



Dandong Xindongfang Crystal Instrument

Introduction to DXM-OXY-01 Tools

**Advanced design concept, high-quality after-sales
service**

Talents come from diligence,
and knowledge is gained by
accumulation.



WELCOME

Thank you for your trust in our products
This file is only used for the discussion of the customer's intentional design scheme, not the actual molding
product modeling

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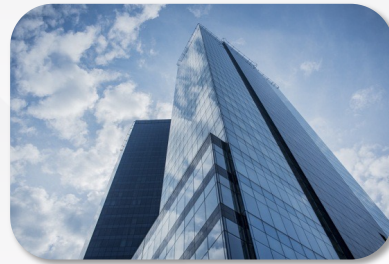
Comparison

01

Company
Profile



Company Profile



Dandong Xindongfang Crystal

Dandong New Oriental Crystal Instrument Co., Ltd. was established in 2007. It is a private high-tech enterprise specializing in the research and development of X-RAY crystal orientation and testing equipment.

In February 2017, the international semiconductor standard SEMI HB8-0217 Test Method for Determining Orientation of a Sapphire Single Crystal/Single Crystal Orientation Test Method, which was compiled by Dandong New Oriental Crystal Instrument Co., Ltd., was officially released. This is the first breakthrough for Chinese LED companies to promote international LED industry standards. This is the first approved standard of SEMI China HB-LED Standards Committee since its establishment three years ago, which is of great significance.

Company Profile



Dandong New Oriental Crystal started in 2007. It is a high-tech enterprise specializing in the research and development of X-Ray crystal orientation and testing equipment. For more than ten years, the company has passed ISO9001 quality management system certification, many products have passed CE certification and other special qualifications or certifications, etc., and has successively obtained 1 invention patent and 45 utility model patents; in 2013, it was awarded the title of national high-tech enterprise.

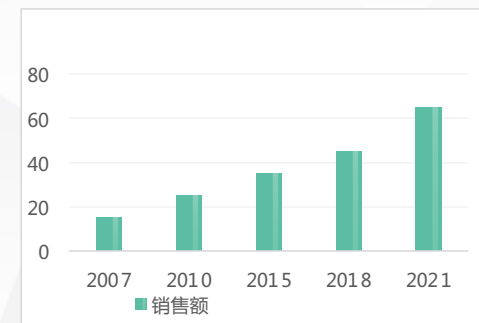
At present, X-Ray crystal orientation and testing equipment and other products have been exported to more than ten countries and regions, and are widely used by well-known semiconductor materials, LED, solar photovoltaic industry manufacturing enterprises, universities and research institutes conducting research and development at home and abroad. The domestic market share has reached more than 45%



Development path

After 15 years of development, New Oriental Crystal has developed into a leader in my country's crystal orientation instrument industry, with a domestic market share of 45%.

Due to the continuous efforts of national industries including New Oriental, China's crystal orientation instrument products have completely gotten rid of the situation of relying on imports, making China the only country in the world that can produce the same type of orientation instruments besides Germany, Japan and France.



World Market

Dandong Xindongfang
Crystal Instrument Co., Ltd.
X-ray directional
instrument sells well all
over the country, and
exported to the United
States, Russia, Canada,
Japan, South Korea, Taiwan
and other countries and
regions.

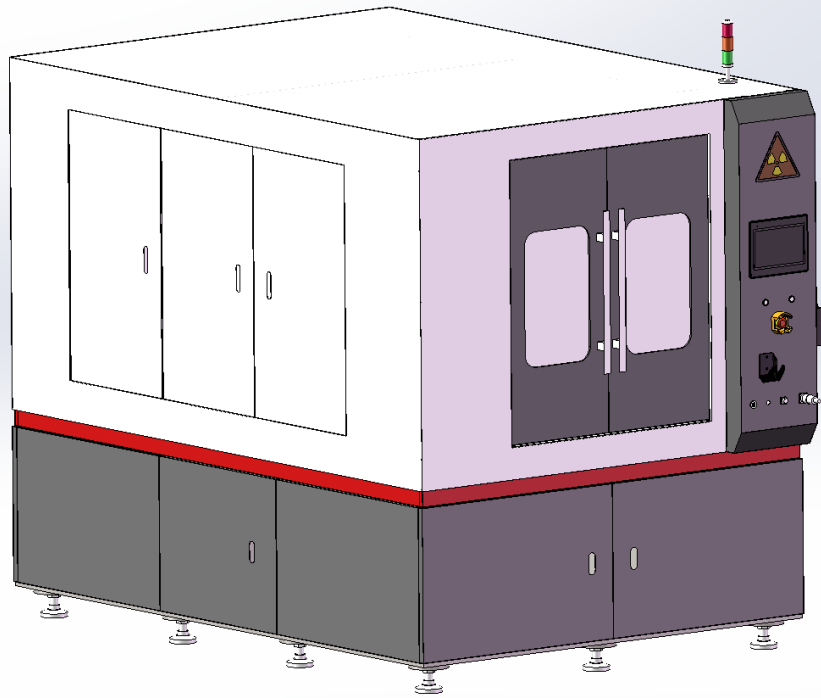




02

Product
Introduction

Product introduction



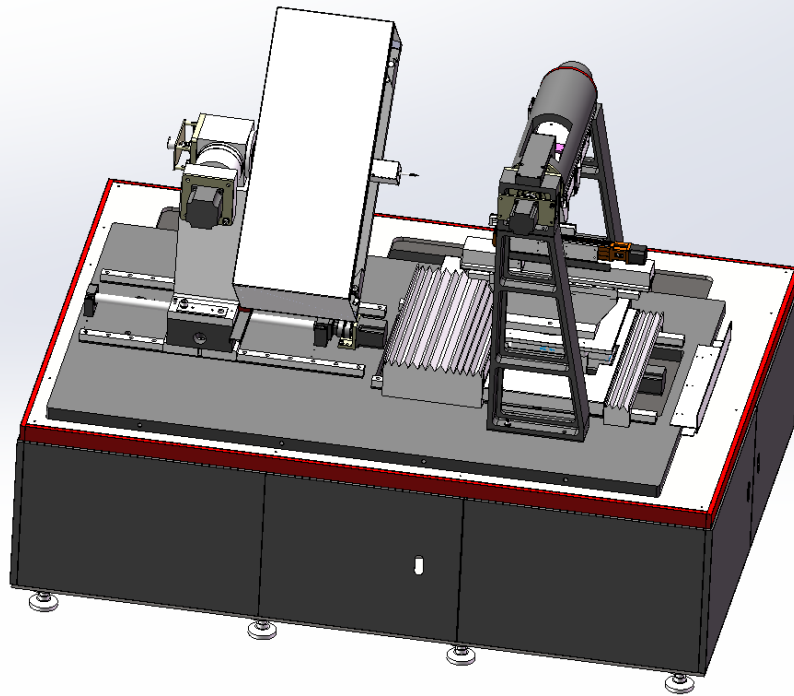
DXM-EXY Series

High-precision orientation, bonding, and re-inspection integrated operation

This instrument is a comprehensive automatic equipment integrating X-ray orientation, one-time bonding of polycrystalline rods, and re-inspection after bonding.

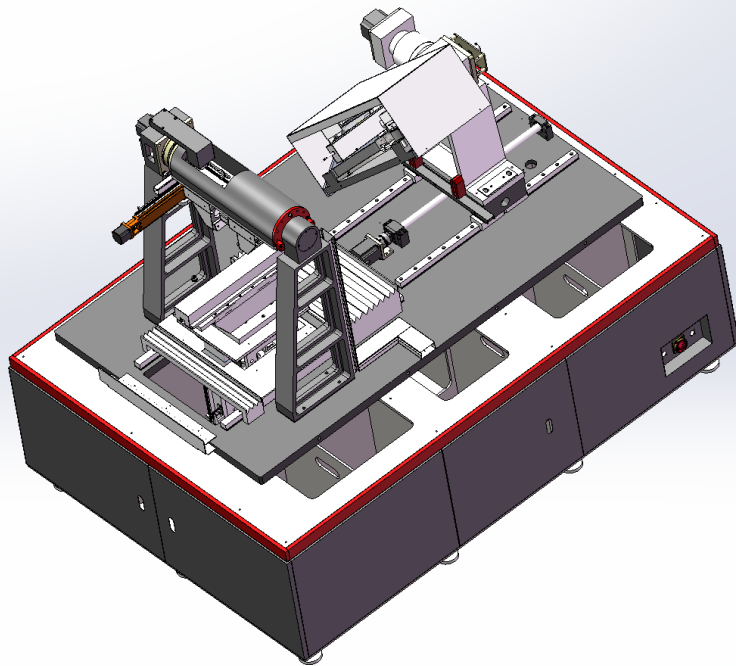
- Full automation
- High measurement and positioning accuracy
- Easy to Use
- Humanized design
- Labor cost reduction

Product introduction



1. Full automation. The adjustment, lifting and loading of the tools are all automatically controlled by motors, and high-precision sensors are used at the same time, so the measurement and bonding process does not require manual operation by personnel
2. The integrated design of functions simplifies the production structure, realizes measurement, alignment, positioning, bonding and other functions in one, which greatly improves the production efficiency.
3. The labor cost is low, and a single tools can be completed by a general worker, which reduces the requirements for the skill and quantity of workers, and reduces the training period.
4. High accuracy and stability. Adopt X-ray automatic peak-finding technology, X, Y dual-axis automatic detection, no need for personnel to participate, reduce human error, improve the accuracy and stability of the equipment.

Product introduction

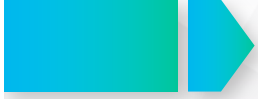


5. The production cycle is short and the production efficiency is improved. It integrates multi-functions and reduces the connection between workbenches.
 6. Reduce the industrial chain of production lines, have low requirements for the processing quality of upstream products, reduce upstream processing steps, and reduce the requirements for upstream crystal processing accuracy.
 7. Re-inspection function, it can realize the biaxial re-inspection after the ingot is bonded.
 8. It has a real-time monitoring function during the bonding process of the ingot to improve the fault tolerance rate.
 9. During the bonding process, the bonding pressure can be adjusted.
 10. The tools has lower requirements on the working environment, and digital control is realized in each working link.
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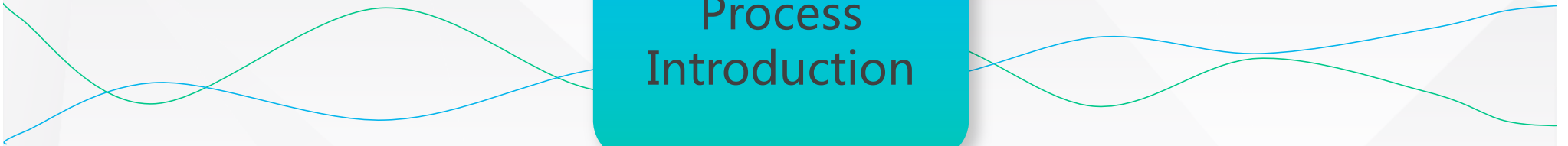
Product introduction

Sn.	Traditional solution	This equipment plan	Advantage
1	The crystal measurement and bonding are separated, and the crystal needs to be moved for multi-station operation.	Measurement and bonding functions are integrated in one	Increased accuracy and stability of bonded crystals
2	2-4 workers required, high technical requirements, subject to technical and human judgment	One regular worker required	Reduce labor costs
3	Measurement and bonding positioning are all manually operated by human judgment	Both measurement and movement are controlled automatically, with foolproof function	Reduce the influence of human factors and improve stability
4	The Y axis is adjusted to change the different shims to adjust the pitch angle	Manipulator clamping, motor direct drive to control angle deviation	The accuracy and operability are greatly improved, and the labor intensity of workers is reduced
5	Use the cylindrical physical plane of the crystal rod as the benchmark to position and bond the crystal rod	The standard atomic plane required for direct measurement of crystals is the reference plane	High precision, low requirements for upstream physical processing
6	The recheck is the method of dotting the cylinder	Direct measurement of crystal end face, real-time monitoring of crystal rod during bonding process	Improve fault tolerance and reduce production costs
7	The measurement data is divided into parts and uploaded manually	Data docking by means of communication	Avoid human error, or tampering. Improve data accuracy and labor costs.
8	Manually confirm the bonding angle	The recipe function is filled in one time and automatically called	Avoid manual errors, improve process control, and enhance the consistency of bonding parameters.



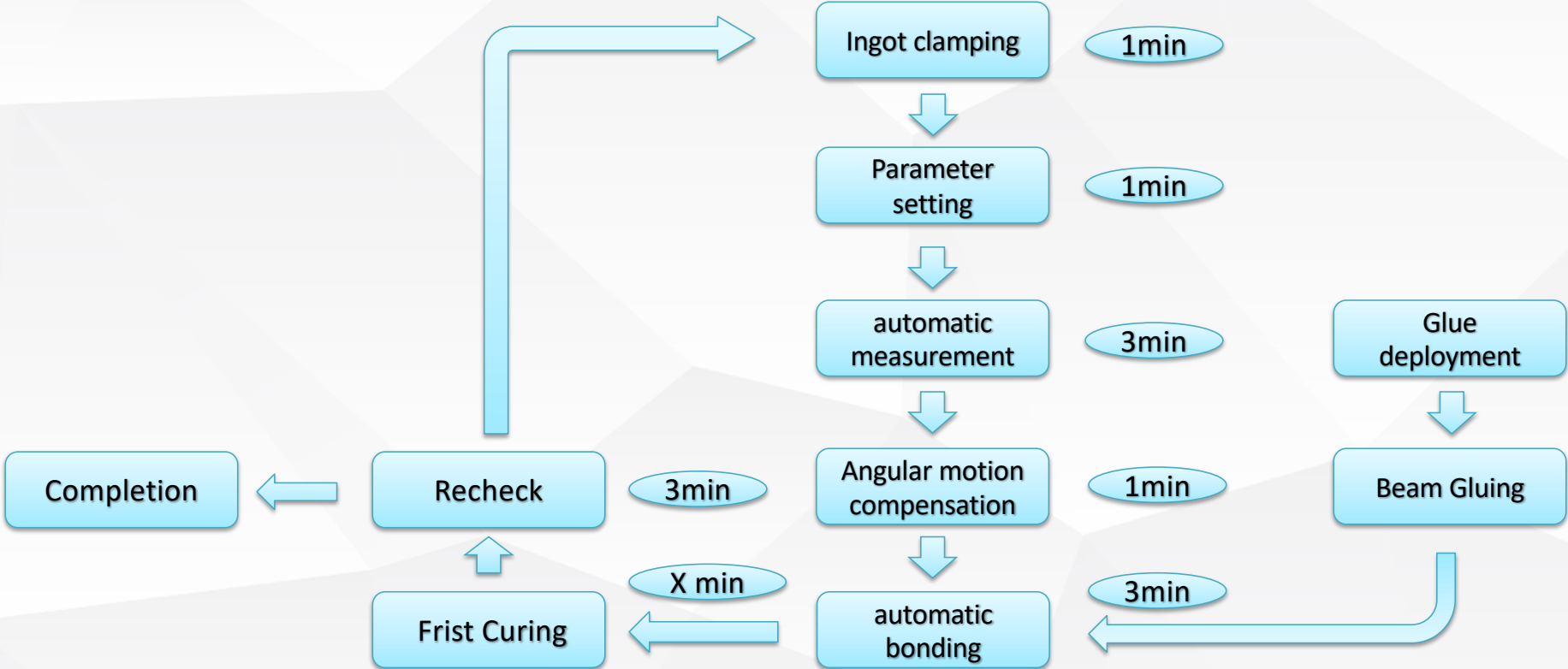
03

Process
Introduction





Process flow chart

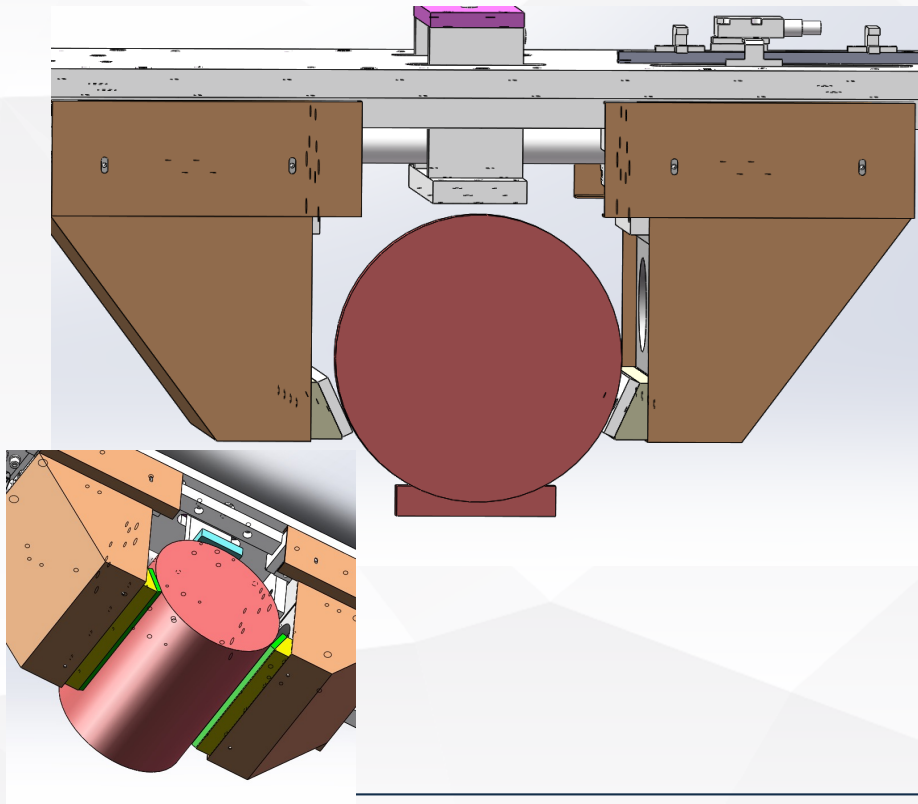




Process Introduction

- Ingot clamping: place the ingot to be bonded on the material plate table, control the tools, and the manipulator automatically clamps the ingot.
 - Parameter setting: Enter the data of the ingot that has been clamped into the tools, including the number, size, length and bonding angle parameters, etc.
 - Automatic measurement: The device automatically measures the crystal X, Y biaxial lattice angle.
 - Angular motion compensation: automatically run according to the input parameters and measured values to compensate for the angle difference.
 - Glue preparation: mix AB glue in proportion.
 - Beam gluing: Apply the prepared glue on both sides of the beam.
 - Automatic gluing: place the beam above the material board, and the tools will automatically glue it.
 - Frist curing : The adhesive layer is left to be initially cured.
 - Re-check: re-inspect the X and Y biaxial angles of the ingot after bonding.
 - Completion: The overall sheet is removed.
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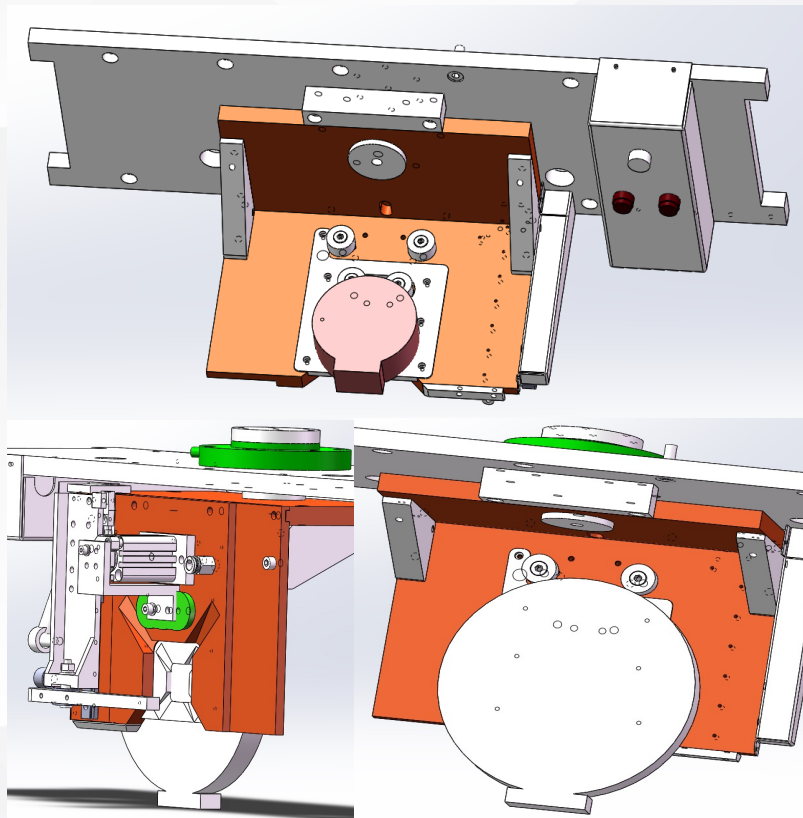
Process Introduction



The bonding scheme for long ingot such as sapphire gallium arsenide:

1. Three-point clamping and fixing ingot;
2. The inverted cone structure prevents accidental falling off;
3. The PPS pad contacts the crystal without scratches;
4. For different cutting processes, the reference edge is down, and the reference edge is oblique to 45° bonding (the picture shows the reference edge down bonding process);
5. 4-6, 6-8 inch crystal rods are bonded, the backing plate is replaced, and the program is automatically switched;
6. The clamping pressure is continuously adjustable from 10-200N; the clamping position is self-checked to prevent errors;
7. Applicable crystals: size 4-6, 6-8 inches, length 50-300mm, diffraction angle: $12-38^\circ$ (adjustable), crystal rod cylindricity less than 0.02mm.

Process Introduction



Bonding scheme for short ingot such as SIC:

1. Vacuum adsorption type fixed crystal ingot;
2. Polyurethane wheel locates the cylindrical surface of the crystal ingot;
3. The rubber backing plate contacts the crystal without scratches;
4. For different cutting processes, the reference edge is down, the reference edge is up, and the notch groove is up (the picture shows the reference edge down bonding process);
5. There is no need to replace the fixture for bonding of 4-6 inch crystal ingot, and it can be automatically switched;
6. Adsorption technical parameters: large suction holes. Air source rated pressure: 0.5MPa; vacuum pressure: less than -87kPa;
7. Applicable crystals: size 4-6 inches, length 5-50mm, diffraction angle: 12-48° (adjustable), the weight of a single crystal is less than 2.5KG, and the flatness of the end face is less than 0.02mm.



04

Prototype
Data

Prototype data

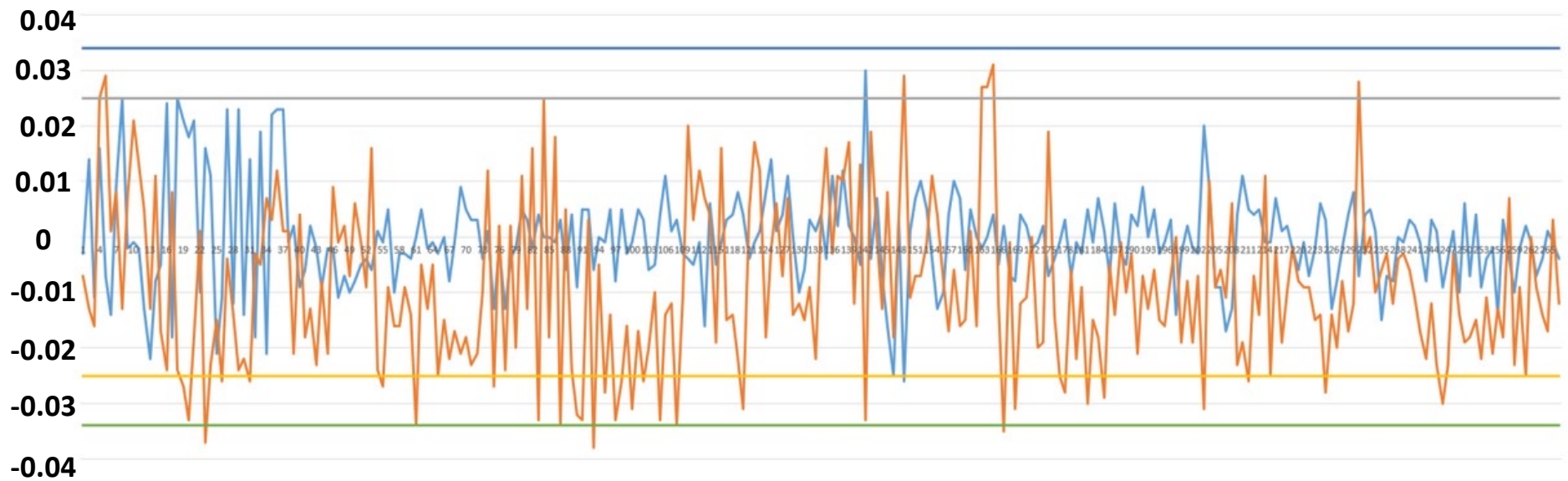
Sapphire test data 267 groups

Less than 0.02° Quantity: 190; Proportion: 71.16%;

Less than 0.025° Quantity: 229; Proportion: 85.77%;

Less than 0.034° Data: 264; Proportion: 98.88%;

Note: The blue polyline is the X-axis deviation value, and the orange polyline is the Y-axis deviation value.





05

Comparison

Comparison of similar equipment

Applicable crystals	DXM-EXY-01-JC-(4.6)-300-01	DXM-EXY-01-JC-(6.8)-300-01	DXM-EXY-01-XF-(4.6)-60-01
Material	Single crystal (sapphire)	Single crystal (sapphire)	Single crystal (SiC)
Shape	Cylindrical	Cylindrical	Cylindrical
Diameter	4/6 inch (±0.5mm) 101.6±0.5mm 152.4±0.5mm	6/8 inch (±0.5mm) 152.4±0.5mm 203.2±0.5mm	4/6 inch (±0.5mm) 101.6±0.5mm 152.4±0.5mm
Length	50~300mm	50~300mm	10~60mm
Measuring position	Ingot end face	Ingot end face	Ingot end face
Ingot weight (MAX)	<20KG	<30KG	<2.5KG
Maximum deviation in the vertical direction of the crystal end face	<5°	<5°	<3°
Ingot cylindrical taper extremely poor	<0.02mm	<0.02mm	<0.2mm
Extremely poor end surface flatness	<0.1mm	<0.1mm	<0.015mm



Comparison of similar equipment

Applicable to material plates and strips	DXM-EXY-01-JC-(4.6)-300-01	DXM-EXY-01-JC-(6.8)-300-01	DXM-EXY-01-XF-(4.6)-60-01
Length range	300-600mm	300-600mm	300-600mm
Width range	60-120mm	60-120mm	50-120mm
Height range	30-130mm	30-65mm	30-120mm
Type of Material seat	Single customization	Single customization	Single customization
Gasket thickness	10-15mm	10-15mm	10-15mm
Gasket width	50-75mm	50-75mm	50-75mm

Comparison of similar equipment

Process limitations	DXM-EXY-01-JC-(4.6)-300-01	DXM-EXY-01-JC-(6.8)-300-01	DXM-EXY-01-XF-(4.6)-60-01
Number of crystals bonded to a single material plate	1-6 ingot	1-6 ingot	Customize
Communication method	TCP/IP	TCP/IP	TCP/IP
Input power	single phase AC 220V , 50Hz	single phase AC 220V , 50Hz	single phase AC 220V , 50Hz
Crystal orientation angle	θ Angle: $+12 \sim +48^\circ$ 2 θ Angle: $+24 \sim +96$	θ Angle: $+12 \sim +48^\circ$ 2 θ Angle: $+24 \sim +96$	θ Angle: $+12 \sim +48^\circ$ 2 θ Angle: $+24 \sim +96$
Bonding ingot gap	≥ 5 mm	≥ 5 mm	≥ 5 mm
Bonding accuracy	$\geq \pm 0.05^\circ$	$\geq \pm 0.05^\circ$	$\geq \pm 0.05^\circ$
Bonding direction	OFF Flat, up or down when bonding OFF Flat, up or down when bonding NOTCH, up when bonding	OFF Flat, up or down when bonding OFF Flat, up or down when bonding NOTCH, up when bonding	4 inch OFF flat, up or down when bonding 6 inches is the OFF flat, up or down when bonding 6 inches is NOTCH, upwards when bonding



THANKS

Let the world know
Xindongfang Crystal

Talents come from diligence,
and knowledge is gained by
accumulation.



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