

*Advanced Inspection Solution Built  
for Mass Production Lines of Glass Core Substrates*

# High-Speed TGV Crack Inspection System SP7000G



**SPIROX** *LTS*®

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

- **Proprietary SpiroxLTS® Inspection Technology**

Powered by advanced optics and patented SpiroxLTS® technology, SP7000G utilizes specialized laser wavelengths to penetrate both ABF film layers and glass substrates. It delivers a fully non-destructive, real-time internal crack inspection for advanced Glass Core Substrates!

- **Dual Gatekeeper for Pre- & Post-ABF Processes:  
Penetrating Substrates to Secure Yield**

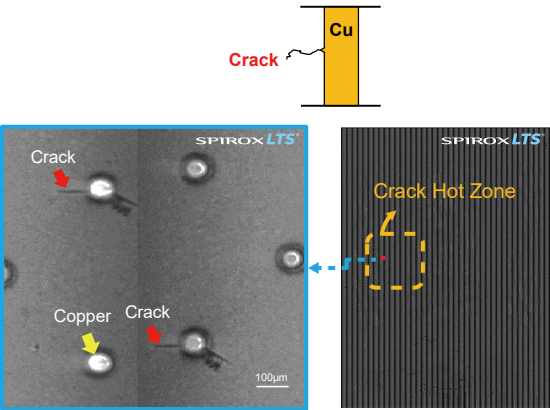
Precisely targeting the two critical process nodes in Glass Core Substrates manufacturing. Whether Post-CMP (metallization) or Post-ABF Lamination and Buildup Process, our specialized laser technology seamlessly penetrates multi-layer media to visualize internal cracks — ensuring uncompromised quality control across key manufacturing stages!

# Dual-Gate Inspection across Front- & Back-End Processes, Building the Foundation for Glass Core Substrate Mass Production!

## Front-End Stage

### Post-CMP TGV Metallization-Glass Crack Inspection

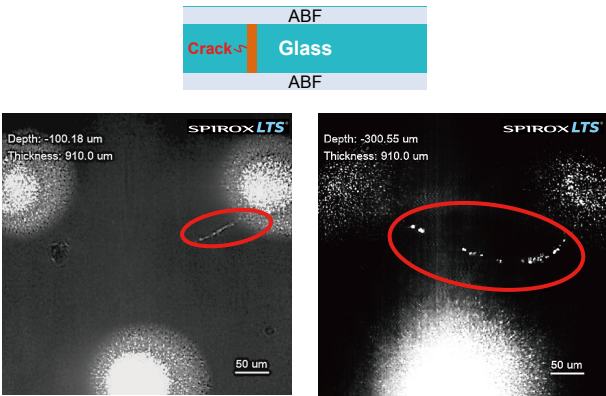
SpiroxLTS® technology penetrates glass to precisely detect cracks surrounding copper pillars, ensuring zero defects before advancing to the ABF lamination and buildup process.



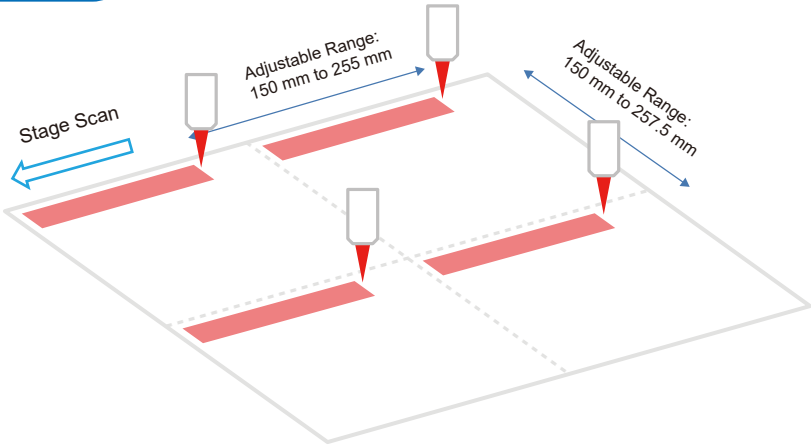
## Back-End Stage

### Post-ABF Lamination and Buildup Process TGV Glass Defect Inspection

SpiroxLTS® technology penetrates both ABF layers and glass, directly inspecting internal glass cracks caused by lamination thermal stress and CTE mismatches without requiring layer stripping.

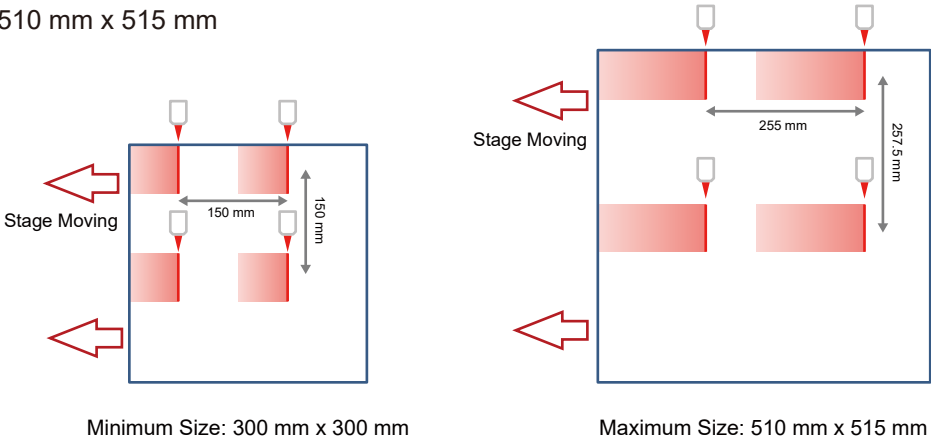


## Flying Scan – Stage Paths in Full Speed!



## Adjustable Scanning Range

From 300 mm x 300 mm to 510 mm x 515 mm



## Features

- **Patented SpiroxLTS® Non-Destructive Inspection:** Utilizes a specialized laser light source to penetrate ABF and glass materials, providing fast, fully non-destructive fluoroscopic inspection capabilities for internal cracks in Glass Core Substrates.
- **End-to-End Coverage Across Glass Core Substrate Manufacturing Stages:**
  - **Post-CMP Stage:** The laser penetrates the glass to clearly observe cracks inside the glass and around the copper pillar interface caused by process defects, preventing defective substrates from entering the costly ABF lamination process.
  - **ABF Lamination and Buildup Stage:** The laser penetrates both ABF and glass to inspect cracks within the glass substrate generated during lamination procedure, ensuring the overall structural stability of the buildup layer.
- **Quad-Head Synchronized High-Speed Flying Scan:** 4 independent scan heads (each equipped with a built-in 4X objective lens) operate synchronously in parallel, achieving exceptional large-area scanning efficiency.

## Advantages

- **Truly 100% Non-Destructive to Samples:** No need to strip ABF lamination and buildup process or destroy costly Glass Core Substrate panels. The specialized laser directly penetrates the ABF-laminated layer and glass to observe sub-surface cracks and metallization perimeter interface defects.
- **Ultra-Fast Mass-Production Throughput:** With all 4 scan heads operating simultaneously, a full panel (510 x 515 mm) single-layer scan (1 ToSL, thickness of scan layer) is completed in just 10 minutes, perfectly meeting the high-throughput demands of mass-production lines.
- **Support for Large-Format Glass Core Substrate Panels:** Supports panel sizes up to 510 x 515 mm, combined with 0.1  $\mu$ m high-precision X-Y motion resolution and reserved interfaces for EFEM / automation upgrades.

## Benefits

- **Preventative Control to Avoid Unnecessary Costs:** Intercepts defects immediately after the CMP process, preventing defective Glass Core Substrate panels from entering the ABF lamination and buildup process, thereby avoiding costly material and labor waste.
- **Ultimate Inspection Efficiency to Accelerate Throughput:** A full-panel high-speed scan in just 10 minutes significantly reduces Inspection Cycle Time, boosting overall equipment effectiveness across the fab.
- **Dramatically Reduced Engineering and Production Material Losses:** Completely replaces traditional destructive cross-section sampling, saving expensive Glass Core Substrate test samples and labor-intensive sectioning evaluations while delivering objective, consistent defect classification standards.

## Optical Capability

- **Thickness of Scan Layer (ToSL):** The axial depth range within the optical depth of field covered in a single-pass scan layer, during which optical signals can be effectively collected.
- **Minimum Detectable Crack (MDC):** The smallest physical dimension of a micro-crack that the system can reliably detect under a specific ToSL configuration.

The K2 Signal Collection Mode of the SP7000G utilizes a defocused laser light source to collect defect signals. By adjusting the Thickness of Scan Layer (ToSL), users can flexibly switch between inspection modes:

- **Smaller ToSL (High-Precision):** Concentrated depth of field enables detection of extremely small micro-cracks, but requires more scan passes and longer inspection time.
- **Larger ToSL (High-Throughput):** Expands depth coverage per pass and reduces total scan passes, significantly shortening inspection time for rapid screening of larger defects.

| Optical Capability | Thickness of Scan Layer (ToSL) | Minimum Detectable Crack (MDC) |
|--------------------|--------------------------------|--------------------------------|
|                    | 250 $\mu$ m                    | 3 $\mu$ m                      |
|                    | 500 $\mu$ m                    | 7 $\mu$ m                      |
|                    | 800 $\mu$ m                    | 15 $\mu$ m                     |

## Specification

|                             |                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------|
| Model Number                | SP7000G                                                                                            |
| Model Name                  | High-Speed TGV Crack Inspection System                                                             |
| Key Optical Technology      | Patented SpiroxLTS® Optical Inspection (Application wavelength 1200 - 1800 nm)                     |
| Applicable Substrate Size   | Up to 510 mm x 515 mm *                                                                            |
| Signal Mode                 | K2                                                                                                 |
| Inspection Items            | Post-ABF Lamination and Buildup Process TGV Glass Crack,<br>Post-CMP TGV Metallization-Glass Crack |
| Objective Lens              | 4X Obj. built-in with each scan head (total 4 heads)                                               |
| Scan Mode                   | Flying Scan (line width of 2,000 µm & stage speed of 96 mm/s)                                      |
| Inspection Time             | 510 mm x 515 mm: 10 mins @ 1 ToSL by 4 scan heads (no depth info)                                  |
| Movement Accuracy           | X-Y axis: $\leq \pm 1.5 \mu\text{m}$ , Z axis: $\leq \pm 2 \mu\text{m}$                            |
| Load & Unload               | Manual (reserved space for automation upgrade)                                                     |
| Dimension / Weight **       | Length 2.58 m x Width 1.80 m x Height 1.95 m / Weight 4,800 kg                                     |
| Electrical Specification ** | 220 V 60 Hz AC 4,400 W                                                                             |

\* 4 heads in parallel: 300 mm x 300 mm ~ 510 mm x 515 mm  
Single head: up to 310 mm x 310 mm

\*\* Dimensions, weight, and electrical specifications are preliminary  
and subject to change.

## Contact us

 No. 95, Shuiyuan St., Hsinchu City 300042  
 +886 3 573 8099 #1078  
 daisy\_wu@spirox.com

