

**QUALITY  
MAKES  
WHO WE ARE  
TODAY**

When it comes to product quality, ranking No.1 in shipments for three consecutive years and solid track record speaks for itself. As a leading module manufacturer, JinkoSolar has shipped approximately 40GW of solar modules to customers in 108 countries around the globe.

Only a reliable, sustainable, and financially healthy company can deliver its promise and cover a 25-year service life warranty. For years, JinkoSolar has been one of the most profitable solar PV manufacturers in the world.

**What manufacturer can back up its warranty?**

**Are promises made in the guarantee underpinned by credible tests?**

UL certified in-house testing facilities, accurate methodology, efficient processes, highly skilled staff as well as participation in all international authorized third-party quality certification programs ensure JinkoSolar's tests are credible and underpin the promise we make in the guarantee.

**What kind of documentation is provided to verify the performance of a product?**

JinkoSolar provides the client with the panfile + IAM behavior to validate via 3rd-party our high/reliable module performance.

**What achievements specific to quality, has your company accomplished?**

Awarded Best Performer in Photon Lab Module Test for consecutive years. First Company to pass as PID-Free under 65°C/85% RH, and First company to withstand a PID-Free test under 65°C/85% RH for 1000 hrs. One of the lowest defect and claim rates in the industry.

**Are there some key quality processes used to rule out hazards such as PID or micro-cracks?**

JinkoSolar is the first company to mass produce PID-resistant modules. These 100% PID – Free modules are routinely tested with zero micro-cracks.



**How does the company ensure a focus on quality?**

52 steps continuous and routine quality inspection in production, in-line monitoring throughout the entire supply chain, 100 % electroluminescence test for each cell and module, barcode ID Quality traceable system in place.





JinkoSolar is one of the few companies that are certified by all key quality programs, which considerably expand the well-known module test of IEC 61215 and IEC 61730. This extensive participation in the quality tested programs of global and regional independent certification authority ensures the continuously high reliability, safety and quality of our modules over the long term.

### Quality Tested Represents:

- ▲ 52 steps quality control and inspection process.
- ▲ Continuous line monitoring and video/photo record for each cell and panel
- ▲ The most advanced quality assurance devices
- ▲ Comprehensive QC information management system in place to allow quality data flow constantly
- ▲ Intelligent alarm and stop mechanism in case of any deviation or errors
- ▲ Most stringent acceptance criteria and tightest tolerance
- ▲ A team of 1500 quality control professionals
- ▲ "Zero" defects objective

### Advantages for customers:

- ▲ Reliable system performance due to comprehensive approval certification
- ▲ High yields over the long run and increased investment security due to additional reliability and safety tests
- ▲ Increased bankability due to independent certification by an internationally recognized testing and certification authority
- ▲ More power generation in given space and in time duration
- ▲ Consistent performance and durability after exposure to intense sunlight and extreme conditions
- ▲ Less maintenance required over the lifecycle of the solar system

### Tougher Requirements to Gain International Quality Approvals:

- ▲ 4-fold thermal cycling test in acc. with IEC and UL (IEC and UL standard is 200 cycles, we conducted minimum 800 cycles)
- ▲ 4-fold damp heat test in acc. with IEC (IEC standard is 1,000 hours, we conducted 4,000 hours)
- ▲ 4-fold humidity freeze test in acc. with IEC(10 hours) and 8-fold in acc. with UL (5 hours), we conducted 40 hours
- ▲ 6-fold UV exposure test in acc. with IEC (IEC standard is 15 kWh, we conducted under 90kWh)
- ▲ Undergo dynamic mechanical load test (1,000 hours) which is not required by IEC
- ▲ UL 10-fold PID free test in acc. with IEC (IEC standard is 96 hrs@65°C-85%RH, we pass 1000hrs @65°C-85%RH)

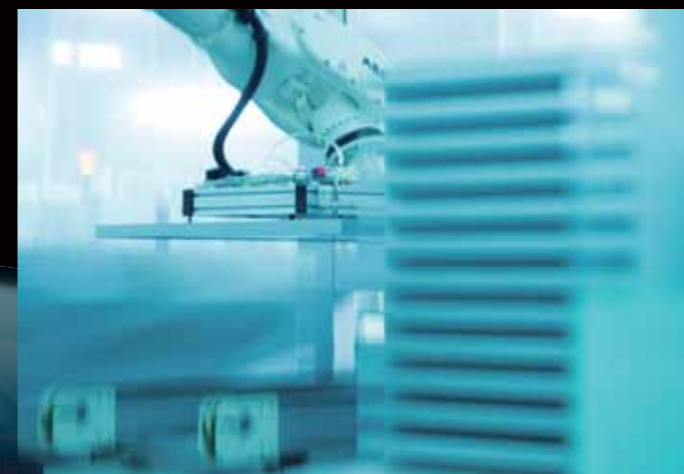
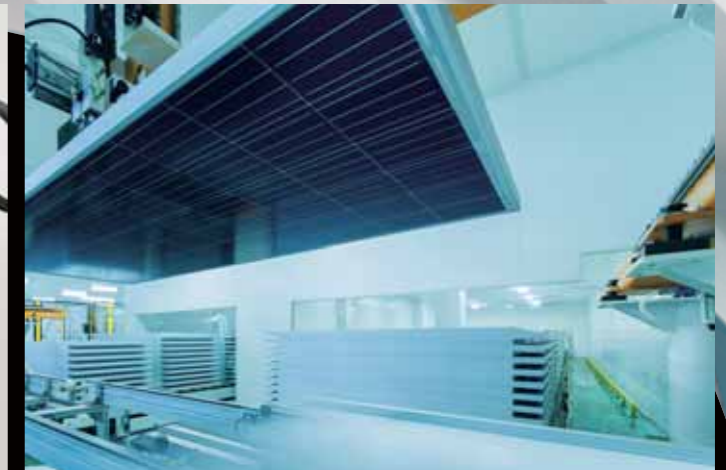
### Stringent Quality Assurance in Production to Ensure Consistency:

- ▲ 100 % electroluminescence test before and following lamination
- ▲ 100% "zero" micro crack monitoring and accurate test before shipment
- ▲ Daily test of grounding behavior
- ▲ Daily welt leakage testing

### Comprehensive and Continuous Testing Guarantees Accuracy:

- ▲ The first module was calibrated by TUV, Frequency: every half a year; the following modules were calibrated by the first one module, Frequency: every week
- ▲ Thermal cycle testing is done on 45 modules from running production every two months
- ▲ Monthly climatic testing on 45 modules from running production

# The best modules on the market





# DIGITAL

## Premium Quality in The Digital Age

In JinkoSolar's first GW scale Smart Factory F5 in Shangrao, the megatrend in digitalization, is changing the understanding of quality and influencing the Company's work in quality assurance. "We are moving from pure testing and analysis to a holistic system view. In doing so, we are increasingly turning to automated and digital methods." said Mr. Kuisong Fan, Head of Module JinkoSolar's Quality Department. "In this Smart Factory, we are moving away from quality checking and moving toward towards quality controlling."

65

CRITERIA

65 criteria of normal module appearance with 45 criteria leading in the industry

2rd

The second company to receive the TS62941 certification

RECEIVE

The first large-scale solar PV company in the industry to receive the title of National Quality Benchmark

1st  
FIRST

18

CRITERIA

18 EL criteria for modules with 9 criteria leading the industry

64 key IPQA points, 12 more control points than before, data record of precision inspection

KEY IPQA

64





# SMART FACTORY

## Human-Robot Integrated Quality Control

JinkoSolar's Smart Factory Quality Team makes use of automated checking and analysis devices and is bringing the quality management into a new era. The traditional manual inspection is partially being supplemented by specialized measurement instruments. Where previously just a manual check allowed the desired premium quality to be verified, today photometric robots with extremely precise optical sensors can now carry out the required steps. In addition to the functional criteria, the optical measurement devices also focus on visual properties. All components are inspected for micro cracks, hot spot and other surface defects. The QC robots lend its attention to even the finest of details, every little shortcoming is discussed to achieve the best quality.



# Human-Robot Integrated Quality Control



The length of time required to complete a measurement is reduced significantly. What's more, it doesn't just measure individual points, rather it precisely measures the entire surface area. Subsequently, the resulting data derived from this process is then recorded, documented, and shared within the organization simultaneously. Correction data is created if any deviation occurs, and can be used to optimize components at an early phase.

"Much of what we used to check on physical, visual and electric performance of panels can now be carried out by smart devices. It allows our quality people to focus on cause analysis and put our expertise into the optimization," said Ms. Ling Huang, Manager of F5 Quality Department.





# Paperless Record and Wireless Communication



The employees in our QC department collect data during the entire product creation process.

Advancing digitalization offers new possibilities; it has brought the QC automation up to a new level. They allow for automated and objective analysis of the quality of cells and modules through the software, as well as complete quality documentation throughout its whole production cycle. Data obtained through the new method serves as an important basis for further quality optimization and traceability.





# Corporate Quality Culture Enhancement

With more than 40 GW modules shipped to customers, JinkoSolar has always met or exceeded our customers' quality expectations.

The key to its success has always been a consistent and comprehensive quality program. Quality at JinkoSolar is not viewed simply as a single task in the manufacturing process, but a holistic discipline that runs through every division in the company.

It has built a corporate culture that strives to optimize risk management, achieve defect-free performance, verify the effectiveness of its quality programs, and continuously improve these processes.



As a cornerstone of that quality effort, JinkoSolar pursues a zero-defect strategy which has successfully driven return defect-rates down to < 1 defect per million. This achievement illustrates the effort it makes in every step of production; from design, fabrication, encapsulation through assembly and testing.



## QA Earlier Involvement

JinkoSolar's Quality Assurance Team's involvement begins at the earliest stages of each new product design. Here, every product concept must progress through a series of quality gates, and must pass a mid-point and final review to ensure it has met pre-defined quality objectives.



# TS62941-Certified Manufacturing

To ensure the highest quality levels, JinkoSolar has adopted a TS62941-certified manufacturing flow that starts with its F5 Smart Factory and passes through our package assembly sites, test sites, and programming sites. Each production phase in this flow has also adopted a zero-defect philosophy with rigorous procedures at each phase of development.



# Beyond IEC Standards

JinkoSolar's Qualification Program conforms to IEC61730, and IEC61215, the industry standard developed by solar products manufacturers and suppliers. JinkoSolar goes well beyond IEC requirements by exceeding required test times by a factor of two to ensure its products achieve the highest quality levels. Also, JinkoSolar is an active member of the International Electrotechnical Commission (IEC/TC82) and representatives from JinkoSolar has chaired subcommittees that define test criteria.

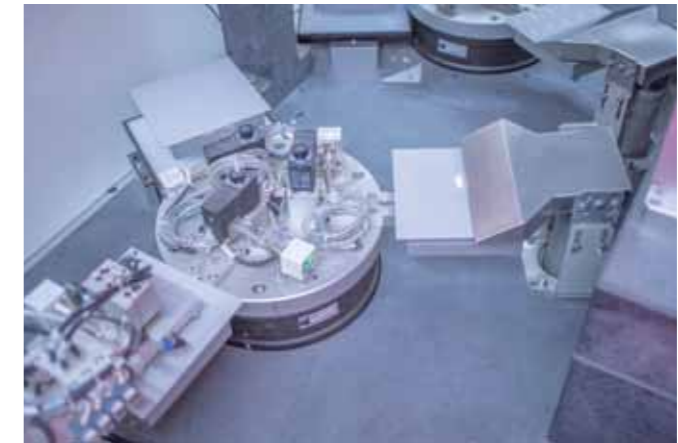
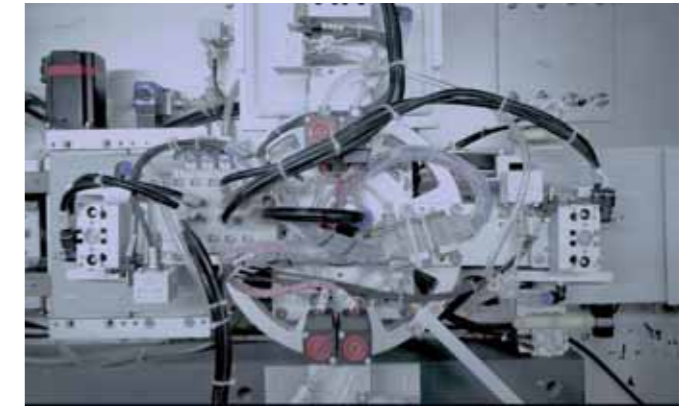
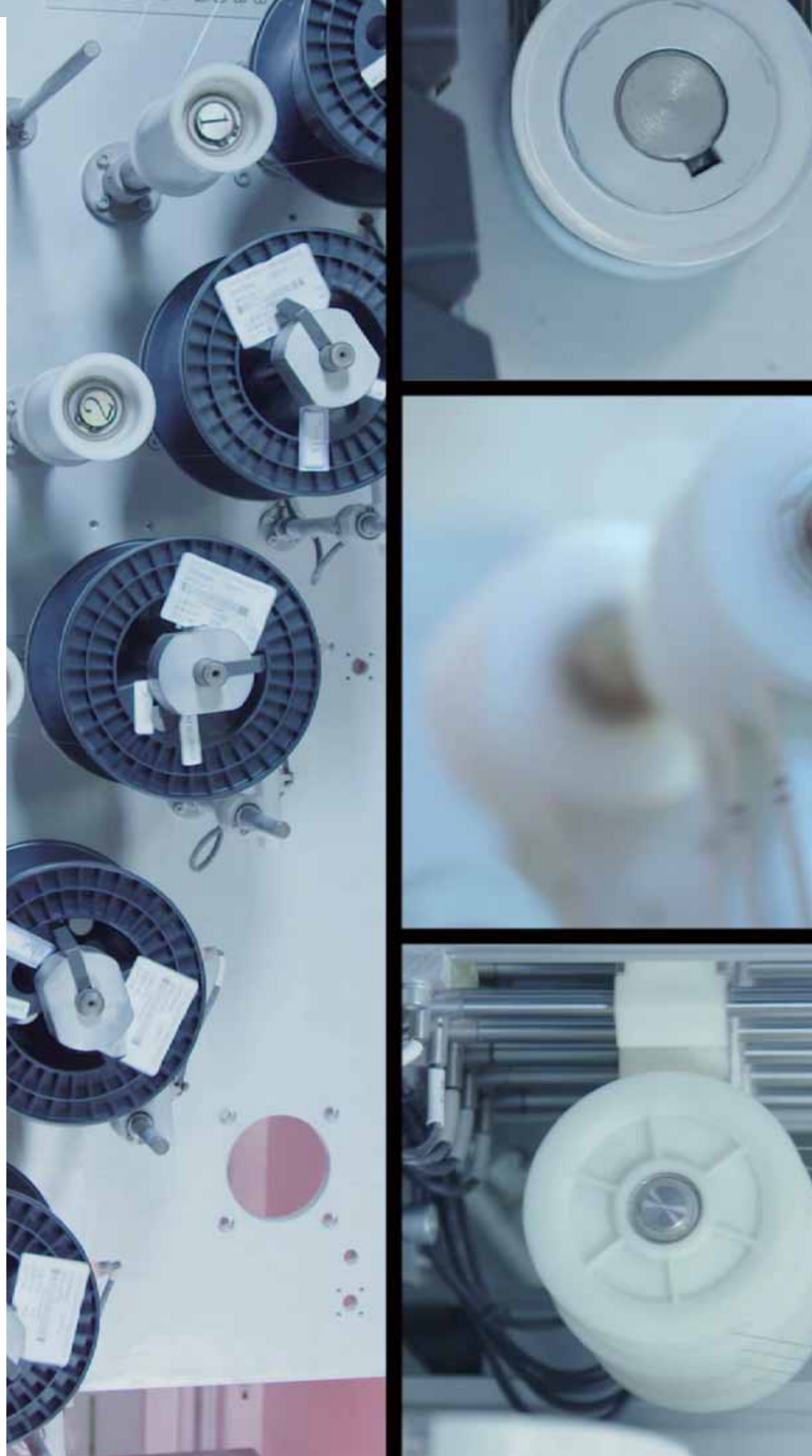
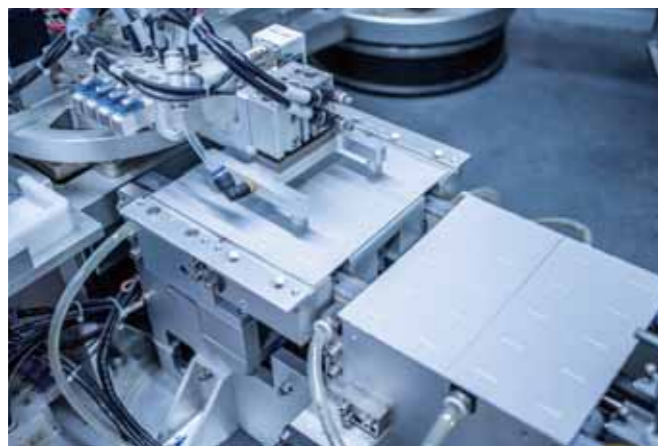




# Z

## Zero-Defect Strategy

The quality team works closely together with manufacturing and technology departments to drive down defects by continuously implementing manufacturing process improvements and enhancements.

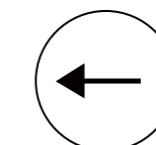


The following factors play a key role in the success of our comprehensive zero-defect program:

- An extremely robust testing methodology – capable of achieving > 99% test coverage.
- Repeatedly reprogramming arrays exhaustively tests logic resources. While conventional 64 tests coverage reaches about 90%, JinkoSolar can exceed 99% by setting 64 tests using automated defect investigation capabilities to gain access to all more details.

• Continuous Improvement – a real-time Automated Lot Monitoring System controls quality and yield, and communicates data constantly across every layer of organization as well as with its key suppliers.

• Maximizes yield through long-term strategic supplier relationships and rigorous manufacturing control. Frequent supplier audits ensure changes to the process do not impact quality.





# Product Life Cycle Support

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JinkoSolar has adopted an average product lifecycle of 25 years, some of the company's products such as the Swan Bifacial Module with transparent backsheet offers a lifetime of 30 years. At JinkoSolar, each cell and module have an individual bar code which contains all relevant information, including lot number #, production date, fab location, materials and suppliers, quality data etc. It makes quality traceability possible.





# Comprehensive Technical Support

————— Rapid failure analysis is another crucial aspect of JinkoSolar's quality program. By having failure analysis equipment, engineers can test a potentially defective device quickly. This unique approach results in a faster response to customer requests and quicker issue resolution.



# Quality Continuous Improvement

The Quality Team monitors Key Performance Indicators (KPI) and manages on going continuous improvement efforts. This group, meeting each month, reinforces internal awareness of the importance of quality efforts and continuous improvement activities.