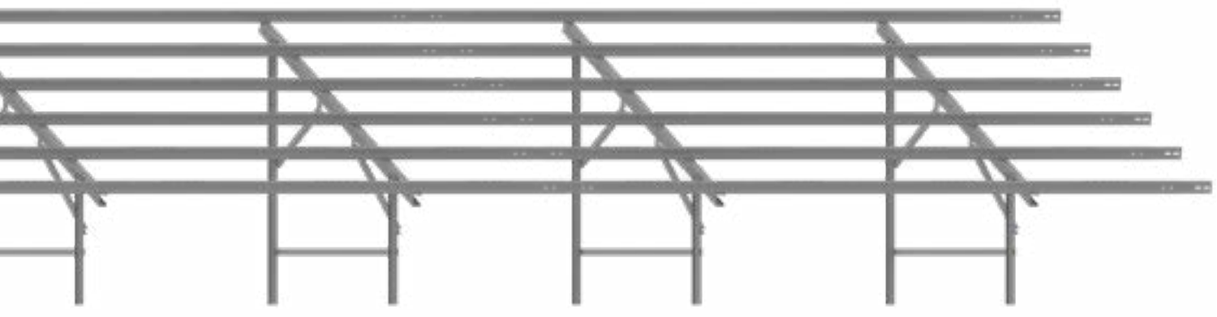


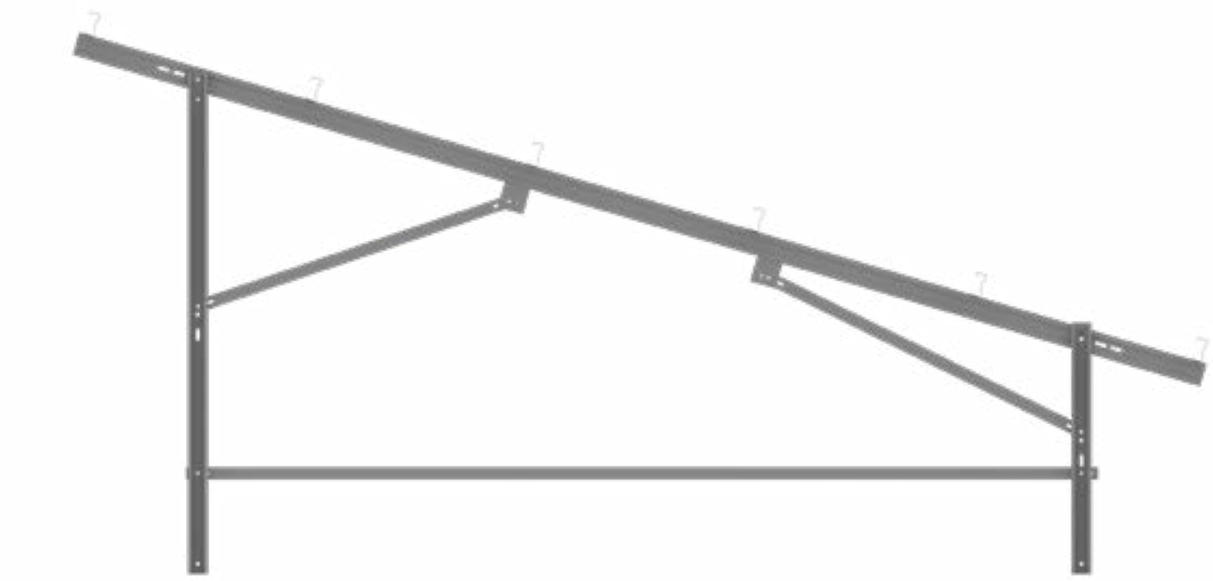
Our frames are manufactured using Magnelis®, a cutting-edge metallic coating developed by ArcelorMittal, specifically designed for the structural components of solar framing systems. Composed of zinc, aluminium, and magnesium, this innovative material provides exceptional corrosion resistance, making it ideal for use in harsh environments. Including marine conditions.

Magnelis® exhibits a unique self-healing property that protects cut edges from corrosion, significantly outperforming traditional galvanized coatings by up to ten times in durability.

The coating is available in various thicknesses and is compatible with a wide range of steel substrates, allowing for easy fabrication and assembly of solar mounting structures. Its application streamlines the manufacturing process, eliminating the need for post-galvanisation, thus reducing costs and lead times.

Additionally, Magnelis® comes with a 25-year warranty for solar support structures, reinforcing its reliability and longevity in renewable energy applications





Advantages over steel and aluminium

Superior Corrosion Resistance
Magnelis® provides corrosion resistance that is up to 10 times better than traditional galvanized steel and significantly better than aluminum in harsh environments, including chloride and ammonia conditions.

Longer Lifespan:
The coating's unique composition, which includes 3.5% aluminum and 3% magnesium, allows it to endure corrosive environments for up to 25 years in normal conditions, and it performs particularly well in marine and agricultural applications.

Self-Healing Properties
Magnelis® has a self-healing mechanism that protects cut edges, creating a new layer over damaged areas to prevent further corrosion. This is particularly beneficial in applications where edges are exposed to environmental stressors.

Processing and Cost-Efficiency
The effective corrosion protection of Magnelis® allows for a reduction in coating weight; up to 2 to 4 times less than post-galvanized products—while maintaining robust performance. This results in easier processing and lower material costs.

Ease of Fabrication:
Magnelis® can be easily formed, welded, and processed using standard techniques applicable to galvanized steel, which enhances its versatility in manufacturing applications.

Environmentally Friendly:
The production of Magnelis® uses less zinc than traditional coatings, contributing to reduced environmental impact through lower zinc runoff into soils.

> *"Magnelis® is an ideal choice for applications where durability and long-term performance are critical."*
>
> **ArcelorMittal**

Design overview

The modular design of the solar panel mounting frames offers significant advantages for solar farms, especially in Ireland's varied terrain. These flexible structures streamline the installation process by allowing quick and efficient assembly, which reduces both time and labour costs. The modular nature of the frames makes them adaptable to different land conditions, from flat fields to uneven or sloped areas. This adaptability is crucial in Ireland, where terrain can vary widely.

By using modular systems, installers can easily adjust the mounting configuration to accommodate specific site challenges, ensuring optimal panel alignment and maximising energy capture. Additionally, the modular design simplifies maintenance and potential future upgrades, as individual components can be replaced or reconfigured without major disruptions.

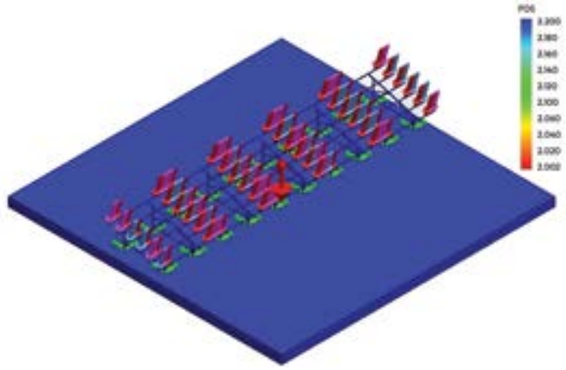
The modular design significantly reduces the number of unique parts needed for the solar panel mounting structure, streamlining the assembly process and shortening lead times. By standardising components, the system minimises the complexity of both assembly and logistics, leading to faster installation and fewer potential points of failure.

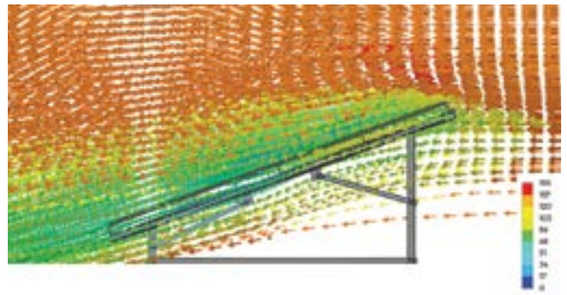
This approach also simplifies inventory management, as fewer specialised parts are required, allowing for more efficient procurement and reduced manufacturing delays. The result is a more streamlined and cost-effective installation process, with quicker turnaround times and enhanced overall reliability.

Simulations

Magnelis® was selected for its mechanical properties, ensuring it could handle the anticipated loads. To assess the robustness of the design, various load conditions, including both static and dynamic forces, were simulated. The mesh was refined in areas of high stress to improve the accuracy of the results, providing a reliable assessment of the part's performance. Several iterations of the simulation were carried out, adjusting design parameters and re-evaluating the results to optimise the factor of safety (FOS).

The combined use of SOLIDWORKS Simulation and Flow Simulation offers a powerful platform for validating design integrity. This ensures that products can withstand both static loads and dynamic environmental conditions, such as wind, achieving a minimum FOS of 2.





Results

The simulation results confirmed that the maximum stress experienced by the mounting frame was well within acceptable limits for the selected materials. The factor of safety (FOS) plot revealed that the overall assembly achieved a minimum FOS of 2 or higher in critical areas, indicating that the design is robust enough to manage the applied loads effectively.

Stress distribution analysis highlighted that the highest stress concentrations occurred at joints and connections, which are crucial points in the design. The choice of aluminium and steel grades, known for their adequate yield strengths, was instrumental in achieving the desired safety factor.

This careful material selection ensures that the frame can withstand operational stresses and environmental factors, contributing to its overall durability and reliability.

Achieving a minimum factor of safety of 2 is significant in structural design, particularly for solar mounting systems that must endure environmental stresses. This safety margin not only ensures the longevity of the installation but also enhances the safety of the overall system, preventing potential failures that could lead to costly repairs or safety hazards.

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