Optical Comparators

Contour Projector® Technologies

Comparator Products Focused on Quality

OGP® offers a complete line of optical comparators with the world's most advanced measurement technologies. From reliable manual profile projectors to fully automatic CNC controlled vision comparators, OGP has the right measurement solution to support your manufacturing needs. Our worldwide network of authorized OGP representatives offers expert support and service for OGP comparators anywhere in the world.

This catalog presents an overview of the many optical comparator models and unique technologies offered by OGP. In addition, we offer a Comparator Trade-In Program assessing the value towards a new OGP comparator or Video Contour Projector.

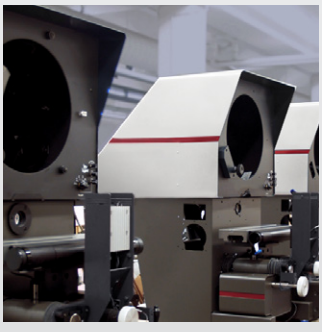
Quality Manufacturing

Solid Construction from Start to Finish

At OGP, we know that you expect a solid, well-built optical comparator that will perform reliably and accurately for many years. That begins with optical and mechanical designs that are proven reliable and serviceable.

It means using stable materials – cast iron, granite, composite, and steel – and the finest optics, made in our own optics shop. It means having an ISO 9001:2015 certified quality system with continuous improvement processes. OGP brings all this and more to our quality manufacturing operations. From the paint shop to the optics lab, OGP builds every comparator in the USA, with quality from the ground up.

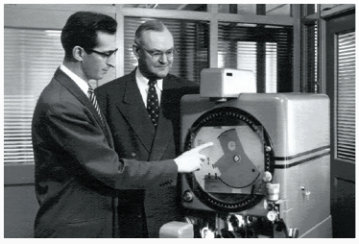
Scan the QR code to see more about OGP Optical Comparator Contour Projector Technologies:






Optical Comparator History

OGP has been the leader in optical comparator technology. For over 75 years, OGP has been the world leader in optical measurement technology for manufacturing quality control. OGP has developed a wide range of new technologies for optical measurement that have revolutionized the use of comparators in manufacturing.

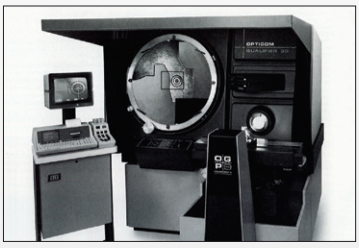


1945 – OGP is Founded

The optical comparator was invented in 1929 and was further developed by Eastman Kodak and employed extensively in the production of the Norden bombsight used by U.S. and Allied bombers during World War II. Edward C. Polidor (OGP founder), an officer in the U.S. Army Ordinance Division, worked closely with Kodak® engineers to optimize and improve the techniques of optical gaging.

1956 – Projectron

Projectron™, the world's first electronic edge detection system for optical comparators using photocell technology and analog circuitry, is introduced, foreshadowing the need for automation in the inspection industry.



1984 – VidiProbe Contour Projector

The VidiProbe introduction effectively bridges contour projector and video inspection technologies and was highly valued by customers who were looking for the "best of both worlds" – optical comparators and video systems.

1995 – Top Bench

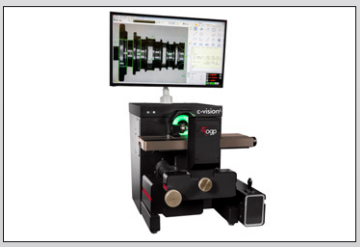
As new demand for compact benchtop machines emerged, OGP responded with a revolutionary optical system –Top Bench®. Images were erect and unreversed, regardless of illumination used (profile or surface). The side of the part facing the operator was the same side seen on the screen. This combination of ergonomic features was unprecedented.

2009 – Groundbreaking Optical Comparator Technology

Innovative all-LED TruLight® illumination, a world-first use in optical comparators and eCAD®, an electronic overlay package that allows a CAD model to project virtual charts onto the comparator screen, for comparison with part images are applied to new benchtop horizontal Contour Projectors.

2013 – c-vision

OGP SNAP optics and software were incorporated into a horizontal projection optical comparator housing. Leveraging the OGP comparator worktable and motion system, provided a much heavier load capacity than seen on most video measuring systems of comparable travel.

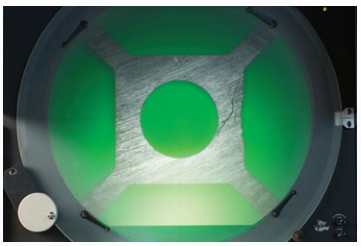


2018 – c-vision Lite

Taking the heart of the c-vision product, the heavy-duty worktable, and the large field-of-view optics and dispenses with the rest of the structure to provide the benefits of the concept at an attractive price.

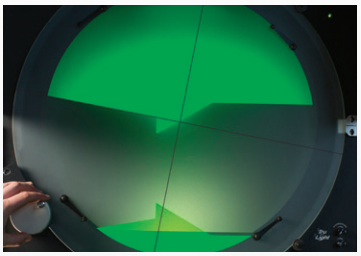
Versatile Measurement Systems

OGP offers a complete line of optical comparators with the world's most advanced measurement technologies.



Surface Inspection

TruLight through-the-lens surface light is a high intensity, pure-white light, projected parallel to the optical axis. This type of illumination is ideal for visual inspection of surface grain, texture, cracks, flaws, or colors in the object's surface. Three bright all-LED illuminators are available: Coaxial Surface Light, Profile Light, and Oblique Surface Light.

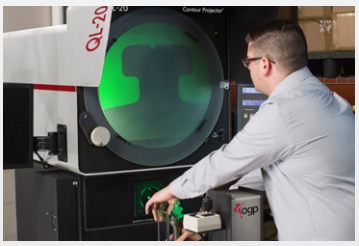


Angle Measurement

The rotating screen ring and digital protractor readout allow direct measurement of angles. Radius and angle chart gages are available for direct comparison as well.

Manual Inspection

OGP comparators offer a constant, long working distance between the part being inspected and the front lens. This large working area provides ample room for tooling fixtures, or for manual inspections without fixtures.

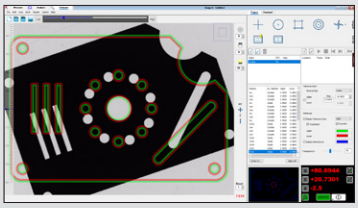


Tool Pre-Setting

The comparator's high magnification and bright light make it convenient for use as a manual tool presetter. Ample room is available in the work envelope to manipulate the part by hand to facilitate alignments.

Off-Axis Measurement

Helix motion allows measurement of threads, gears, and gear cutting hobs by rotating the part so that the features are presented correctly to the optics and measured normal to the part axis.

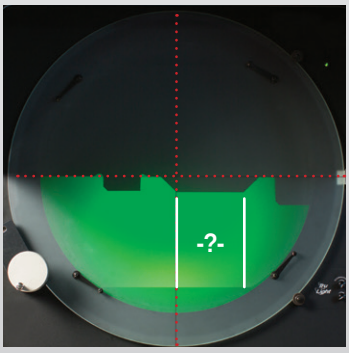


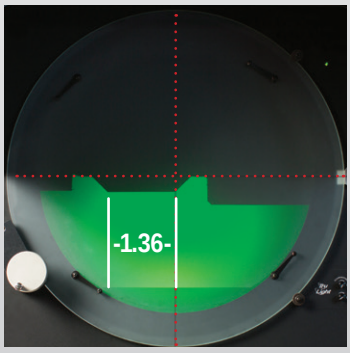
Measurement by Comparison

Overlay charts or eCAD virtual chart gages provide a master outline of the nominal part, allowing easy comparison of the actual part to the master.

Measurement by Motion

Distances between features can be measured manually using the standard DRO controller, or even using a ruler to measure directly on the screen and simply dividing the distance by the magnification. Fully automatic measurements can be made using optional edge detection and automation software.

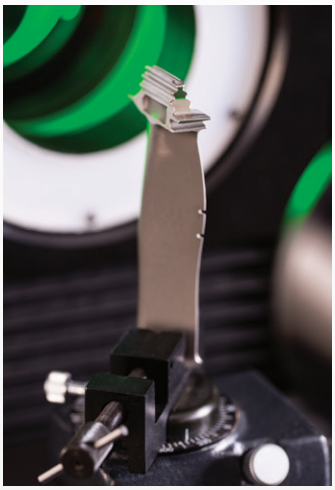




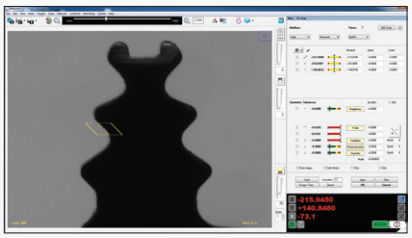
Industries

OGP optical comparators use cutting-edge optical, lighting, and automation technologies, handling the tight tolerances and wide range of applications in the manufacturing process.

Aerospace

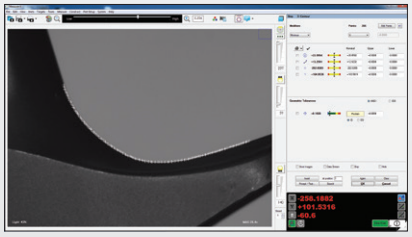


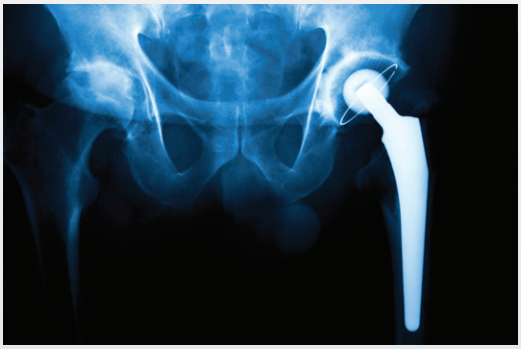
Aerospace parts often have complex shapes, critical dimensions, and tight tolerances. OGP Optical Comparators handle these requirements easily, with a high payload capacity, large helix motion and full featured measurement software.



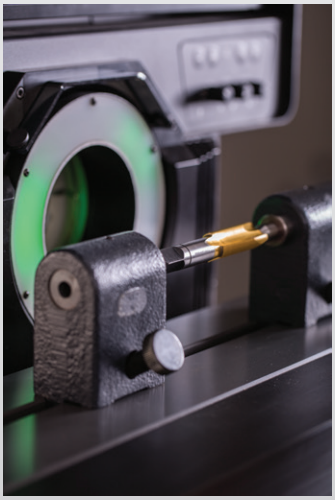
Medical

Medical devices such as orthopedic implants are designed to match the human form, with organic curves controlled by unconstrained profile tolerances. Optional SNAP™-X software provides the tools for OGP Optical Comparators to measure these complex shapes and apply the geometric tolerances correctly.

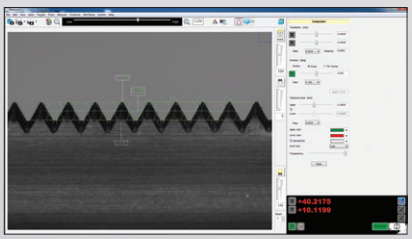




Manufacturing



Large castings, turned shafts and cylinders and other machined and formed parts are equally at home on the OGP Optical Comparators. The large throat clearance and generous XY measurement range let you measure most anything you can make in your shop.



c-vision Video Contour Projectors

The Best of Both Worlds

The c-vision™ Video Contour Projector® combines the speed and accuracy of a video measurement system with the rugged capacity of an optical comparator to create the world's easiest-to-use shop-floor measuring tools.

c-vision Floor Model

Tough

Optical comparators are a mainstay of shop-floor measurement. Their tough construction and big viewing screen make measurements fast and easy.

Fast

Traditional video measurement systems offer the high magnification and the speed of automatic measurement.

Versatile

c-vision brings you the best of both worlds – the rugged, proven design of a profile projector and the accuracy of a precision video measurement system. With 60% more magnification range than a standard comparator, you can accurately measure features up to 4 inches without moving the worktable.

Reliable

c-vision offers the rugged construction and high reliability you expect from OGP – the leader in non-contact measurement systems for over 75 years.

Scan to view c-vision video:

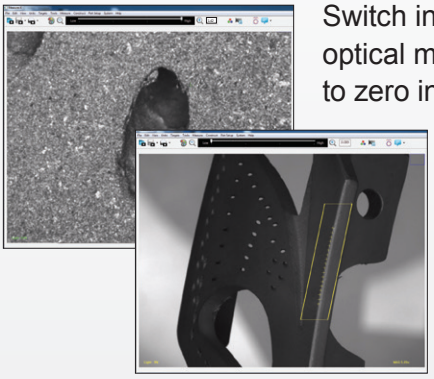
Innovative Optics

c-vision multiple magnification, telecentric optical system offers the convenience of up to a 4-inch field of view, and the resolution to measure small features accurately.

The heart of c-vision optics is the oversized front receiving lens which creates the large field of view. The optics are fully telecentric, ensuring accurate size measurements throughout the field.

The OGP digital megapixel metrology camera measures the entire field of view in one snapshot, enabling dozens of features to be measured at once. Instantly available electronic zoom settings enable inspection of small features up-close.

For small feature sizes, high optical magnification is needed to achieve the optical resolution required for high accuracy measurement. c-vision switches to high magnification at the touch of a button – with industry proven OGP AccuCentric®, calibrating paracentral and parfocal, this automatically compensates magnification for each mag lens change to ensure accuracy.

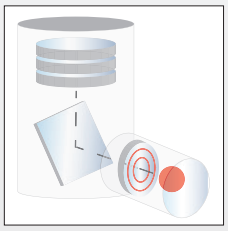


Switch instantly between low and high optical magnification and use digital zoom to zero in for a closer look.

Low magnification has up to 4-inch field of view – more than a 30-inch optical comparator with a 10x lens (which has 3-inch field of view). Optical magnification and digital zoom together provide a huge 16 to 1 magnification range.

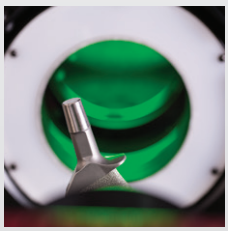
Digital Turret Assembly option with three objective lenses.
Available only on c-vision Lite.

c-vision Benchtop shown above

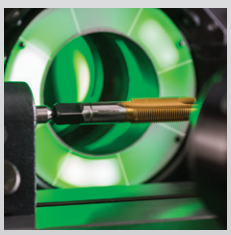


OGP's exclusive AccuCentric auto-calibration automatically confirms magnification with every mag-lens change.

Available on Benchtop and Floor Model systems only.



TruLight all-LED illumination sources are designed to complement the c-vision unique wide field optics. Backlight and square-on internal surface lights fill the field of view with uniform, bright light to pick up the smallest details.



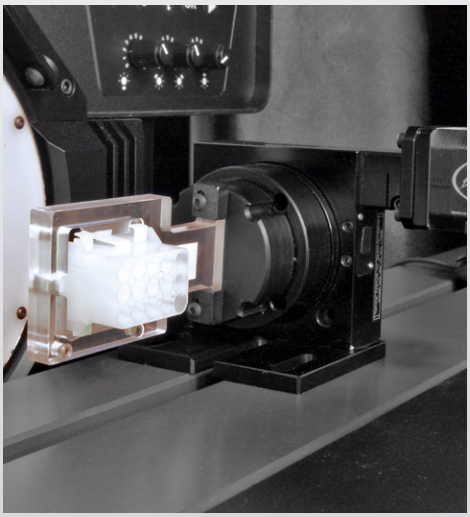
The 8-sector programmable ring light highlights surface details, allowing measurements of features that standard optical comparators are unable to detect with conventional surface light.

A True Shop Floor Measuring Machine

c-vision offers rugged construction and simple controls that make it ideal for use right on the shop floor. Hardened worktables, fully enclosed optics and industrialized controls stand up to harsh environments.

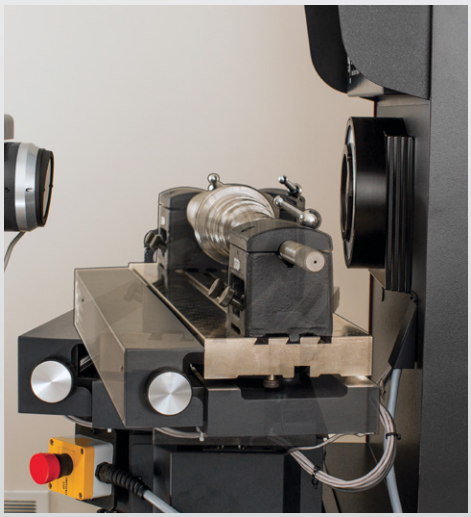
c-vision has an open work envelope that makes it easy to load or unload large, heavy parts. Completely telecentric optics create crisp images that make measurements easy. Just load a part and simply push a button to measure your part instantly.

c-vision offers high load carrying capacity and the open work envelope of a horizontal comparator. The floor model offers a 350 lb load capacity.



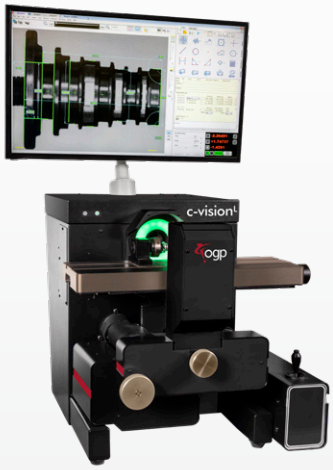
Optional rotary stages automatically bring features of interest into view.

Operator controls are simple and easy to reach.



Helix stage motion of up to ±7.5° allows the table to pivot for correct thread profile measurements.

c-vision Video Contour Projectors



Features	c-vision Lite	c-vision Benchtop	c-vision Floor Model
XYZ Travel			
Standard	12” x 5” x 1.5”	15” x 6” x 2”	15” x 9” x 2”
Optional	–	18” x 6” x 2”	15 x 10” x 2”, 18” x 9” x 2”, or 18” x 10” x 2”
Drive System			
Manual	▯	–	–
Motorized	*	▯	▯
Optical System	Telecentric, upright and un-reversed		
Optical Lens			
Standard	Single Mag with 1.88" Field of View	Motorized Dual Mag turret with 3.0" low mag Field of View and 4x high mag lens	Motorized Dual Mag turret with 4.0" low mag Field of View and 4x high mag lens
Optional	Motorized three-lens turret with additional 0.94” and 0.47” Field of View	–	10x high mag lens in lieu of 4x
Maximum Load Capacity	45 lb	65 lb	350 lb
Helix Angle Range			
Standard	+/- 6.5 degrees	+/- 7.5 degrees	–
Optional	–	–	+/- 7.5 degrees
Throat Clearance	11”	10”	16”
Swing Away Lamphouse	–	*	*
Illumination			
Profile	▯	▯	▯
Oblique	*	*	*
Coaxial	–	*	*
Software			
SNAP-X™ Measure	▯	▯	▯
SNAP-X™ Compare	▯	▯	▯
SNAP-X™ Analyze	*	*	*
OGP EVOLVE® SPC	*	*	*

▯ – Standard * – Optional

Traditional Optical Comparators

Optical Comparators with the World's Most Advanced Measurement Technologies

The mainstay of shop-floor measurement, optical comparators' tough construction and big viewing screens make measurements fast and easy. Contour Projectors from OGP offer the industry's best value and performance for non-contact measurement. All OGP benchtop and floor model comparators use cutting-edge optical, lighting, and automation technologies, allowing for tight tolerances and a wide range of manufacturing process applications.

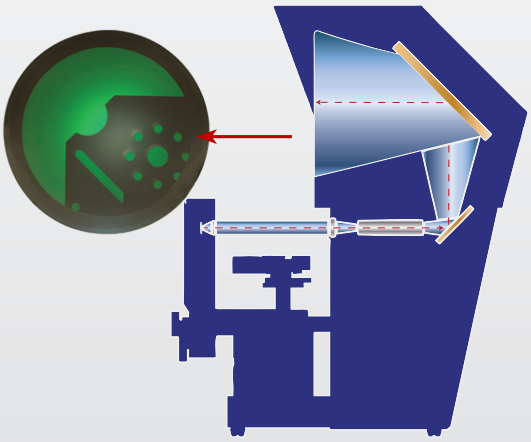
Innovative Optical Technologies

Telecentric Optics

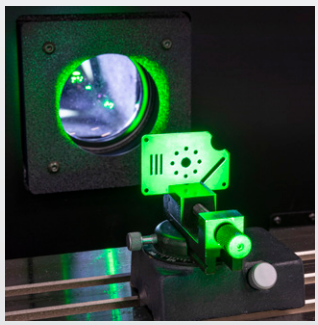
Telecentric optics are the foundation of all OGP comparators. Each model in the OGP optical comparator line uses one of our unique optical designs to ensure size measurements are accurate even when the image is not perfectly focused, allowing any user to achieve accurate measurements with ease.

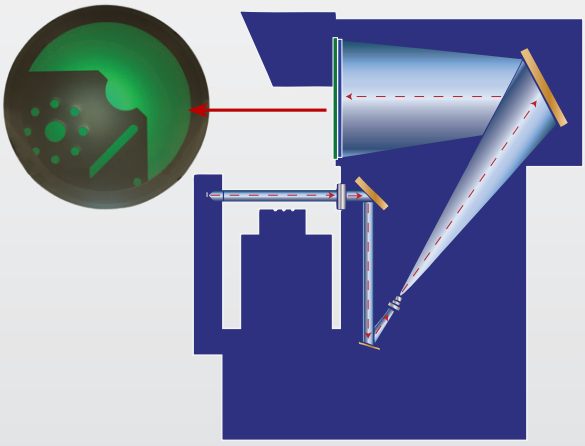
All OGP comparators provide a constant working distance between the front lens and the part being measured at all available magnifications. It is never necessary to reposition or re-stage a part when a different magnification is selected. All lens changes are internal via a turret with the same focus points for each lens.

OGP's exclusive relay lens system maintains an accurate distortion free image for all magnifications. The profile light collimating lens is well matched to the front receiving lens for optimum optical resolution.



Focus dual mirror optics produce an upright and reversed image.





QL-20™ and QL-30™ three mirror optics produce an upright and un-reversed image.

Scan for more information on traditional optical comparators:

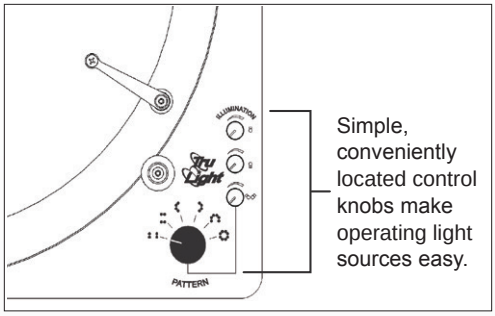
Viewing Screen Diameter				
Lens Selected		14”	20”	30”
	10x	1.40”	2.00”	3.00”
	20x	0.70”	1.00”	1.50”
	31.25x*	0.45”	0.64”	0.96”
	50x	0.28”	0.40”	0.60”
	62.5x*	N/A	0.32”	0.48”
	100x	0.14”	0.20”	0.30”

*31.25x Magnification = Using a machinist's rule on the screen, 0.001” at the part becomes 1/32” on the screen

*62.5x Magnification = Using a machinist's rule on the screen, 0.001” at the part becomes 1/16” on the screen

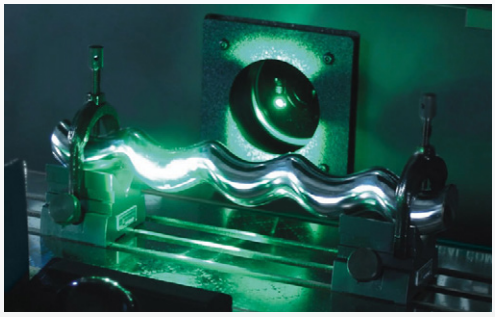
Illumination

Exclusive TruLight LED lighting (Focus and QL-20 only) has transformed OGP optical comparators into modern, high-tech measuring systems. High brightness LEDs offer low power consumption, cool operation, indefinite lifetime, and continuously variable intensity control – all for very bright, crisp imaging. Stable, digitally controlled – ideal for automatic edge detection (Projectron).



Profile Light

Monochromatic green light provides maximum contrast, maximum screen brightness with minimal glare, preventing eye strain.

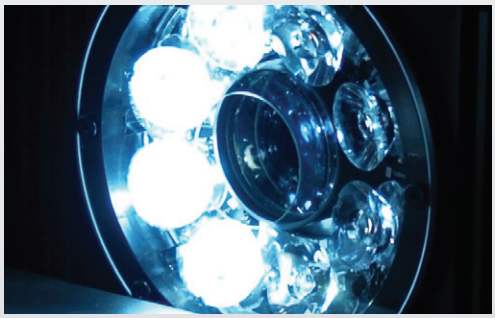


Coaxial Surface Light

Through-the-lens coaxial surface light provides white, brightfield illumination across the entire field of view, fully illuminating part surfaces.

Oblique Surface Light

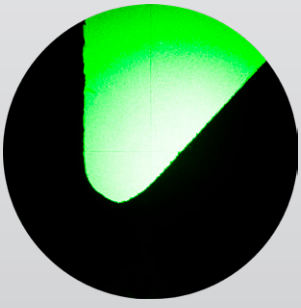
Oblique dark field ring light provides six selectable patterns allowing you to highlight surface details for maximum image clarity and change light direction to match surface geometry.



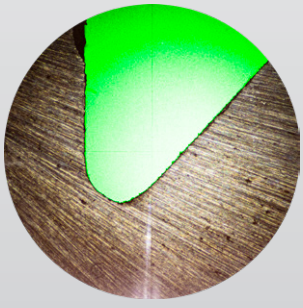
Surface Contrast

Profile Illumination 10x

Surface Illumination 10x



Profile Illumination 50x

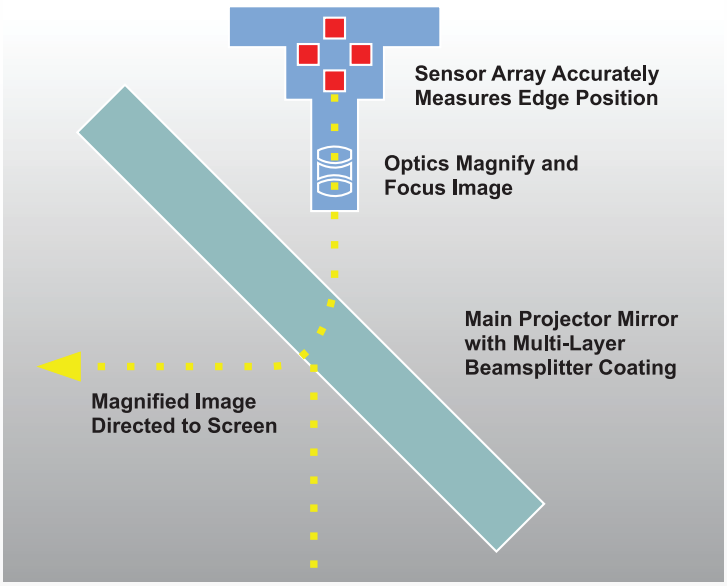


Surface Illumination 50x

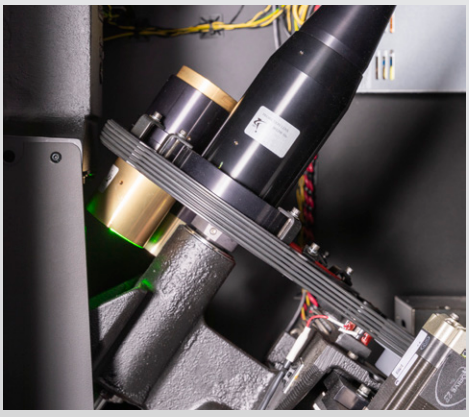
Edge Detection

Automate measurement routines with Projectron image analysis.

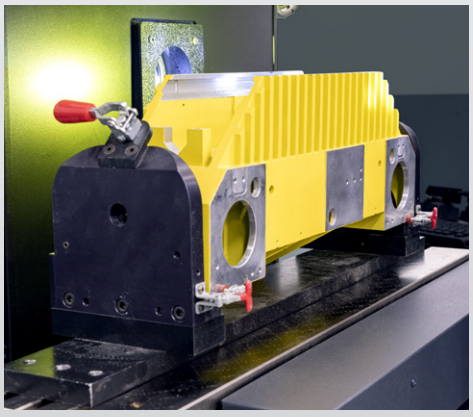
- Improve accuracy and repeatability – Eliminate variability due to operator influence
- Accurate with any edge orientation – Horizontal, vertical or 45° edges are located accurately with repeatability better than 0.0002” (5.0 µm)



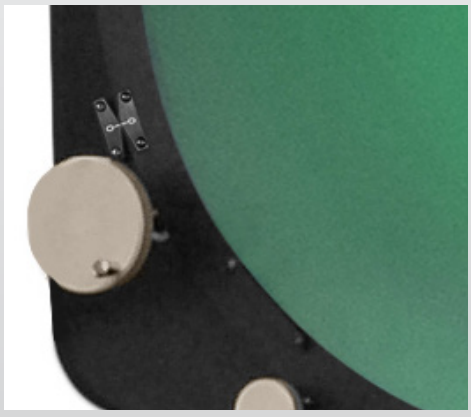
Focus with VidiProbe



All OGP comparators have internal lens turret up to 5 positions to keep lenses safe and ready for use



High-Load worktable capacity



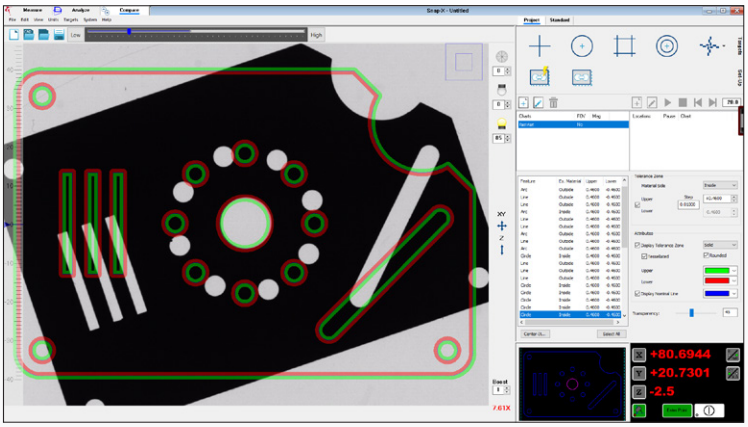
Precise rotary screen ring for highly accurate rotational measurements

Traditional Optical Comparators

Features	Focus	QL-20	QL-30
Screen Size (viewable)	14”	20”	30”
XY Travel			
Standard	12” x 5”	15” x 9”	
Optional	15” x 5”	15 x 10”, 18” x 9”, or 18” x 10”	
Z Focus Travel	1.5” (1.25” with optional oblique ringlight)	3”	
XY Drive			
Manual	▯	–	–
Motorized	*	▯	▯
Optics	Telecentric, upright and reversed	Telecentric, upright and un-reversed	
Optical Lens			
Turret Lens	Standard 3-position turret	Standard Fixed 1-position turret, Optional Motorized 5-position turret	
Standard	10x Lens		
Optional	20x, 31.25x, 50x, 100x	20x, 31.25x, 50x, 62.5x, 100x	
Maximum Load Capacity	45 lb	350 lb	
Helix Angle Range			
Standard	+/- 6.5 degrees	–	–
Optional	–	+/- 7.5 degrees	+/- 7.5 degrees
Throat Clearance	10” (9” with optional oblique ringlight)	19”	21”
Illumination			
Profile	▯	▯	▯
Oblique	*	–	–
Coaxial	*	*	*
Illumination Type	LED	LED	Mercury Arc
Projectron Edge Detection	*	*	*
eCAD®	–	*	*
VidiProbe	*	*	*
DRO			
Q-Check®	▯	▯	▯
Q-Touch™	*	*	*
Software			
SNAP-X™ Measure	**	**	**
SNAP-X™ Compare	**	**	**
SNAP-X™ Analyze	***	***	***
eChek™	*	*	*
OGP EVOLVE® SPC	*	*	*

▯ – Standard * – Optional ** – Included with VidiProbe *** – Optional with VidiProbe

c-vision Software – SNAP™-X

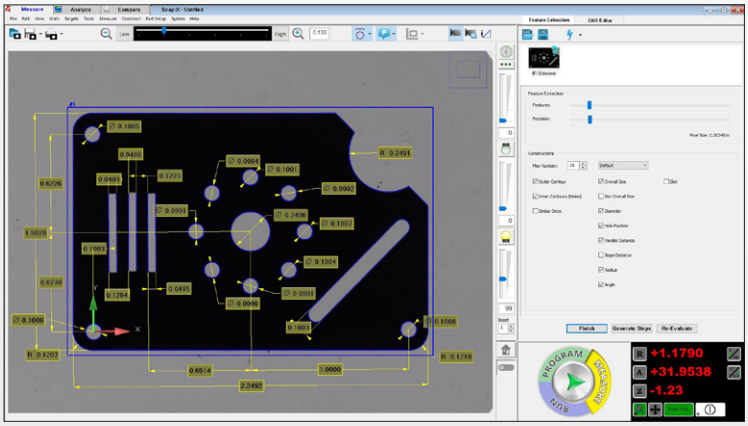


Compare

The most basic measurement. No variable data, a widely accepted method of quickly assessing part acceptability.

The Compare Tab is selected, a CAD file is imported, and the operator is able to fit the part image to the CAD overlay on the monitor.

This allows the user the ability to use effective surface illumination, easy to maintain CAD overlays, and the option to change mag with the same overlay – all within a smaller footprint versus a traditional optical comparator.



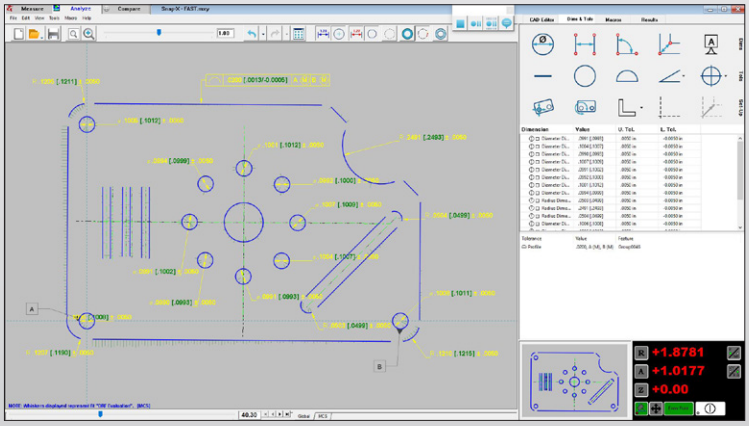
Measure

With the Measure Tab selected, various measurement tasks can be performed, depending on the mode selected:

SnapShot™ Mode: Place the part on the stage, press Go. The image is scanned and Feature Extracts all discernible features. Images may be viewed with no further action, or the features can be turned into measured steps for a program.

Program Mode: Measurements can be taken, and programs can be created. An operator creates a program from extracted features of SnapShot Mode by making the measurements as usual with a video measurement system, or from a CAD file of the part.

Run Mode: A pre-set selection of a desired routines is available for the operator to select.



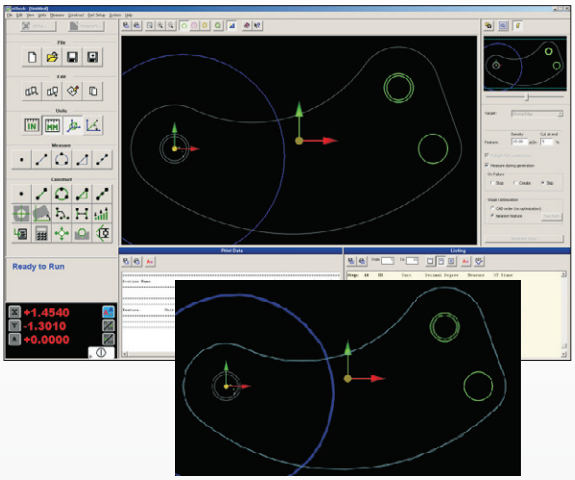
Analyze

Users have the ability to address more complex GD&T requirements such as profile, true position of features when datum features of size allow mobility on the feature and the datums.

The display and reporting capabilities with Analyze provide both graphical, color coded whiskers of deviation, and GD&T callouts on the part CAD.

Analyze works seamlessly with SNAP-X Measure functions.

Contour Projector Software



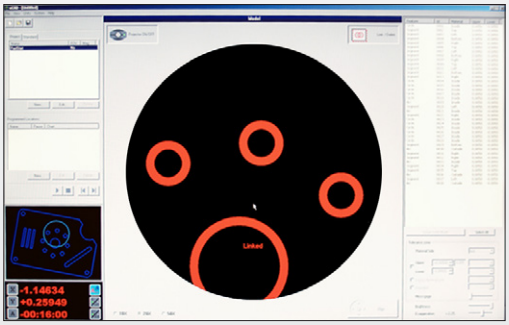
eChek

eChek™ automatic measurement software combines the benefits of motorized X,Y stages and automatic edge detection to create completely automatic measurement routines (Go/No Go, Pass/Fail). Set up a program once and run it time and time again for maximum productivity and precision. eChek's unique CAD-based programming option allows entire parts or sections of parts to be programmed simply by indicating the area to be measured. Let eChek do the programming for you.

eCAD

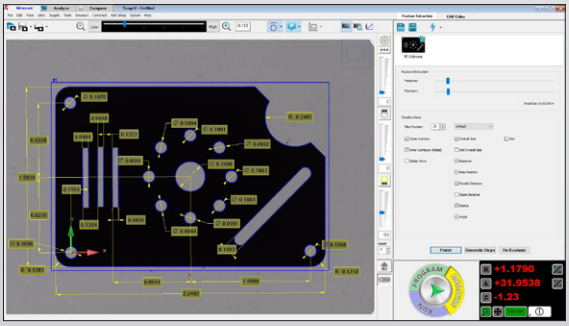
Patented† eCAD projects an accurately magnified CAD model directly onto the comparator screen presenting a virtual chart gage, which includes nominal dimensions and tolerance bands. eCAD eliminates the need to produce and maintain an inventory of specialized chart overlays.

† eCAD is covered by the following patents: US 8,400,633 and US 8,269,970



VidiProbe

VidiProbe transforms the traditional comparator into a fully automatic video inspection system using SNAP-X software. An internal video camera positioned to capture the image formed by the comparator optics provides digital image data to the software for fully automatic measurement routines.



Digital Readouts

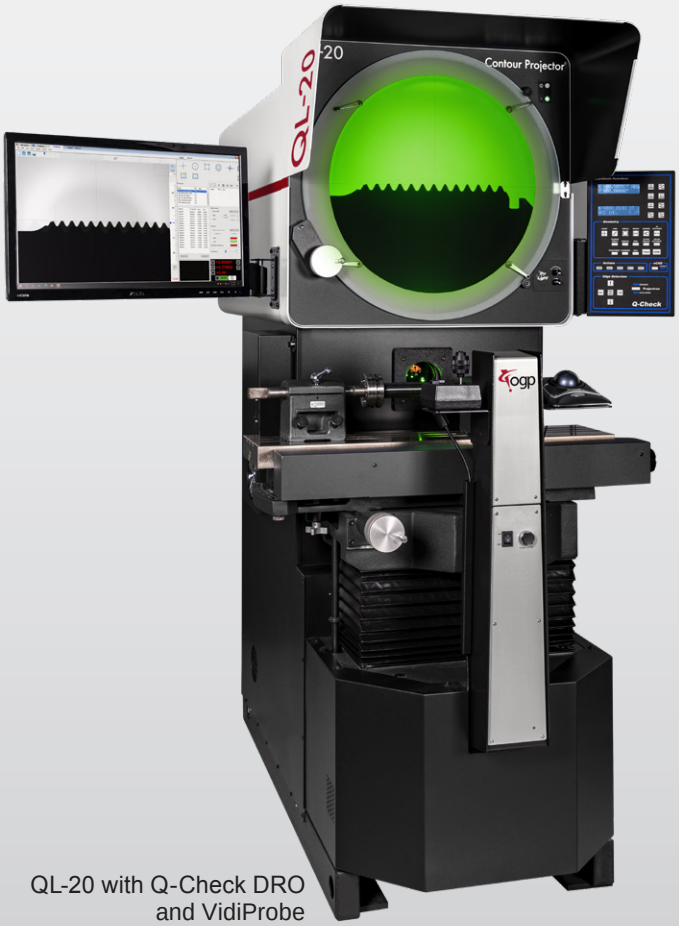
OGP offers two digital readout controllers for all new comparators. Both DRO models offer intuitive user interfaces and simple displays that reduce errors, improve operator productivity, and save time and money.

Q-Check DRO

The Q-Check® Digital Readout with its dual backlit two-line LCD displays and durable construction is designed to survive in almost any shop environment. Its full geometric processing power makes quick work of tough measurements. Q-Check supports Projectron auto edge detection and VidiProbe video measurement systems and eCAD.

Q-Touch (Wi-Fi Capable)

The Q-Touch Digital Readout is an advanced color graphics touchscreen controller offering multi-function geometric measurements and constructions. Q-Touch is compact and offers a bright, easily readable display in all light conditions.



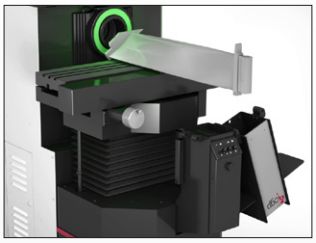
QL-20 with Q-Check DRO and VidiProbe

	Q-Check	Q-Touch
Displays in inches and mm; Digital protractor display	▯	▯
Remote footswitch support	▯	▯
Printer support	▯	▯
RS-232 data output	▯	▯
Measurement of 2D features	▯	▯
Edge detection	▯	▯
Graphical display	–	▯
Programming of features and parts	–	▯
USB support	–	▯
CNC support (with eChek)	▯	–
Color (Including tolerance results)	–	▯
Touchscreen	–	▯
On-screen measurement instructions	–	▯
Supports eCAD	▯	–
Supports VidiProbe	▯	–

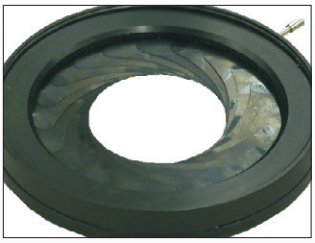
▯ – Standard – - Not available

Optional Accessories

OGP offers a full line of comparator tooling and accessories to make measurements more convenient.

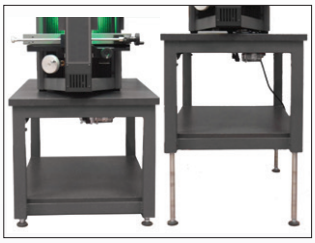


Swing Away Lamphouse allows oversized parts to be staged (c-vision only).



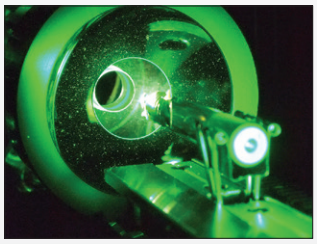
Direct Projection Iris helps reduce reflections from shiny surfaces.

Sturdy Benches for mounting benchtop comparators.

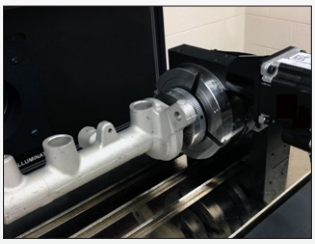


Ergonomic Motorized Stand with adjustable height.

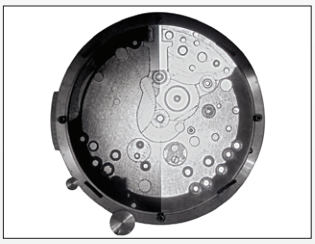
Helix Stage Motion allows the worktable to pivot for gear and thread measurements.



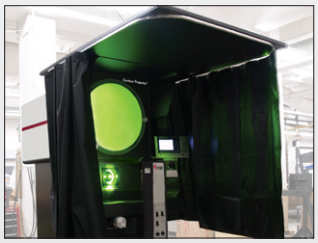
Surface Concentrator intensifies surface light for a brighter image.



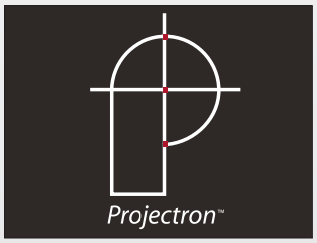
Programmable Motorized Rotary Indexer for staging shafts and cylinders.



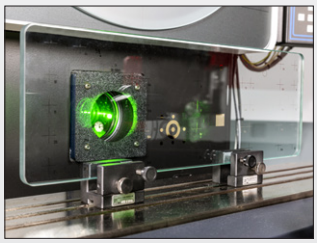
Fresnel™ Lens focuses all screen illumination at the normal viewing position.



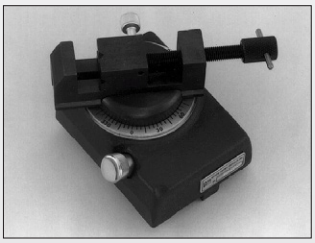
Light Curtain controls excess ambient light.



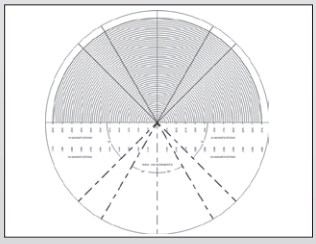
Projectron™ auto edge detection is an internally mounted unit that automatically locates edges using gray-scale processing.



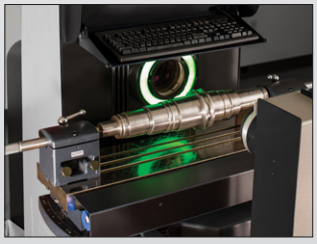
NIST Traceable Calibration Reticle artifacts are specifically designed for OGP Contour Projectors*.



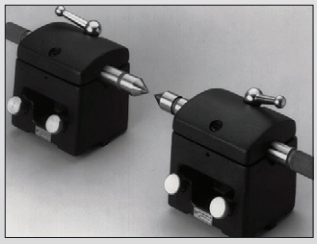
Rotary Staging Vise Provides quick, convenient staging for a variety of parts.



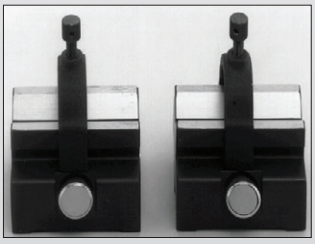
Overscreen Chart Gages provide comparison of actual part features to nominals*.



Extended Travel – standard stage travel can be extended up to 18 inches on both c-vision models



Standard and Heavy-Duty Staging Centers hold cylindrical parts securely and allow free rotation*.



V-Blocks are available in 1", 2" and 3" sizes to accommodate a range of parts*.

Comparator Trade-In Program

Leading manufacturers are realizing the value of their old comparators – as trade-in towards new OGP optical comparators and video contour projectors. OGP will assess a value towards the trade of a new QVI / OGP comparator or Video Contour Projector. It is that easy!

Certified PreOwned Comparators

Certified Comparator Products (CCP), a division of Quality Vision International, has the world's largest inventory of PreOwned optical comparators. We accept older model comparators as trade-ins, and we buy surplus comparators. We also offer a search and locate service for clients to find a specific machine using our extensive network. All CCP PreOwned comparators undergo an exhaustive service check.

Certified Factory Upgrades

Level 1: Certified PreOwned

- Previously owned optical comparator in exceptional measuring condition, ready for sale as is
- Certification to original factory specifications
- Full 30-day warranty for parts and labor

Level 2: Certified Refurbished

- Includes all items in Level 1 Category
- Rebuilt or new membrane panels or DRO
- New illumination system
- New or rebuilt axis drive systems and linear glass scales on all measuring axes
- Top and bottom table surfaces repaired (as required)
- New optical surfaces (as required)
- New glass chart
- Paint touch-ups
- Safety updates
- Full one-year warranty on parts and 90 days for labor

Level 3: Factory Certified

- Includes all items in Level 1 and 2 categories
- Kodak, Excello, CCP, or OGP models only
- New machine wiring and electrical systems
- New optical surfaces
- Resurfacing of top & bottom worktable
- New motion controls (motorized units only)
- New axis drive systems
- Complete tear-down and clean
- Completely repainted
- Upgraded specifications
- Full one-year warranty on parts and labor

Large Field-of-View Systems

Comparator and c-vision are Large Field-of-View (LFOV) systems. Below are additional LFOV systems from OGP:

SNAP

OGP SNAP™ LFOV Video Measurement Systems are compact measuring systems that integrate perfectly from the shop floor, to the lab, or as part of an automated work cell. Rugged construction and an open work envelope make SNAP easy to implement in virtually any manufacturing setting.

All SNAP systems feature large field of view optics, high resolution cameras, and lighting custom-designed to optimize the image, creating a complete optical system. Camera, optics, lighting, and platform are matched and tuned for optimum performance.

SNAP-X software provides users with a simple, powerful interface for instant 2D measurement, virtual chart gaging, and profile analysis.

TurnCheck

OGP TurnCheck™ systems are LFOV precision optical instruments designed to measure shafts and other cylindrical parts. Each member of the TurnCheck family is built for ease of use and consistent accuracy, even in difficult shop-floor conditions.

TurnCheck systems are built for the people who use them: With advanced optics, rugged materials, and intelligent controls to make set up and measurements fast, accurate and easy.

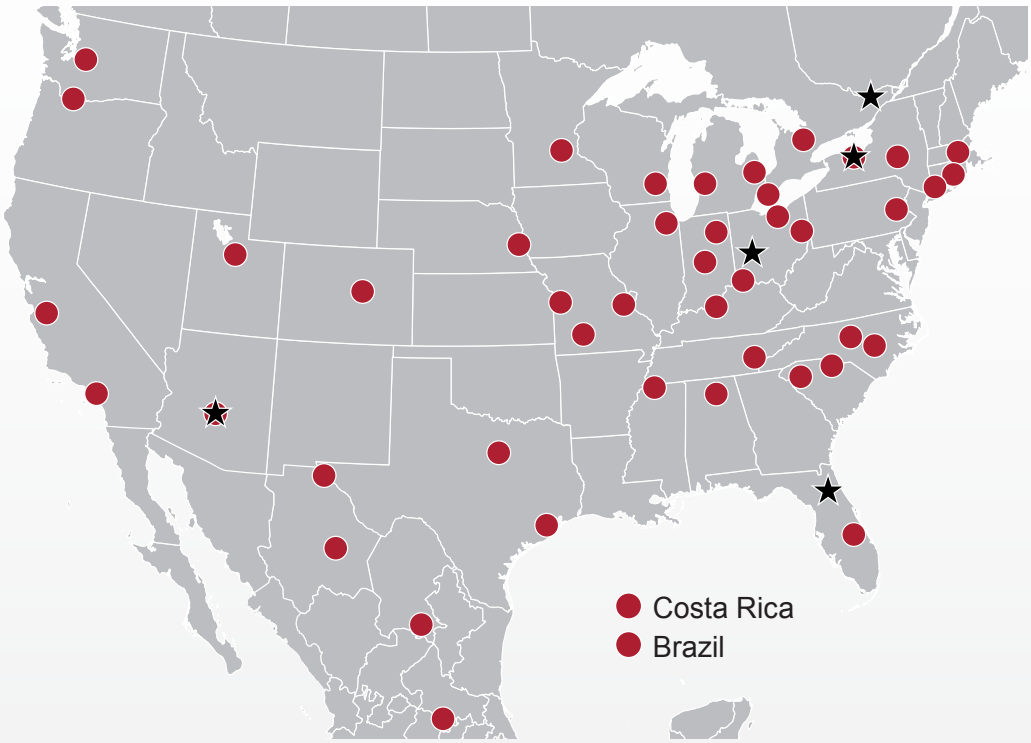
Fusion

OGP Fusion® is an innovative, high-speed, multisensor measurement system with 3D capability that combines an exceptional large field-of-view (LFOV) optical system with multisensor flexibility to form a uniquely productive metrology system.

The heart of Fusion's capability lies in its telecentric large field optics. Fusion's dual optical magnifications: low with 100 mm viewing area and high for small feature measurements and autofocus – each telecentric for image accuracy throughout the depth of field. Advanced design principles and FOV non-linear calibration allow Fusion to measure many features in a Large FOV with the same accuracy as a small FOV on a traditional video measurement system. Large field optics allow a wide area to be imaged with high accuracy, while feature extraction can instantly process and identify all features and dimensions within the scene with no need for a pre-programmed measurement routine.

Global Sales & Support Offices

The Americas



Support Office Locations:

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- Gainesville, FL, USA
- Tempe, AZ, USA
- Ottawa, Canada

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- Budapest, Hungary
- Hofheim-Wallau, Germany
- Turin, Italy

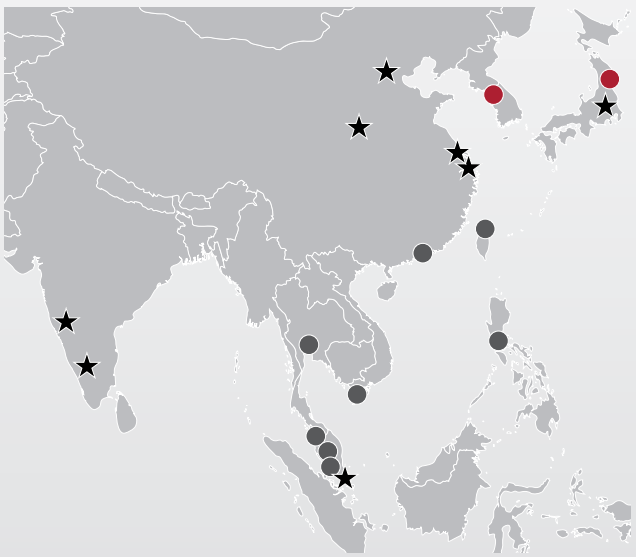
Asia

- Beijing, Shanghai, Suzhou, Xi'an, China
- Bengaluru & Pune, India
- Singapore
- Tokyo, Japan

★ Support Offices
● Sales Representatives
● Agents

Europe, Middle East and Africa

Asia



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