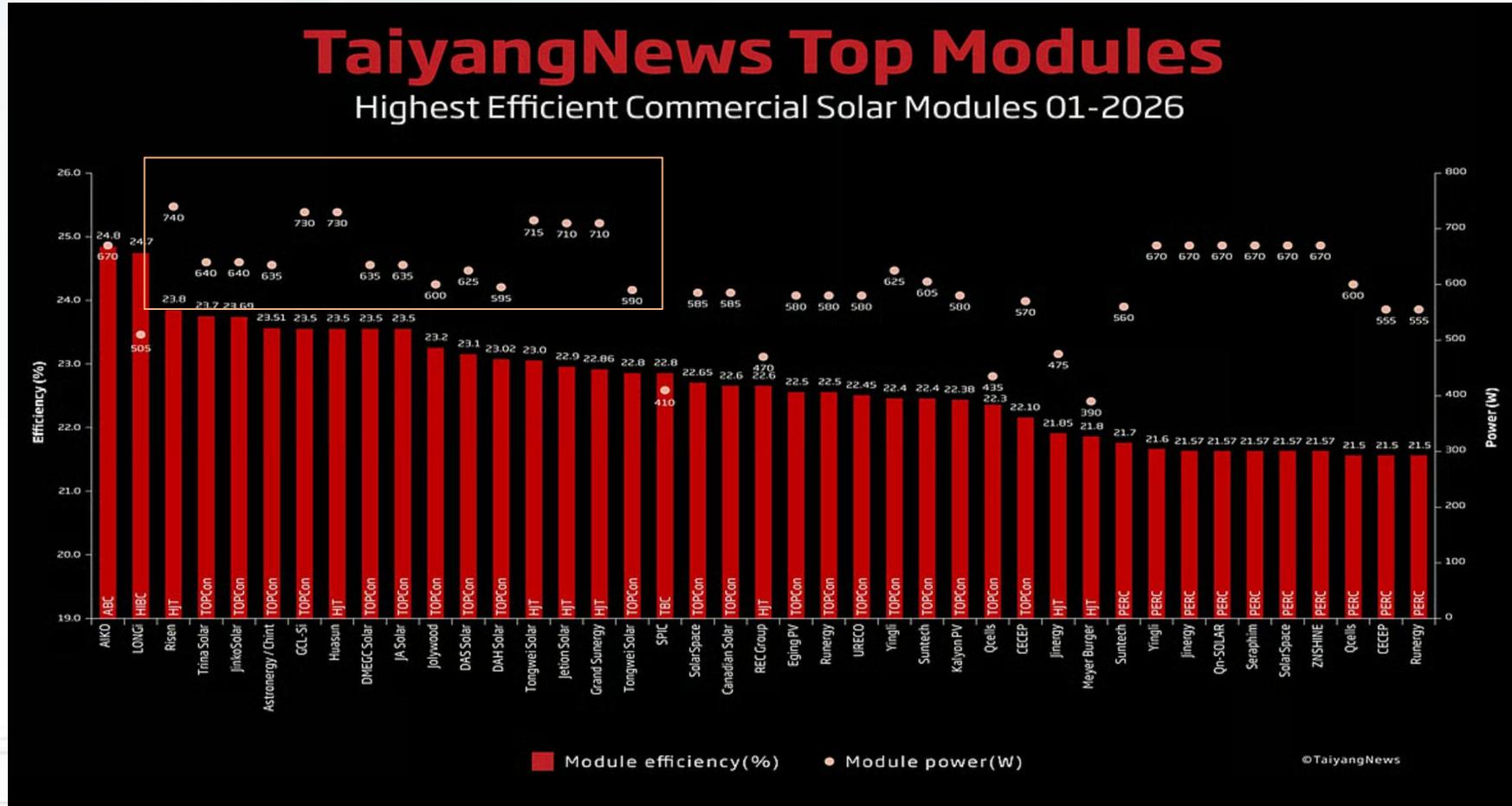


# Turnkey Solution for High-efficiency Solar Module Manufacturing

Hangzhou ConfirmWare Technology Co., Ltd.

Enjoy Tomorrow's Technology with you

# TOP SOLAR MODULES LISTING



*The Era of  
High  
Efficiency  
Has Come*

# High-Efficiency PV Module Technologies Route



**Jinko Solar**  
Tiger Neo 3.0

- Quarter-cut Module
- TOPCon
- 20BB
- Overlapping Soldering
- Edge Passivation Cell



**TW SOLAR**  
TNC 3.0

- Quarter-cut Module
- TOPCon
- 3D passivated cell
- Ultra-fine grid lines
- Two-part junction box



**AIKO**  
STELLAR

- ABC cell
- Full-screen Module
- Hidden Busbar
- Overlapping Soldering



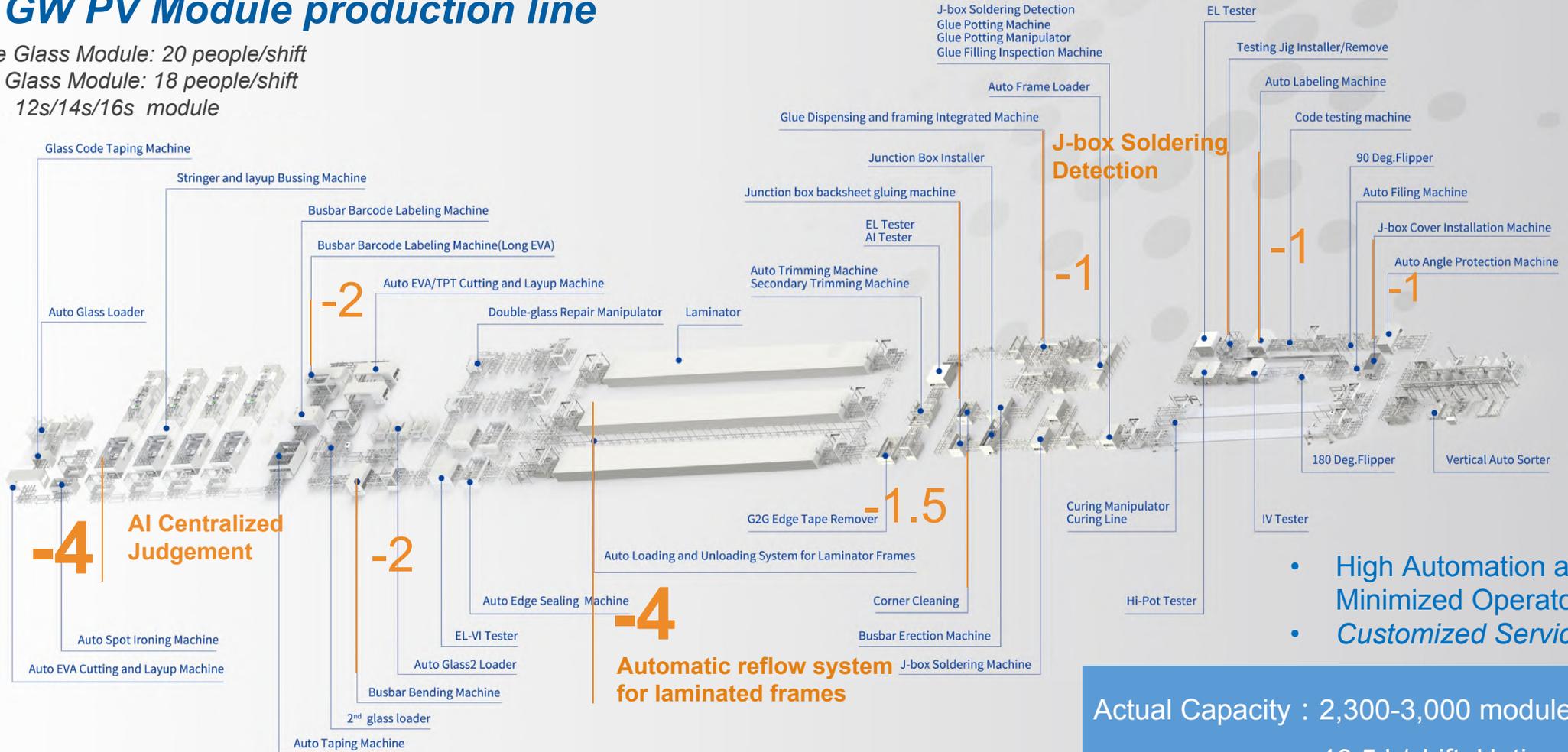
**LONGI**  
Hi-moX10

- HPBC 2.0
- Zero busbar
- Front side grid-free
- rear side without busbar

# 1. PV Module Manufacturing TURNKEY Solution

## 1.2 GW PV Module production line

Double Glass Module: 20 people/shift  
 Single Glass Module: 18 people/shift  
 Cycle: 12s/14s/16s module



- High Automation and Minimized Operator
- Customized Service

Actual Capacity : 2,300-3,000 modules / shift  
 —10.5 h/shift, Uptime: ≥ 95%

## 2. Technical Advantages of Module Equipment



### High Compatibility

- TOPCon / XBC / HJT / 0BB.....
- 9BB~30BB, 1/2, 1/3, 1/4 cell.....
- Single-glass, double-glass, and lightweight designs
- High cost-performance ratio



### Key single machine innovation

- Replace manual workstations with automated equipment
- Optimize equipment performance
- Achieve **advanced market-level automation** for the entire line



### Full Process Control

- Self-developed AI + visual inspection system
- Full-process automatic inspection and control
- Through data inspection and feedback, it achieves quality traceability and production process optimization, ensuring module yield and reliability.



### High Safety and Reliability

Safety measures focus on preventive design, covering personal safety, equipment protection, operational standards, and emergency response.



### Advanced Automated Control System

Utilizes highly reliable industrial-grade PLCs paired with high-precision sensors.

- High-precision Synchronization Control Technology
- AI vision and PLC collaborative decision-making.
- Modular Software Platform

# 2. Technical Advantages of Module Equipment

## Process Control - AOI System , "Super Inspector"

The PV AOI inspection covers four key dimensions: surface defects, process quality, appearance consistency, and electrical performance correlation. By integrating EL, PL technologies, multi-spectral imaging, and AI algorithms, it achieves full-process quality control for solar cells.

Defect Detection Models:

PL Defect Model / EL Defect Model / Front and Rear Side Appearance Model

Positioning Models:

Glue Dot Positioning Model / U-shaped Groove Positioning Model / Ribbon Positioning Model

AI Data Model

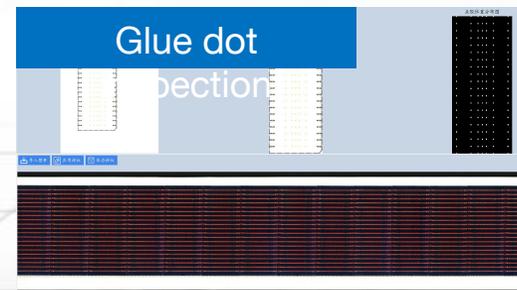
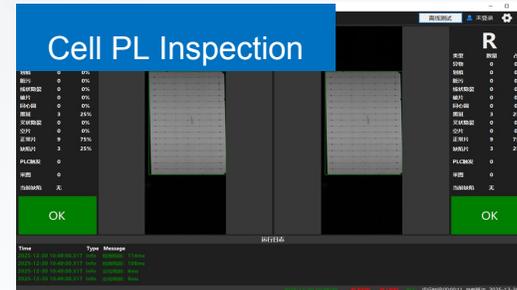


Image Presentation  
Data Storage and Traceability  
Human-Machine Collaborative  
Re-evaluation Workflow

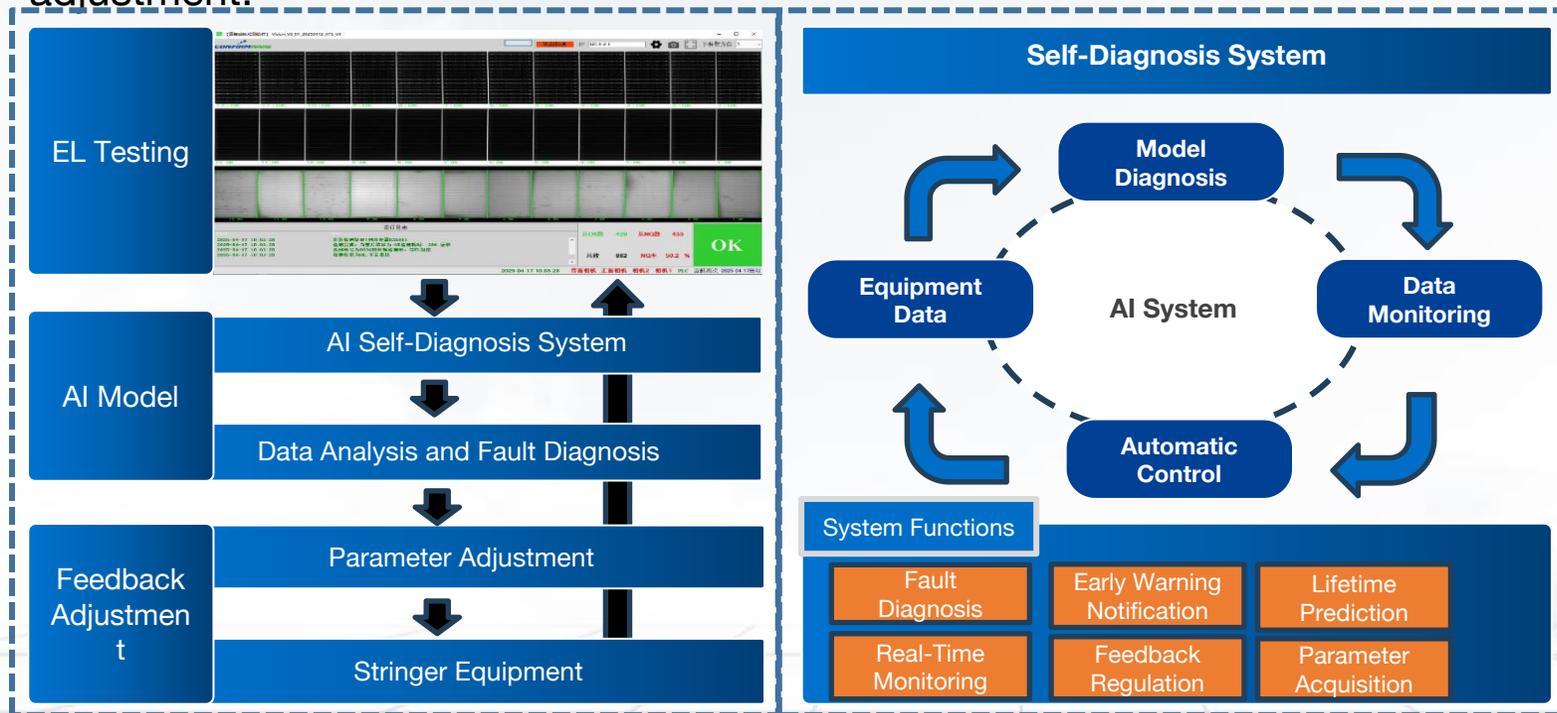
Real-time Monitoring  
Dashboard  
Process Separation

## 2. Technical Advantages of Module Equipment

### AI Equipment Management System

ConfirmWare has built a full-link capability system of "**Perception-Analysis-Decision-Execution**"

Achieve full-process data collection, real-time monitoring, self-diagnosis and parameter adjustment.



#### Production:

Avoid defects and material waste, increase production capacity

#### Management:

Help factories achieve lean management, reduce headcount and workload, and lower equipment maintenance costs.

## 2. Technical Advantages of Module Equipment

### Key Equipment

*High percentage of self-produced equipment, after-sales more convenient*



Cell Stringer



Auto Layup Machine



Auto Bussing Machine



Cell Cutting Machine



Auto Taping Machine



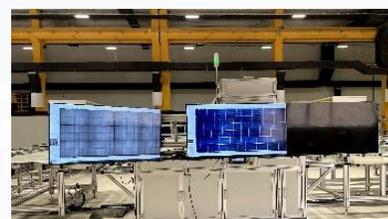
Glass Loader



EVA/TPT Laying and Cutting machine



Automated Framing Machine



ELVI Tester



Laminator



Auto Trimming Machine



Auto Junction Box Soldering Machine



Curing Manipulator



Sorting Manipulator

- ✓ HIGH PRODUCTIVITY
- ✓ HIGH AUTOMATION
- ✓ HIGH STABILITY
- ✓ BETTER ROI

# 3. Smart Solar Cell Stringers



## Multi-cutting Cell Stringer

*AMS120M*

- 3rd Generation Tunnel-type High-precision Temperature Control System
- AI Intelligent Device Management System



## Ultra High Speed MBB Cell Stringer with Inline NDC

*AMS120CA / AMS100CA*

- Patented Tunnel-type Lightbox High-precision Temperature Control System
- 4-Axis Robot



## Zero Busbar Stringer

*AMS120Z / AMS120P*

- Supports various OBB flexible interconnection solutions.
- Floating Stencil Printing technology
- High precision ribbon handling system  
、 flexible conveyor systems



## High Speed BC Stringer

*AMS120B*

- High-precision temperature control system and effectively controlling soldering warpage
- Hot plate soldering, Whole-string processing technology, efficient and precise

\*Separate Cell Stringer and laser cutting machine are optional

### 3. Smart Solar Cell Stringers — Technology Platform



#### Stability :

- Simple structural design, low breakdown rate
- Excellent component selection
- Process optimisation iteration

#### Convenience :

- Convenient module replacement with minimal downtime
- Compatible with multiple 0BB flexible interconnect processes
- AI-driven intelligent adjustment significantly reduces manual intervention

- Cycle:12,000+ pcs/hour
- String repaired rate  $\leq 1\%$ , Breakage rate  $\leq 0.1\%$
- Shingled PV module :  $\pm 0.3\text{mm}$
- Cell spacing : -1mm- -0.4mm , 0.8mm-6mm adjustable

# 3. Smart Solar Cell Stringers — AI Intelligent Adjustment

## Stringer AI Light Box Self-Diagnosis System

Achieving Automatic Adjustment of Light Box Parameters

机台号: H08-A-CJ-KFW-17L    NG料盒号: CLH00377    NG数: 1

正面检测图像

背面检测图像

EL检测图像

Gridline Breakage, Zero-cracking, Scratch, Black Spots, Cracking, False Soldering, Concentric Circles, Dirt, Missing Solder, Over-soldering, Inactive cell

断筋 隐裂 划痕 锡斑 碎片 虚焊 同心圆 脏污 空焊 过焊 死片

槽位	温差	灯管响应时间	焊接功率系数	焊接时间	灯管熄灭时间
0	10,000	500	1.030	600	1300
1	30,000	530	1.040	610	1300
2	40,000	550	1.050	640	1400
3	60,000	580	1.060	660	1400
4	80,000	600	1.070	690	1400
5	100,000	620	1.090	720	1400
6	130,000	630	1.090	750	1400
7	160,000	650	1.110	780	1400
8	190,000	670	1.150	800	1400

暂停后控制

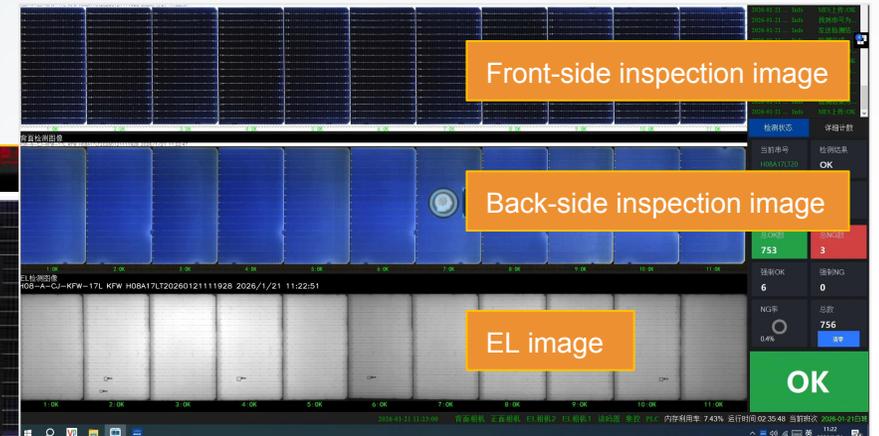
- 电池片缺陷追溯
- AI已介入
- 未执行复位
- 过焊判定

Cell Defect Traceability

AI Intervention Initiated

Over-Soldering Determination

Re-inspection Not Performed



当前串号: H08A17L-T20-26012111928

检测结果: OK

强制复判: 无复判

人工复判: 无复判

727

3

强制OK: 6

强制NG: 0

NG率: 0.4%

总数: 730

OK

- Real-time monitoring and adjustment during production prevent defects and losses, enhance productivity, reduce material waste, and minimise manual intervention.

### 3. Smart Solar Cell Stringers — Multi-cell Solution



**Multi-cut Cell Stringer**

Cycle:13,000+ pcs/hour



**Auto Layup Machine**

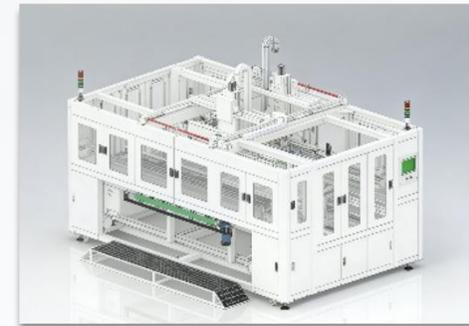
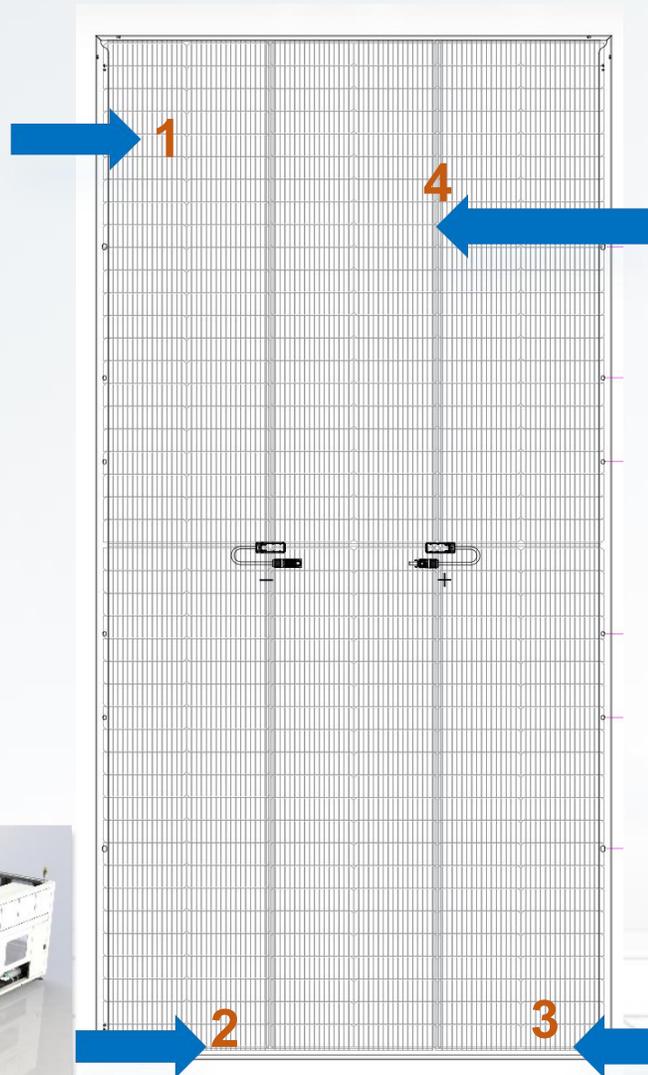


**Auto Bussing Machine**

or



**Auto Layup and Bussing Machine**



**Jumper Welding Stringer**



**Busbar Folding Machine**

# 3. Smart Solar Cell Stringers — Multi-cutting Solution

## How to solve the micro-cracking issue at cell spacing caused by overlapping?

### *Route 1: Physical Buffering*

#### **Cell Spacing Spacer Film Technology**

Edge film application on solar cells, with heat-assisted bonding to the cell surface.

### *Route2 : Structural Optimization*

#### **Ribbon Flattening**

High Flattening Precision  
Highly Efficient and Stable

### *Route 3:Chemical Bonding*

#### **Cell Spacing Glue Dispensing**

There are very high requirements for the fluidity of the adhesive itself and the adhesive height.

- Visual inspection is conducted both before and after film application
- High cutting precision and stability
- Convenient for upgrades and modifications
- Enhanced resistance to micro-cracks

Cycle : 0.5s/cell  
Positioning accuracy :  $\pm 0.5\text{mm}$   
Width : 4-6mm  
Thickness : 0.1-0.2mm

- Built-in needle roller bearings ensure uniform flattening thickness
- High stability
- Thickness precision:  $\pm 0.01\text{mm}$
- Independent cylinder control minimises noise and vibration

# 3. Smart Solar Cell Stringers — Zero Busbar Stringer

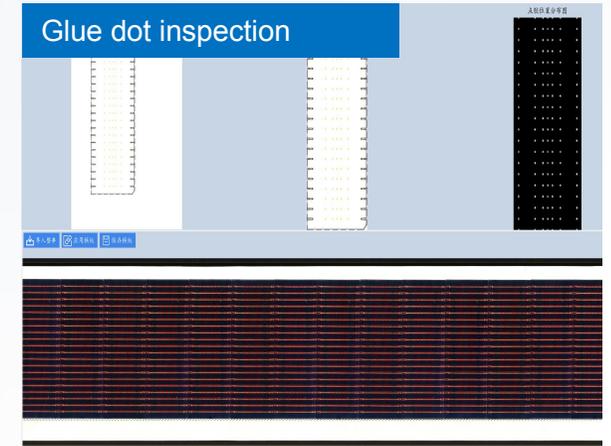


## AMS120Z Soldering + Printing Glue

1. IR Soldering → 2. printing and curing(front) →  
3. Turn over the cell string → 4. printing and curing(back)  
→ 5. EL Detection

## AMS120P Printing Glue + Soldering

1. Printing Glue Dots → 2. Ribbon placing →  
3. IR Soldering → 4. Adhesive curing → 5. EL Detection



## Actual Data

Tensile Testing	Standard	Unit	Test Result			Test Basis	Result	Test Tool
			Min	Average	Max			
UV glue dot peel force (frontside)	≥0.8N , overall pass rate ≥75% , not allowing two consecutive PAD dot peel force less than 0.8N	N	1.00	1.72	2.39	30	OK	Automatic Tensile Tester
UV glue dot peel force (backside)		N	0.83	1.78	2.65	30	OK	
Ribbon PAD point peel force (frontside)	≥0.8N , overall pass rate ≥75% , not allowing two consecutive PAD dot peel force less than 0.8N	N	1.04	1.37	1.49	30	OK	
Ribbon PAD point peel force (backside)		N	1.12	1.53	2.02	30	OK	

### 3. Smart Solar Cell Stringers — High Speed BC Stringer

- Cycle : 12,000 pcs/h
- Soldering Mode : hot plate soldering
- String soldering yield :  $\geq 98\%$

- Full-string base plate welding technology effectively controls welding warpage.
- Solder ribbons adopt a full-string processing method for high efficiency and precision.
- A flexible handling and conveying system is used to prevent scratches on the front side of the cells.



An aerial view of a city skyline, likely Hong Kong, with a large green circle overlay on the right side. The circle contains the text 'About ConfirmWare'. There are also two smaller green squares, one on the left and one on the right, partially overlapping the circle.

# About ConfirmWare

Established in 2005, Hangzhou ConfirmWare Technology Co., Ltd. is a national high-tech enterprise, specializing in R&D and manufacturing of intelligent equipment.

We always focus on automation control, sensing, drive, information system and other aspects of technology research, to provide customers with automation turnkey engineering services, including program design, technology development, processing and production, installation and commissioning, training and maintenance.

Specialized and Sophisticated Little Giant Enterprise

Provincial Enterprise Research Institute

Provincial High-tech Enterprise Research and Development Center

The First Product in the Key Areas of the Equipment Manufacturing

Industry in Zhejiang Province (Auto Stringer)

20 Years

accumulation of smart equipment  
and automation technology

30,000 m<sup>2</sup>

30000 m<sup>2</sup> production base  
3000 m<sup>2</sup> R&D lab

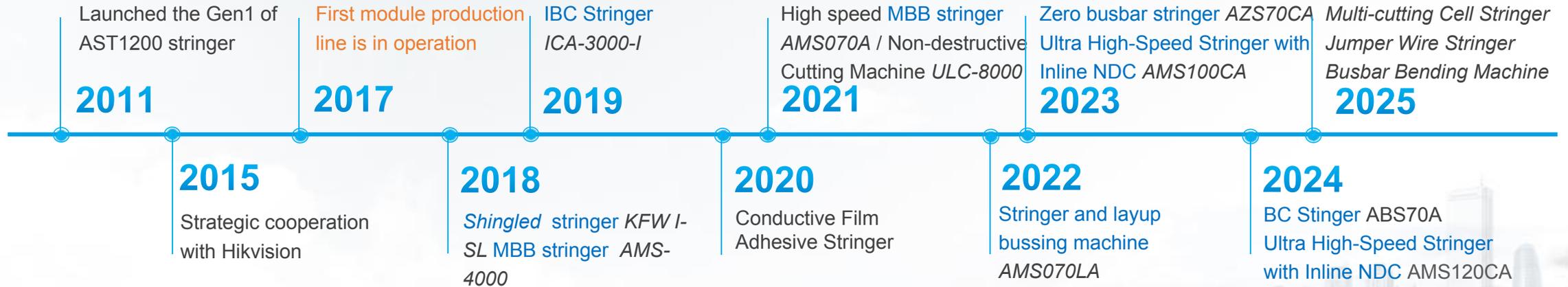
500+

over 500 professional  
employees

# Milestones and Technological Breakthroughs

Specializing in cell string welding technology and module equipment processes for 15 years.

Always keeping pace with the evolution of PV technology



# Customer Service in Global



## Our products are exported to over 30+ countries

Establish spare parts warehouse in global core regions, in order to respond to customers' parts needs and ensure the steady operation of the equipment.



## Professional after-sales service team, quick response, flexible chaperone

Installation and commissioning, ramping up production capacity, flexible production support



## Systematic training

From operation and management to maintenance and upkeep  
Systematically train employees in operational and maintenance skills  
Covering different teams and employees at all levels



- The number of R&D technicians accounts for **37.8%** of the total number of employees in the company
- Through **ISO9001** and **ISO14001**, products have passed **CE, CSA, UL** and other certifications
- Having **200+** core patents and intellectual property rights
- Establish industry university research cooperation mechanisms with **Zhejiang University**
- Led and collaborated with leading module manufacturers to jointly develop and release “Automated stringer for crystalline silicon solar cell” standard T/ZZB3711-2024



# Customer Service in India



Deeply cultivated in the India market for many years, familiar with the India cultural policies and regulations.



Efficient service team: Local installation and commissioning team to ensure project delivery, and after-sales service.



Mature and extensive local India program management and implementation experience



Set up local service centers in the India in 2023 to localize after-sales service and provide spare parts supply.

# Thank you!

Get It In Touch

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