

CyberOptics Award-Winning Systems Portfolio

Automated Optical Inspection, Solder Paste Inspection and 3D Scanning Inspection

SYSTEMS



A Global Leader in High-Precision sensors and systems for AOI, SPI and 3D Scanning Inspection.

Technology Leadership. Global Solutions.

CYBEROPTICS®

3D Solder Paste Inspection (SPI)

The Recognized Leader For Quality Inspection Solutions

CyberOptics is a global leader in solder paste inspection equipment used to monitor and control one of the most crucial steps affecting the finished quality of circuit boards.



SE600 | High Precision

- Dual illumination sensor
- Enables unrivaled GR&R up to 108cm²/sec.



SE500 Ultra | High Speed

- High-speed single illumination sensor
- All-in-one scan
- On the fly measurement at 210cm²/sec.



SE500-D | Dual Lane

- SE500-L Large Board available
- High-speed single illumination sensor
- Inspection speed up to 80cm²/sec.

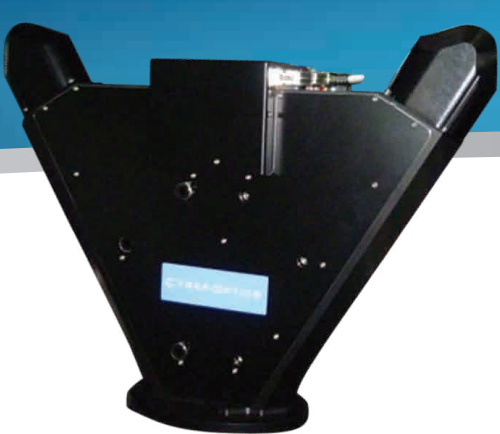
3D SPI Sensor Technology - Faster, More Accurate Performance

Designed and built by CyberOptics, the sensor is manufactured as an integrated unit with no moving parts – which means no machine-to-machine variation either. Plus, there is no drift over time, no parts to wear and absolutely no recalibration needed.

For improved repeatability on smallest paste deposits, you can choose from the MicroPad and Dual Illumination sensor options. Pads as small as 100 microns (4 mils) can be accurately measured with the MicroPad sensor. And, it is easy to swap with the standard sensor too – so you can plug-and-play whenever you need to.

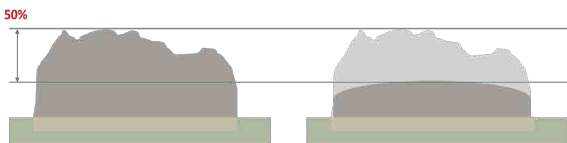


MicroPad Sensor



Dual Illumination Sensor

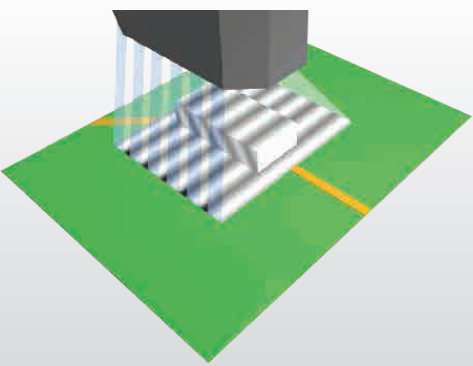
True Height Volume Measurement



CyberOptics reports the "true" height

Competitors reports the "filtered" height

Provides median height measurement for accurate solder paste profile



Pattern of structured white light on PCB

High Speed, On-the-Fly Inspection

Using white strobe light to project patterns of structured light on the surface of the printed circuit board (PCB). Full FOVs are acquired with each strobe and vibration effects are minimized – delivering high accuracy and consistent repeatability. Any PCB surface including flexible circuits can be measured as white light causes minimal diffusion. With its continuous image acquisition, you can be assured of fast, focused and reliable inspection.

True height measurement accuracy is critical to SPI measurement as it has a direct correlation with solder volume and defects. The importance of true height increases with the continuous miniaturization and density of electronic components CyberOptics' SPI systems set a new bar for height accuracy measurements.

Award-winning Intuitive Software

Intuitive Design, Exceptional Usability

CyberOptics' software delivers world-class user experience with its intuitive interface, completely changing the way users interact with our system. Yet, at the same time, the software is extremely stable and simple to use enabling shortest learning curve. With full multi-touch experience, SPI software offers a range of features that enable smarter and faster inspection:

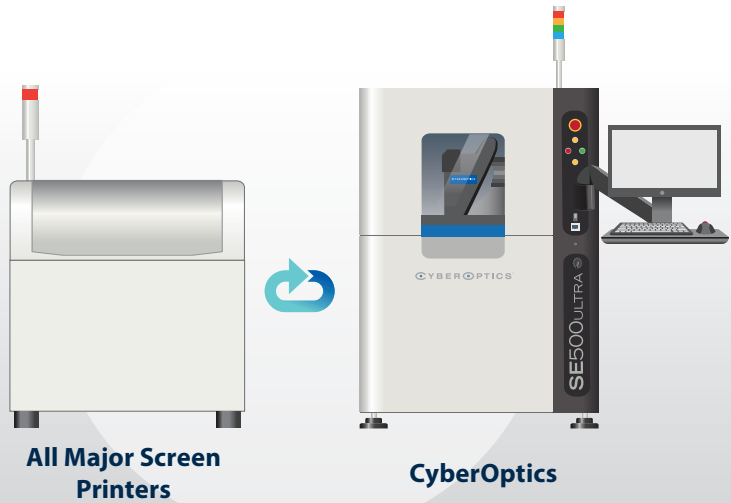
- Seamless integration of all applications - Teach, Inspection, Defect Review and Real-time SPC
- Unlimited undo-redo and global search options in Teach
- Loads of smart, informative and relevant charts that provide yield summary, FPY information, hotspot display, top 10 pad failures, historical panel and more.
- Easy, hassle-free operation using multi-touch, multi-selection, pinch-zoom and pan-move options
- CyberPrint OPTIMIZER™ - Automatically optimizes the print process by proactively analyzing accurate trend data – first-ever in the industry! Pre-defined templates help you get started quickly while customizable rules support perfect customization for specific product needs. With its predictive process improvement capability, you can get better yields and reduce downtime.



Closed Loop/APC Feed-forward Ready

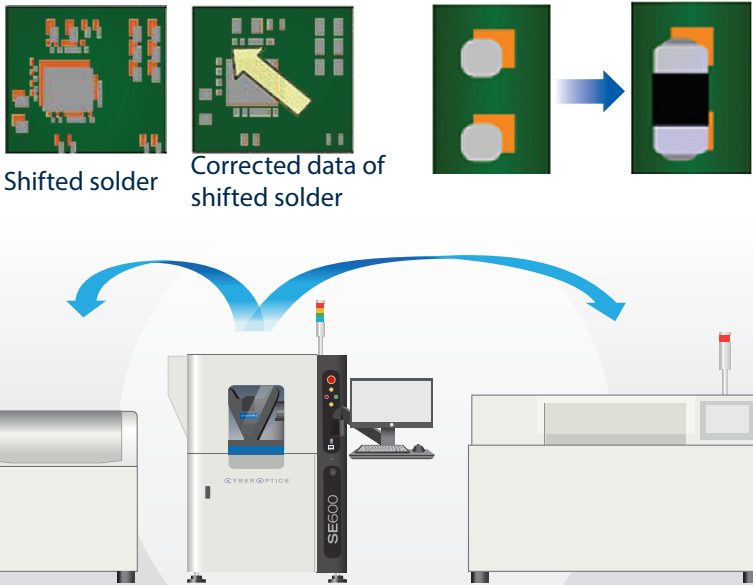
Reduce rework costs, increase production throughput and improve quality
CyberOptics' SPI systems fully support feedback and feed forward capability with leading Solder Paste Printer and SMT Mounter vendors. Closed loop feedback gives you the power to do more with SPI results – optimize printing process, establish stencil cleaning cycles and fine-tune printer setup. While feed-forward capability improves the solderability of smaller components by using the printing offset data for compensating parts placement. All this means reduced rework costs, increased production throughput and improved quality.

Closed Loop Feedback



Gives you the power to do more with SPI results - optimize printing process, establish stencil cleaning cycles and fine-tune printer set-up

APC Feed Forward Ready



Improves solderability of smaller components for reduced rework cost, improved production throughput and improved quality

Automated Optical Inspection (AOI)

Best-in-Class 3D AOI Technology



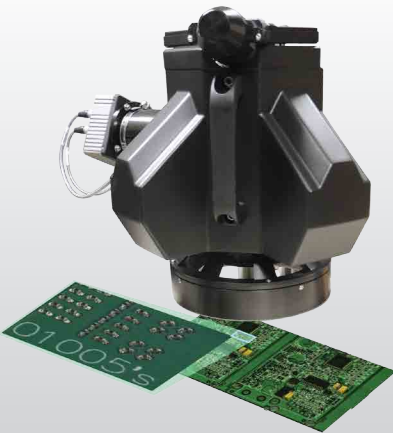
3D Multi-Reflection Suppression (MRS) Sensor Technology

The revolutionary MRS technology delivers unmatched accuracy by meticulously identifying and rejecting reflections caused by shiny components and reflective solder joints. Effective suppression of multiple reflections is critical, making MRS an ideal technology solution for a wide range of applications including those with very high quality requirements.

CyberOptics's unique sensor architecture with 4 multi-view 3D sensors and a parallel projector, simultaneously captures and transmits multiple images in parallel while proprietary 3D fusing algorithms merge the images together, delivers metrology grade accuracy at production speed.

CyberOptics has advanced the proprietary MRS sensor to an even finer resolution. The Ultra-High Resolution MRS sensor enhances the SQ3000 3D AOI platform, delivering superior inspection performance, ideally suited for the 0201 metric process and micro-electronic applications where an even greater degree of accuracy and inspection reliability is critical.

Specifications	MRS Sensor	Ultra High Resolution MRS Sensor
Inspection Speed	40 cm ² /sec (2D+3D)	15 cm ² /sec (2D+3D)
Resolution	Sub 10 μm	7 μm
Minimum Component Size	0402 mm (01005 in.)	0201 mm (008004 in.)



SQ3000 | 3D AOI

Ultimate in Speed and Accuracy

- MRS Sensor
- Delivering metrology grade accuracy at production speed, powered by MRS Technology

2D AOI Sensor Technology - High-speed, On-the-fly Inspection

The SIM (Strobed Inspection Module) is at the core of every CyberOptics' 2D AOI system. Designed and manufactured exclusively by CyberOptics, the SIM delivers high performance inspection at 200cm²/sec - making our AOI systems the fastest in the world. And, it is absolutely calibration-free too!

The SIM on the QX600™ is designed with enhanced illumination using LED lighting - delivering the best 01005 and solder joint performance ever. With an 80/150 Megapixel sensor and higher resolution (12μm), you get crisp, perfect quality images for more accurate defect review.



QX600 | 2D AOI

Ultra-Fast, Ultra-Versatile

- Strobed Inspection Module (SIM)
- Best-in-Class 01005 and solder joint inspection



QX250i | 2D AOI

Fast, Flexible, High-Performance

- 2 Strobed Inspection Modules (SIM)
- Shortens production line and delivers ~50% productivity improvement vs. single SIM
- Ideally suited for pre-reflow'

QX250, QX150 Tabletop, Large Board and Dual Lane options available



QX150i | 2D AOI

High-Value, Flexible for All Applications

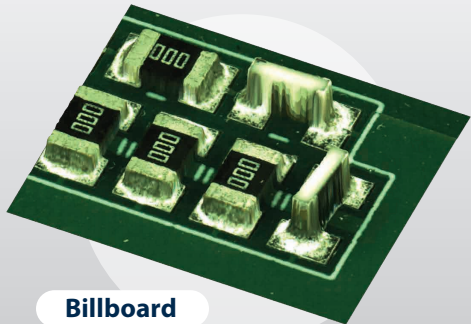
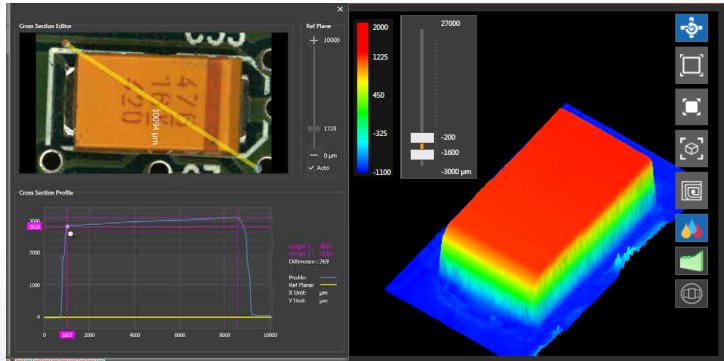
- Strobed Inspection Module (SIM)
- Ideally suited for pre-reflow and selective solder joint inspection

Award-Winning AOI Software

Faster, Simpler and Smarter

Intuitive, Easy-to-use Software

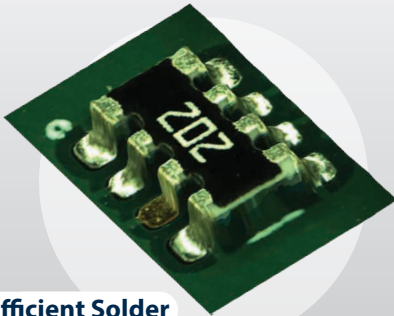
The latest software for SQ3000™ is an even more powerful, yet extremely simple software with an intuitive interface that reduces training efforts and minimizes operator interaction – saving time and cost. Based on the award-winning SPI software, the SQ3000 software includes multi-touch control and 3D image visualization tools, taking ease-of-use to a whole new level.



Billboard



Lifted Leads



Insufficient Solder



AI² - Superior in Programming & Performance

CyberOptics AI² (Autonomous Image Interpretation) technology is all about keeping it simple - no parameters to adjust or algorithms to tune. And, you do not need to anticipate defects or pre-define variance either - AI² does it all for you.

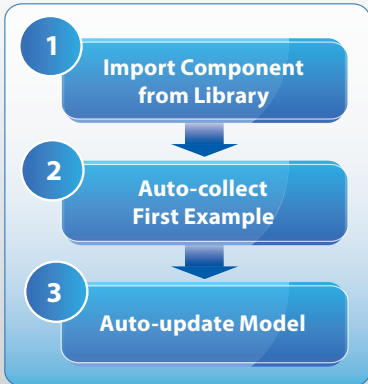
Just draw a box, show a few good examples and you are ready to inspect just about anything. Add more images to the model and watch false call rates get even lower. With AI², you have the power to inspect the most comprehensive list of features and identify the widest variety of defect types - including those that you least expect.

A 90% reduction in examples required enables even faster programming - so you get superior defect detection and low false call rates even with just one example. This means significantly lower tuning time and quality results with one panel inspection. Perfect for those high-mix or low volume applications. With its unique ability to 'ignore' bad examples in a model, AI² offers precise discrimination even with excessive variance and minimizes effects of outlier examples. The pixel marking feature highlights defective spots, so you can identify genuine defects instantly.

3-Easy-Steps Programming

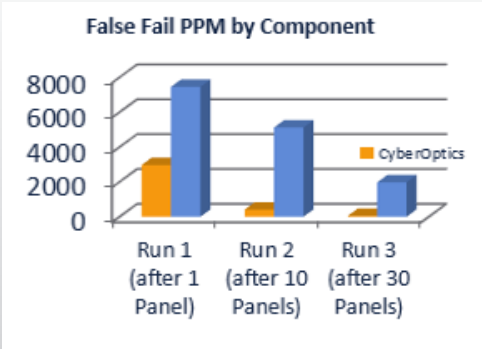
Our latest software improvements take programming to a whole, new level - zero to production ready in less than 13 minutes! All this is made possible, with a data-rich, pre-loaded library and automated scripts that collect examples and update models - all on their own.

AI² Imaging Programming



Enables Fast Set-up time <13 minutes

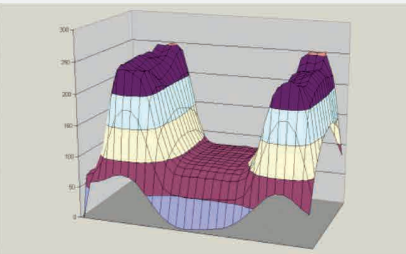
AI² Imaging Tuning



Enables Ease-of-Tuning

AI² Imaging Modeling

Varying Grayscale Values (as seen by AI²)



Enables Simple Set-up

Industry 4.0

Intelligent Self-Learning, Self-Adjusting Zero Defect line

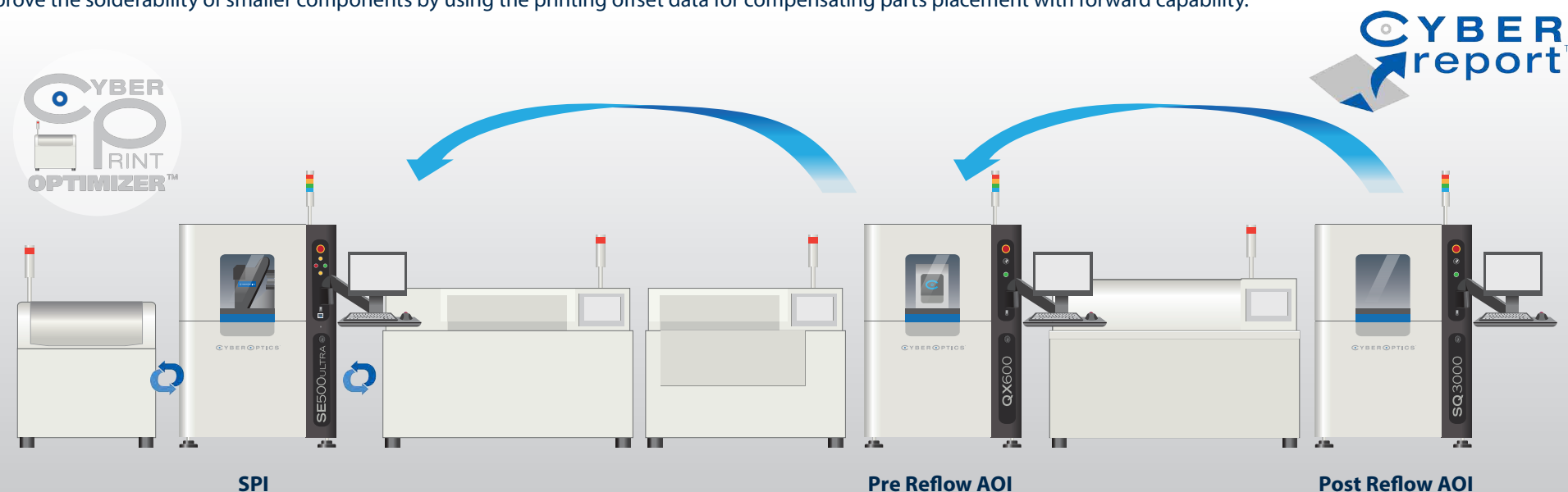
Save Time, Save Expense and Improve Yields With CyberOptics' Powerful Value-Add Solutions



CyberOptics offers a range of unique value-add software solutions that enable automation, reduce rework costs, minimize scrap and optimize print process.

Feedback and feed forward capable SPI Systems with leading Solder Paste printer and SMT Mounter vendors reduces rework costs, increases production through put and improves quality.

- Optimize printing process, establish stencil cleaning cycles and fine-tune printer set-up.
- Gain the power to do more with SPI results with closed loop feedback.
- Improve the solderability of smaller components by using the printing offset data for compensating parts placement with forward capability.



CyberOptics' SPI software - Enables smarter and faster inspection

- Reduce training efforts and minimize operator interaction saving time and cost with the powerful yet simple software with intuitive multi-touch interface and 3D visualization tools.

CyberPrint Optimizer - Automatically optimizes the print process by proactively analyzing current trend data.

- Improve yields and reduce downtime with its predictive process improvement capability.
- Get started quickly with pre-defined templates
- Customize with customizable rules for specific product needs.

CyberOptics' AOI software - Enables smarter and faster inspection

- Reduce training efforts and minimize operator interaction saving time and cost with the powerful yet simple software with intuitive multi-touch interface and 3D visualization tools.
- Speed programming and performance with AI2 (Autonomous Image Interpretation) technology for set-up in <13 minutes with a data-rich, pre-loaded library and automated scripts that collect and update models all on their own.

CyberReport - A complete Statistical Process Control (SPC), offers full-fledged machine-level to factory-level SPC capability to improves yields

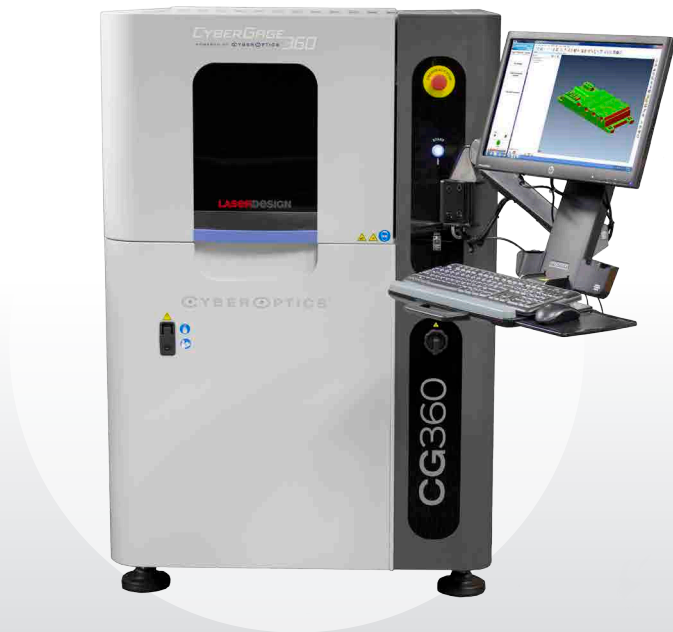
- Attain effective process verification and control with traceability.
- Identify trends and enhance line yields with real-time monitoring tools for historical analysis and reporting.
- Reduce training with easy-to-set-up intuitive interface that facilitates quick learning.
- Achieve fast parsing and charting speed with the robust and scalable software, while enabling an extremely compact database size.

CyberGage360

3D Scanning and Inspection System



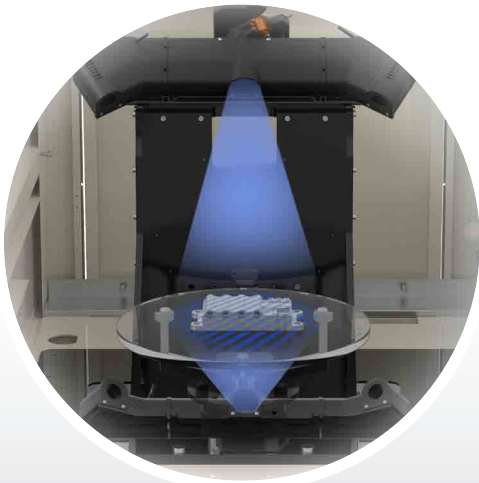
Unprecedented speed, accuracy and one-button simplicity for non-contact automated 3D scanning inspection. A highly precise full 360° scan in <3 minutes.



The CyberGage360 is a blue light 3D Scanning System powered by CyberOptics' breakthrough, patented 3D scanning technology that enables metrology-grade accuracy by inhibiting optical measurement distortion and reflections. CyberOptics' MRS 3D scanning sensor technology is at the heart of the world's cell phone manufacturing inspection systems.

Designed for use in general purpose metrology, the CyberGage360 has a range of potential industrial applications from automotive to aerospace where high accuracy and high speed throughput are important.

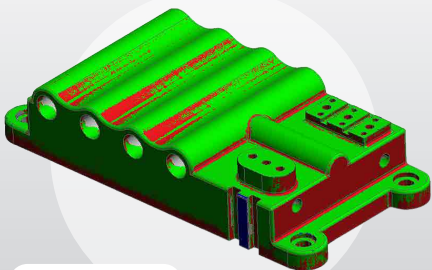
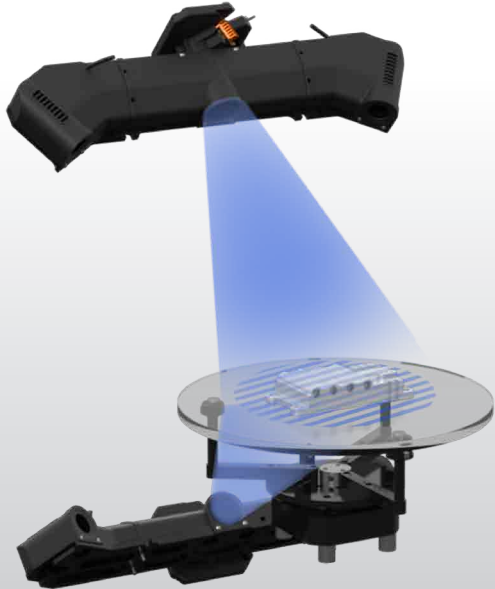
MRS allows simultaneous data capture from multiple sensors and transmits in parallel multiple image data at unprecedented speeds. CyberGage360's patented algorithms combine tremendous amounts of data into a single coordinate system using high-precision encoder position feedback for mechanical metrology-grade part measurement. No best fit piecing together of scan regions is used as is common in competitive projection scanning systems. The resulting part measurement provides NIST traceable system accuracy to 7 µm + L/10000, and repeatability to 5 µm.



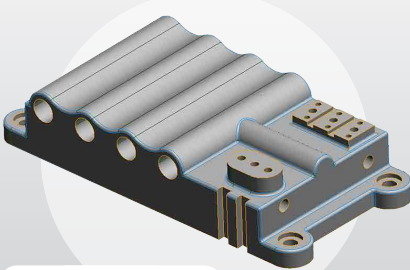
MRS suppresses the effects of variations in surface characteristics of parts under inspection, resulting in a highly precise scan.

CyberGage360 MRS Scanning Sensor Architecture

The patented CyberGage360 system design utilizes two dual camera optical blue light scanning sensors mounted above and below the subject part sitting on an optically flat, clear glass plate calibrated for scanning. The glass plate allows simultaneous data capture from both sensors and eliminates the need to flip-over the part necessary for all other scanning and other conventional measuring systems. The rugged industrial enclosure provides a stable measuring environment and eliminates the effects of ambient light on the part under measurement. The small footprint of CyberGage360 can be used on the factory floor, in the inspection lab, or for incoming parts inspection.



Color Map



CAD/ Reference

Scan generates high density point cloud data to compare to CAD model or reference part

CyberGage360 | 3D Scanning

- MRS Sensor High Precision
- Generates highly precise full 360 degree scan to 7 microns

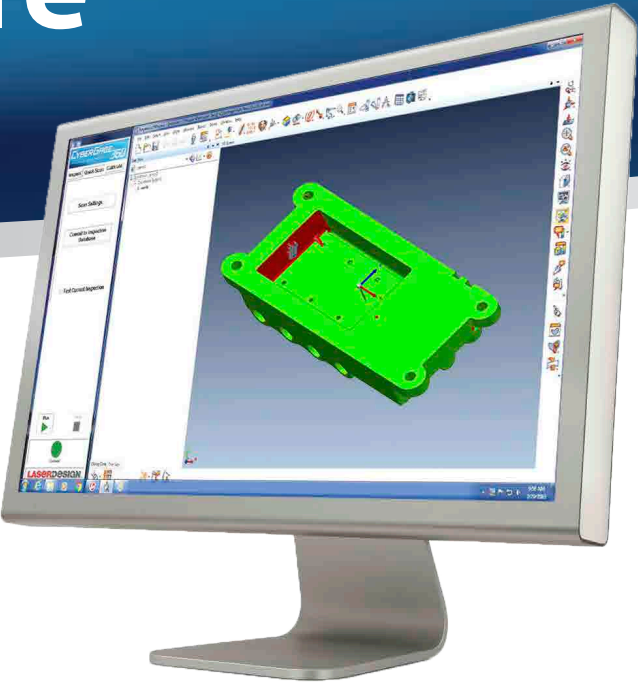
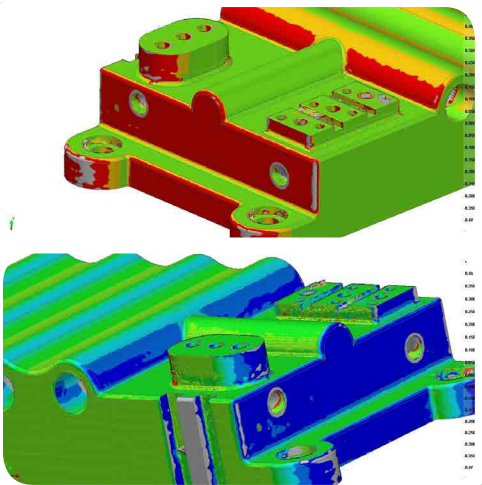
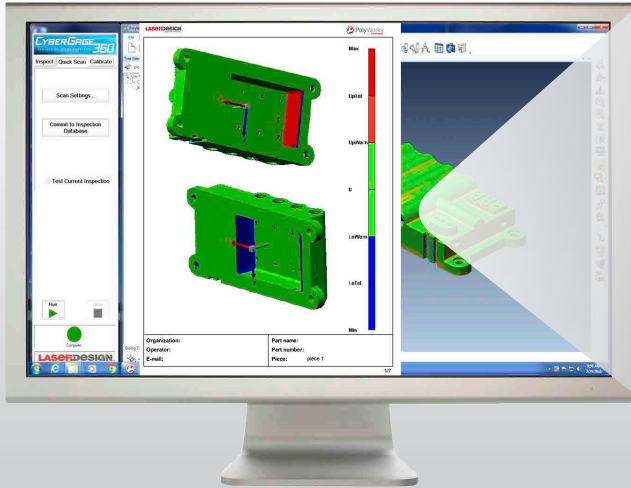
CyberGage360 Software

Easy-to-use with Push-Button Automation

CyberGage360 provides the easiest user experience for 3D scanning inspection requiring no fixture or part alignment. Open the door, place part on the glass plate and press the button. The system comes standard with bar-code reader allowing for automatic program selection. CyberGage360 requires no specialist training providing factory-friendly shop-floor operation while supplying metrology-grade inspection accuracy.

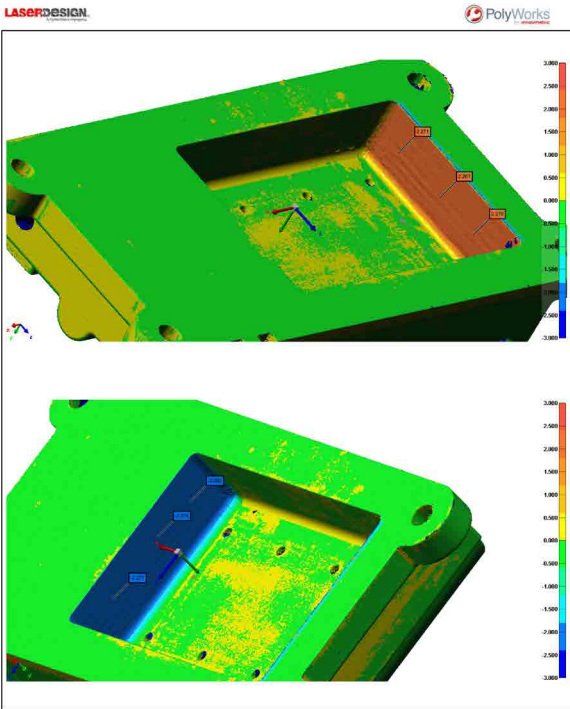
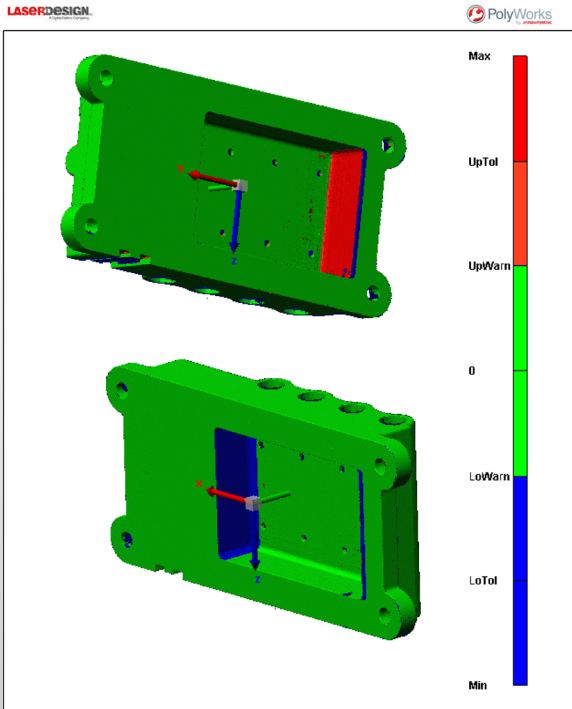
MRS Technology provides metrology-grade accuracy by inhibiting optical measurement distortions (glints) common in white/blue light scanned data.

The generated full volumetric scan provides a high density point cloud for automatic alignment to the CAD model or 'golden part' with the embedded industry-standard Polyworks® inspector software technology. CyberGage360 comes complete with the built-in Polyworks software license and factory training.



Automated Generation of Part Program and Inspection Report from CAD with PMI

The full volumetric part scan generated by CyberGage360 is automatically aligned to the CAD model by Polyworks software. A comprehensive inspection report including dimensions and GD&T is generated automatically using PMI (Production Manufacturing Information) if contained within the CAD part model. Critical part inspection criteria are tracked automatically by trend analysis/ SPC. A 3D color deviation map is displayed indicating tolerance variation as compared to CAD. Red or blue indicate oversize/undersize condition. Inspection projects can be digitally shared throughout a manufacturing organization, suppliers and customers using the free Polyworks Inspection Viewer providing rapid access to critical geometric data.



Feature Table

Units: Millimeters
Coordinate System: world
Data Alignments: drf - A B C

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
cylinder 6	2.500+0.150/-0.250 mating	2.500	2.055	+0.150/-0.250	-0.445	Fail	-0.195
Diameter		2.500	2.190	+0.150/-0.250	-0.310	Fail	-0.060
cylinder 7	2.500+0.150/-0.250 mating	2.500	2.064	+0.150/-0.250	-0.436	Fail	-0.186
Diameter		2.500	2.285	+0.150/-0.250	-0.235	Pass	
cylinder 8	2.500+0.150/-0.250 mating	2.500	2.245	+0.150/-0.250	-0.255	Fail	-0.005
Diameter		2.500	2.377	+0.150/-0.250	-0.123	Pass	
cylinder 9	2.500+0.150/-0.250 mating	2.500	2.203	+0.150/-0.250	-0.297	Fail	-0.047
Diameter		2.500	2.368	+0.150/-0.250	-0.132	Pass	
cylinder 10	2.500+0.150/-0.250 mating	2.500	2.251	+0.150/-0.250	-0.249	Pass	
Diameter		2.500	2.385	+0.150/-0.250	-0.115	Pass	
cylinder 11	2.500+0.150/-0.250 mating	2.500	2.272	+0.150/-0.250	-0.228	Pass	
Diameter		2.500	2.391	+0.150/-0.250	-0.109	Pass	
cylinder 12	2.500+0.150/-0.250 mating	2.500	2.321	+0.150/-0.250	-0.179	Pass	
Diameter		2.500	2.423	+0.150/-0.250	-0.077	Pass	
cylinder 13	2.500+0.150/-0.250 mating	2.500	2.381	+0.150/-0.250	-0.119	Pass	
Diameter		2.500	2.491	+0.150/-0.250	-0.019	Pass	

Feature Table

Units: Millimeters
Coordinate System: world
Data Alignments: drf - A B C

Name	Control	Nom	Meas	Tol	Dev	Test	Out Tol
DistanceBetween65	3D Distance	52.250	49.976	±0.500	-2.274	Fail	-1.774
DistanceBetween66	3D Distance	78.000	78.012	±0.500	0.012	Pass	

CyberOptics' headquarters is located in Minneapolis, MN and conducts worldwide operations through its facilities in North America, Asia and Europe, with a large network of distribution partners around the world. Through continuous technology advancements, a rich patent portfolio, and our sensor expertise CyberOptics continues to be an industry leader at the forefront of technology.



Distribution/Service & Support:



www.smarttec.dk

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