Mikrosize®

iMetal-500B/BD

Inverted Metallographic Microscope

Contact us

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Feature and Application

iMetal-500 is a professional-grade inverted metallographic microscope specially designed for material metallographic analysis, supporting bright field, bright-dark field, polarizing observation and differential interference contrast (DIC). It is equipped with an intelligent light intensity management LED system featuring a 50,000-hour long-life light source with stable color rendering. The microscope comes with a 30° inclined trinocular observation tube and 10X wide-field eyepieces, and is compatible with optional multi-magnification plan objectives for various observation modes including bright field, polarizing and DIC. Adopting a right-side handle detachable stage with a 50*50mm travel range, it enables easy operation. It supports a standard C-mount interface for flexible expansion of cameras and software, meeting the needs of microstructural observation and failure analysis of metals, semiconductors and other materials in scientific research and industrial testing. It is a reliable tool in the field of material analysis.

Product Feature

- The iMetal-500 adopts an infinite optical system, matched with plan semi-apochromatic objectives and large-field high-eyepoint eyepieces, restoring the true details of metallographic structures to meet high-precision testing requirements.
- The optimal light intensity is automatically matched when switching objective magnifications, eliminating the need for repeated manual adjustment, reducing operational steps, avoiding human errors and greatly improving testing fluency.
- The 4400K-4600K warm white LED light source has a color rendering index (CRI) of ≥95, accurately restoring the true color of samples, avoiding misjudgment caused by color deviation, and is suitable for metallographic grading and image analysis.
- A rich variety of optional accessories are available, including bright-dark field illumination, polarizing observation and DIC observation.
- The coarse and fine coaxial focusing system (1μm fine adjustment scale value) and 50×50mm large-travel stage are combined with a five-hole encoded nosepiece, realizing precise positioning, smooth operation and stable precision during long-term use.

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Feature and Application

Product Application

- Used for grading the grain size and inclusions of steel, non-ferrous metals and other materials, and evaluating the effect of heat treatment processes and material properties.
- Detecting defects such as cracks, blowholes and porosity in castings and weldments, tracing the causes of failure to ensure the quality and reliability of products.
- Accurately observing microstructural changes after processes such as quenching and annealing, optimizing process parameters to ensure the process stability of mass production.
- Clearly presenting the microstructures of weld fusion zones and heat-affected zones, detecting defects such as incomplete penetration and slag inclusions to meet the acceptance criteria of welding processes.
- Observing the porosity and sintered structure of powder metallurgy parts, as well as the thickness and bonding interface of coatings and platings to control coating quality.
- Suitable for teaching experiments in materials science for metallographic structure observation and material performance analysis.

Product Details

1.Eyepiece 2.Trinocular Observation Tube 3.Camera
4.Light Source Control Knobs And Buttons 5.Objective Switching Button
6.Workbench 7.Coarse And Fine Coaxial Adjustment Knob
8.Workbench Control Handle 9.Nosepiece 10.Objective Lens
11.Polarizer 12.Analyzer 13.Bright-Dark Field Switching lever 14.DIC Slot

Product Details

Product Structure

- Stage size: 260200mm with an ultra-large travel range of 5050mm.
- Ergonomically designed stage knobs and focusing knobs.
- Customizable stage accessories for special samples.
- A graduated scale on the stage for more precise adjustment.

- Objective Lens Options
- Plan objectives: 5X, 10X, 20X, 50X, 100X
- Semi-apochromatic objectives: 2.5X, 5X, 10X, 20X, 50X, 100X
- Apochromatic objectives: 5X, 10X, 20X, 50X, 100X
- The iMetal-500 is standard equipped with a five-hole encoded nosepiece, which allows for the future integration of the microscope's hardware settings with image analysis software, where illumination intensity and objective position are both recorded in the software.

Product Details

Product Structure

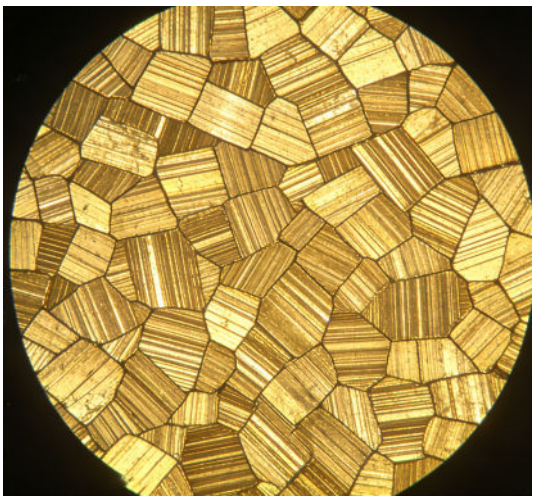
- Coarse and fine coaxial adjustment knobs with adjustable tightness and a 1μm fine adjustment scale value.
- Smooth and accurate knob adjustment.

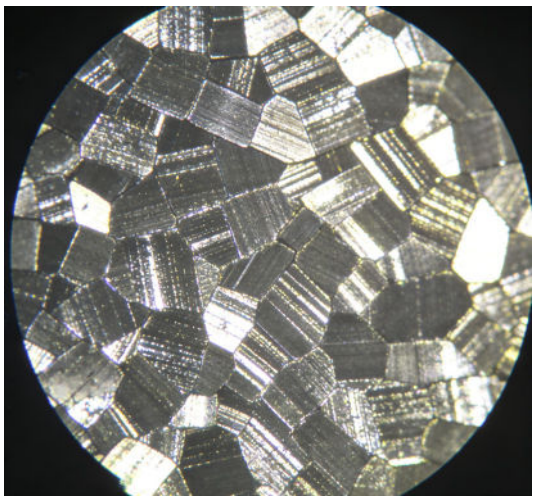
- Constant color temperature of 4500K, CRI of 95, and 50,000-hour service life.
- True color imaging can be fully achieved at both high and low brightness levels.
- Generates almost no heat, with light intensity equivalent to a 100W halogen lamp.
- Stepless adjustment of light intensity; the desired light intensity can be set for each objective, and the light intensity is automatically adjusted when switching objectives.

Product Details

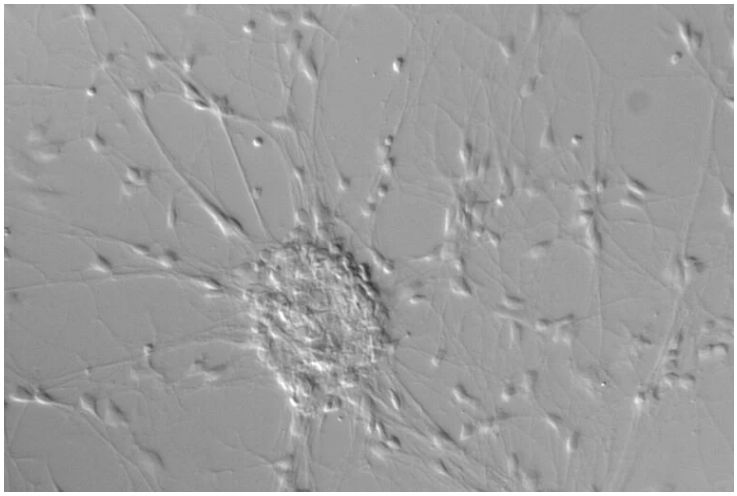
Optical Path Switching

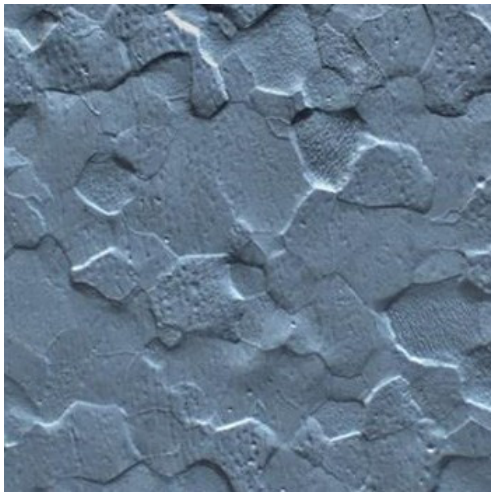
- The iMetal-500 supports optional bright-dark field, polarizing observation and differential interference contrast (DIC), which can be selected by customers according to their needs.





- Simultaneous bright-dark field comparison of samples: the bright field displays the overall morphology, while the dark field highlights defects, particles and transparent edges with stronger contrast for easier flaw detection.

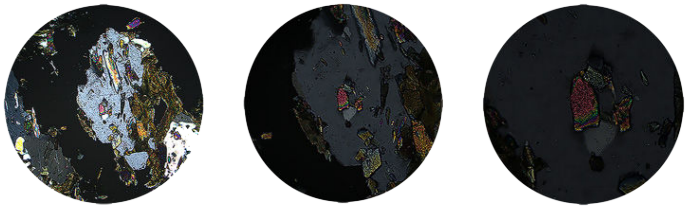




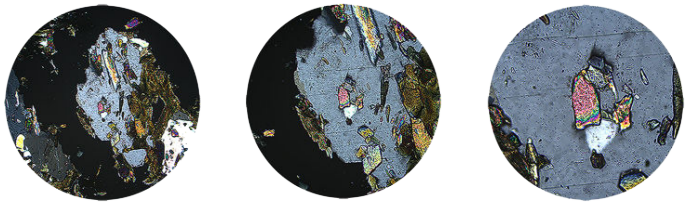
- DIC observation delivers a 3D embossed effect with a strong sense of depth, clear edges and no halation, ensuring more accurate details. It enables sample observation without staining, which is sample-friendly.

Product Details

Intelligent Light Intensity Management System

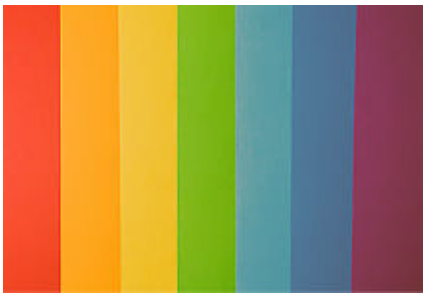


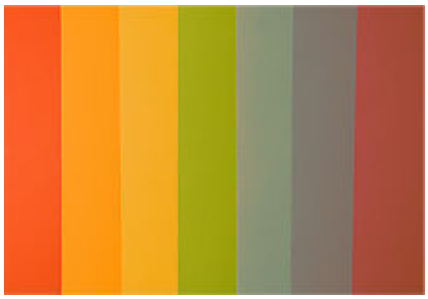
- For traditional microscopes, the image becomes darker when increasing the objective magnification.



- The intelligent light intensity management system automatically adjusts the light intensity to the optimal level when changing the objective magnification.

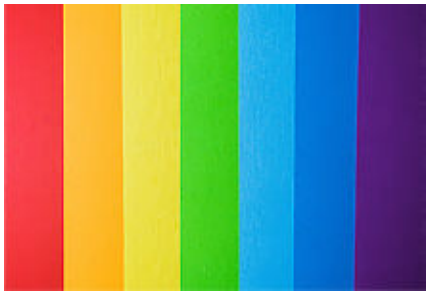
LED Light Source





- Halogen lamps: color rendering changes at different light intensity levels.

- LED light source: constant and consistent color rendering at different light intensity levels, with more vivid colors than halogen lamps.

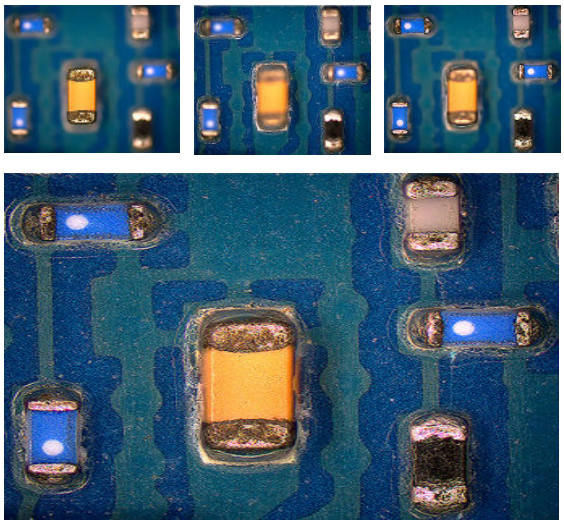


Software (Standard Delivery)

Software Function: Image Stitching

- The real-time image stitching function adopts image recognition technology; a panoramic image can be obtained simply by moving the stage knobs, providing a wider field of view for users.

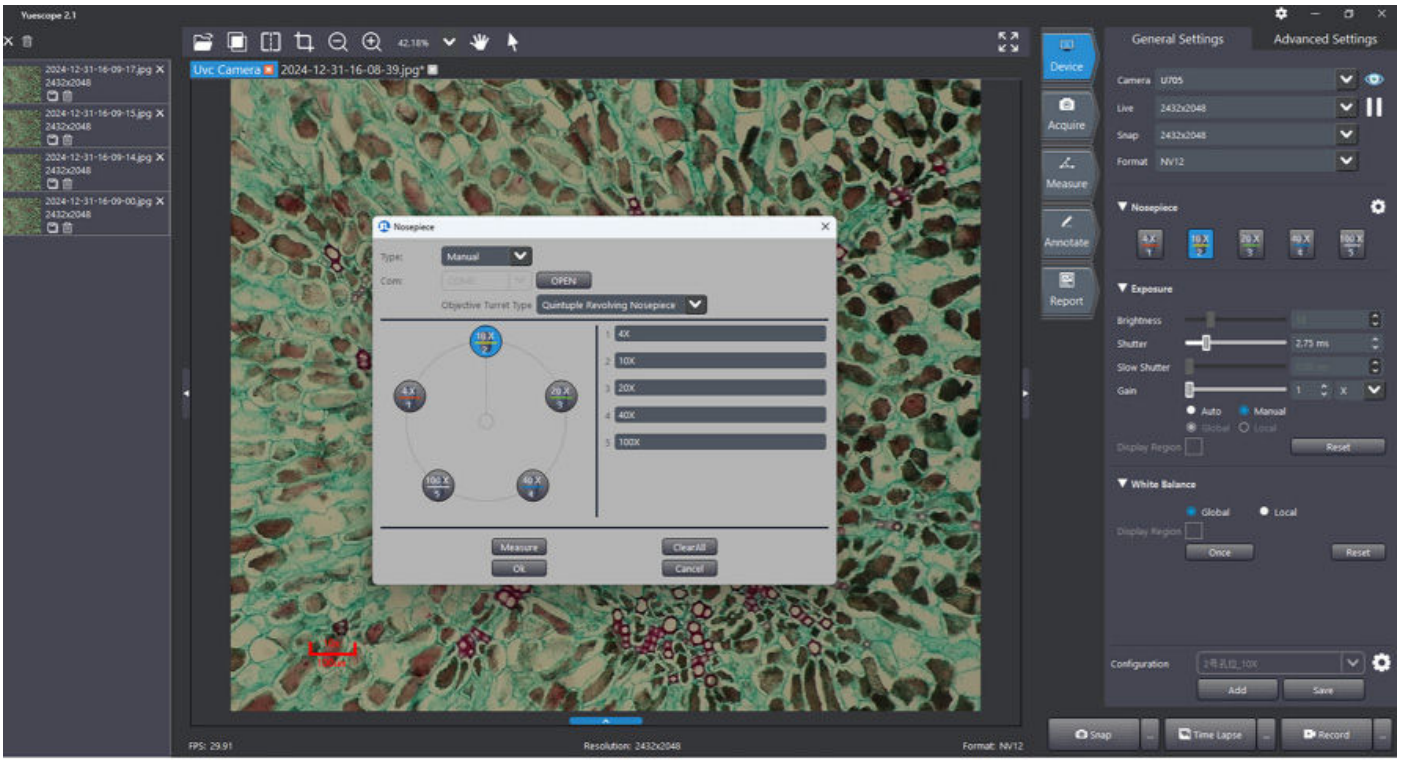
Software Function: Depth of Field Fusion

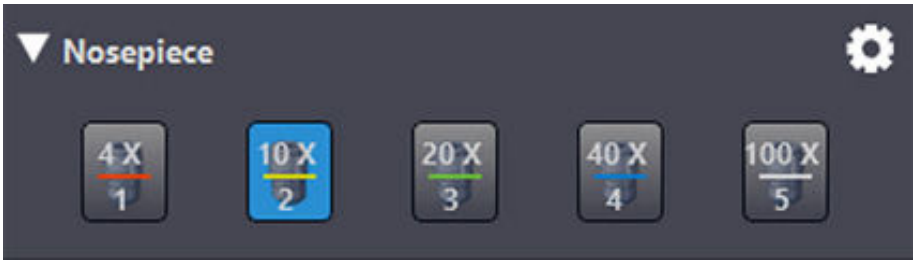


- The real-time depth of field fusion function can capture sample images with a height exceeding the objective depth of field and stack them to create an ultra-depth of field image.

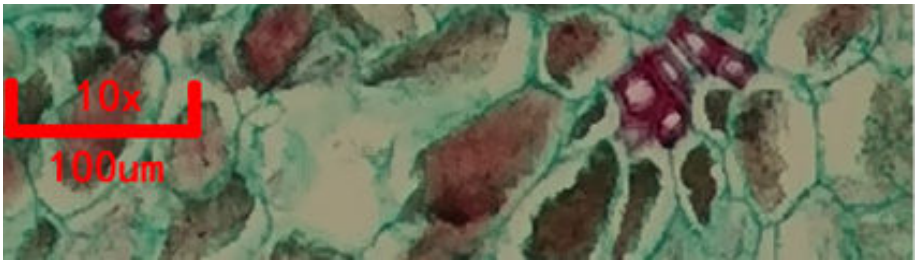
Software Operation Interface

Software Functions





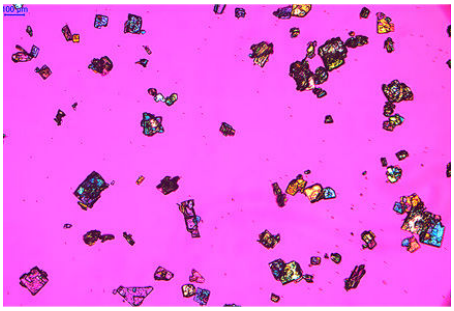
- Automatic objective lens recognition by software.



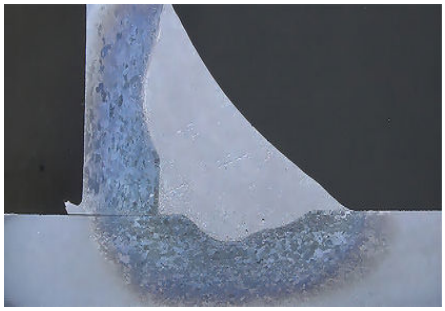
- Automatic scale bar switching by software when the objective lens is changed.

Software Operation Interface

Measurement Imaging

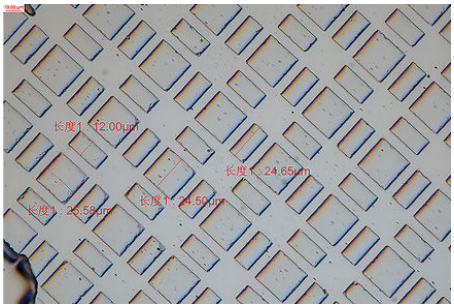


The drug powder under polarized light

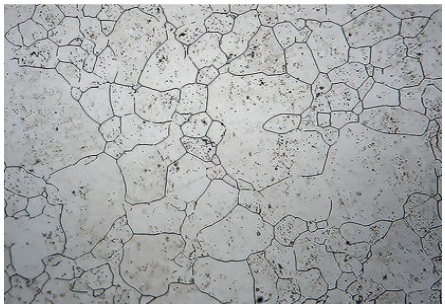


Measurement of aluminum alloy melting depth

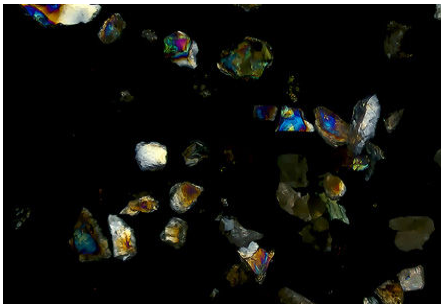
Capacitor tin plating height detection



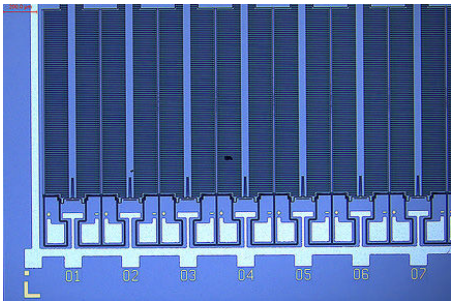
OLED photoresist material



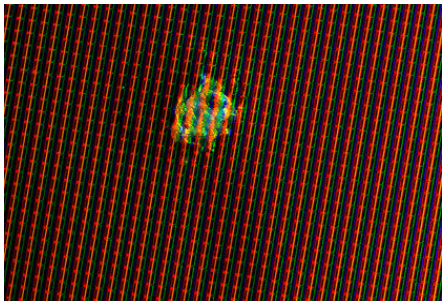
Metallographic structure analysis



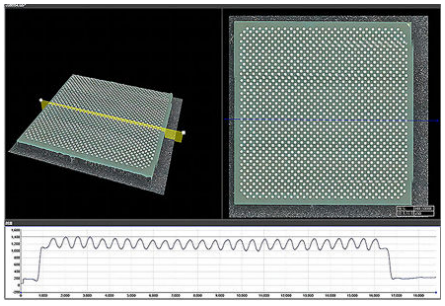
Phase analysis of rocks



Semiconductor testing



Display screen defect detection



The 3D shape of the tin ball

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Technical Specification

Model	iMetal-500B	iMetal-500BD
Optical Path	Bright Field	Bright and Dark Field
Optical System	Infinite optical system, intelligent light intensity management LED system	Infinite optical system, intelligent light intensity management LED system
Observation Tube	Hinged trinocular observation tube (compatible with imaging system), 30° inclined, interpupillary distance 48-86mm, adjustable eyepoint, beam splitter ratio 100:0, 0:100	Hinged trinocular observation tube (compatible with imaging system), 30° inclined, interpupillary distance 48-86mm, adjustable eyepoint, beam splitter ratio 100:0, 0:100
Eyepiece	Ultra-wide field eyepiece 10X (field number Φ22mm), high eyepoint, diopter adjustable	Ultra-wide field eyepiece 10X (field number Φ22mm), high eyepoint, diopter adjustable
Objective Lens	MPL5X,NA=0.15,WD=14.8mm	MPL5X,NA=0.15,WD=16.5mm
	MPL10X,NA=0.3,WD=8.5mm	MPL10X,NA=0.3,WD=11.7mm
	MPL20X,NA=0.45,WD=3.5mm	MPL20X,NA=0.45,WD=13mm
	MPL50X,NA=0.75,WD=3mm	MPL50X,NA=0.8,WD=3.5mm
Polarizing Observation	Reflective polarizer (optional) 360° rotatable analyzer (optional)	Reflective polarizer 360° rotatable analyzer

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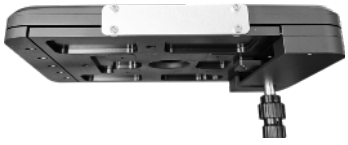
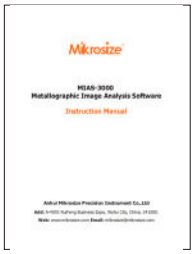
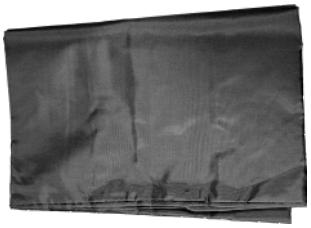
Technical Specification

Objective Nosepiece	Five-hole encoded nosepiece (RMS)	Five-hole encoded nosepiece (M26)
DIC Observation	High-resolution DIC, adjustable focal length (optional) High-resolution DIC, fixed focal length (optional)	High-resolution DIC, adjustable focal length (optional) High-resolution DIC, fixed focal length (optional)
Reflective Illumination System	LED illumination, color temperature 4400K-4600K, CRI≥95	LED illumination, color temperature 4400K-4600K, CRI≥95
Reflective Observation	Bright field Kohler illumination system, 50,000-hour LED light source	Bright field Kohler illumination system, 50,000-hour LED light source
Focusing System	Coarse and fine coaxial, adjustable tightness, 1μm fine adjustment scale value	Coarse and fine coaxial, adjustable tightness, 1μm fine adjustment scale value
Stage	260*200mm double-layer mechanical stage, 50*50mm travel range	260*200mm double-layer mechanical stage, 50*50mm travel range
Intelligent Management	The control circuit automatically adjusts the light intensity to the optimal level when changing the objective magnification	The control circuit automatically adjusts the light intensity to the optimal level when changing the objective magnification
Camera Interface	Standard C-mount 0.5X, parfocal adjustable, suitable for CCD within 2/3 inch	Standard C-mount 0.5X, parfocal adjustable, suitable for CCD within 2/3 inch

Standard Delivery

Name		Qty	Photo
Mainframe		1pc	
Eyepiece 10X/22mm		2pcs	
Objective lens	MPL5X,NA=0.15,WD=14.8mm	1pc	
	MPL10X,NA=0.3,WD=8.5mm	1pc	
	MPL20X,NA=0.45,WD=3.5mm	1pc	
	MPL50X,NA=0.75,WD=3mm	1pc	
Nosepiece		1pc	
Stage		1pc	
0.5X C-Type Camera Adaptor		1pc	

Standard Delivery

Name	Qty	Photo
12 Million Pixel Industrial Camera	1pc	
Instruction Manual	1pc	
High-precision Micrometer (0.01mm scale value)	1pc	
Dust Cover	1pc	
Power Cord	1pc	

Optional Delivery

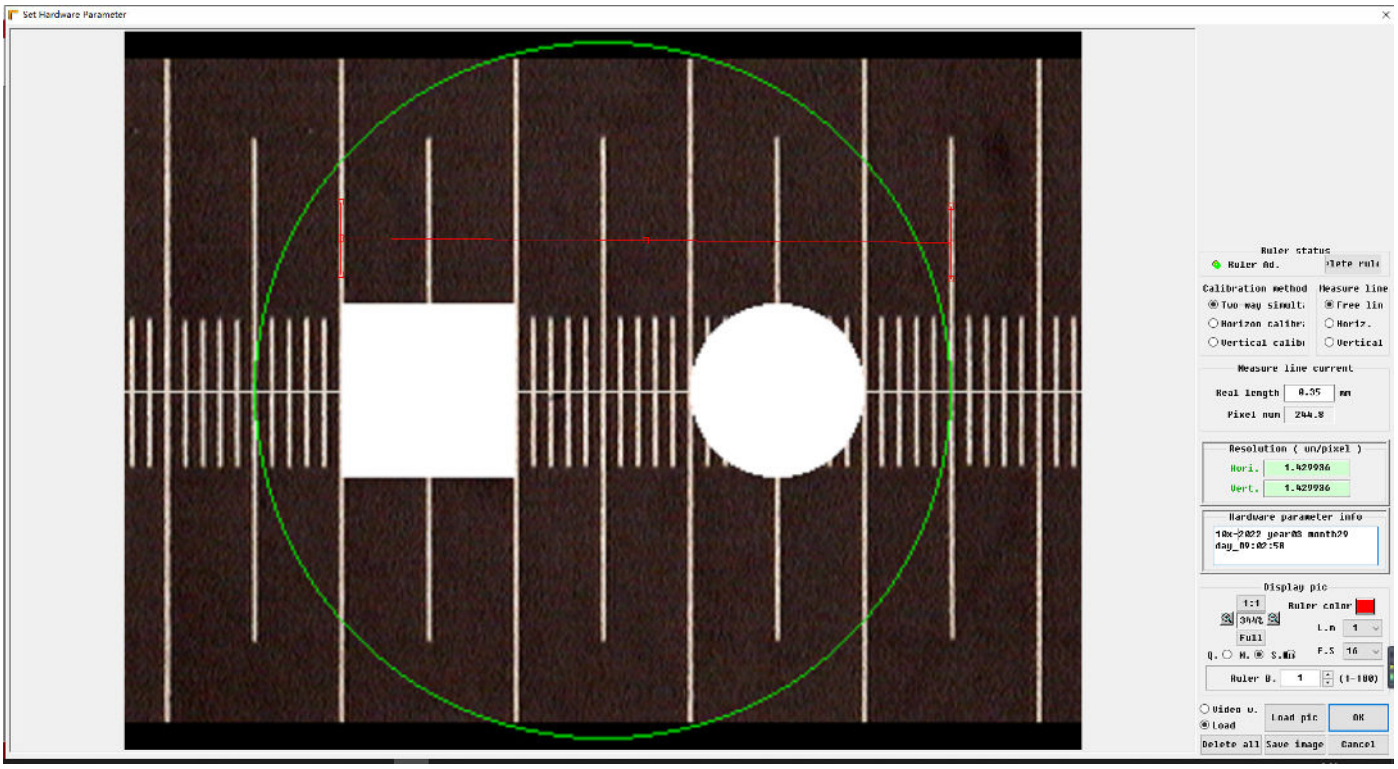
Eyepiece	10X/23mm, diopter adjustable
Objective Lens	MPLFL2.5X NA0.08 WD9.8
	MPLFL100X NA0.9 WD1
	LMPLFL100BD NA0.9 WD1.1
	LMPLAP050XBD NA0.6 WD8.8
	LMPLAP0100XBD NA0.85 WD3.3
Polarizing Observation	Reflection polarizer
	360°rotatable analyzer
Differential Interference Contrast (DIC)	High-resolution DIC, adjustable focal length High-resolution DIC, fixed focal length
Camera	1pc
Camera Cable	1pc 
Camera Adaptor	Standard C-mount 1X, parfocal adjustable, suitable for CCD within 4/3 inch
Metallographic Microscopic Analysis Software	

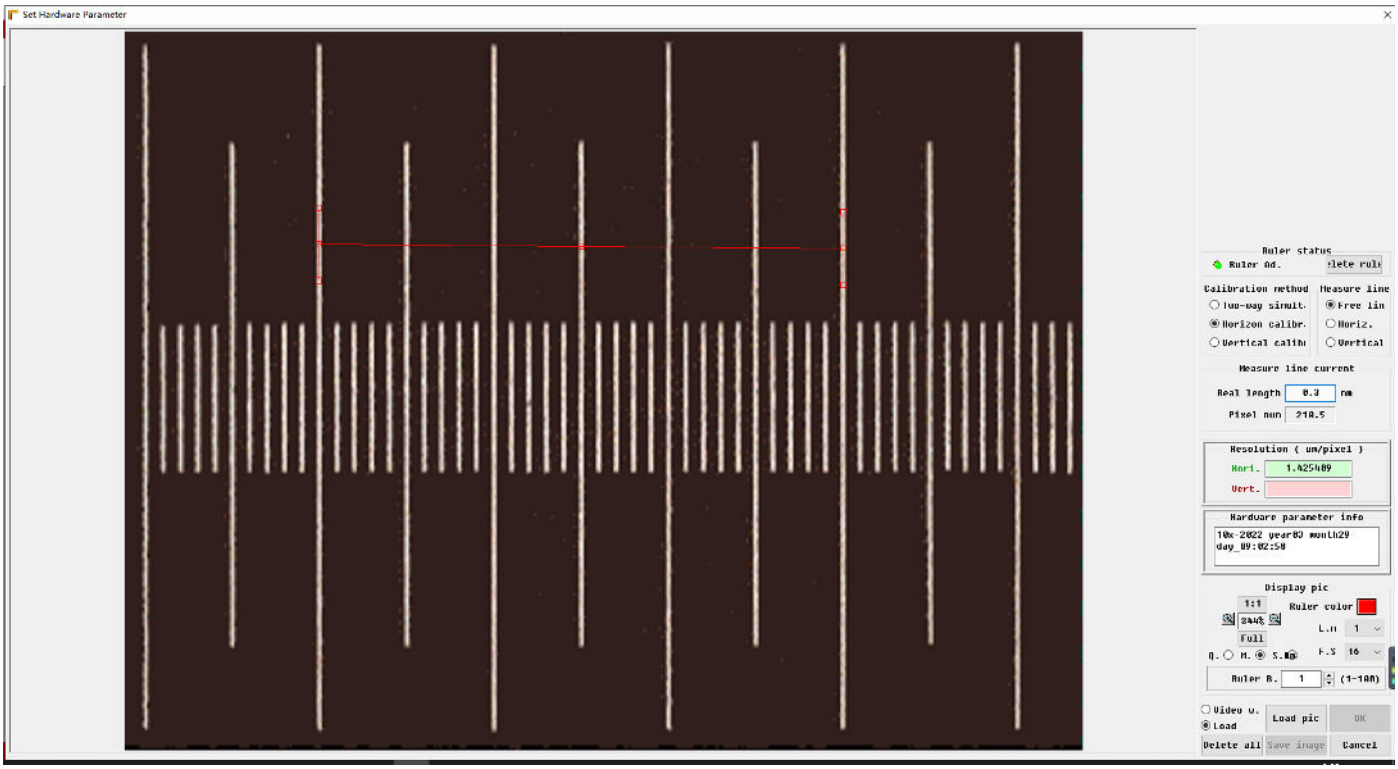
iMetal-MA Metallographic Analysis Software

- The software supports hardware calibration and metallographic grade evaluation, covering international testing modules for grain size, inclusions etc. It has basic functions such as image preprocessing, accurate geometric measurement, multi-format report export and fixed-magnification printing, as well as image stitching, video acquisition, confocal imaging and 3D optical imaging etc. It supports atlas comparison and data statistics, It meets the standardized requirements of the entire metallographic testing process and is compatible with the Windows 7, 10 and 11 operating systems.

Operation Interface

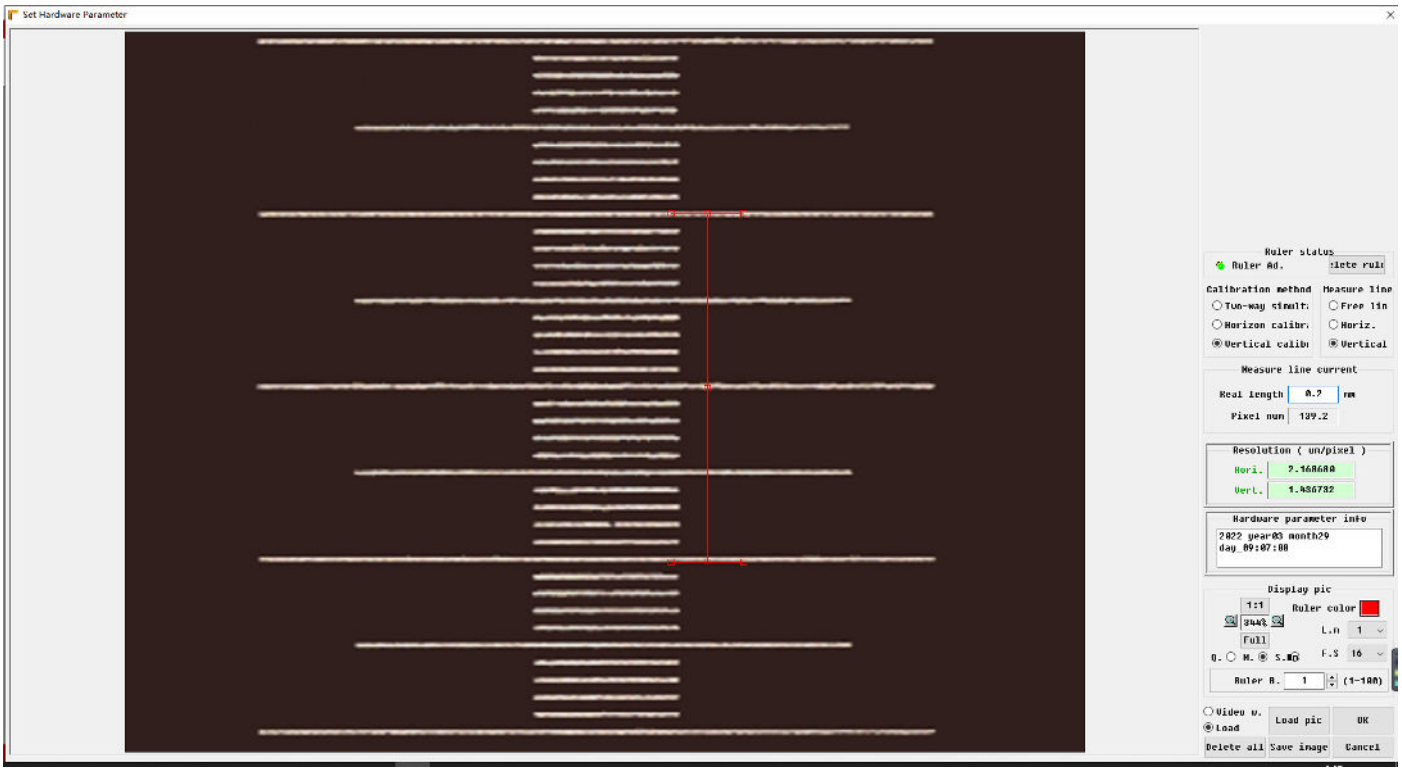
Image Calibration





Operation Interface

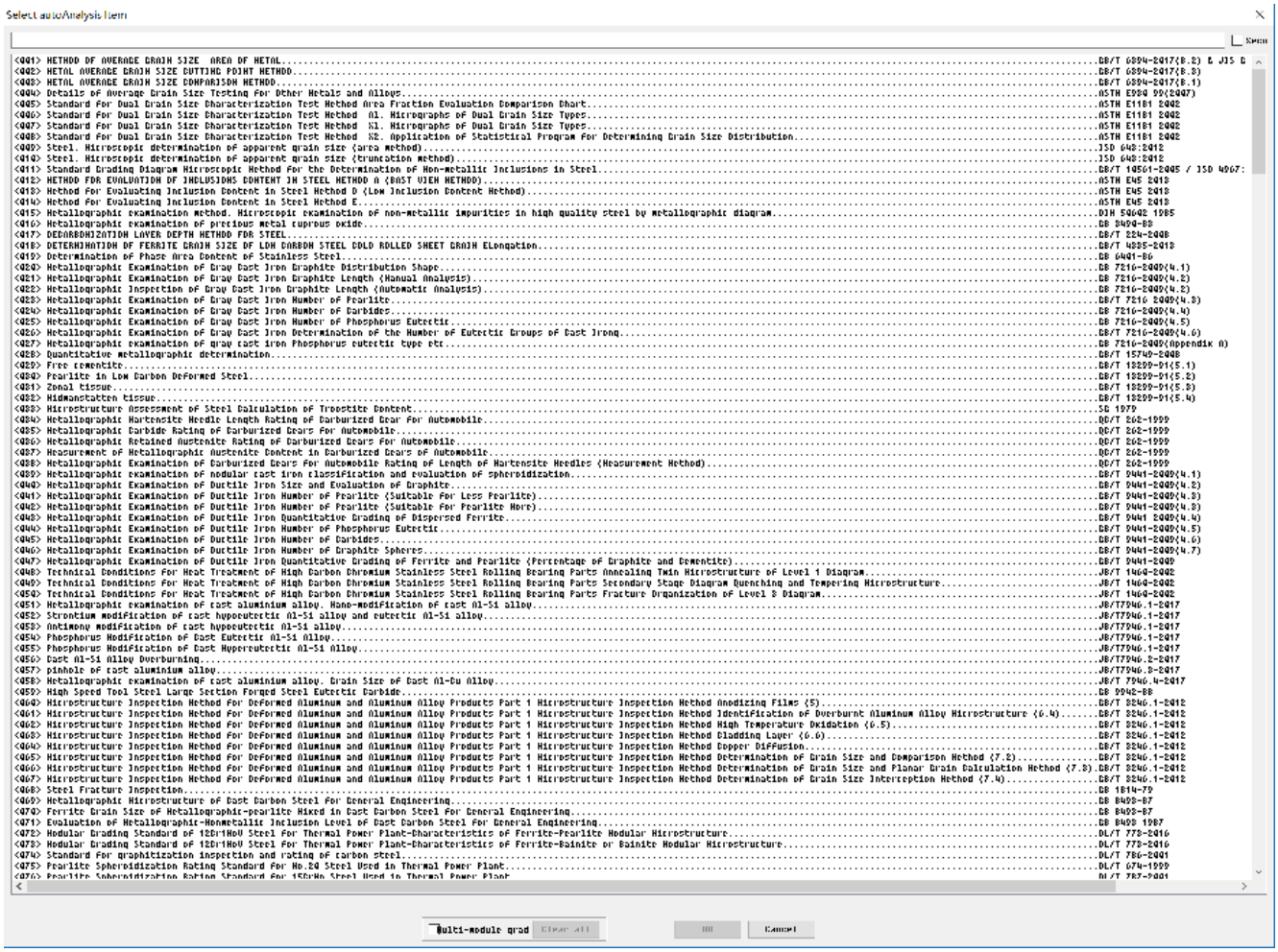
Image Calibration

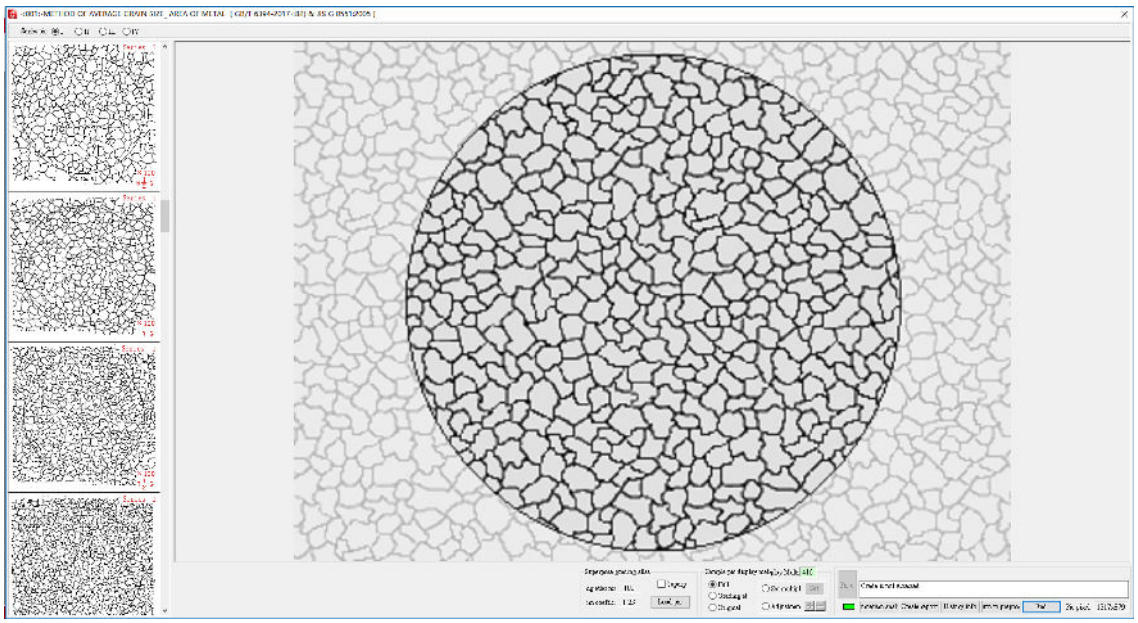


- The software supports three calibration methods (bidirectional simultaneous, horizontal and vertical) to adapt to different testing scenarios.
- The resolution can be automatically calculated only by loading the micrometer image, dragging the scale and entering the actual length, featuring simple and easy operation.
- The calibration results can be verified through geometric measurement with the error controlled within a minimal range, laying an accurate hardware foundation for subsequent measurement and grading. Meanwhile, it supports the export and import of resolution parameters to realize rapid reuse across multiple devices and scenarios.

Operation Interface

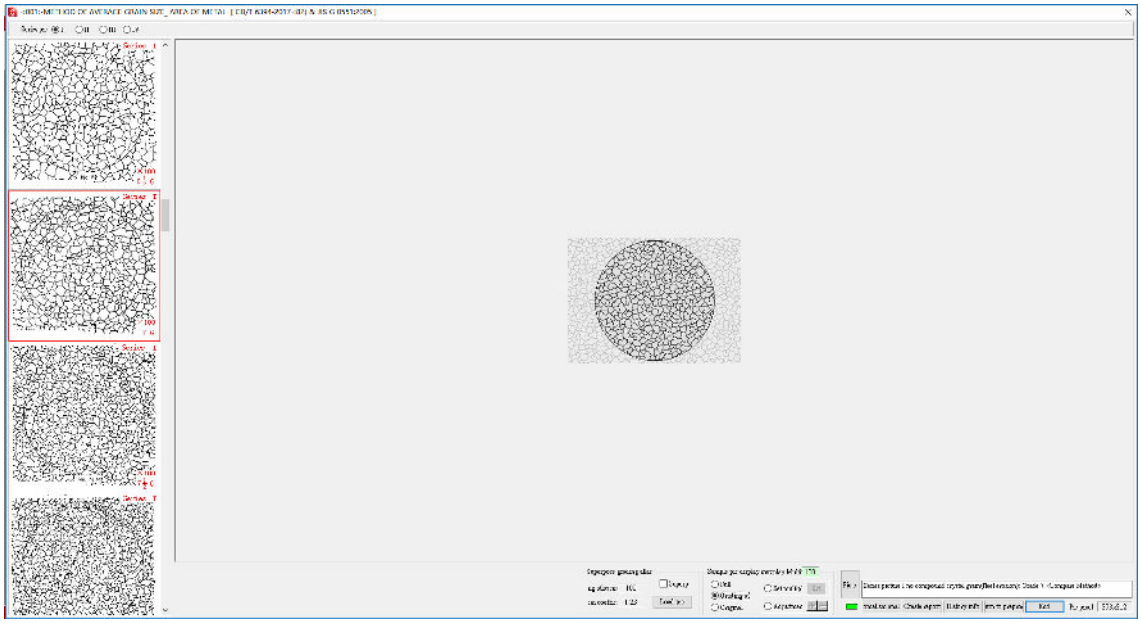
Metallographic Grade Evaluation Function





Operation Interface

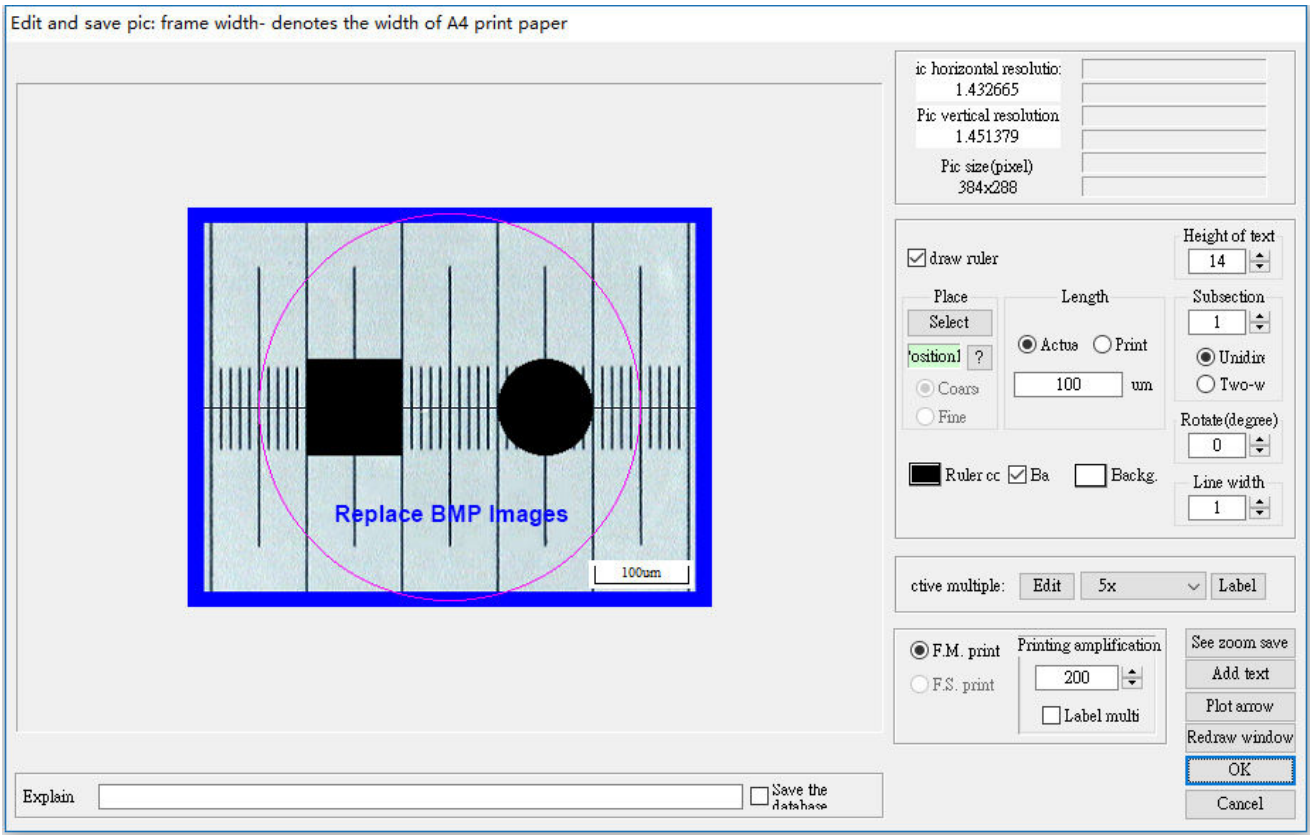
Metallographic Grade Evaluation Function



- Comprehensive testing coverage: It covers mainstream testing items such as grain size, non-metallic inclusions, ductile iron and ferrite in stainless steel welds, and is adapted to national and international standard modules to meet the metallographic testing needs of various products.
- Adaptation of dual grading modes: It supports manual comparison grading and automatic quantitative grading. The former enables intuitive atlas comparison, while the latter accurately identifies microstructures and automatically calculates parameters, taking into account different testing scenarios and precision requirements.
- Convenient module retrieval: Testing modules can be sorted by number/standard number or quickly retrieved by keywords, which greatly improves the efficiency of module searching and makes the operation more efficient.
- Manual correction of results: It supports manual adjustment of metallographic microstructure attributes, addition/deletion of feature points and correction of automatic identification deviations. It also supports multi-field statistics for averaging to ensure the accuracy of grading results.
- Seamless connection of results to reports: Grading results can be directly linked to the report generation function, and standardized reports in PDF/WORD/EXCEL formats can be exported with one click, realizing a closed loop of the entire process from testing and grading to report generation.

Operation Interface

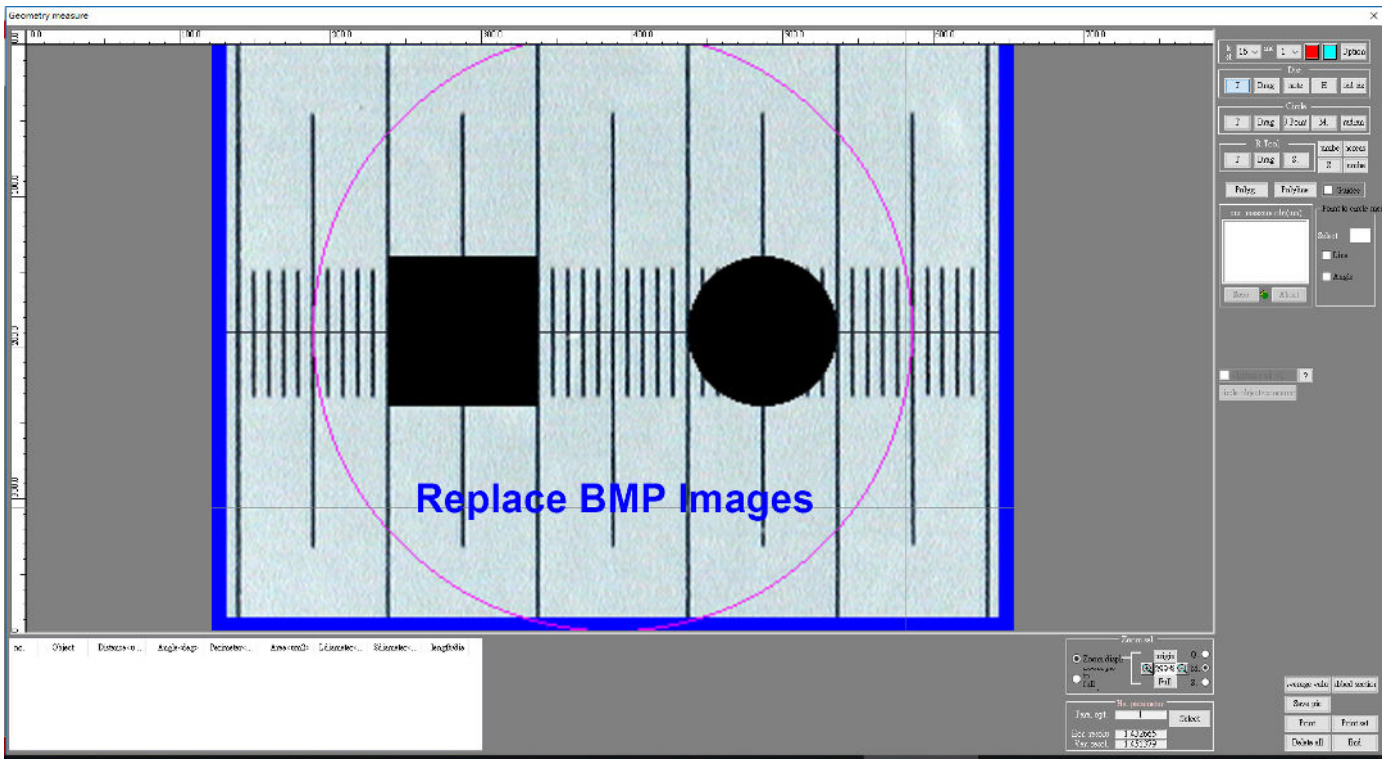
Image Preprocessing



- Rich processing tools: It is equipped with dozens of professional tools such as brightness/-contrast adjustment, binarization, sharpening and softening, filtering and denoising, and morphological operations to meet the optimization needs of various metallographic images.
- Flexible selection operation: It supports multiple selection methods including rectangle, ellipse and polygon. Selections can be moved and rotated, and precise pixel-based selection is also available, adapting to local and overall image processing scenarios.
- Customized output: Scales, text and arrows can be added when saving images, the printing magnification can be customized, and fixed-scale printing settings are supported to meet the requirements of standardized output.
- Efficient and convenient operation: Commonly used processing functions are integrated into exclusive panels, which can be called with one click without searching through multiple layers of menus, greatly improving the efficiency of image preprocessing.
- Complete data retention: It supports saving selected areas/entire images in BMP/JPG formats, the processing process is traceable, and the processed images can be directly connected to grading, measurement and report functions for smooth process connection.

Operation Interface

Geometric Measurement



- Complete measurement tools: It supports various types of measurement including distance, rectangle, circle, polygon, angle, radian and point-to-center distance, covering the full-dimensional geometric measurement needs of metallographic testing.
- Units such as nm/um/mm can be freely selected, and the directions of measuring lines, arrows and text can be customized.
- Measurement results can generate image-text reports in real time and can also be directly imported into Excel for secondary analysis.

Operation Interface

Report Export

(Report name)

(Submission unit) Sample Submission Date: 2018-01-01

(Submission unit)	(Submission unit)
(Sample Varieties)	(Sample Varieties)
(Test number)	(Test number)
Inspection Item & Assessed Grade:	Item: Average Grain Size of Metals - Test Method for Average Grain Size of Metals (Area Method) [GB/T 6394-2017(8.2) & JIS G 0551:2005] Grade Type: Series of Images | Twin-free Grain (Light Etching): Grade 5 <Comparison Method>

Image for Sample No.1: (Print Magnification: 280×)

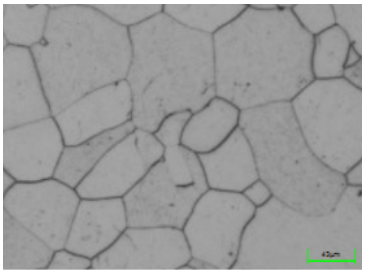
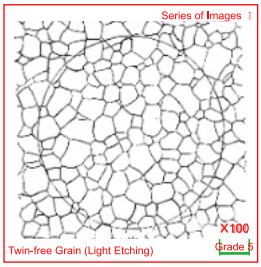


Image for Sample No.2: (Print Magnification: 171×)



{Remarks}	{Remarks}

{Surveyor} {Check} Sample Submission Date: 2018-01-01

- It supports universal report formats for single/multiple images, which can be selected on demand to adapt to the report presentation needs of different testing scenarios.
- Grading and measurement results can be exported in three mainstream formats (PDF/WORD/EXCEL) with one click, meeting different usage needs such as filing, editing and data statistics.
- Grading and measurement results can be directly linked to report generation without manual data entry, realizing the seamless connection of testing, results and reports and improving the efficiency of report generation.