蔚華科技
SPIROX

Revolutionary Breakthrough! Industry-first

Non-Destructive TGV Laser Modification Inspection System

SP8000G

SPIROX LTS™

Spirox **L**aser **T**omography **S**can

Tomogram of Laser Modification for Superior Pre-Etching Quality Assessment & Precision Control for Success!

- Exclusive Patented SpiroxLTS Technology!
  Advanced non-linear optical measurement with SpiroxLTS Technology for the improvement of the laser modification to best match the glass processing.
- No Destruction on Sample!
  Non-destructive inspection with SpiroxLTS enables precise control of laser modification performance, significantly reducing process costs and optimizing production conditions!

Non-Destructive Laser Modification Inspection System — *SP8000G*

● Multi-Mode Automatic Inspection with Flexibility

- ROI (Region of Interest) Inspection modes
- Script scanning workflow
- Coordinate-based inspection mode
- Random inspection mode

● Dynamic Tomogram of Laser Modification (DTLM)

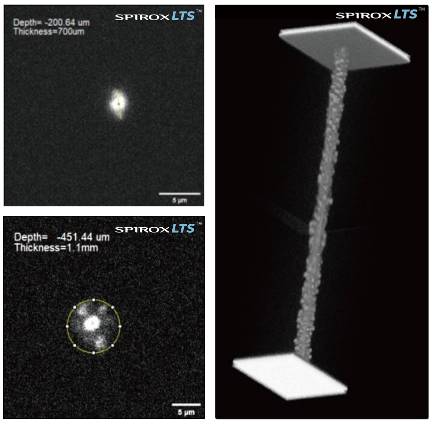
● Intuitive User Interface

● Manual Loading and Unloading

- Standard Supported Substrate Size: 310 × 310 mm
- Maximum Supported Substrate Size: 510 × 515 mm

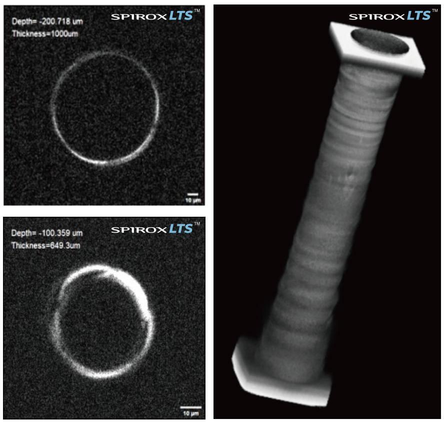
Laser Modification

Modified Beam Profile and Uniformity Inspection



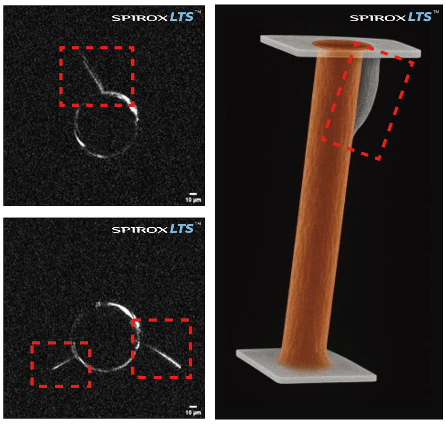
TGV Etching

Morphology and Dimensional Inspection



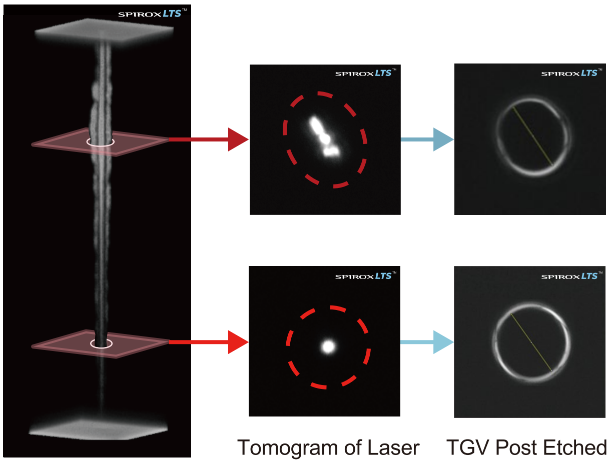
Metallization

Crack Inspection after Metallization and CMP



Laser Modification Inspection

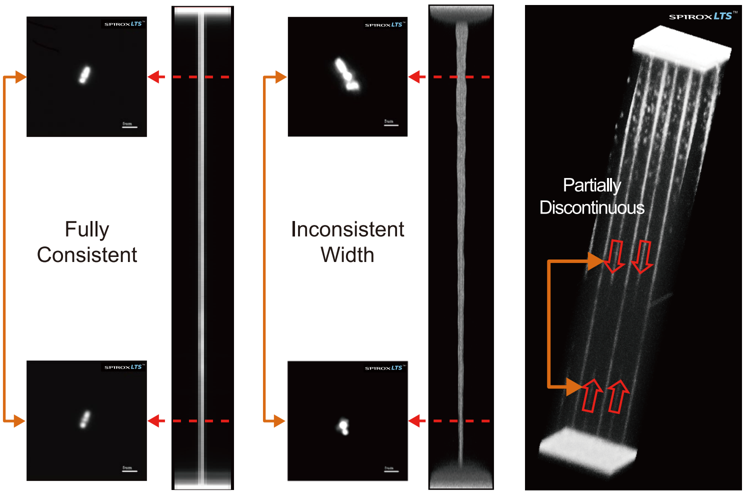
Laser Modification Impact on Post Etched TGV



Tomogram of Laser Modification beam

TGV Post Etched Inspection Image

3D Tomogram: Uniformity and Continuity of Laser Modification

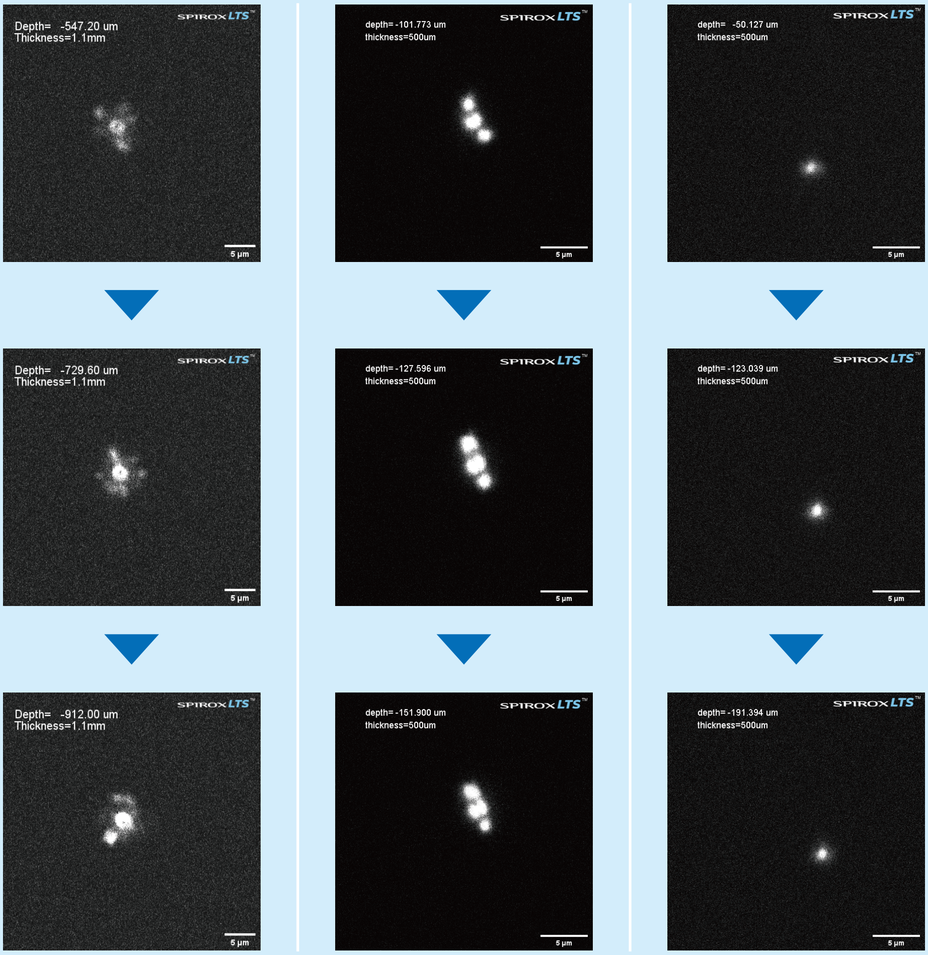


Slight modified shape difference at the Bottom

Significant modified shape difference at the Bottom

Dynamic Tomogram of Laser Modification

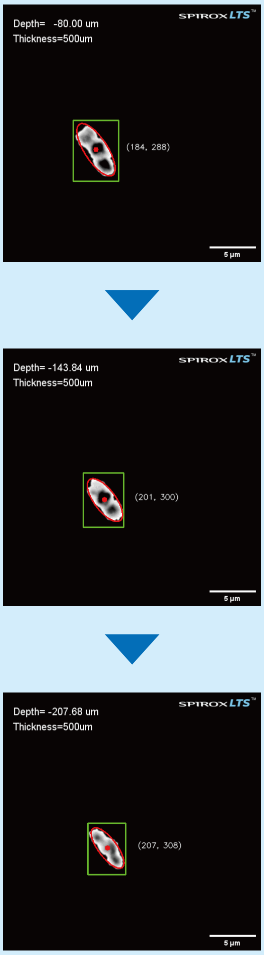
It's able to observe laser modification variations along the vertical depth changes.



Tracking Function of DTLM

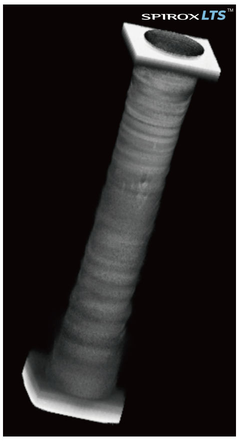
🟩 Inspection Area ⬭ Criteria Mask

● Observation Center

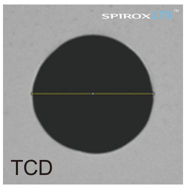


TGV Etching

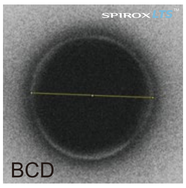
TGV Dimension Measurement

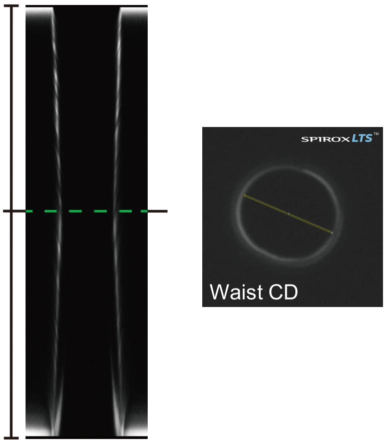


3D Imaging to TGV Profile



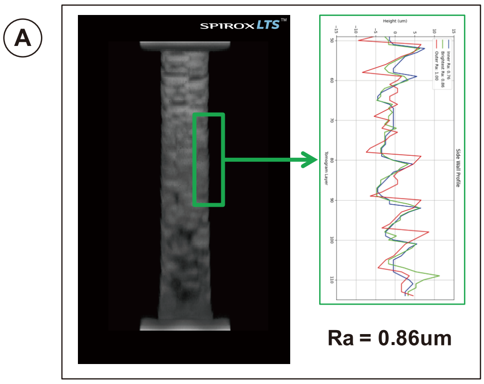
Vertical Depth of Aperture Changes
and Waist Depth Positioning

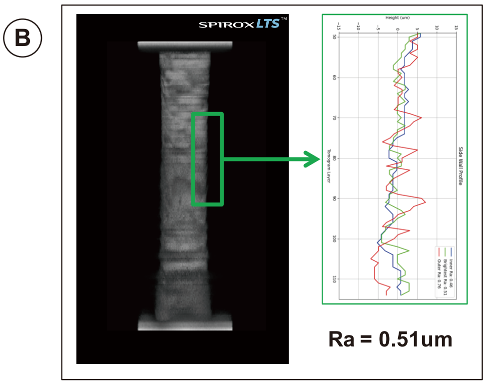




Offering Vertical Cross-Section
Imaging without Sample Destruction

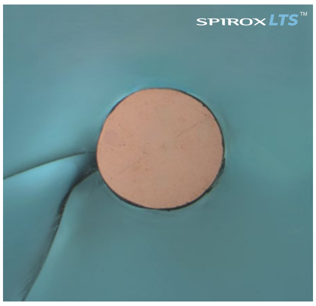
Roughness Calculation after Via Etching



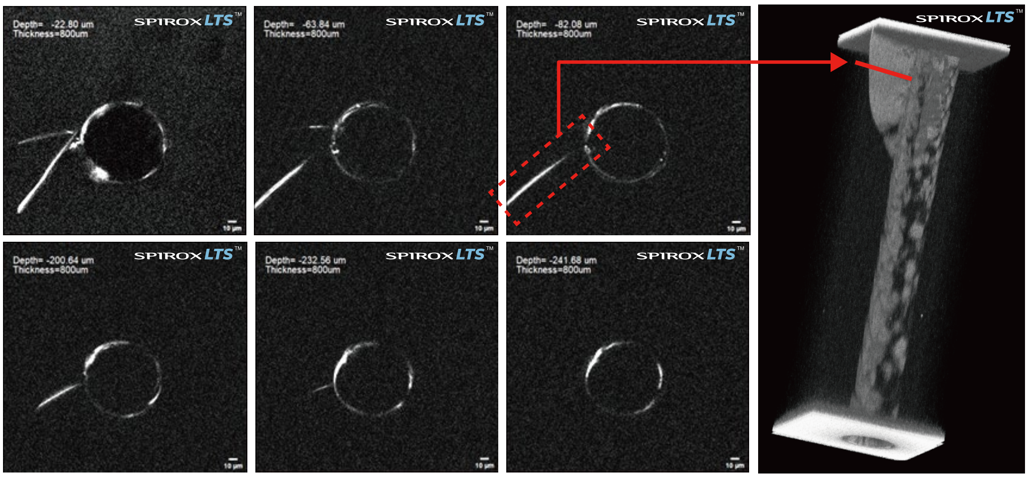


It’s able to observe the difference of A & B by 3D profile image;
Adopt Z axis resolution with precise level and inspection of micro area, the roughness could be calculated.

Crack Inspection after TGV Metallization and CMP



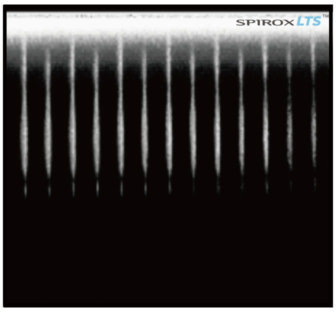
OM imaging only
observe the surface.



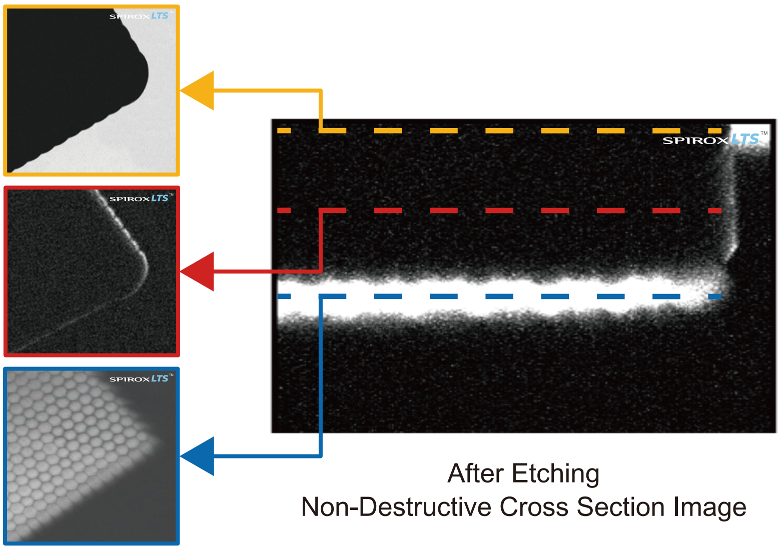
Tomogram allows observation of crack length variations along the vertical depth changes.

Co-Packaged Optics (CPO) Applications

Cavity in CPO Applications



Before Etching
Laser Modification Treatment

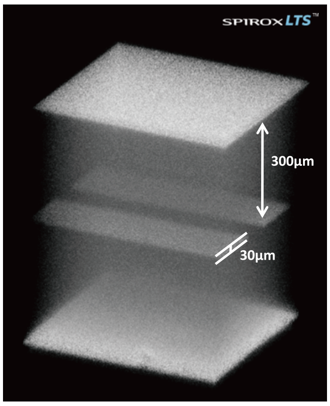


Tomogram

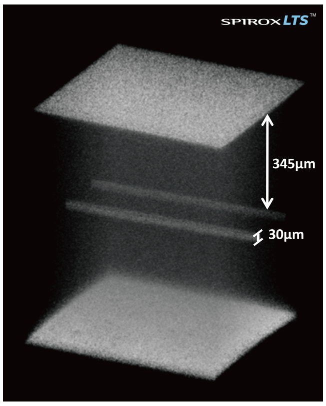
After Etching
Non-Destructive Cross Section Image

Glass Optical Waveguide in CPO Applications

It's able to inspect the waveguide structure made by laser modification in the glass, and observe its profile with 3D image!



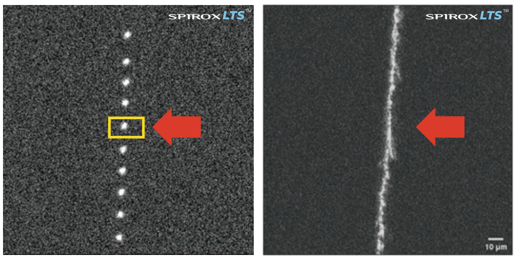
Planar Waveguide



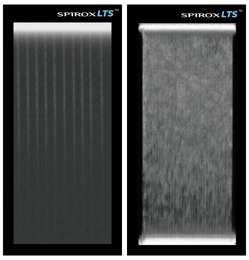
Channel Waveguide

Dicing Lane Inspection

Before Etching Laser Modification Treatment

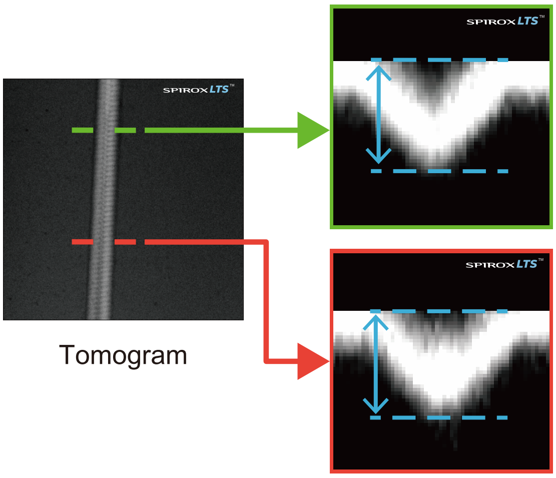


Tomogram



3D Side View Profile

After Etching



Tomogram

Non-Destructive
Cross Section Image

Features

- Patented SpiroxLTS technology, precisely analyzing laser modification effectiveness.
- Non-destructive measurement. Comprehensive inspection of laser modification continuity and uniformity, ensuring that laser modification quality meets process design requirements.
- TGV profile inspections: TCD, Waist CD, BCD, depth, roundness, roughness.
- Crack inspection after TGV metallization and CMP: Accurately inspect the length and depth of crack-affected areas, and observe the crack conditions through 3D imaging.

Advantages

- **Industry-first direct identification:** The only technology for inspecting laser modification continuity and uniformity, providing early prediction of etched perforation outcomes after laser modification.
- **Process parameter optimization and calibration:** Tomogram of laser modification enables rapid adjustment of laser parameters and optimization of optical path design, significantly saving process development time.
- **TGV profile inspection:** Offering a more efficient, direct, and concrete inspection method without destruction.
- **Precise measurement of sample size and inspection of structural defects:** Identify the waist position, critical dimensions, roundness, roughness, and the impact area, length, and depth of cracks after metallization.

Benefits

- **Process development:** Significantly shortens development time and effectively reduces R&D costs. Precisely select laser source and glass material to ensure that TGV laser modification and through-via etching meet manufacturing quality specifications.
- **Process monitoring:** Monitor laser modification quality before etching, providing real-time prediction on whether etching is necessary, avoiding blind etching from past practices and preventing unnecessary cost waste.
- **TGV yield improvement:** Monitor TGV quality, reduce product defects, increase output, and prevent the batch costs associated with ineffective yield.

Specification

Model Number	SP8000G
Model Name	Non-Destructive Laser Modification Inspection System
Key Optical Technology	Patented SpiroxLTS Non-linear Optical Inspection (Application wavelength 1200 - 1800 nm)
Applicable Substrate Size	Standard: 310 x 310 mm Maximum: 510 x 515 mm
Measurement Items	Tomogram of Laser Modification, 3D Tomogram of Laser Modification, Dynamic Tomogram of Laser Modification; TGV Aperture Size and Roundness Measurement, TGV Waist Depth Positioning, TGV 3D Profile Image, TGV Cross Section Analysis, TGV Roughness Calculation; Crack Inspection after TGV Metallization and CMP
FOV / Measurement Time	FOV 400 μm x 400 μm @20X objective magnification; 3.5 seconds / frame (Scanning resolution: 512 x 512 pixels); 100 frames ≒ 6 minutes
Inspection Modes	Micro-area imaging, sub-region automatic measurement, coordinate-based automatic measurement, random automatic measurement, script scanning process
Measurement Resolution	Image Minimum Resolution 0.5 μm
Motion Resolution	X-Y axis Motion Resolution 0.1 μm, Z axis Motion Resolution 0.1 μm
Load & Unload	Standard: Manual (Reserve space for EFEM upgrade) Maximum: Manual
Equipment Dimension / Weight	Standard: Length 2.375 m x Width 1.780 m x Height 1.900 m Weight 2700 kg (Tentative) Maximum: Length 2.600 m x Width 1.600 m x Height 1.900 m Weight 3500 kg (Tentative)
Electrical Specification	220 V 60 Hz AC 4400 W (Tentative)

Contact us

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