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DHM 1000 Family
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This digital approach to holography allows the application of computer based procedures for sample lift and environmental disturbance, making DHM a robust and easy to use method for routine inspections at the nanometer and micrometer scale.

DHM Software

The DHM Software is designed to provide a powerful software for surface topography analysis.

Specifications are subject to change without notice.

**As for classical optical microscopy, the transverse resolution is defined by the numerical aperture of the microscope objective.

DHM 1000 Family

A new generation of patented microscopes for 3D real-time optical topography

Technical specification

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DHM 1000 Family

A new generation of patented microscopes for 3D real-time optical topography

3D high resolution

Nanometer vertical resolution

Powerful software for surface topography analysis

Real-time imaging

Very fast screening of your sample

Dynamic measurements

Robust, stable and easy to use

For harsh conditions on factory floor
For demanding R&D applications
For routine inspections

DHM Software

The DHM Software is designed to provide a powerful software for surface topography analysis.

Specifications are subject to change without notice.

**As for classical optical microscopy, the transverse resolution is defined by the numerical aperture of the microscope objective.
Applications

The DHM 1000 family can measure samples of all kinds of materials and shapes down to nanoscale applications in both material and life sciences.

DHM combines advantages that makes it an unrivaled technology:

- **Robust & stable**
  
  The short acquisition time (a few microseconds) makes the method insensitive to external vibrations and avoids the need for a vibration isolation table. Its stability permits prolonged examination sequences.

- **Real-time imaging**

  The acquisition and digital reconstruction rate (15 images per second) allows real-time imaging. Dynamic event viewing and active interaction with the observed phenomena are therefore possible.

- **Non-contact & non-invasive**

  The technique uses low-power light to illuminate the sample and form the image. The sample surface is never in physical contact with the DHM, thus ensuring the preservation of the sample characteristics. Biological specimen can be observed without contrast agent.

- **Cost effective solution**

  The DHM has low installation and operating costs. Adaptability and flexibility make it very competitive in the high resolution microscopy domain. All these features make the DHM a cost-effective tool for R&D and quality control in production.

- **User-friendly**

  No sample preparation, no specific environments (temperature, vacuum, ...), no high precision positioning or orientation of the sample, the simplicity of DHM makes it a user-friendly tool for quick and reliable measurements. The digital focusing technique, while increasing the depth of field, simplifies the fine tuning of image sharpness.

- **Powerful 3D software**

  The software has a convivial, user-friendly graphical interface combined with the power to make a complete analysis of the surface. The sample can be represented in a large variety of 2D and 3D plots and movie (AVI) format, interaction with external software or hardware is possible. An option permits synchronization of the camera for stroboscopic observation of periodic high frequency movements.

- **Optical Topography**

  The DHM 1000 Family

  - Life Science
    - Cellular Biology
    - Bio Chips
    - Bio Sensors
  - Material Science
    - MEMS / MOEMS
    - Micro Optics
    - Micro Technology
    - Semi Conductor
    - Nano Technology

  3D gallery

  - Full wafer quality control
  - Roughness surface measurements
  - Surface deformation analysis
  - Optical Properties and defect analysis
  - Optical topography at nanometric scale
  - Cellular morphology monitoring
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Material Science

Life Science

Material Science

3D gallery

DHM combines advantages that makes it an unrivaled technology

Life Science

Material Science

3D gallery

DHM 1000 Family

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The Holographic microscope

DHM 1000 Family

**Measurement principle**

Digital Holographic Microscopy (DHM) generates, in real-time, high resolution 3D digital images of a sample using the principle of holography. Holograms are generated by combining a coherent reference wave with the wave scattered from a specimen (see figure below).

They are recorded by a video camera and transmitted to a computer for numerical and image processing.

This digital approach to holography allows the application of computer based procedures to obtain an image of the complete wavefront emanating from an object and provides:

- intensity images preserving the same contrast as classical optical microscopy
- phase images providing quantitative data, defined at a sub-wavelength scale, used for accurate measurement
- intensity images providing the same contrast as with classical optical microscopy, in a few microseconds, of the complete wavefront emanating from an object and provides:

DHM software procedures allow computation, from a single hologram acquired by a video camera, of the wavefront and its temporal evolution, by software compensation of optical aberrations, digital image focusing and numerical reconstruction.

DHM software provides automatic compensation for sample tilt and environmental disturbances, making DHM a robust and stable measurement. In reflection, the phase image reveals directly the surface topography with a sub-nanometric vertical resolution. In transmission, the phase image reveals the phase shift induced by a transparent specimen, which depends on its thickness and refractive index.

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The ultimate solution in high precision microscopy combining simultaneously:

**Very fast screening of your sample**

**Real-time imaging**

**Powerful software for surface topography analysis**

**Nanometer vertical resolution**

**3D high resolution**

**Robust, stable and easy to use**

For harsh conditions on factory floor

For demanding R&D applications

**A new generation of patented microscopes for 3D real-time optical topography**

**DHM 1000 Family**

Measuring principle

Digital Holographic Microscopy (DHM) generates, in real-time, high resolution 3D digital images of a sample using the principle of holography. Holograms are generated by combining a coherent reference wave with the wave scattered from a specimen (see figure below).

They are recorded by a video camera and transmitted to a computer for further numerical reconstruction. DHM software processes all computations, from a single hologram acquired in 3-10 microseconds, of the complete wavefront emanating from an object and provides:

- Intensity images providing the same contrast as with classical optical microscopy.
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Technical specification

DHM 1000 Digital Holographic Microscopes Family made for 3D real-time optical topography

**Dye laser**

- Laser type: single wavelength laser source
- Images types: intensity and quantitative phase contrast images
- System: Digital Holographic Microscopy in reflection (R1000 series) or transmission (T1000 series)
- Measurement technique: digital holographic microscopy in reflection (R1000 series) or transmission (T1000 series)
- Microscope measurements: L x W x H: 500 x 500 x 737 mm & 42.8 kilos (R1000 series)
- Microscope: L x W x H: 500 x 500 x 500 mm & 34.5 kilos (T1000 series)
- Camera: 1392 x 1040 pixels, 8 bits
- Light source: single wavelength laser source
- Sample stage: manual 3 axes x, y, z travel 6 mm
- Objective mounting: single dovetail mounting
- Optional working modes: vertical scanning and stroboscopic mode
- Objective: available objectives: 1.25x, 2.5x, 5x, 10x, 20x, 50x, 100x
- Sample: working distance: objective dependent from 0.30 mm to 20 mm
- Sample reflectivity: down to less than 1%
- Sample illumination: down to 1 µW/cm²
- Spatial resolution: objective dependent: 300 nm with oil immersion objective (1.4 NA)
- Spatial sampling: 1024 x 1024 pixels (hologram)
- Field of view: objective dependent, up to 4.40 mm
- Vertical resolution**: temporal: 0.2° (0.2 nm in air)
- Vertical digital focusing range: 50x depth of field (objective dependent)
- Image acquisition rate: real-time imaging: 15 fps (512 x 512 pixels), 4 fps (1024 x 1024 pixels)
- Dynamic measurements: postponement reconstruction 15 fps  (1024 x 1024)
- Spatial: 0.6° (0.6 nm in air)
- Average: 0.1° (0.1 nm in air)
- Optical aberrations: digital image focusing and numerical compensation for sample tilt and environmental disturbances, making DHM a robust and easy to use methods for routine inspections at the nanometer and micrometer scale.

**As for classical optical microscopy, the transverse resolution is defined by the numerical aperture of the microscope objective.

**Vertical resolution**: for sharp edge samples up to half the wavelength for sharp edge samples

**Temporal resolution**: defined by the 2D standard deviation measured for one acquisition over the entire field of view.

Specifications are subject to change without notice

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