

Global PV Ribbon Machine Market Growth 2026-2032

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Abstracts

The global PV Ribbon Machine market size is predicted to grow from US\$ 684 million in 2025 to US\$ 964 million in 2032; it is expected to grow at a CAGR of 5.1% from 2026 to 2032.

In 2024, the global production of photovoltaic (PV) ribbon welding machines reached 952 units, with an average selling price of US\$700,000 per unit.

PV ribbon welding machines are one of the core pieces of equipment in the PV panel production process, primarily responsible for the precise welding of busbars (PV ribbons) onto PV cells. These ribbons act as conductive channels, collecting and transmitting the current generated by the cells, connecting multiple cells in series to form a complete circuit system, ultimately constituting a PV module with specific voltage and current output. In the PV module production process, ribbon welding machines are typically located at a critical stage between cell manufacturing and module encapsulation, connecting pre-assembled cell strings to lamination and encapsulation equipment. The welding quality directly affects the output efficiency and lifespan of the PV module.

The global photovoltaic (PV) ribbon welding machine market continued to grow in 2024 along with the expansion of the PV industry. Based on ribbon welding demand estimates and equipment compatibility analysis, in terms of capacity, the annual design capacity of a single PV ribbon welding machine line is generally 60-120 units (calculated based on a complete line). Medium and large enterprises, such as Autowell, can achieve an annual capacity of over 150 units through modular production lines. The industry average capacity utilization rate is approximately 75%, which can increase to over 85% during the peak period of PV module production expansion. Gross profit margins vary significantly depending on the technology level; the gross profit margin for conventional equipment is generally between 25% and 35%, while the gross profit

margin for high-end equipment with independent precision control technology and energy-saving systems can reach 40%.

Transaction Case: In the third quarter of 2024, Jiangsu Youzha Machinery delivered an integrated photovoltaic welding strip production line to Yubang New Materials. The line included an energy-saving rolling mill, a high-speed tinning machine, and intelligent rewinding equipment, with a contract value of 4.8 million yuan. The core technical indicators were 'roll surface roughness $Ra \leq 0.02 \mu\text{m}$, raw material utilization rate $\geq 95\%$, and annual power consumption reduced by 25% compared to traditional equipment,' used to produce ultra-thin welding strips compatible with OBB busbar-less modules.

Industry Chain: The upstream of the photovoltaic welding strip machine industry chain includes precision mechanical components, control systems, and material supply: core components such as precision rolls and servo motors are supplied by companies such as Panasonic and NSK; laser generators mainly come from Trumpf (Germany) and Han's Laser (China); control system components rely on brands such as Omron and Schneider Electric; and stainless steel and special coating materials are mainly supplied by Baosteel and Taiyuan Iron & Steel. Downstream applications are primarily with photovoltaic (PV) ribbon manufacturers (such as Yubang New Materials and Tongxiang Technology) and PV module manufacturers (such as LONGi, Jinko Solar, and Trina Solar), with particularly strong demand in mass production lines for OBB (Obstacle-free) modules, HJT (heterojunction) modules, and BC (carbon-coupled) cell modules. With the continued growth of global PV installations, global demand for PV ribbon reached 273,000 tons in 2024, directly driving up the demand for ribbon welding machines.

Business Opportunities Brought by PV Ribbon Welding Machines

The large-scale production of high-efficiency cell technologies such as N-type TOPCon and HJT is driving the development of ribbons towards ultra-fine wire diameters (SMBB, 0.24-0.26mm or even 0.2mm), low-temperature processing, and irregular shapes. The production technology barriers for these special ribbons are high, and the processing fees are significantly higher than for traditional products. For example, SMBB (Super-Slim Busbar) solder ribbon can effectively reduce costs for downstream module manufacturers by reducing silver paste consumption and shading area in solar cells. Therefore, its unit processing profit margin may have a 20%-40% premium compared to conventional solder ribbon. Furthermore, without breakthroughs in OBB (Optimal Busbar) technology, the trend towards thinner solder ribbons will be further accelerated, opening up new growth opportunities.

Industry Development Trends and Challenges

The industry development trend presents three main directions: precision, energy saving, and intelligence. Technological upgrades focus on three dimensions: First, improved precision, with roll surface roughness breaking through to $Ra \leq 0.02 \mu\text{m}$ and welding tolerance controlled within $\pm 0.003\text{mm}$ to adapt to ultra-thin solder ribbon production; second, energy saving optimization, reducing power consumption per unit capacity by more than 25% through high-efficiency motors and waste heat recovery systems, with some equipment saving up to 120,000 kWh/unit per year; and third, intelligent upgrades, incorporating IoT modules to achieve remote monitoring of welding parameters and combining with MES systems to achieve full traceability of production data, adapting to the digital management needs of photovoltaic factories. Market opportunities mainly come from three areas: First, the expansion of new battery production capacity, with the expansion of HJT, BC and other technology routes driving demand for high-end ribbon welding machines, and equipment investment per GW production line increasing by 40% compared to the PERC route; Second, the upgrading of existing equipment, with traditional equipment facing a replacement wave due to high energy consumption and insufficient precision, and the replacement demand is expected to account for 35% from 2024 to 2026; Third, the expansion of overseas markets, with the construction of photovoltaic module factories in Southeast Asia and South America providing incremental exports for domestically produced equipment. However, the industry still faces multiple challenges: significant pressure for technological iteration, with new processes such as OBB and copper plating requiring rapid equipment adaptation and R&D cycles needing to be compressed to 6-12 months; prominent monopoly issues in the high-end market, with European and American brands still leading domestic companies in core laser welding technologies and long-term stability, and imported equipment, despite being more than 50% more expensive than domestically produced equipment, occupying the high-end production lines of leading component manufacturers; intensified homogeneous competition, with small and medium-sized manufacturers crowding into the low-end and mid-range markets, leading to frequent price wars for conventional equipment and squeezing gross profit margins to below 20%; in addition, core components such as high-precision rolls and laser generators still rely on imports, making them highly susceptible to fluctuations in the international supply chain.

LP Information, Inc. (LPI) ' newest research report, the "PV Ribbon Machine Industry Forecast" looks at past sales and reviews total world PV Ribbon Machine sales in 2025, providing a comprehensive analysis by region and market sector of projected PV Ribbon Machine sales for 2026 through 2032. With PV Ribbon Machine sales broken

down by region, market sector and sub-sector, this report provides a detailed analysis in US\$ millions of the world PV Ribbon Machine industry.

This Insight Report provides a comprehensive analysis of the global PV Ribbon Machine landscape and highlights key trends related to product segmentation, company formation, revenue, and market share, latest development, and M&A activity. This report also analyzes the strategies of leading global companies with a focus on PV Ribbon Machine portfolios and capabilities, market entry strategies, market positions, and geographic footprints, to better understand these firms' unique position in an accelerating global PV Ribbon Machine market.

This Insight Report evaluates the key market trends, drivers, and affecting factors shaping the global outlook for PV Ribbon Machine and breaks down the forecast by Type, by Application, geography, and market size to highlight emerging pockets of opportunity. With a transparent methodology based on hundreds of bottom-up qualitative and quantitative market inputs, this study forecast offers a highly nuanced view of the current state and future trajectory in the global PV Ribbon Machine.

This report presents a comprehensive overview, market shares, and growth opportunities of PV Ribbon Machine market by product type, application, key manufacturers and key regions and countries.

Segmentation by Type:

Laser Welding

Electromagnetic Induction Welding

Roller Pressure Welding

Segmentation by Automation Level:

Manual

Semi-automatic

Fully Automatic

Segmentation by Technology Route:

PERC Compatible

HJT Compatible

OBB Gridless Compatible

BC Battery Dedicated

Segmentation by Application:

Photovoltaic Module Manufacturing

Distributed Photovoltaic Power Generation Systems

Centralized Photovoltaic Power Stations

Energy Storage System Integration

Others

This report also splits the market by region:

Americas

United States

Canada

Mexico

Brazil

APAC

China

Japan

Korea

Southeast Asia

India

Australia

Europe

Germany

France

UK

Italy

Russia

Middle East & Africa

Egypt

South Africa

Israel

Turkey

GCC Countries

The below companies that are profiled have been selected based on inputs gathered from primary experts and analysing the company's coverage, product portfolio, its market penetration.

Ooitech

Jiangsu Youzha Machinery

Wuxi Tongli Electric

Zichen Laser

KUKA

JUKI

Byström (Switzerland)

FUHR

Shanghai Youzha Technology

Zhangjiagang Shengyou Machinery

Plasmait

Jiangsu Lanhui Intelligent Equipment Technology

Suzhou Weilan Intelligent Equipment

Sky Blue Environmental Protection Technology

WEN CHENG LEAD WIRE

Invimec

Key Questions Addressed in this Report

What is the 10-year outlook for the global PV Ribbon Machine market?

What factors are driving PV Ribbon Machine market growth, globally and by region?

Which technologies are poised for the fastest growth by market and region?

How do PV Ribbon Machine market opportunities vary by end market size?

How does PV Ribbon Machine break out by Type, by Application?

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