

*Revolutionary Breakthrough! Industry-first*

# Non-Destructive Laser Modification Inspection System SP8000G



**SPIROX** *LTS*<sup>TM</sup>

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)

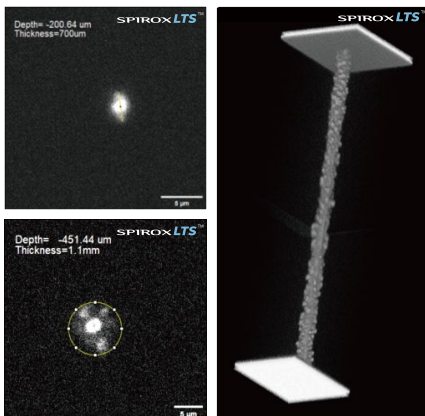
## • Intuitive user interface

## • Manual loading and unloading

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

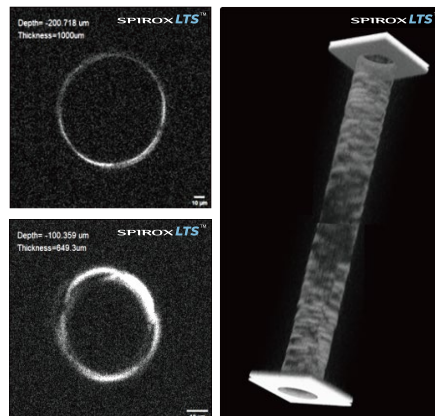
## Laser Modification

Modified Beam Profile  
and Uniformity Inspection



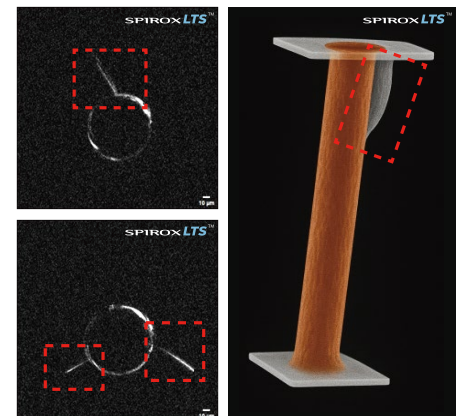
## TGV Etching

Morphology and  
Dimensional Inspection



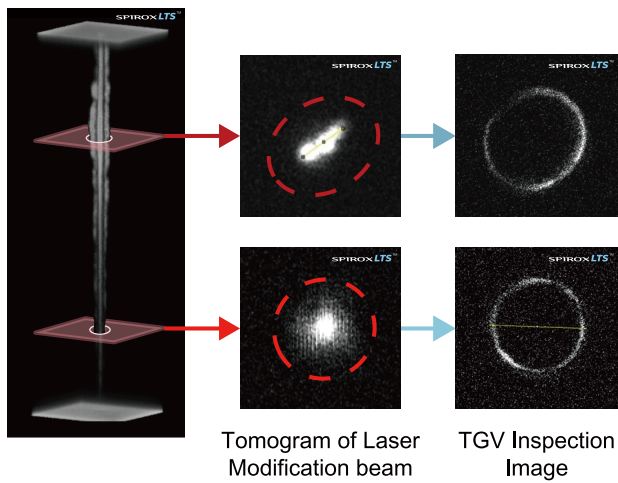
## Metallization

Crack Inspection  
after Metallization

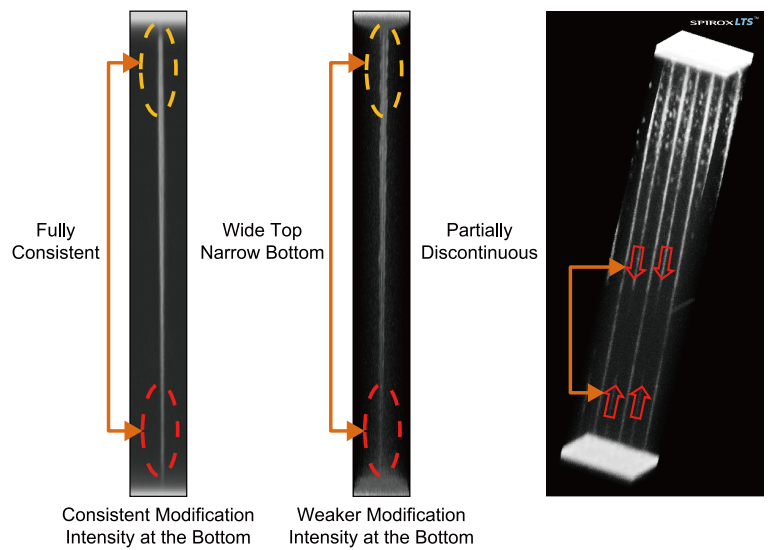


## Laser Modification Inspection

### Laser Modification Impact on Post-Etching TGV

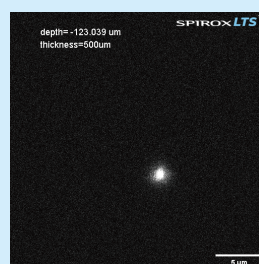
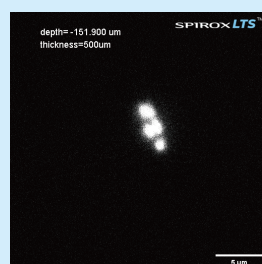
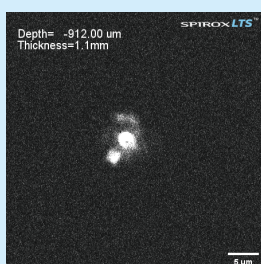
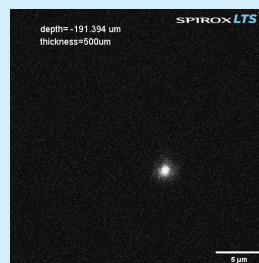
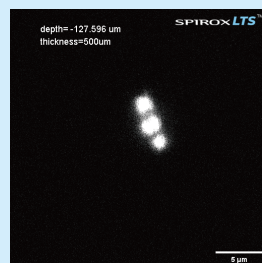
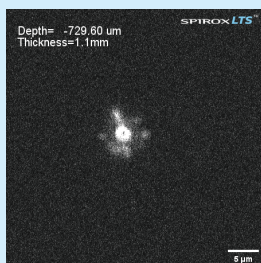
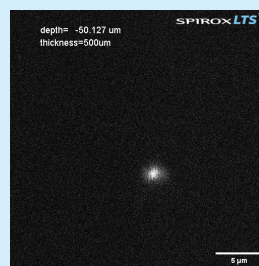
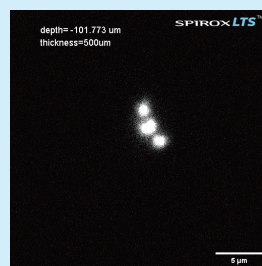
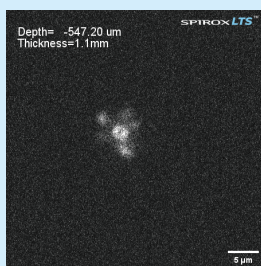


### 3D Tomogram : Continuity and Uniformity of Laser Modification



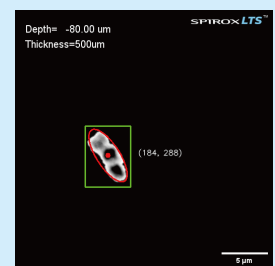
### Dynamic Tomogram of Laser Modification

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



### Tracking Function of DTLM

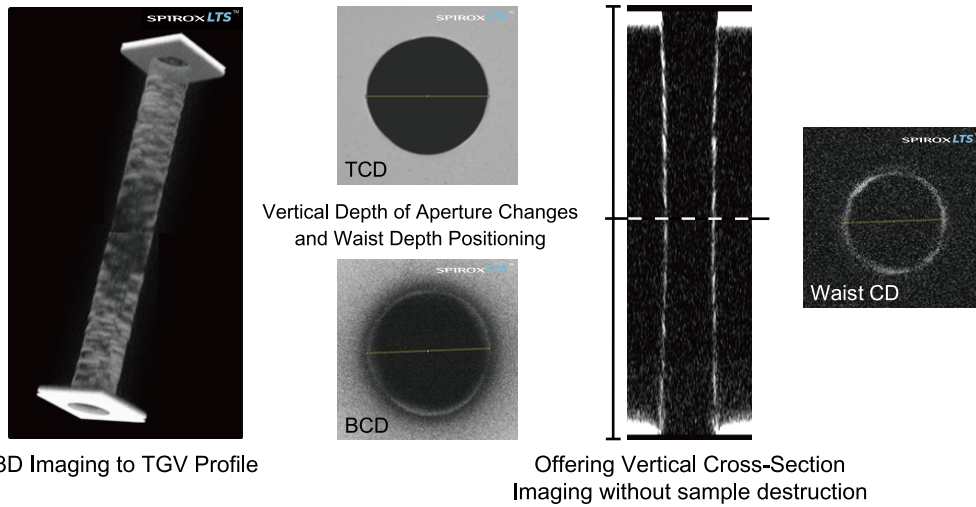
- Inspection Area
- Criteria Mask
- Observation Center



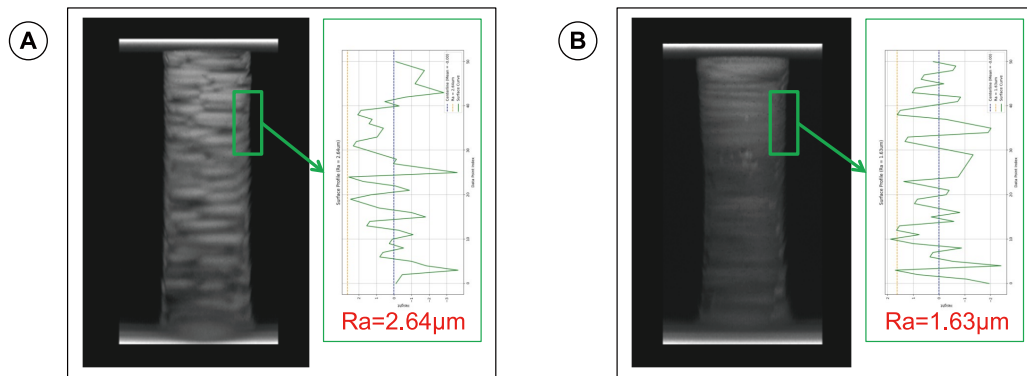


## TGV Etching

### TGV Dimension Measurement

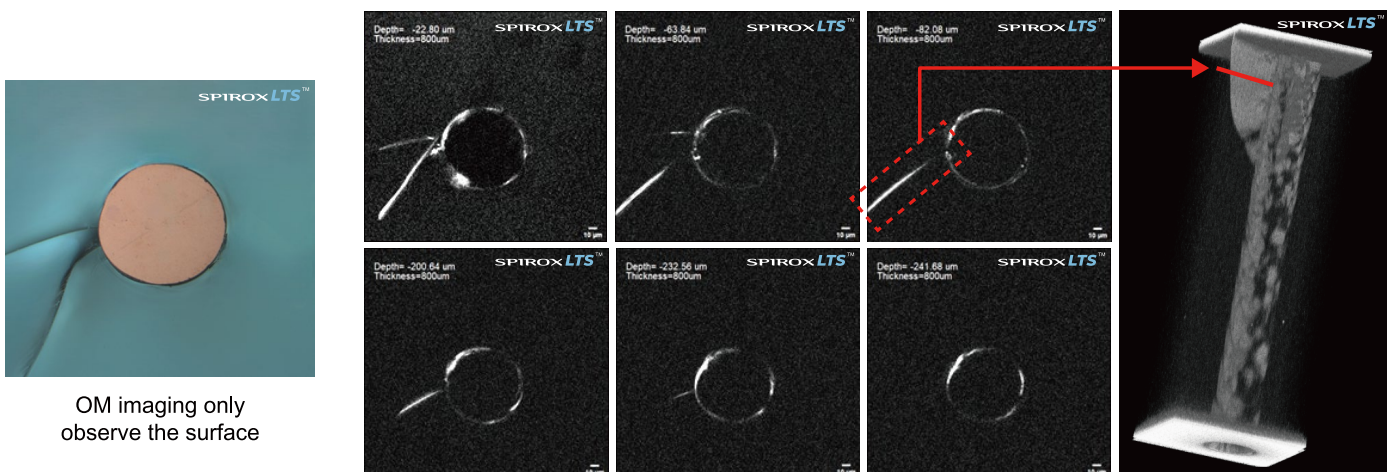


### Roughness Calculation after Via Etching



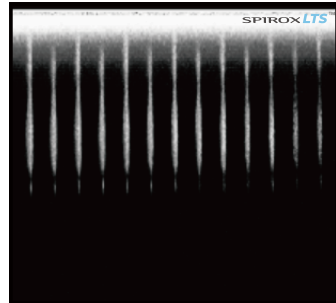
It's able to observe the difference of A & B by 3D profile image;  
Adopt Z axis resolution with precise level and inspection of micro area, the roughness could be calculated.

### Crack Inspection after TGV Metallization

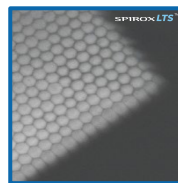
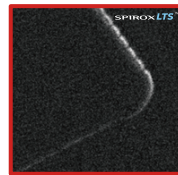


## Co-Packaged Optics (CPO) Applications

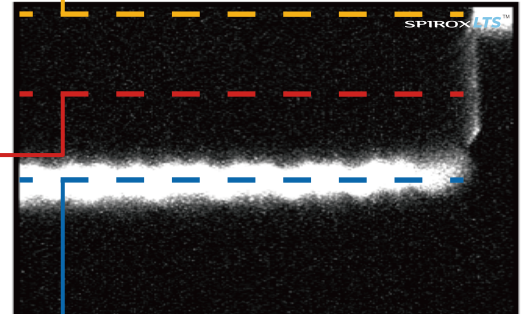
### Cavity in CPO Applications



Before etching  
Laser Modification Treatment



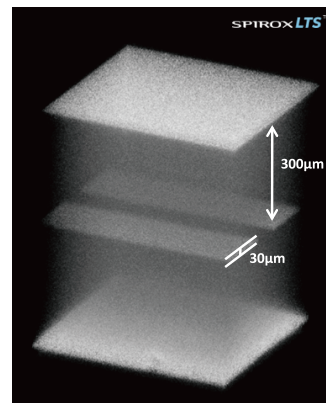
Tomogram



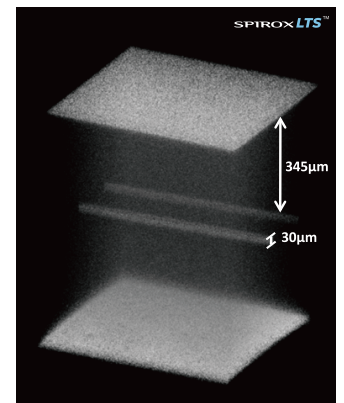
After etching  
Non-destructive cross section image

### 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!



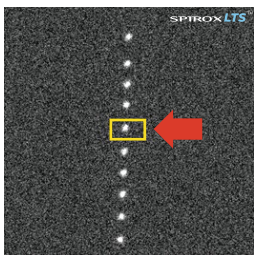
Planar Waveguide



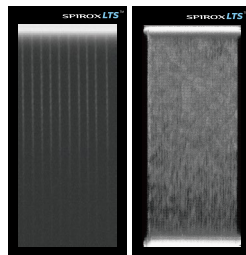
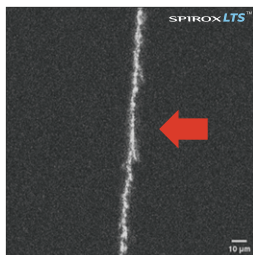
Channel Waveguide

## Dicing Lane Inspection

### Before etching Laser Modification Treatment

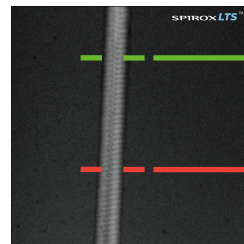


Tomogram

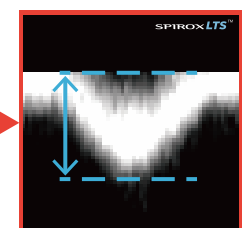
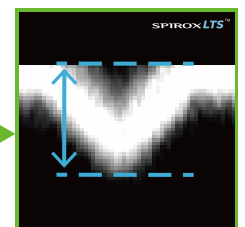


3D Side View Profile

### 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.
- Crack inspection after TGV metallization & 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, 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; Crack Inspection after TGV Metallization & CMP
FOV / Measurement Time	FOV 400 $\mu$ m x 400 $\mu$ m @20x objective magnification; 3.5 seconds / frame (Scanning resolution: 512 x 512 pixels); 100 frames $\approx$ 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 $\mu$ m
Movement Accuracy	X-Y axis Precision 0.1 $\mu$ m, Z axis Precision 0.02 $\mu$ m
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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