

# ERSASCOPE: Best in Class Inspection

Award Winning & Patented Optical Inspection Systems  
for hidden solder joints of BGAs, Flip Chips, SMDs & THTs

## Our Vision

**Our competitive lead in technology optimizes quality, costs and delivery service in our customers' production process.**

## Our Mission

- ▼ We develop and produce high quality machines and systems for the production of electronics.
- ▼ We offer services and complete solutions designed to optimize our customers' production processes.
- ▼ We think globally and act locally.
- ▼ As a company with tradition, we strive for long-term relationships with our customers, partners and employees.
- ▼ Our core focus is to business areas where we can prove to be "Best in Class" as compared to third parties.
- ▼ We strive for above average economic success in order to guarantee the continuing development and innovative strength of our company.



SMD

Print & AOI



Handling Systems

Reflow



Wave



Periphery Systems

THT



# BEST in CLASS Inspection Technology

Helping our Customers Discover Hidden Problems

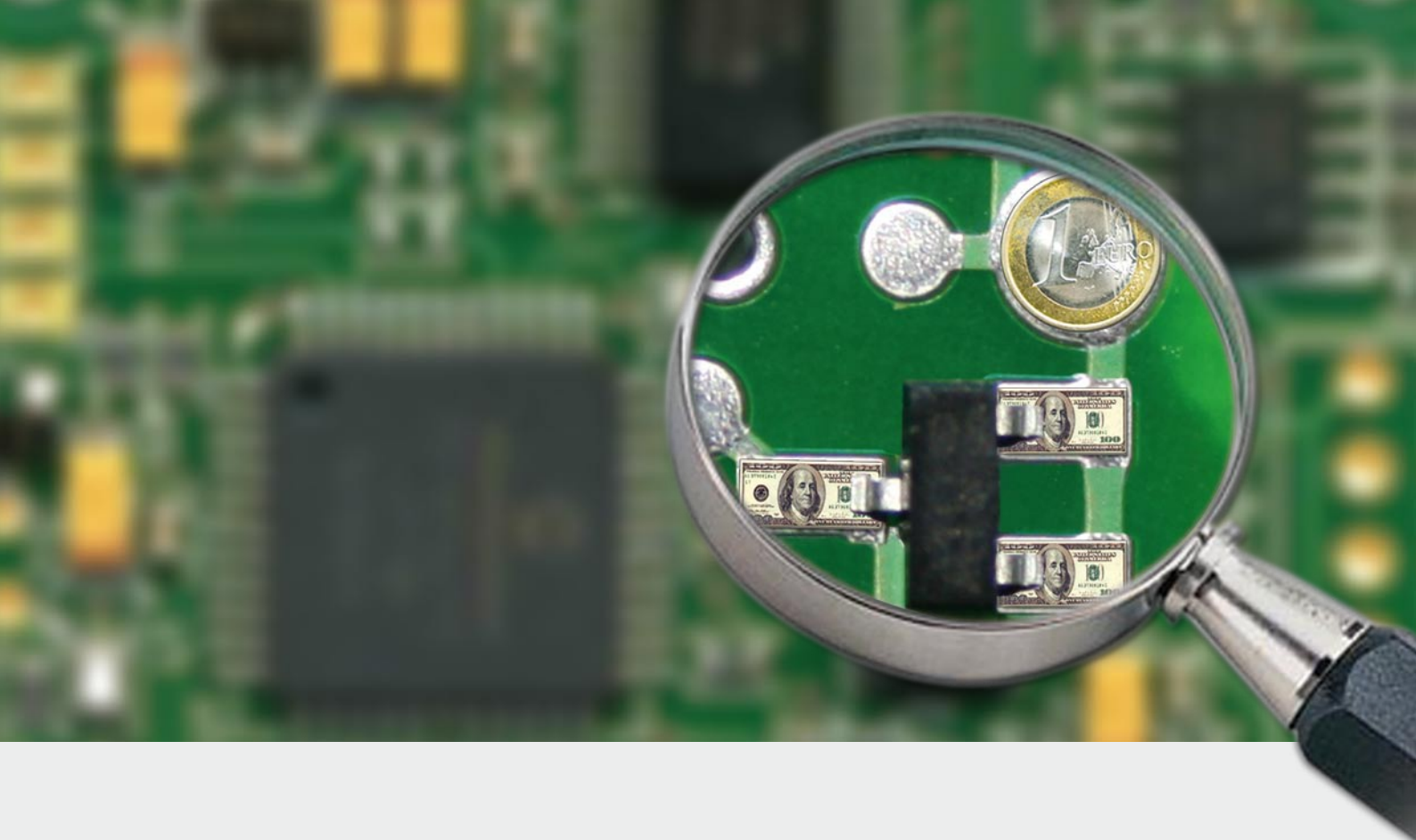
Now for nearly a decade, thousands of users worldwide are benefiting from the ability to inspect hidden solder joints with the patented & award winning ERSASCOPE inspection technology.

Industry experts recognize the critical importance of using ERSASCOPE technology for the inspection of hidden solder joints. In combination with x-ray inspection equipment, the ERSASCOPE provides the most complete view of potential problems.

ERSASCOPE remains to be the undisputed industry standard for optically inspecting BGAs & other hidden solder joints!

Whether for inspection under Flip Chips or for inspection where other microscopes cannot see, ERSASCOPE technology offers a significant added value to any quality assurance program.





# Proper inspection can save money!

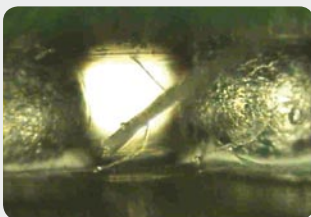
Industry standards like IPC & experts alike promote hidden solder joint inspection

Industry expert Bob Willis\* relies on endoscopic inspection technology for his “Ball Grid Array & Lead-Free Defect Guide”. The IPC standard IPC-7095B (March 2008) recommends the use of endoscopes for BGA inspection. \* [www.ASKbobwillis.com](http://www.ASKbobwillis.com)

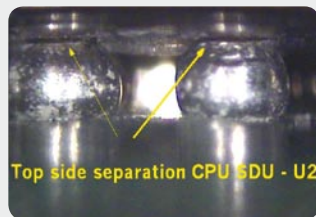
The lead free process will lead to new problems and will require an improved inspection process using ERSASCOPE technology. The defects shown in the images below cannot be detected with standard microscopes. If undetected, such problems will result in the improper qualification of the lead free process.

The award winning ERSASCOPE is a patented, endoscope based system specifically designed for hidden solder joint inspection under components like BGAs, CSPs and Flip Chips.

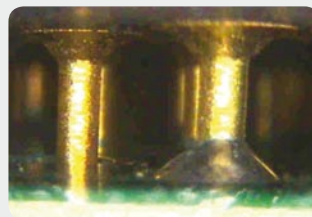
**To See is to Survive** – Only by being capable of seeing all potential problems in your process, will you be able to react, in order to correct those problems, to assure quality and **TO SAVE MONEY!**



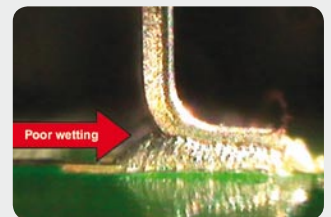
Flux residue under BGA



Top side separation CPU SDU - U2

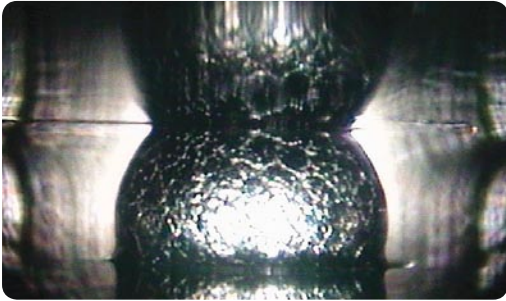


PGA: insufficient hole fill



PQFP: missing interior heel fillet

# ERSASCOPE



See demovideo: [www.ersascope.com](http://www.ersascope.com)



US Patent Nr.: US 6,580501  
EU Patent Nr.: EP 11 23 52



**1999 Dr. Rudolf-Eberle,**  
Innovation Prize, Germany

**1999 Most Innovative Product**  
ELENEX Australia

**2000 Best Product in Show,**  
Komponent & Electronic, Sweden

**2000 EP&P Excellence Award**  
Nepcon, USA

**2000 EP&P Grand Award,**  
Nepcon, USA

**2000 SMT Vision Award,**  
Best New Product, Inspection, Apex USA

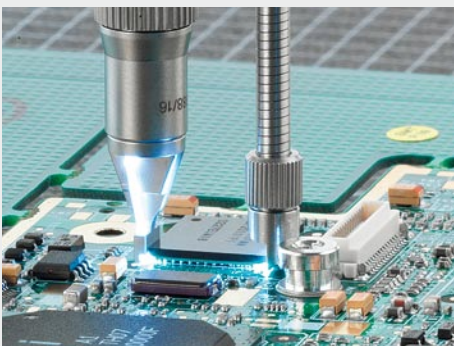
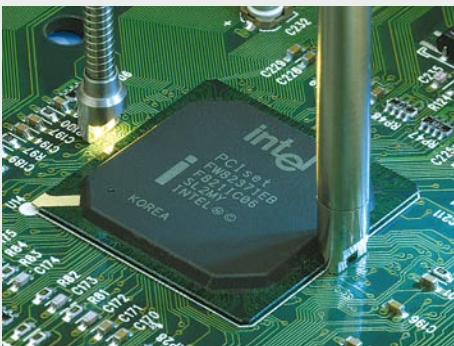


**Best in Class Optical Inspection Technology for inspecting underneath components**

The award winning & patented original ERSASCOPE technology has been further developed in order to meet today's lead free and low component profile challenges.

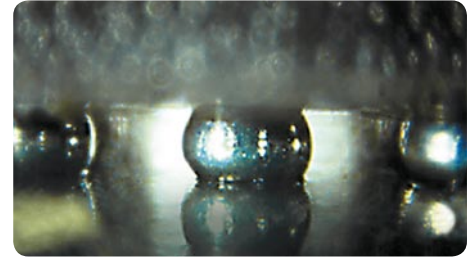
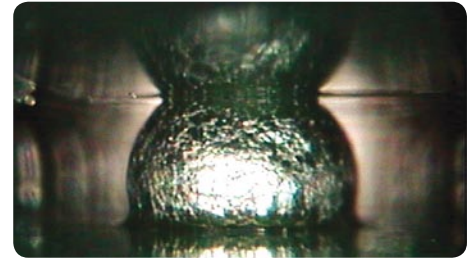
The ERSASCOPE 1 offers a cost effective optical inspection solution in accordance with the new IPC Inspection Standards (see IPC -7095B) for not only BGA, but also for the hidden, interior joints on SMD and TH components.

The ERSASCOPE 2 is currently the ONLY inspection system in the world offering exchangeable optical heads for Flip Chip, CSP, BGA and 0201 optical inspection.



← ERSASCOPE 1 Fixed optics for BGAs;  
ERSASCOPE 2 Exchangeable optics for CSPs

ERSASCOPE 1 image of BGA (gap ~ 300  $\mu\text{m}$ );  
ERSASCOPE 2 image of Flip Chip (gap ~ 30  $\mu\text{m}$ )



# ERSASCOPE 1 vs. ERSASCOPE 2

Which system is best for which inspection application?

## Making the proper choice of systems to meet your specific application

Whereby both ERSASCOPE systems are fundamentally similar in their capabilities, they differ technically in the following functional areas listed in the Technical Comparison table to the right.

When considering inspection applications, the two ERSASCOPE systems differ with respect to the standoff height of the component to be inspected and the density of the PCB. The ERSASCOPE 1, 90° lens for example has a footprint 1.5 x 4.5 mm, a magnification up to 400x\* and a typical inspection gap of ~ 300  $\mu\text{m}$ . The Flip Chip optical lens of the ERSASCOPE 2, on the other hand, has a footprint of only 0.6 x 4.0 mm, a magnification up to 700x\* and a typical inspection gap of ~ 30  $\mu\text{m}$ . Low standoff components such as CSPs and Flip Chips are thus better inspected with the ERSASCOPE 2 system.

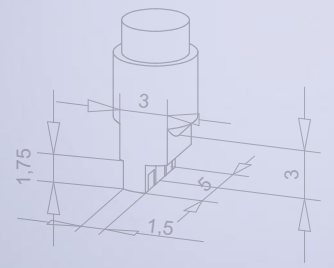
## Technical Comparison:

Part	ERSASCOPE 1	ERSASCOPE 2
Optic	Endoscope with fixed integrated lens	Endoscope with exchangeable lenses
Camera	Digital USB Camera	High resolution CCD, 1.3 megapixel
Light Source	Halogen	Metal halide
Table	x-y	x-y- $\theta$
Software	ImageDoc Basic	ImageDoc EXP

## Application Comparison:

Component	ERSASCOPE 1	ERSASCOPE 2
THT	😊	😊
SMD	😊	😊
BGA	😊	😊
CSP	😊	😊😊
Flip Chip	😊	😊😊

\*20" monitor, 1600 x 1200 pixel resolution, no digital zoom



● **ERSASCOPE 1:**

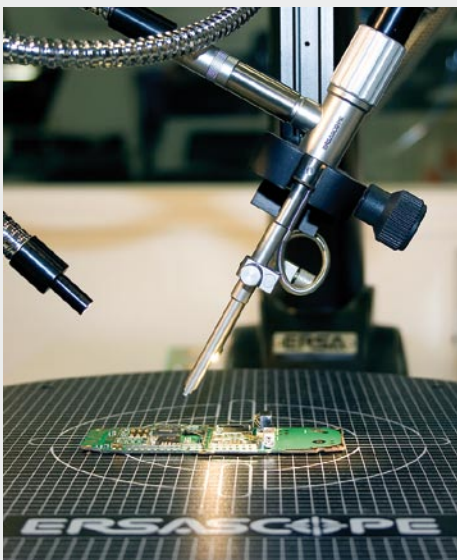
System order number  
0VSSC070 (see p. 18)

**Optics**

The patented ERSASCOPE is the world's first optical inspection system which allows for non-destructive manual inspection of BGAs. Today over 3,000 users worldwide are benefiting from finding defects that would have otherwise gone undetected by other inspection methods. The ERSASCOPE 1 optic is a specially designed endoscope with an integrated fibre optic system, focus ring & adjustable back light; a footprint of 1.5 x 4.5 mm; a magnification up to 400x and a typical inspection gap of ~ 300 µm.

**Camera**

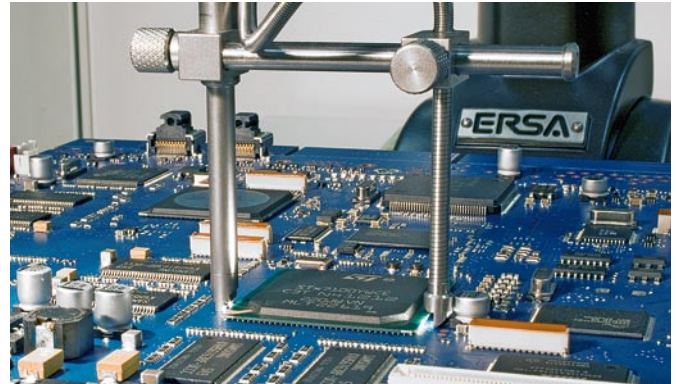
The newly designed ERSASCOPE 1 USB 2.0 Camera with CMOS technology offers optimal light sensitivity and resolution for your inspection applications.



High magnification & viewing angles from 0 to 90° offer maximum inspection flexibility



**Integrated front & back lighting**  
allows for optimal illumination of the  
hidden joints underneath the component



# ERSASCOPE 1

The Award Winning & Patented Original ERSASCOPE

## Light Management

Two light outlets at the ERSASCOPE optical system & a third flexible arm light ensure superb light distribution both on the PCB surface and beneath the component. Via mechanical coupling of the backlight with the inspection head, the illumination remains uniform during movement along the component thus allowing for the fastest BGA inspection of any system on the market.

The ERSA halogen, “cold” light source was specifically designed for ERSASCOPE industrial endoscopy and image processing. Continuous dimming from 0 to 100 % ensures an optimal light control in areas where an exact lighting adjustment is required such as by hidden joint inspection underneath BGAs.

## Table & Stand

Flexible & ESD safe stand and PCB table allows for a total of 6 axes of movement of optics and PCB.

## Software

Image processing and documentation software goes hand in hand with today’s inspection requirements. The ERSASCOPE 1 comes standard with ImageDoc Basic inspection software (see page 15).

## Value Added Features:

- ▼ USB 2.0 WVGA Digital camera
- ▼ High resolution, 90° BGA optical lens ( $\leq 300 \mu\text{m}$ )
- ▼ Halogen light source; long life bulb
- ▼ Light management with flexible arm and optional accessories: fiber optic light brush & fan; mechanical iris adapter
- ▼ Flexible & ESD safe stand and table allows for a total of 6 axes of movement of optics and PCB
- ▼ ImageDoc Basic software with large database of problems & solutions
- ▼ “Plug & Play” set up

# ERSASCOPE 2

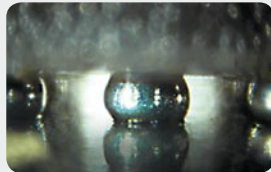


## ERSASCOPE 2:

System order number  
0VSSC600 (see p. 19)



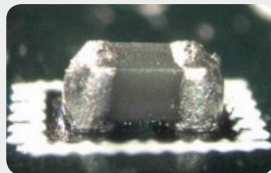
90° Flip-Chip head



90° SMD & BGA head



0° Microscope head



High magnification (up to 700x) inspection

from 0 to 90° and in gaps as low as 30 µm

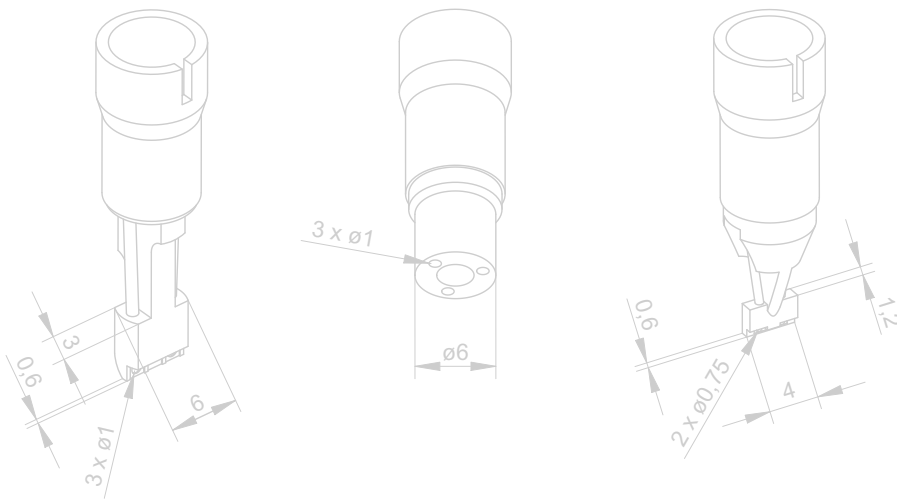
## Optical carrier

The ERSASCOPE 2 optical carrier is a highly advanced, endoscope based system offering a rapid exchange of the 3 robust optical heads (lenses) as well as precise image focussing and superior light management. Value added features include:

- Fibre optic front & back lights with mechanical iris adjustable from 0 to 100 %
- Swing out & fixture mechanism of backlight arm
- Connection & fastening of the 3 optical heads
- Focus ring with measurement scale
- "One Click" interface for fibre optic light cable

## Flip Chip 90° lens

The revolutionary Flip Chip optical lens has the smallest foot print in the industry (0.6 x 4.0 mm) and has been specifically designed for use on densely packed PCBs. The ERSASCOPE 2 Flip Chip head's aperture height is so low that it is now possible with a magnification up to 700x to inspect even a typical



**Easy to change & robust optical heads**

offer the greatest inspection flexibility  
of any system on the market

# ERSASCOPE 2

The world's only optical inspection system for Flip Chips & CSPs

gap of ~ 30  $\mu\text{m}$ . The critical top side Flip Chip joint, never before seen by any BGA optical inspection equipment on the market, is now visible!

## BGA 90° lens

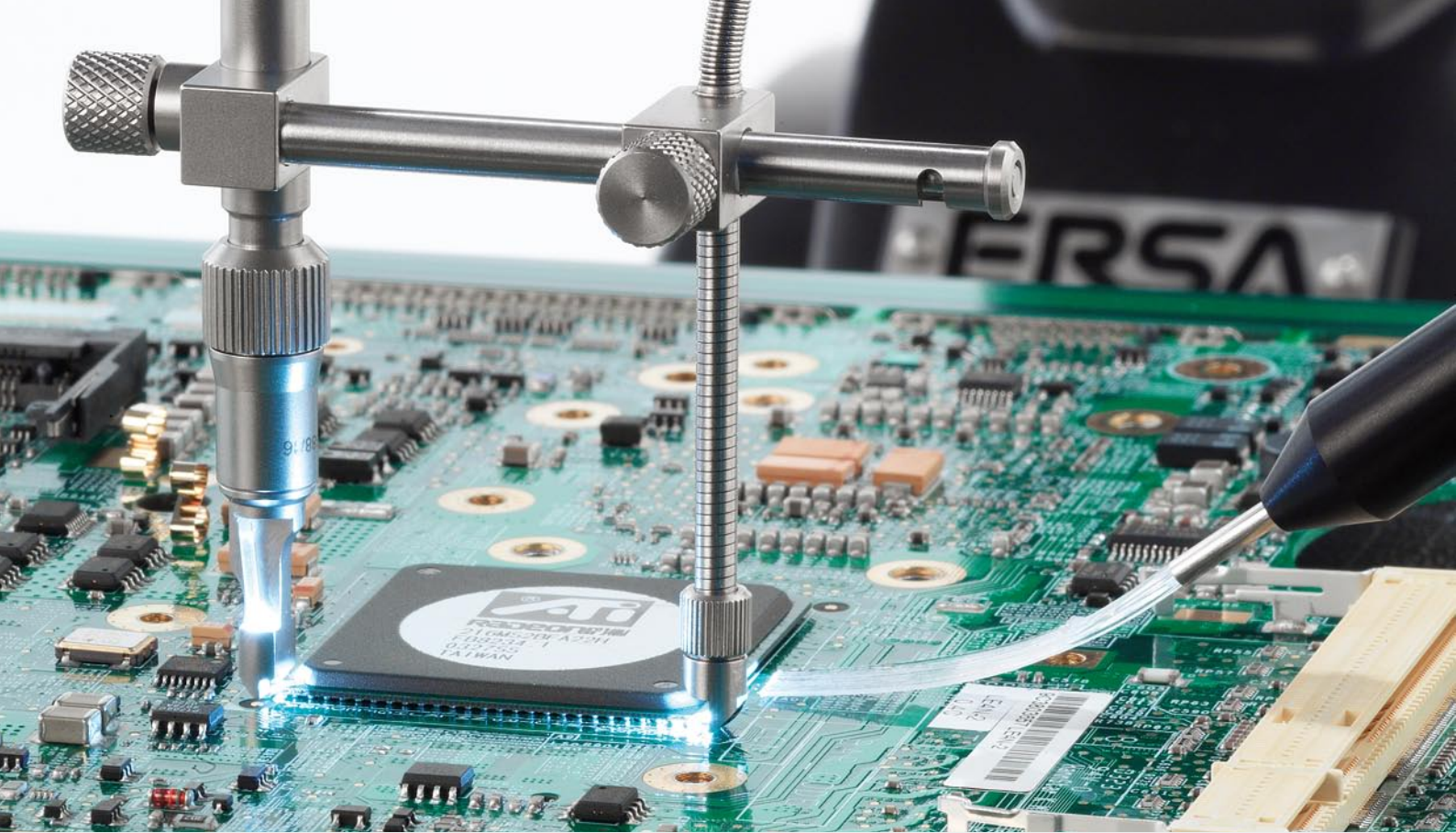
The ERSASCOPE 2 BGA lens provides a high resolution, 90° viewing angle under the component. This light sensitive optical lens offers a 425x magnification in a typical inspection gap of ~ 300  $\mu\text{m}$  and a footprint of 3 x 6 mm. The digital zoom and focus distance of 50 mm makes it possible to inspect the interior joints underneath the BGA component!

## “Look down”, 0° lens

The wide angle, 0° optical lens offers viewing similar to a microscope. The integrated fibre optic lighting perfectly illuminates and magnifies up to 250x for high-contrast surface and via hole inspection.

## Value Added Features:

- ▼ USB 2.0, Megapixel High Resolution Camera
- ▼ Flip Chip Optical lens (700x mag., gap ~ 30  $\mu\text{m}$ )
- ▼ BGA Optical lens (425x mag., gap  $\leq$  300  $\mu\text{m}$ )
- ▼ Wide Angle 0° “Look down” Optical lens (250x)
- ▼ Metal Halide Light Source; Long Life Bulb
- ▼ Superior Light Management: Fibre Optic Light Brush & Fan; Mechanical Iris Adapter
- ▼ ESD Safe Stand and Table Allows for a Total of 7 Axes of Movement of Optics and PCB
- ▼ ImageDoc EXP Software for both Beginner & Advanced Operators
- ▼ Largest Database of Problems & Solutions
- ▼ Advanced Recording, Measurement & Reporting Functions
- ▼ “Plug & Play” Set Up

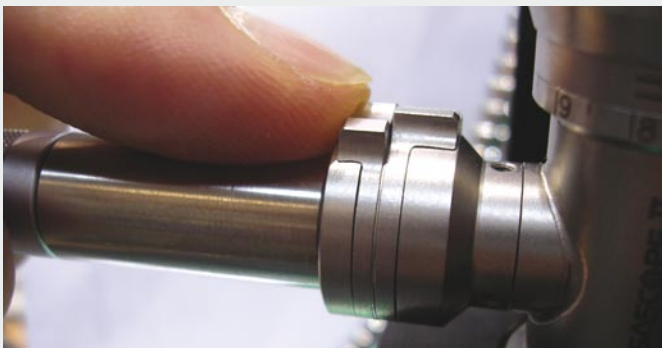


Optimal component lighting is essential  
for a quality inspection process



### Superior Light Management

The ERSASCOPE 2 inspection system comes standard with the MHLS Metal Halide Light Source. The metal halide light bulb offers a much cleaner, crisper and brighter “white” light compared to other systems. A mechanical iris on the MHLS station regulates the light quantity without changing the temperature or colour of the light during dimming. Furthermore, all fibre optic light cables have a mechanical iris. Two mechanical irises on the optic carrier allow for individual & separate continuously variable dimming adjustment from 0 to 100 % of the front & back lights. Also standard is a newly designed fibre optic light brush. This new light brush is made up of individual fibres (0.050 mm diameter) which can be inserted under most area array packages and mechanically dimmed for optimal lighting during inspection.



Mechanical irises control both the  
front & back lights for perfect lighting

7 axes of movement of the ERSASCOPE optic positioning guarantees maximum flexibility & productivity



# Light, Camera and Action!

Best in Class Inspection Productivity with Highest Quality Images

Finally, the new metal halide light bulbs are lower in cost, yet they have an average expected lifetime of over 2000 hours. This represents a 400 % lifetime improvement over the previous light source!

## High Resolution, Light Sensitive USB 2.0 Camera

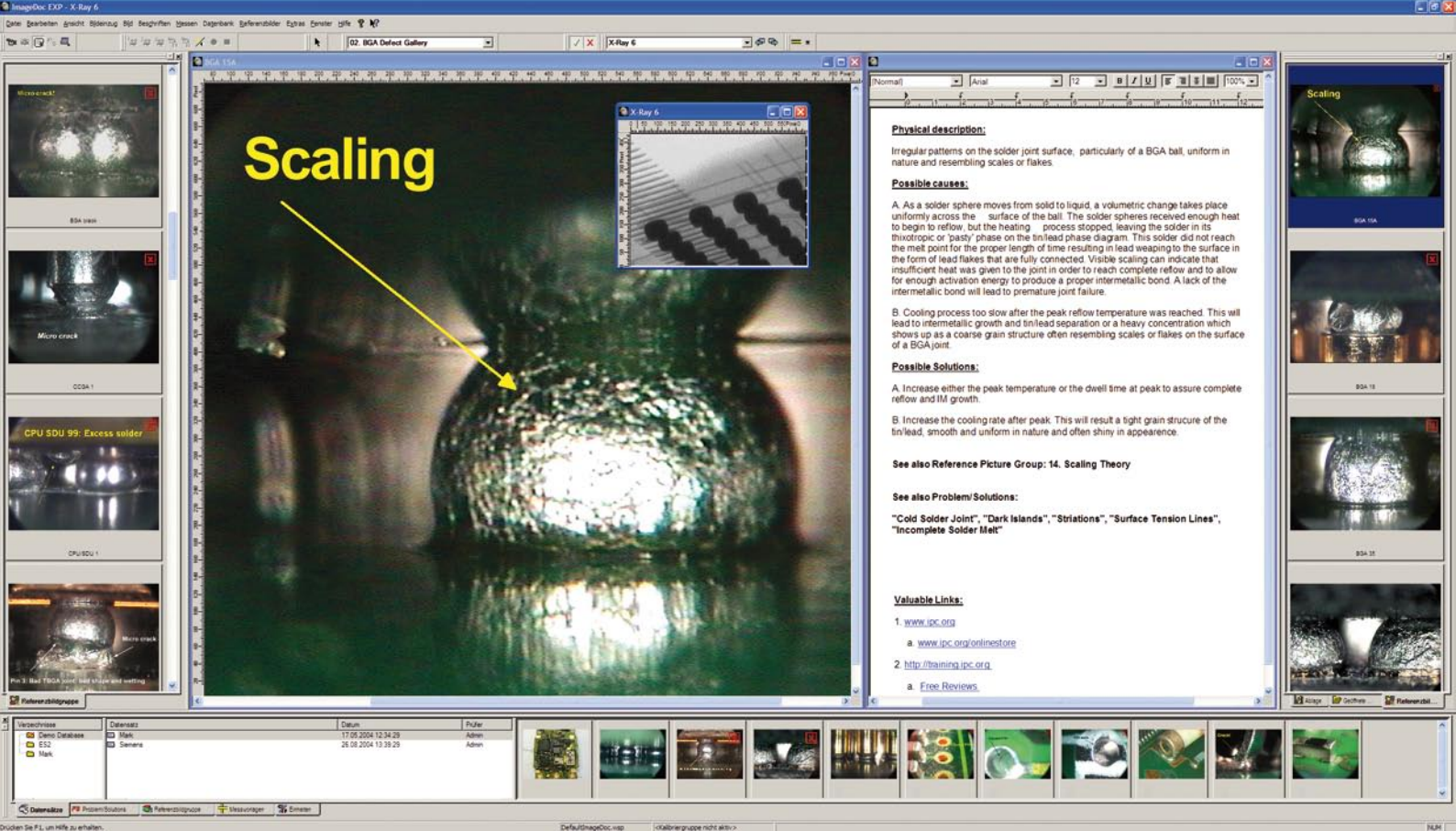
In addition to optimal light management, image quality depends not only on precision optics, but also on high-quality camera technology. The high-resolution and highly light sensitive ERSA USB 2.0 camera has 1.3 megapixels and delivers images of highest detail & perfect contrast. Even the smallest object details can be captured, digitally enhanced and used for quality assurance & documentation purposes.

Mechanical iris controls the removable fibre light fan for additional lighting

## Inspection Stand & Table

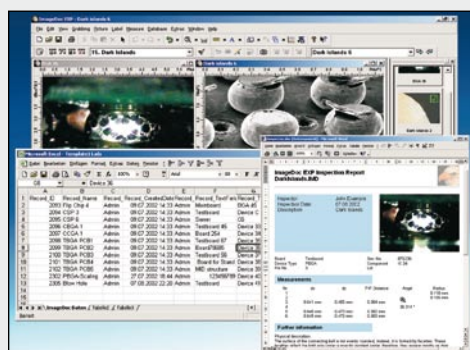
The ERSASCOPE stand and inspection table offer the most accurate BGA inspection in the fastest cycle time when compared to all competitive systems on the market. The greatest flexibility with a total of 7 axes of movement of the ERSASCOPE optic positioning is guaranteed: optics pan positions every 90°, unlimited table rotation, unlimited camera rotation, free tilting of optic between +/- 90° with zero degree lock position, X-Y-Z adjustment in micrometer range.



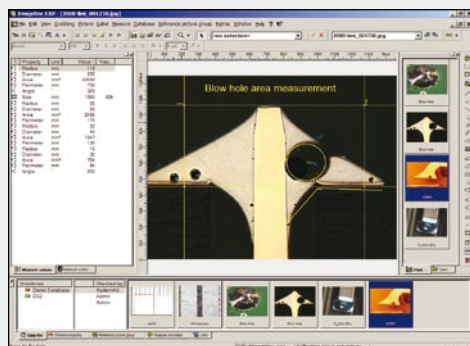


## Reference Picture Databank

live image with “good/bad” reference images assists operator



Database & reporting modules store process & FA info



Extensive measurement control and labelling functions

The ImageDoc software platform was designed to accompany, assist and document the inspection process. Based on the four fundamental principles of Inspect, Classify, Analyse and Document, this software concept was designed for QA inspectors!

Lead free implementation will require a complete re-training of how operators classify solder joint quality. The days of “If the solder joint looks good, it most likely is good!” are over! The ERSASCOPE software guided inspection approach will greatly assist in getting operators properly trained for lead free.

ERSA ImageDoc software guides the operator through the critical and time consuming process of determining whether a defect exists, and then directs the operator where to look in the process in order to correct the problem!

Inspection subjectivity is reduced, problems are solved quicker and valuable process information is documented for future use!

**Problem / Solution Databank**  
extensive BGA defect gallery &  
corrective action suggestions

Problem
01 INTRODUCTION
02 LITERATURE / REFERENCES
03 GLOSSARY
04 Problem / Cause - QUICK REFERENCE GUIDE
05 INTERNATIONAL ERSASCOPE USER'S LIST
A 0201 Chip Components: design, assembly, and rework issues
BGA Joint Integrity
BGA Voids
Blow hole / Outgassing / Pin Hole
Cleaning / PCB cleaning
Cold or disturbed solder joint
Component Defect Levels and PPM Monitoring
Component Identification
Crystalline fracture
Dark islands
Delamination/Blistering/Measling
ERSA PL Systems Manual & Spare Parts List
ESD - Electro Static Discharge
Excess Solder / Bulbous Joint / Icicles / Flags
Flux residue
Incomplete PTH fill
Incomplete solder melt
Insufficient Solder
Lead Free Library
Micro crack
Misregistration / Placement problems
MLF Assembly
No problem - Good solder joint
PCB Warpage
Pin-in-Hole/Intrusive Reflow Assembly (PIHR)
PLCC Dimensional Criteria
Poor fusion zone



# ERSA ImageDoc Software

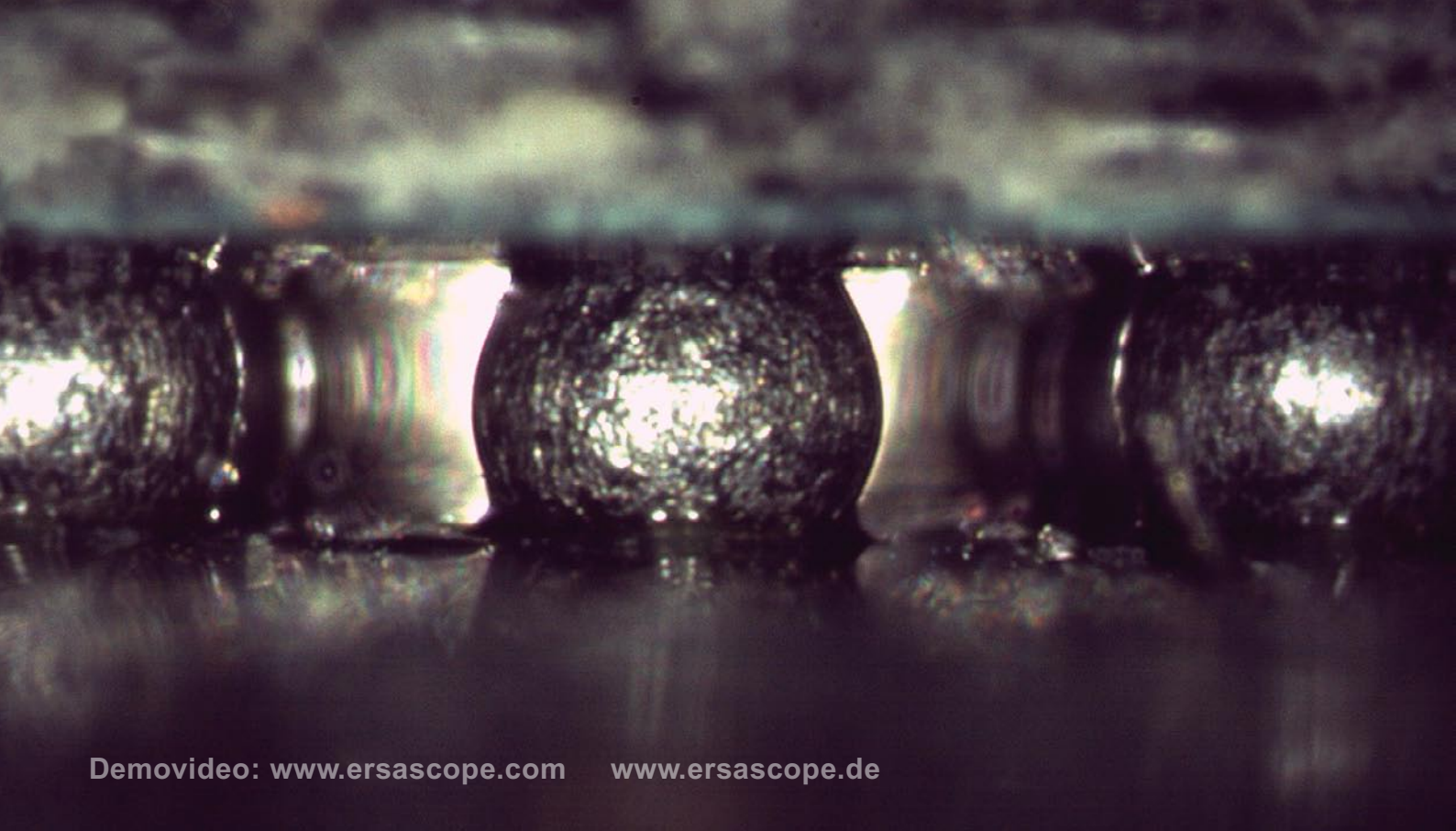
Inspection Software Designed for Inspectors, Documented by Experts!

## ImageDoc Basic 1.3 – General Inspection Software:

- ▼ Live image window & still picture window for documentation & control purposes
- ▼ Image database of known examples of “good” & “bad” solder joints for evaluation purposes
- ▼ Reference picture groups
- ▼ Limited ERSAs/Fraunhofer/industry database with soldering process problems/solutions
- ▼ Measurement & automatic measure control function / calibration groups
- ▼ Image processing & labelling
- ▼ Basic reporting / e-mail out of application

## ImageDocEXP 2.0 – Multimedia, Professional Inspection Software:

- ▼ Live image / still picture / AVI recording / sequence module / presentation mode
- ▼ Guided failure analysis, via extensive knowledge database (over 450 MB)
- ▼ Reference picture groups
- ▼ Extensive ERSAs/Fraunhofer/industry database with soldering process problems/solutions
- ▼ Measurement / automatic measure control function / calibration groups
- ▼ Image processing / labelling / filter macros
- ▼ Network operability / multi-user licensing
- ▼ User group defined authorities
- ▼ Customized report generation in \*.doc, statistic in \*.xls/database import/ -export / e-mail
- ▼ On-line updates and user forum



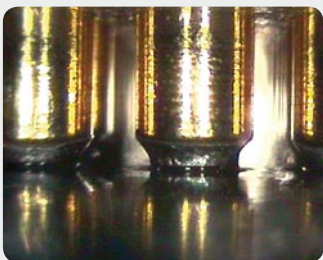
Demovideo: [www.ersascope.com](http://www.ersascope.com) [www.ersascope.de](http://www.ersascope.de)

# Inspection Applications

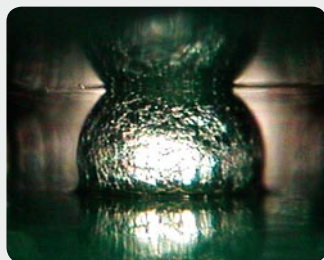
Hidden solder joints & other inspection images

Today's hidden solder joint inspection is one of the most important areas for consideration in a quality assurance program. The images shown on these pages underscore the flexibility of the ERSASCOPE

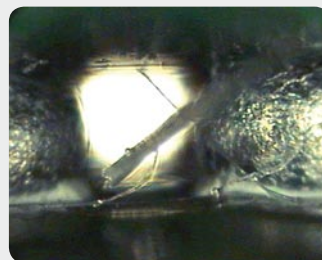
inspection systems. Whether SMDs or THTs, BGAs or Flip Chips, the ERSASCOPE offers the perfect complement to existing microscopes and x-ray systems for a total quality assurance program.



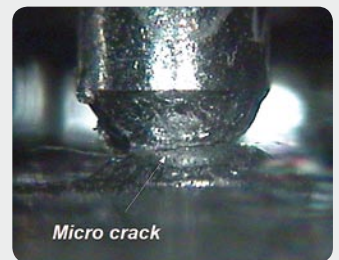
Gold Column Grid Array



PBGA- scaling: insufficient heat



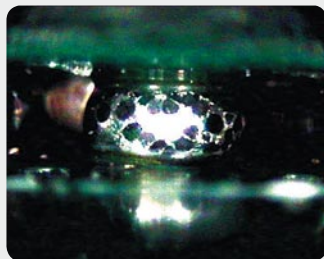
BGA-Top side delamination



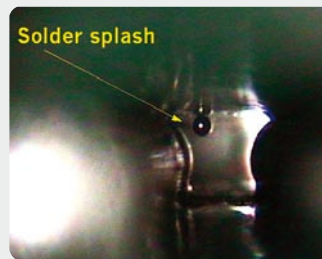
BGA-Top side delamination



BGA: "blow hole" out gassing



BGA "Dark islands" -overheat

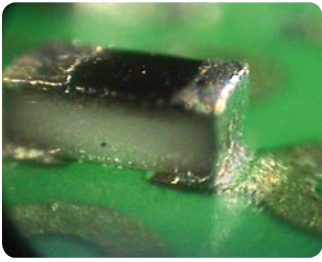


BGA- via hole solder splash

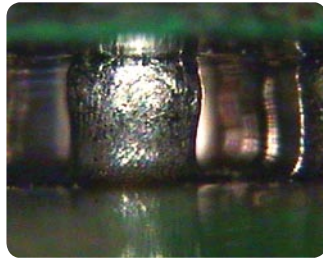


BGA/Column (MILLMAX)

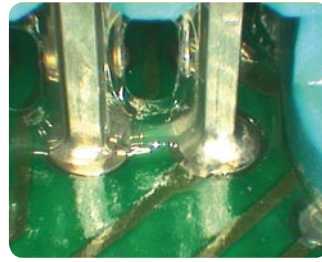




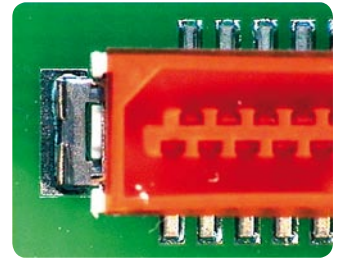
0201: insufficient solder



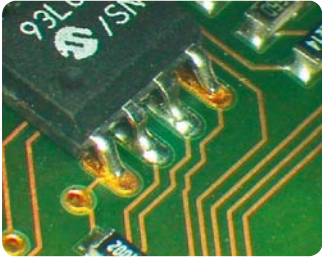
TBGA-Top side delamination



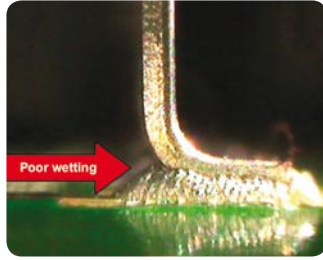
Conformal coating inspection



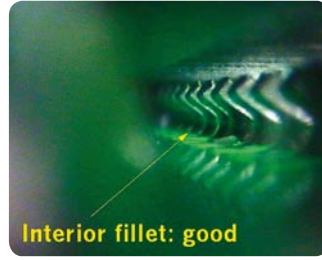
SMD surface inspection



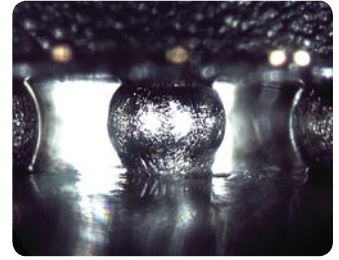
Lead free assembly: non-wetting



PLCC interior fillet: poor wetting



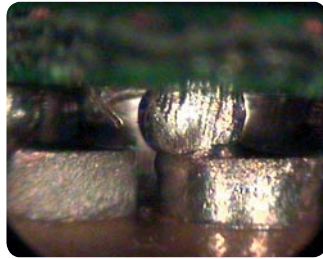
PLCC interior fillet inspection



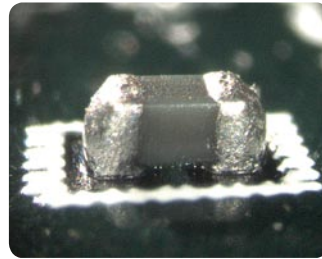
PBGA- cold joint: insufficient heat



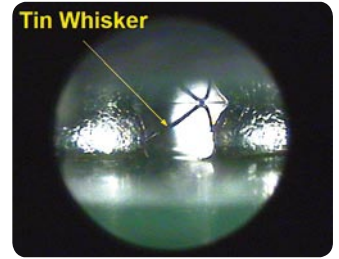
CCGA: insufficient solder



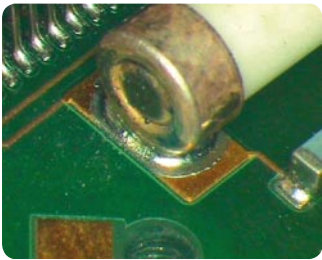
BGA- piggy back: bad alignment



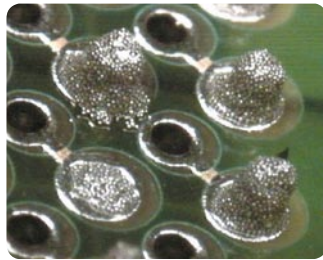
0402: bulbous solder joint



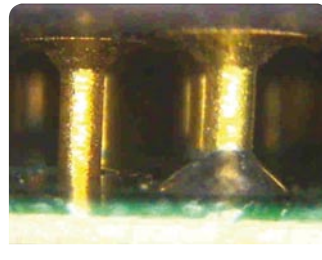
PBGA-Tin whisker



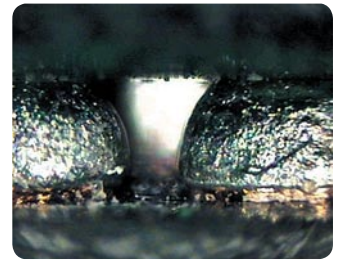
Lead free assembly: non-wetting



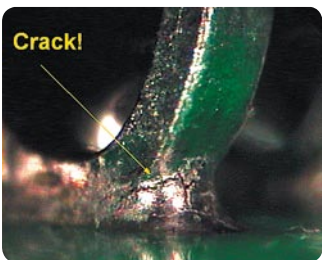
BGA paste print: insufficient solder



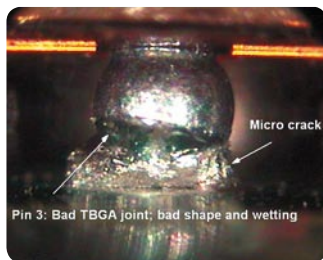
PGA - no flow thru: insufficient heat



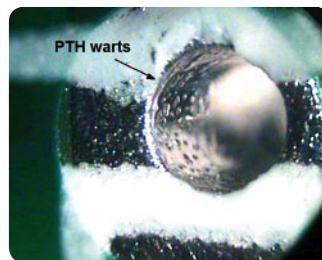
PBGA- scaling: insufficient heat



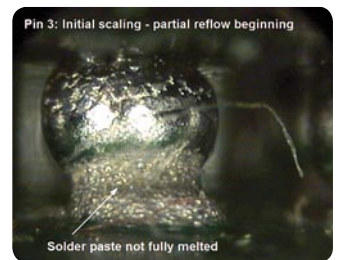
Lead free PLCC: micro crack



TBGA: disrupted joint & micro crack



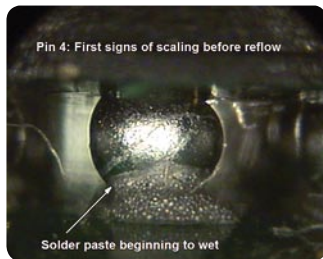
Plated thru-hole: disrupted wall



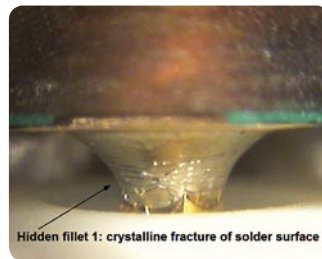
PBGA- scaling: insufficient heat



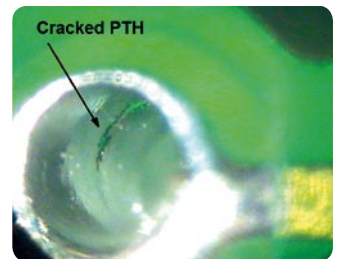
SMD LED inspection



PBGA- scaling: insufficient heat










THT joint: crystalline fracture









Plated thru-hole: cracked wall

# ERSASCOPE 1

Inspection system configurations & optional items











Part Number	Description	Technical Data	Part
<b>0VSSC070</b>	<b>ERSASCOPE 1 System consisting of:</b>		
<b>0VSSE100</b>	<b>ERSASCOPE 1</b> endoscope with integrated lens and fibre optic system	focus ring & adjustable back light footprint 1.5 x 4.5 mm magnification up to 400x* typical inspection gap ~ 300 µm	
<b>0VSCA1225</b>	<b>Digital USB Camera</b> color inspection camera	digital [USB 2.0] manual or auto white balance 1/3" CMOS chip	
<b>0VSTV036</b>	<b>TV Adapter</b> connects optical carrier to CCD camera	60 mm focal length C-Mount type	
<b>0VSLS070</b>	<b>Halogen light source,</b> adjustable	(W x H x D): 130 x 55 x 235 mm 220 V - 240 V~, 50 Hz, 45 W or 115 V - 127 V~, 60 Hz, 45 W weight: ~ 1.8 kg	
<b>0VSST210</b>	<b>ERSASCOPE stand</b> with z-axis micrometer adjustment; integrated fibre optics & camera cables	(W x H x D): ~ 500 x 400 x 520 mm total weight ~ 5 kg surface: antistatic includes 1000 mm coated fibre optic cable with gooseneck	
<b>0VSXY090</b>	<b>ERSASCOPE 1 table</b> with 4 PCB support columns	X-Y movement with fine adjust wheels; antistatic mat with grid dimension: ø 320 mm; weight: ~ 3 kg	
<b>0VSID135</b>	<b>ImageDoc Basic 1.3</b>	General inspection software	

● = Optional for ERSASCOPE 1;      ● = Optional for ERSASCOPE 2

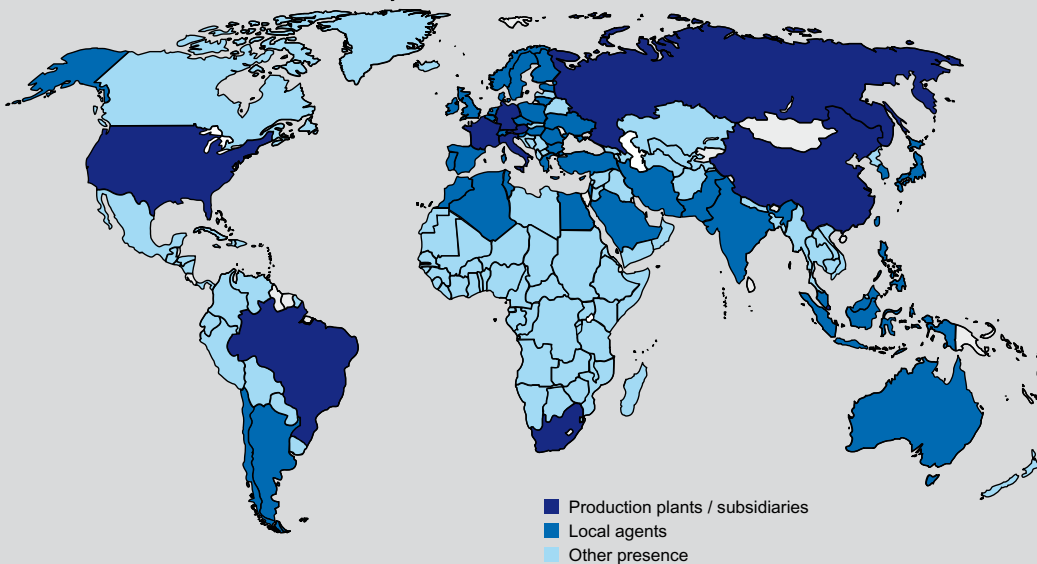
Part Number	Description	Technical Data	Part
<b>0VSUP6XL</b> ● ●	<b>Upgrade kit XL</b> upgrades the ERSASCOPE stand and table for inspection of very large PCBs	antistatic XL table (600 x 700 mm), telescopic arm, optic holder and light cable extender	
<b>0VSMS100</b> ●	<b>MAGNISCOPE</b> 0° static endoscope with integrated lens & fibre optic system	focus ring magnification up to 400x* <b>*20" monitor, 1600 x 1200 pixel resolution</b>	
<b>0VSMZ100</b> ● ●	<b>MACROZOOM lens</b> for high magnification top view surface inspection	70 x zoom lens aperture adjustment: F 5.6 – 32 C focus adjustment: 180 – 450 mm	
<b>0VSFR100</b> ● ●	<b>MACROZOOM ring light</b>	optical fibre ring light	
<b>0VSMZ300H</b> ● <b>0VSMZ200H</b> ●	<b>MACROZOOM holder</b>	connects lens to stand	
<b>0VSSC600VK</b> ●	<b>ERSASCOPE 2 Upgrade kit,</b> upgrade to ERSASCOPE 2	for complete ordering info, contact your ERSA representative directly	

# ERSASCOPE 2

## Inspection system configurations & optional items

Part Number	Description	Technical Data	Part
<b>0VSSC600</b>	<b>ERSASCOPE 2 System, consisting of:</b>		
0VSSE200-T	<b>Optical carrier</b> endoscope with integrated lens and fibre optic system	calibration scale, focus ring and two each mechanical iris for front & back light	
0VSSE200-90K	<b>90° Optical lens</b> with integrated lens and fibre optic system	footprint 3 x 6 mm magnification up to 425x* typical inspection gap ~ 300 µm	
0VSSE200-FCK	<b>Flip Chip Optical lens</b> with integrated lens and fibre optic system	footprint 1.5 x 4.5 mm (0.6 x 4.0 mm) magnification up to 700x* typical inspection gap ~ 30 µm	
0VSSE200-0K	<b>0° Optical lens</b> for surface inspection	footprint ø 6 mm; magnification up to 250x* <b>*20" monitor, 1600 x 1200 pixel resolution, no digital zoom</b>	
0VSCA2240	<b>High resolution CCD</b> color inspection camera	SXGA digital (USB 2.0) manual or auto white balance 1.3 million pixels; 1/3" CCD chip	
0VSTV200	<b>TV Adapter</b> connects optical carrier to CCD camera	60 mm focus area C-Mount type	
0VSL300	<b>Light source MHLS</b> Metal Halide Light Source with long-life metal halide bulb	W x H x D: 175 x 82.5 x 202 mm 220 V - 240 V~, 50 Hz, 120 W or 115 V - 127 V~, 60 Hz, 120 W weight: ~ 2.5 kg	
0VSLR200	● <b>Light regulator for gooseneck</b>	mechanical iris adjusts 0 to 100 %	
0VSLVL200	● <b>Light fibre extension</b>	L 200 mm	
0VSLF200	● <b>Fibre light fan</b>	L 35 mm, W 5 mm	
0VSLF300	● <b>Fibre optic light brush</b>	L 80 mm, W ~10 to ~35 mm	
0VSRM100	● <b>Glass calibration scale</b>	10 µm lines at 100 µm pitch	
0VSLC100	● <b>Lens cleaning kit</b>	Cleaning cloth, papers & liquid	
0VSSH100	● <b>Dust cover</b>	antistatic textile	
3VP00640	● <b>Storage Case</b>	W x H x D: ~ 325 x 230 x 110 mm aluminum with padded insert	
0VSST210	<b>ERSASCOPE stand</b> with z-axis micrometer adjustment; integrated fibre optics & camera cables	W x H x D: ~ 500 x 400 x 520 mm total weight ~ 5 kg surface: antistatic includes 1000 mm coated fibre optic cable with gooseneck	
0VSXY100	<b>ERSASCOPE 2 table</b> with 4 each PCB supports	X-Y-θ movement with fine adjust wheels and anti-static mat with grid dimension: ø 320 mm; weight: ~ 5 kg	
<b>ERSASCOPE 2 can ONLY be run with ImageDoc software, please choose one of the packages below:</b>			
0VSI201	● <b>ImageDoc EXP 2.0</b>	Multimedia, professional inspection software	
0VSI135	<b>ImageDoc Basic 1.3</b>	General inspection software	

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