

## HDD Glass Substrate

Dr. Schenk GlassInspect:  
modular platform, new benchmark in  
performance and throughput

### Inspection target

- **HDD Glass Substrate**  
(glass blank, 2.5-inch, 3.5-inch)

### Typical inspection tasks

- **Surface** (top and bottom): particles  $\geq 100$  nm, scratches  $\geq 30$ KLux, digs, adg, stains, ...
- **Glass (bulk) defects:** bubbles, distortions, inclusions, knots, platinum, stones, fusion line defects...
- **Top/Bulk/Bottom:** detection and differentiation in a single pass – no flipping required
- **Edge inspection:** chips, cracks, contour, ...
- **Haze/Roughness monitoring**
- **Microscope review**
- ...and many more



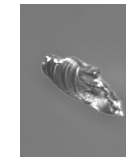
### Processes

- Scribe, Cut
- Lapping, Grinding
- End Face Polishing
- Chemical Strengthening
- Final Polish
- Cleaning

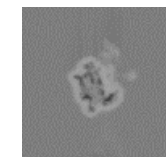
### Fully automated glass inspection for your specific inspection goals

Dr. Schenk GlassInspect delivers high-precision, fully automated optical inspection of HDD Glass Substrates. Optical configurations are carefully matched to your inspection goals for a modular, tailor-made solution rather than a one-fits-all approach.

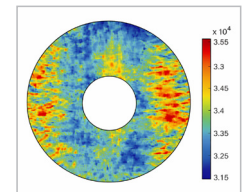
GlassInspect is made for maximum throughput, minimum error rates, and full coverage across all glass applications.



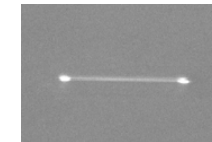
ADG defect



Stain



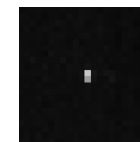
Haze/Roughness Map



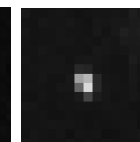
PT Needle



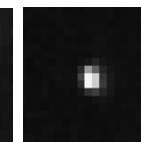
Particles



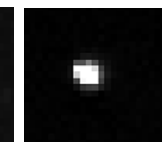
Particles 0.1  $\mu\text{m}$



Particles 0.3  $\mu\text{m}$



Particles 1  $\mu\text{m}$



Particles 3  $\mu\text{m}$



## MIDA – Multiple Image Defect Analysis for every defect

GlassInspect for HDD Glass Substrate inspection uses Dr. Schenk's unique MIDA (Multiple Image Defect Analysis) technology.

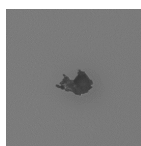
This allows simultaneous:

- Variety of optical setups for optimum view
- Detection and classification of smallest defects
- Multiple views of the same defect in real-time.

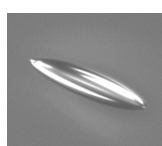
**The result: HDD Glass Substrate surface inspection with optimal perspectives for each defect at all times.**



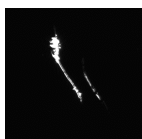
Scratch



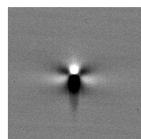
Inclusion Core



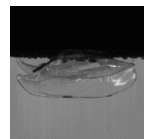
Bubble



Scratch



Distortion



Edge Chip

### Highlights

- **Inspection in Reflection and Transmission** – essential for accurate analysis of transparent materials
- **Simultaneous inspection** with proprietary and dedicated optics – e.g.:
  - Transmission Distortion / Core / Darkfield
  - Reflection Brightfield / Darkfield
  - Oblique Light
  - High Intensity / Low Intensity (super high dynamic range)
  - Flat / Steep Angle
  - ...and many more
- **3D Edge inspection** (top/bottom and side view)
- **Haze/Roughness monitoring** (entire surface)
- **Differentiate top/bulk/bottom particles** in single pass (below 1µm)

## AI built on data quality, speed and system intelligence

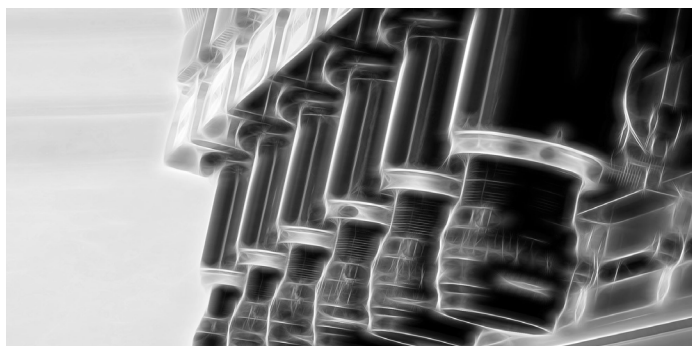
The performance of artificial intelligence is only as good as the data it is based on. At Dr. Schenk, AI starts with what matters most: high-quality image data, generated by our proprietary **MIDA** technology.

Combined with **high-speed AI data processing** – directly in our cameras using FPGA technology – our systems can handle large data volumes in real time. They are 100 to 1000 times faster than conventional CPU/GPU solutions and do not rely solely on external computing power.

With AIMI, customers can use fully AI-based detection, analysis and classification or choose **hybrid concepts** that combine deep learning with proven machine vision methods, such as filtering, thresholding and classical tools for defect classification. This flexible approach uses as much intelligence as the quality goal requires: from fast, deterministic evaluation to advanced AI or the optimal combination of both.

The **Dr. Schenk AI Ecosystem** integrates **Dr. Schenk inspection systems**, with proprietary industrial computing hardware and software for real-time processing on the production floor, and the dedicated cloud or on-premise environment **AI Workbench** for data management, labelling, and AI model training.

**The result is a scalable, end-to-end solution that turns high-quality image data into reliable inspection decisions.**



## Decades of experience in glass inspection

Since 1985, Dr. Schenk systems have been supporting glass manufacturers across the entire value chain, with thousands of systems installed worldwide.

Our systems are developed from the ground up, combining in-house hardware, optics, illumination concepts, and software into fully integrated inspection solutions.

This expertise is the result of decades of hands-on experience and close collaboration with leading glass manufacturers worldwide, covering all types of glass.

With decades of real world experience and close collaboration with leading glass manufacturers and processors worldwide, we are **the experts in glass inspection** – especially for high-end display glass and now cutting-edge semiconductor applications.

### Highlights

- **High-speed Inspection** for maximum throughput – cycle times in seconds, not minutes
- **Simultaneous Top/Bulk/Bottom** detection and differentiation in a single pass – no flipping required
- **Outstanding price-performance ratio** through modular design, flexible optical configurations and high-speed operation
- **One high-speed glass inspection system** tailored to your mass production needs – instead of four slow systems originally designed for silicon wafer inspection
- **Setting the benchmark** in Deep-Learning-driven defect detection and classification (AIMI) – powered by Dr. Schenk AI Ecosystem, AI Workbench and decades of glass inspection experience
- **Available load options:** Manual, Automated Cassette
- **Service and support:** all over the world – 24/7