

Metallurgical Optical Microscopes, Stereozooms and Image Analyzers

SuXma and DeXel Series

For more than 10 years, Metallography and Microscopy is at the heart of Conation Technologies. We offer end to end solutions for complete metallography analysis and Weld analysis for automotive, educational and research needs, with the right kind of products as the application requires.

Our solutions for Metallurgical Lab includes

- Sample preparation machines • Metallurgical Microscopes
- Stereozoom Microscopes • Image Analyzers for various applications

METALLURGICAL MICROSCOPES

SuXma – Met Series

Conation offers finest range of Inverted and Upright Metallurgical Microscopes with excellent optical systems for analyzing complex metallurgical microstructures and to serve research purpose as well. Optical Systems are Infinity Systems with excellent resolution optics.

Upright Metallurgical Microscopes

Upright or Vertical Microscopes have the source for reflected light and objectives placed above the stage and pointing down towards the stage. Sample is placed on the stage pointing up. In transmitted light mode, the source of transmitted light is also available below the stage.

This structure has some distinct advantages :

- Sample is fully exposed to the objectives, hence it can be fully viewed by scanning and without relocating
- Larger scanning range of the stage
- One can locate and view exact location on sample

SuXma – Met B and Met BD

These microscopes provides superior clarity and sharpness due its infinity optical system and high numerical aperture objectives.

Highlights :

- Excellent resolution upto 1000X with high NA objectives
- High contrast, sharp images
- Versatile in nature
- Illumination – Brightfield, Darkfield, Polarizer
- Large sample stage with large sample movement
- Possibility to attach motorized XY stage and motorized focussing

Key Specifications

Met B has brightfield illumination and Met BD is having Brightfield and Darkfield illumination

- **Observation modes** - Brightfield, Polarizer for Met B/ Brightfield, Darkfield, Polarizer for Met BD
- **Illuminations** - 6V, 30W Halogen for brightfield / 12V, 50W Halogen for Darkfield; LED option available
- **Diaphragm & Filters:** Integrated field & aperture diaphragm; frosted glass & colour filters
- **Analyzer & Polarizer**
- **Eyepiece Tube** - Trinocular, inclined 30°; diopter & interpupillary distance adjustment
- **Eyepieces** - 10X wide field, FOV Φ 22 mm
- **Nosepiece** - Quintuple, Backward ball bearing
- **Objectives** - Infinity plan achromatic; 5X, 10X, 20X, 50X, 100X; for only Brightfield OR for Brightfield and Darkfield
- **Focussing Mechanism** - Coaxial coarse and fine focussing controls; Adjustable tension control
- **Stage** - 280mm x 270mm; Travel 200mm x 200mm
- **Optional Features** - DIC Attachment; Objectives – 5X, 40X, 60X, 80X; Eyepieces – 15X, 16X, 20X; 10X graduated

Applications :

- Critical microstructures of Heat Treated components, Forgings, tool steel, gears, castings etc.
- Inclusion Study on large scanned area
- Industrial and research materials such as ceramics, composites, fibres, asbestos, novel materials
- Electronic components, PCB, wafers etc
- Contamination/cleanliness • Powder and particles



SuXma – Met IV and Met IV TR

These are **top of the class material microscopes** that incorporates semi-apochromat & Apo-chromat objectives. These objectives have exceptionally high NA that give best possible resolution in optical microscopy along with superior clarity and sharpness.

Highlights :

- Semi-apochromat and Apo-chromat objectives with exceptionally high numerical aperture to give best possible resolution, High contrast and sharp images
- Observations modes – Brightfield, Darkfield, Polarizer; Option for DIC
- Eco-function for illumination to automatically shut OFF light if not in working for 30 minutes
- Option for motorized nosepiece (turret); motorized stage and focussing; Ergo-tilting head
- Sturdy structure with optimized design for extended life span



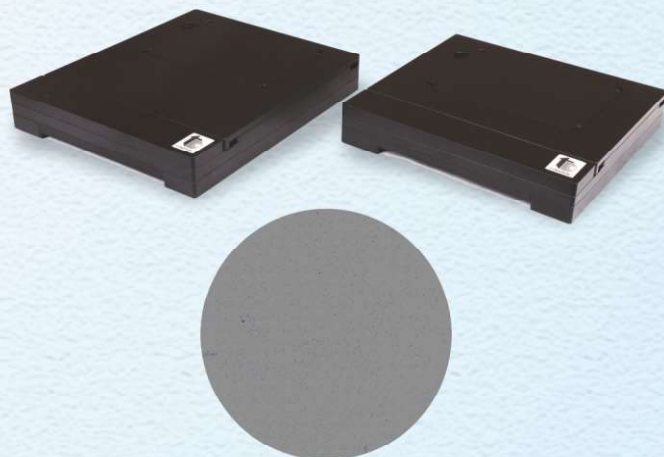
Key Specifications

Met IV has reflected illumination and Met IV TR is having both reflected and transmitted illumination

- **Observation modes** - Brightfield, Darkfield, Polarizer; Upgradable for DIC
- **Reflected illumination** - Koehler 24 volt/100 watt halogen
- **Transmitted illumination** - Koehler 24 volt/100 watt halogen with ND6/ND25 filter
- **Mode selections** - BF1, BF2 and DF modes; selectable on rotating turret
- **Diaphragm & Filters:** Integrated field diaphragm, aperture diaphragm; ND & Colour filters
- **Puller type polarizer and Analyzer**
- **Eyepiece tube** - Trinocular, inclined 30°; diopter adjustment (± 5) with an interpupillary distance adjustment
- **Eyepieces** - 10X wide field, FOV Φ 22 mm
- **Nosepiece** - Inward sextuple Bright and Dark field nosepiece (DIC slot)
- **Objectives** - Infinity plan achromatic objectives; Semi-Apo - 5XBD, 10X BD, 20X BD & APO - 50XBD, 100X BD
- **Focusing Mechanism** - Coaxial coarse and fine focus; Minimum division of fine focusing is 1 μ m
- **Stage** - Size: 210mmX170mm; Moving range: 102mmX102mm
- **Optional Features** - DIC slider; Motorized Nosepiece with short cut buttons on front of the microscope; Ergo tilting trinocular head adjustable from 0° to 35°, interpupillary distance 47-78mm; Eyepieces - Super wide field SW10X/25; EW12.5X/16 WF15X/16 WF20X/12; Condenser for transmitted illumination

Attachments for Upright Microscopes :

- **Motorized Stage** – Ultra compact stage; 80mm X 60mm XY movement; 5 micron positioning accuracy; with controller and joystick, Motorized Focussing attachment
- **Digital Color Cameras** – Ranging from 1.3 to 20 MP resolution
- **Metallography Image Analyzer** - Comprehensive software for all metallography applications
- **Cleanliness Particle Analyzer** – Contamination particles analysis for their total numbers, size, range classification and type distribution



Inverted Metallurgical Microscopes

Inverted Microscopes have the source for reflected light and objectives placed below the stage and pointing up towards the stage. Sample is placed on the stage pointing down.

This structure has some distinct advantages :

- Sample need not be mounted.
- Sample can be of any shape and size (height); also can be of higher weights
- Workflow time is very less; once a sample is focussed, further samples are also focussed at same Z position; no need to refocus

Applications :

- Critical microstructures of Heat Treated components, Forgings, tool steel, gears, castings etc.
- Inclusion Study • Ferrous & Non-ferrous materials
- Industrial and research materials such as ceramics, composites, fibres, asbestos, novel materials

SuXma – Met I

This is basic Inverted Microscope specially designed for routine applications. Being very cost effective yet with high resolution, they are ideally suitable for forging and foundry applications, and educational purpose.

- **Observation** – Brightfield; Polarizer optional
- **Eyepiece Tube** - Trinocular (seidentopf) head, inclined at 30 deg, rotates full 360 deg.
- **Eyepiece** – WF 10X/18
- **Objectives** - DIN plan achromat; PL 10X, 20X, 40X, 100X. (Optional 5X, 50X, 60X, 80X)
- **Nosepiece** - Quadruple, ball bearing nosepiece.
- **Illumination**– LED illumination / Kohler 6V/20W halogen illumination; full range intensity variation, filters included
- **Focussing** - Coaxial course and fine focussing with adjustable tension control.
- **Stage** - 150mmX185mm, travel range - 15mmX15mm, low position right hand control.



SuXma – Met IB and Met IBD

These microscopes provides superior clarity and sharpness due its infinity optical system and high numerical aperture objectives.

Highlights :

- Excellent resolution right upto 1000X with high NA objectives
- High contrast, sharp images
- Versatile in nature
- Illumination Options – Brightfield, Darkfield, Polarizer
- Large sample stage



Key Specifications

Met IB has brightfield illumination and Met IBD is having Brightfield and Darkfield illumination

- **Observation modes** - Brightfield, Polarizer for Met IB/ Brightfield, Darkfield, Polarizer for Met IBD
- **Illuminations** - 6V, 30W Halogen for brightfield / 12V, 50W Halogen for Darkfield; LED option available
- **Diaphragm & Filters:** Integrated field & aperture diaphragm; frosted glass & colour filters
- **Analyzer and Polarizer**
- **Eyepiece Tube** - Trinocular, inclined 45°; diopter adjustment (± 5) with an inter-pupillary distance adjustment range of 55 to 75mm
- **Eyepieces** - 10X wide field, FOV Φ 22 mm
- **Nosepiece** - Quintuple (Backward ball bearing)
- **Objectives** - Infinity plan achromatic; 10X, 20X, 50X, 100X; for only Brightfield OR Brightfield and Darkfield
- **Focussing Mechanism** - Coaxial coarse and fine focussing controls; Adjustable tension control
- **Stage** - 242mm x 200mm; Travel 30mm x 30mm
- **Optional Features** - DIC Attachment, Objectives – 5X, 40X, 60X, 80X; Eyepieces – 15X, 16X, 20X; 10X graduated; LED illumination

SuXma – Met I IV

This is **top of the class material microscopes** that incorporated semi-apochromat and Apo-chromat objectives. These objectives have exceptionally high numerical aperture that give **best possible resolution in optical microscopy along with superior clarity and sharpness**. Microscopes has modular design to offer greater flexibility to adapt various observation modes and extended magnification with intermediate magnification changer.

Highlights :

- Excellent resolution right upto 1500X with high NA objectives and intermediate magnification changer
- Semi-apochromat and Apo-chromat objectives with exceptionally high numerical aperture
- Observations modes – Brightfield, Darkfield, Polarizer; Option for DIC
- Intermediate magnification changer - 1X & 1.5X
- Large sample stage with larger XY moving range
- Sturdy structure with optimized design for extended life span

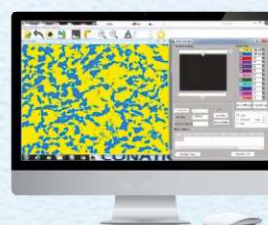


Key Specifications

Observation modes	Brightfield, Darkfield, Polarizer
Illuminations	12V, 100W Halogen
Filters	• Integrated field diaphragm, aperture diaphragm • ND6/ND25 filter, Green filter, Blue filter
Eyepiece tube	Trinocular, inclined 45°; diopter adjustment (± 5) with an interpupillary distance adjustment range of 55 to 75mm
Eyepieces	10X wide field, FOV Φ 22 mm
Nosepiece	Sextuple nosepiece (DIC slot)
Objectives	Infinity plan achromatic objectives • 5XBD Semi-Apo, N. A.: 0.15 W. D.: 20 mm • 10X BDSemi-Apo, N. A.: 0.3 W. D.: 11 mm; • 20X BDSemi-Apo, N. A.: 0.45 W. D.: 3 mm • 50XBD APO N. A.: 0.8 W. D.: 1 mm; • 100X BD APO N. A.: 0.9 W. D.: 1 mm
Polarizer	Analyzer and polarizer
Focusing Mechanism	• Coaxial coarse and fine focusing controls • Adjustable tension control • Fine division 1 μ m • Moving range 9mm, up 7mm and down 2mm
Stage	• Size 340 mm x 230 mm • Travel area 130 mm x 85 mm • Max weight capacity – 20 Kg
Optional Features	• DIC and fluorescent Attachment • Ergo tilting trinocular head • LED illumination

Attachments for Inverted Microscopes :

- Digital Color Cameras
- Metallography Image Analyzer



STEREOZOOM MICROSCOPES

SuXma – SZ Series

Conation range of Stereozoom Microscopes are with excellent optical systems for analyzing typical macrostructures, surface topography, defects, welding structure & for failure macros.

Applications :

- General Macrostructural observation and analysis
- Surace defects, cracks in castings and forgins
- Failure Analysis
- Weld Structure analysis
- Flow lines and macro grains
- Electronic components
- Contamination/cleanliness
- Powder and particles

Highlights :

- Wide magnification range with zoom ratios and addition of objectives
- High contrast, sharp images
- Versatile in nature • Illumination Options – Brightfield, Darkfield, Polarizer
- Options for stands, stages and holders
- Possibility to attach motorized XY stage & focussing



Key Specifications

Model	SuXma-SZ I	SuXma-SZ II	SuXma-SZ 6P	SuXma-SZ 8P	SuXma-SZ 10P
Optical System	Greenough type		Parallel-optics type		
Viewing Head	Trinocular, Inclined at 30°/45		Binocular, Inclined at 20°		
Zoom	1:6.5; 0.7×~4.5×	1:6.3; 0.8×~5×	1:6.3; 0.8×~5×	1:8; 0.8×~6.5×	1:10; 0.8×~8×
Objective	-		1× Plan achromatic		
Eyepiece	WF10×/Φ22	WF10×/Φ23	EW10×/Φ24		
Total Magnification	7X-45X	8X-50X	8X-50X	8X-65X	8X-80X
Max Total magnification	3.5X-180X	4X-200X	2.4X-300X	2.4X-390X	2.4X-480X
Illumination	Transmission & reflection; Halogen/LED illumination, brightness adjustable				
Photography Port	In-built		Beam-splitter (One port) for camera attachment		
	Optional Attachments and Accessories				
Eyepieces	WF15×/Φ15, WF20×/Φ10		WF15×/Φ16, WF20×/Φ12, WF30×		
Objectives	Objectives – 0.5X, 1.5X, 2X	Objectives – 0.5X, 0.7X, 2X	0.3× Achromatic, 0.5×Achromatic, 0.5× Plan apochromatic, 2× Plan achromatic		

Attachments and Accessories:

- Cold light Source and Light Guide
- LED light Source with double light guide (gooseneck)
- Manual XY stage
- Motorized Stage – Precision ball screw driven; with controller and Joystick
- Universal Stands • Digital Color Cameras
- Weld & Macro Image Analyzer • Cleanliness Particle Analyzer

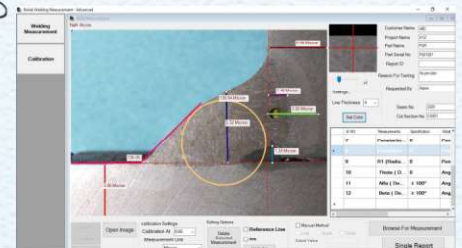


IMAGE ANALYZERS

DeXel - Series

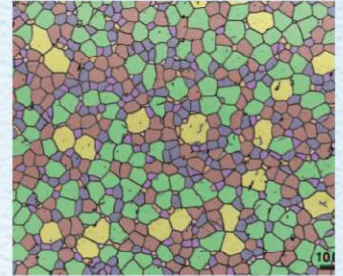
Qualification and quantification of Macro and microstructural features have always been crux of any material Analysis. Image analyzers has given great advantage to metallurgists in their everyday activities as well as in their research.

- Fatigue-free, User-friendly and Fast
- Higher Repeatability and Reproducibility
- Compliance to standards
- Precision and Accuracy
- Data Preservation • Dependability
- Cost Efficient

Metallography Image Analyzer DeXel - Metallography Series

Grain size analysis

- Intercept Method (Manual/ Automatic mode) - E 112, E1382, IS4748, ISO643
- Planimetric Method
- Duplex grain - ASTM E1181
- Largest grain ALA as per ASTM E930
- Auto grain boundary tracing, enhancing and grain cleaning feature

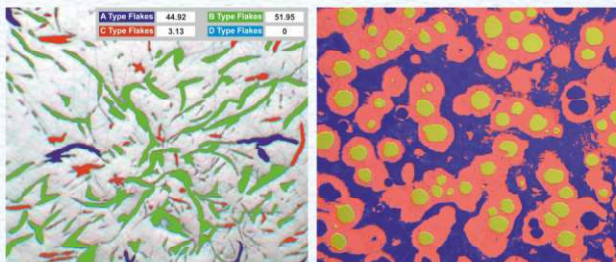
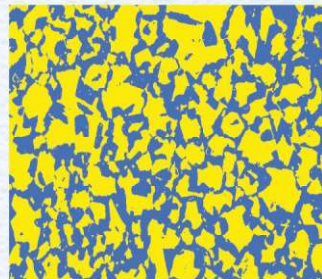


➤ Inclusion Analysis as per ASTM E45, E1122, DIN 50602, JIS G 0555

- DIN K2, K3, and K4 rating as per DIN 50602
- Inclusion analysis as per ISO 10247
- Inclusion analysis as per SAM Method E45 Method E
- Percentage of Cleanliness as per JIS 0555
- Extreme value analysis and statistical data as per ASTM 2283
- Inclusion analysis of as per ASTM B796-02 for Powder Forging Applications
- Inclusion Volume fraction/content of Second-Phase Constituent - ASTM E1245

➤ Phase analysis as per ASTM E562

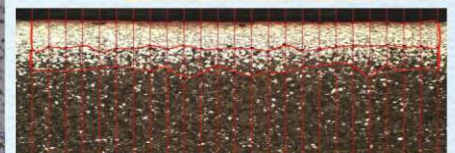
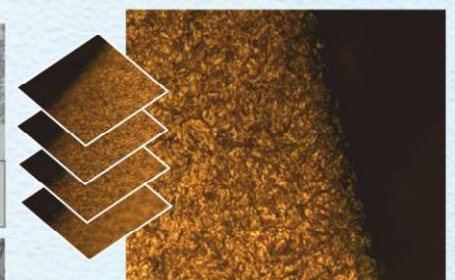
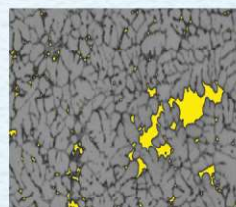
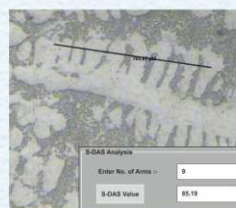
- Threshold Method
- Point count Method
- Histogram, Color coding for independent phases
- Facility for selection of region of interest



➤ Cast Iron Analysis

- Graphite Form/Types % estimation (Type I to Type VII)
- Nodularity & Nodule count analysis as per ASTM E 2567-11
- Graphite flake class separation, size classification as ASTM A247

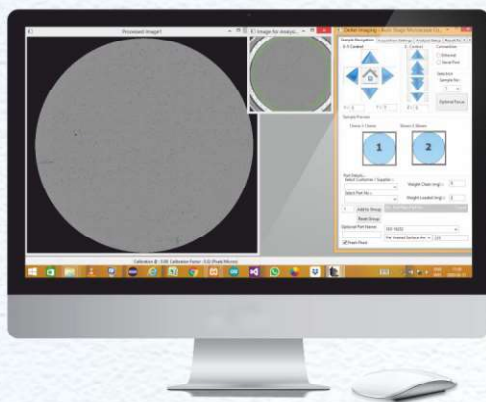
- Dendritic Arm Spacing (S-DAS analysis)
- Erosion measurements in brazed components
- Porosity Measurement as per ASTM B276
- Banding Analysis as per ASTM E1268
- Decarburization depth Analysis - ASTM E1077
- 2D Measurement of features of interest
- Planar Stitching in X and Y direction
- Z stacking / Extended depth of focus
- Batch Run for large number of images



Weld & Macro Analyzer

DeXel - Weld&Macro

- Comprehensive Weld structure and Macro structure analysis software
- Simple workflow based concept
- Easy navigation through image acquisition, analysis and reporting
- Preloaded list of measurement parameters specific to type of weld joint
- Extensive list of all the geometric parameters of weld such as Leg lengths, throat, penetrations, root penetration, metal thickness, gap, Area and depth of Heat Affected Zone, Joining Angles etc
- Macro based analysis by creating customized parameters' list in user-friendly excel format.
- Color coded Measurements
- Porosity and other defects, 2D analysis of features
- Report generation in Excel with OK/NOK comments



Cleanliness Particle Analyzer; DeXel - Filtrate

Motorized Stage is strongly recommended for this analysis

- Contamination analysis system for detailed particle analysis as per ISO 16232-18, VDA19.1, ISO 4406 or any OE standard
- Particle count and size classification as per ISO 16232 or User requirement
- Particle separation into metallic, non-metallic and fibre categories
- Customized report generation includes graphical presentation of particle size classification, category separation, CCC code, largest particle images



Powder Analysis; DeXel-Powder

- Powder particle Count, size parameters, shape parameters
- Size classification
- Size distribution as per D values (D10, D50, D90 etc)



Microhardness Indentation Analyzer; DeXel-Hard

- Direct measurement of hardness value on PC monitor with software by either one of two methods
 - Diagonal Clicking • Grid type reading
- Report generation in Excel and saving in PC
- Effective Case Depth i.e. ECD plotting
- Single reading report along with indentation image
- Multiple readings' report with case depth graph
- Hardness conversion utility
- Result display – serial number, test force, hardness value, length of diagonals, averages, standard deviation, minimum value, maximum value, coefficient of variation

