

CleaveMeter™

Interferometric fiber end-face inspection systems for research, development and production

Product catalogue

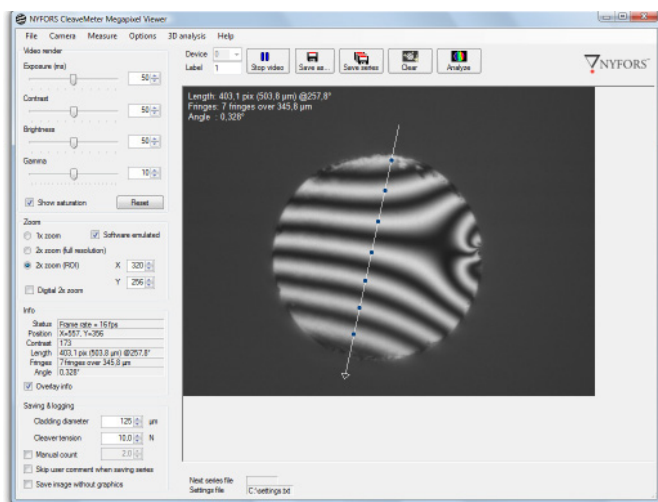


Interferometric fiber end-face inspection systems for research, development and production

The CleaveMeter™ interferometer system is designed for inspecting the surface quality, flatness and perpendicularity of cleaved and polished optical fibers. Complementing the NYFORS AutoCleave™ line of automatic fiber cleavers with process documentation and optimization functionality, it allows every cleave to be individually inspected and evaluated even in high volume production environments.

In research, development and demanding production operations, the sophisticated analysis software provides valuable input when working with difficult to cleave speciality fibers with complicated internal structures, such as polarization maintaining and microstructured fibers.

Two different versions are available – the standard CleaveMeter 2™ and the phase-shifting, CleaveMeter 3D™ high precision interferometer with three dimensional surface reconstruction capability.



Measurement of cleave angle with a NYFORS CleaveMeter™. Each fringe over the user defined measurement line is indicated with a coloured dot. In this case the measurement result is seven fringes over 345.8 µm, corresponding to a cleave angle of about 0.33°.

Features

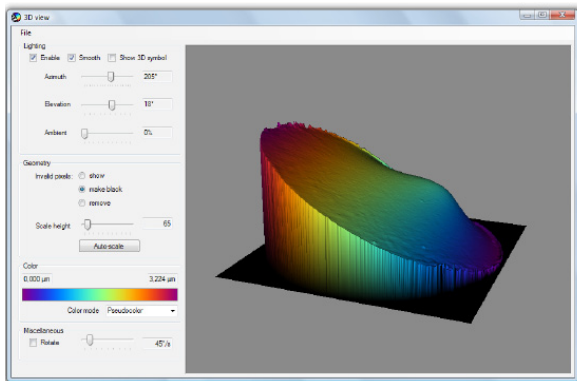
High precision optics. The built-in megapixel camera with digital zoom and the high quality optics together combine to produce sharp images and distinct, high contrast fringe patterns with very little aberration. This makes it easy for the operator to quickly estimate the cleave angle and surface quality from an image that show every detail of the fiber endface surface.

Easy to use software available in two different versions – standard and premium. Standard software features includes support for automatic cleave angle measurements with in-picture presentation of results and the ability to log information, save and load images to and from files with user defined markers at points of interest. The premium software package includes functionality for measurements of plane angles and fiber diameters as well as compensation for adaptor plate angular error for increased measurement precision.

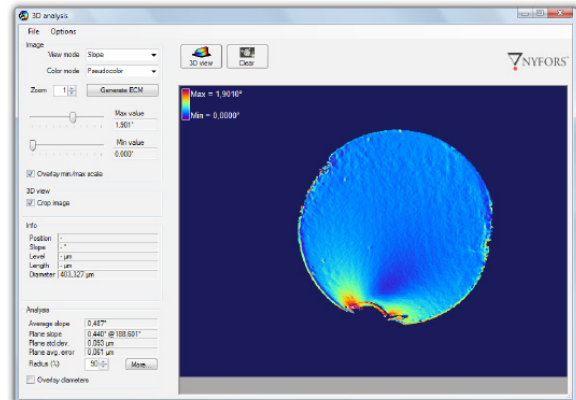
Three dimensional surface reconstruction capability. Using phase-shifting interferometry, the CleaveMeter 3D™ combines the information from several different interferograms to create high resolution, three dimensional images of the cleaved fiber end-face surface. This facilitates easier visual inspection of the cleave result, and more precise measurements of important end-face properties such as surface flatness and cleave angle. Optional pass/fail indication of cleave angle help ensure that consistent quality is maintained over long periods of continuous cleaver operation.

User friendly and ergonomic design. Designed for full operator skill independence, the system accepts fiber holders from the major splicer manufacturers as well as NYFORS automatic fiber cleavers. This makes it easy to move the fiber from cleaver to interferometer for analysis, and then on to the splicer in a production environment. Small and compact, the CleaveMeter™ comes in a bench-top design that connects to the USB port of a PC running the host application.

Interferometric fiber end-face inspection systems for research, development and production



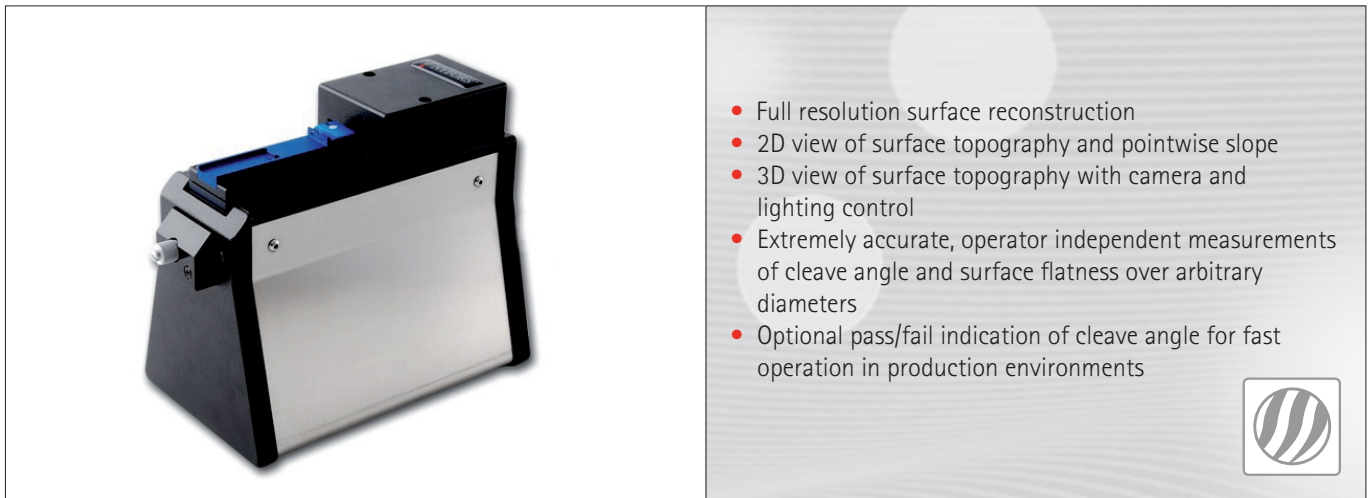
Reconstructed fiber end-face in 3D-mode (with height scaled 65 times to bring out surface irregularities and facilitate easier analysis). The sensitivity of the measurements and the level of detail is such that objects as small as a few nanometers in height, dust particles and other minute surface.



Screenshot showing the pointwise slope of a fiber end-face, a useful feature for spotting small scale irregularities and examining crack propagation behaviour.

CleaveMeter 3D™ *NEW*

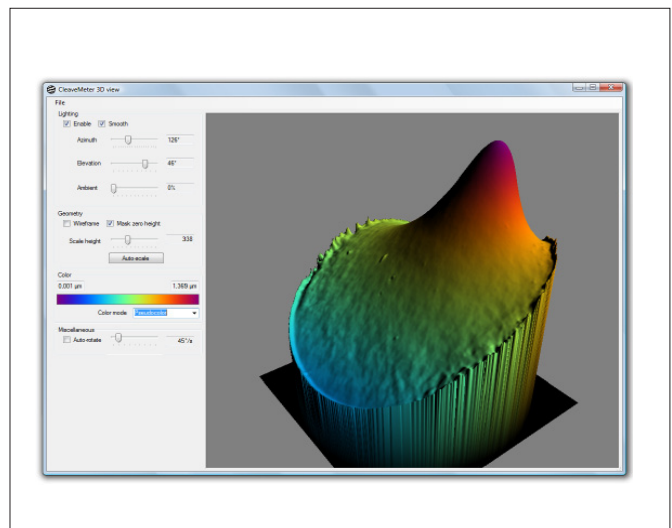
Optical fiber end-face interferometer with three-dimensional surface topography reconstruction



The CleaveMeter 3D™ is a phase-shifting Michelson interferometer for non-contact end-face inspection of cleaved and polished optical fibers with cladding diameters up to 1200 μm . Designed for both production and research applications, this comprehensive fiber optic testing system combines full resolution, three-dimensional surface topography reconstruction and mapping with automated, operator independent measurements of cleave angle and surface flatness in a small, lightweight benchtop unit.

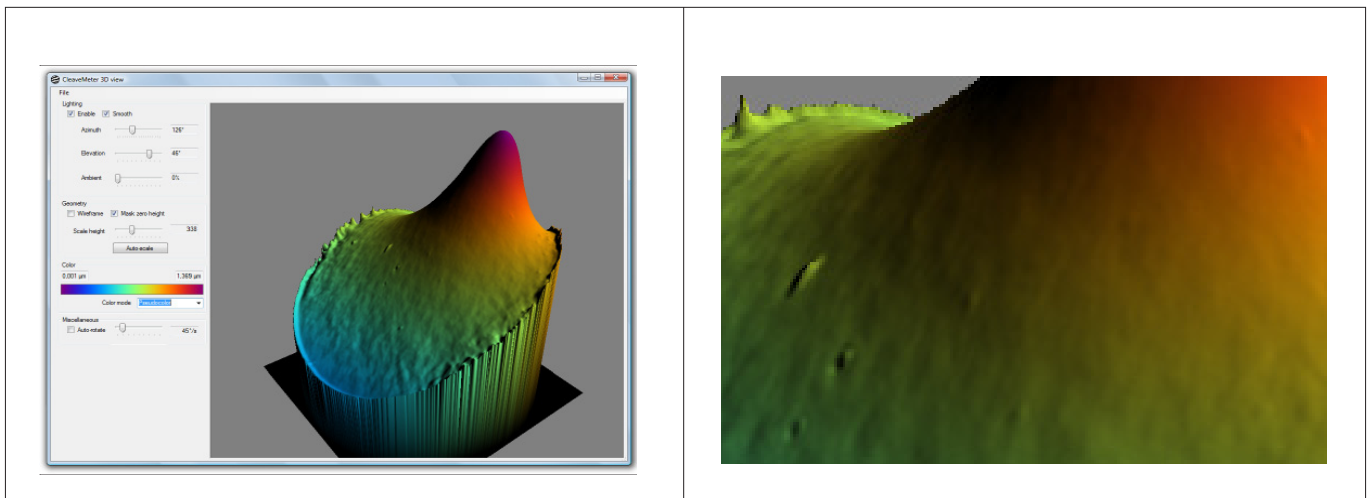
When used in the 3D-mode, the surface topography is reconstructed from the fringe pattern and presented graphically as a three-dimensional image of the fiber end. By rotating the image and adjusting the scale and contrast, the surface quality and cleave angle at different points can be analysed in close detail, allowing for a more comprehensive understanding and accurate interpretation of the data and the cleaving process. While this capability is always important to cleave quality analysis, it can be even especially helpful when analysing cleaving of fibers with complicated structures such as polarization maintaining fibers, or micro-structured fibers. Information on surface topography can also be saved to a file for further analysis using third party software.

Extremely accurate measurements of both cleave angle and surface flatness over arbitrary diameters can be performed on the reconstructed end-face surface. These measurements are carried out automatically, with



Reconstructed end-face surface of a cleaved 400 μm fiber (center cleave angle about 0.16°), with height scaled three hundred times to bring out surface irregularities and facilitate easier cleave quality analysis.

Optical fiber end-face interferometer with three-dimensional surface topography reconstruction



Reconstructed end-face surface of a cleaved 400 μm fiber (center cleave angle about 0.16°), with height scaled three hundred times to bring out surface irregularities and facilitate easier cleave quality analysis. To the right a detail of the same image, showing a dust particle or other surface contamination with a height of about 15 nm – illustrating the level of detail and sensitivity of the measurements.

full operator independence. This makes the system well suited not only for detailed cleave quality analysis in laboratory environments, but also for close production monitoring where software features such as optional pass/fail indication of cleave angle help ensure that consistent cleave quality is maintained over long periods of continuous cleaver operation.

In addition to cleave angle measurements, the system can also be used to measure a number of other properties such as plane angles, fiber diameters and the distance between different points. The software allows the user to view the point-wise slope across the whole fiber end-face, a very useful tool for spotting small scale irregularities and crack propagation behaviour.

Adaptor plates are available for both perpendicular and angled cleave analysis. The mechanical design is compatible with all NYFORS automatic fiber cleavers and accepts the fiber holders used with those machines as well as those of major splicer manufacturers. Custom made adaptor plates are available upon request.

The CleaveMeter 3D™ comes in a small, ergonomic bench-top design and connects to the USB port of a PC running the host application.

TECHNICAL DATA	
Fiber cladding	125–1200 μm^*
Fiber coating	250–1500 μm
Camera resolution	1280 × 1024 pixels
Image scale	1.25 μm per pixel
Image file format	8-bit JPEG, PNG, TIFF, BMP / 24-bit BMP for surface topography
PC connection	USB 2.0 port
Power supply	Through USB port
Dimensions	97 mm (W) × 179 mm (D) × 142 mm (H)
Weight	1.6 kg
CLEAVE ANGLE ACCURACY	
Absolute accuracy**	0.01° standard deviation
Relative accuracy	5 %

NYFORS part number: 30100013

Included in delivery: CleaveMeter 3D™ unit, PC Software, USB interface cable, Manual and Tools.

*Fiber-specific adaptor plates required. ** This level of accuracy requires the adaptor plate angle error to be measured and compensated for on each individual CleaveMeter™ the holder is used with. For more information about system accuracy, please contact us at info@nyfors.com.

Selection Guide Matrix

Fiber specific adaptor plates are required to clamp and align the fiber to the interferometer optics. They are not included in delivery and should be ordered separately.

Adaptor plates are available for use with NYFORS automatic fiber cleavers and fiber holders from the major splicer manufacturers. Below you find a selection of the most common types and dimensions. NYFORS generic adaptor plates are compatible with NYFORS LD fiber clamps and Ericsson FSU-clamps.

Select Adaptor Plate to match the fiber cladding diameter and Angle Adaptor Plate (optional) to match the fiber tilt angle.


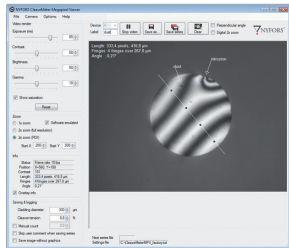
ARTICLE

Adaptor Plate	Cladding diameter	Article number	Article Description	Article Type
	115-210 μm	30100001	Adaptor plate, FJK, 115-210 μm	Fujikura/AFL
	200-529 μm	30100002	Adaptor plate, FJK, 200-529 μm	Fujikura/AFL
	510-800 μm	30100003	Adaptor plate, FJK, 510-800 μm	Fujikura/AFL
	800-1200 μm	30100004	Adaptor plate, FJK, 800-1200 μm	Fujikura/AFL
	Customer specified	30100007	Adaptor plate, NYFORS, Generic	NYFORS, Generic NYFORS/Ericsson


Angle Adaptor Plate	Fiber tilt angle	Article number	Article Description
	15°	30100008	Angle adaptor plate, 15 degrees
	8°	30100009	Angle adaptor plate, 8 degrees
	Customer specified	30100010	Angle adaptor plate, Generic

CleaveMeter 2™ *NEW*

Optical fiber end-face interferometer

- Sharp fringe patterns
- Flat and angled cleave measurements
- Operator skill independent for fast operation
- Accepts fibers with claddings from 125 µm up to 1200 µm
- Accepts fiber holders of major splicer manufacturers
- Adaptor plate angle error measurement and compensation (Premium software)
- Plane angle and three-point fiber diameter measurement (Premium software)



The CleaveMeter 2™ is a non-contact interferometer designed for inspecting the end-faces of cleaved and polished optical fibers with cladding diameters of 125 µm to 1200 µm. It gives immediate information on important end-face properties such as flatness, perpendicularity, hackles and dust. Sampling tests as well as continuous process documentation can be carried out both easily and quickly, making this an ideal instrument for cleaver inspection and optimization.

The optical system is based on a high-end camera with true megapixel resolution and very high sensitivity, yielding excellent image quality at high frame rates and high magnification. Switching between low and high magnification is software-controlled. High-precision optics guarantees sharp and clear images and fringe patterns with very little aberration.

The CleaveMeter 2™ comes with user friendly and efficient software available in two different versions – standard and premium. Standard software features include cleave angle measurements with in-picture presentation of results, user-defined markers at points of interest, pseudo-colour mode for better contrast and the ability to log information, save and load images to and from files. The premium software package includes support for measurement of plane angles and fiber diameters as well as compensation for adaptor plate angle error for increased accuracy.

The CleaveMeter 2™ comes in a small ergonomic, bench-top design and connects to the USB port of a PC running the host application.

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Fiber cladding	125–1200 µm*
Fiber coating	250–1500 µm
Camera resolution	1280 × 1024 pixels
Image scale	1.25 µm per pixel
Image file format	8-bit JPEG, PNG, TIFF, BMP
PC connection	USB 2.0 port
Power supply	Through USB port
Dimensions	97 mm (W) × 179 mm (D) × 142 mm (H)
Weight	1.6 kg
CLEAVE ANGLE ACCURACY	
Absolute accuracy	0.15/0.03 degrees**
Relative accuracy	20 % (125–199 µm)
	10 % (200–529 µm)
	5 % (530–1200 µm)

NYFORS part number: 30100011-12

Included in delivery: CleaveMeter 2™ unit, PC Software, USB interface cable, Manual and Tools.

*Fiber-specific adaptor plates required. ** This level of accuracy requires adaptor plate angle errors to be measured/compensated on the individual CleaveMeters they are used with (Premium software only). For more information about system accuracy, please contact us at info@nyfors.com.

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