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ENGINEERING
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Visual Inspection Post COVID
New Technology and Opportunities

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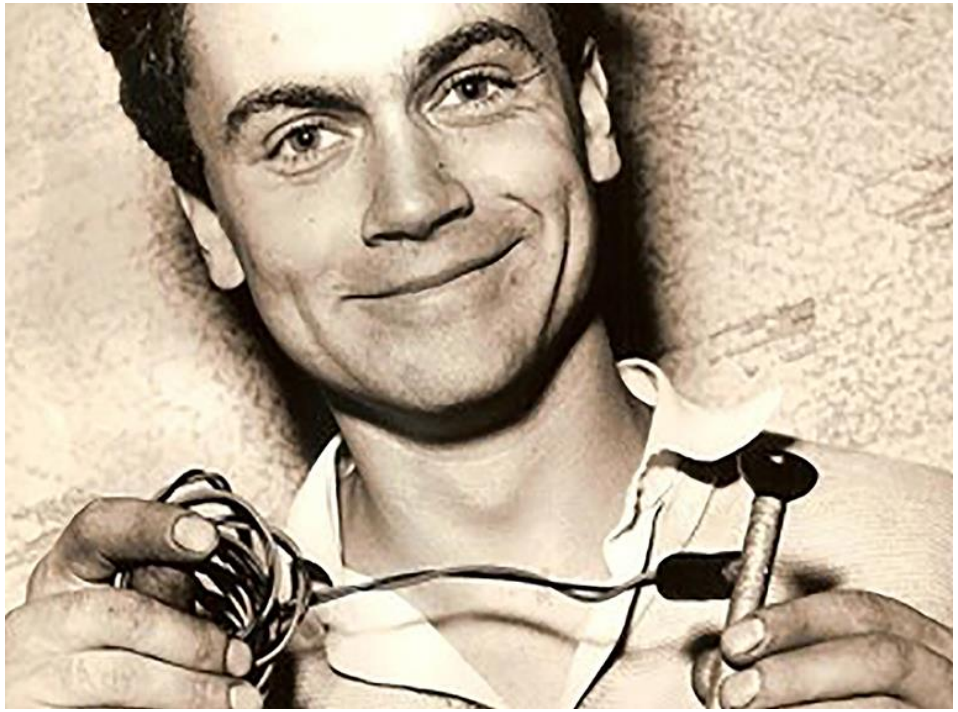
Vision Engineering Introduction

Vision Engineering Ltd is a leading-edge manufacturer of patented optical and digital stereo microscopes and non-contact measuring systems.

Vision Engineering was founded in 1958 by Rob Freeman MBE (1933-2017).

Rob studied Mechanical Engineering at Imperial College, and started working at Kenwood's mixers, as a machinist.

He then joined Jaguar Racing, as a racing mechanic, supporting cars in races all over Europe and North Africa.



Vision Engineering Introduction

- Whilst at Jaguar, Rob developed a borescope for inspecting internal race engine parts without the need for disassembly.

- Subsequently he formed Vision Engineering Ltd as a means of developing his interest in optics applied to manufacturing technology.

- The company started off as a specialist optical sub-contractor to large British companies including Rolls Royce, Vickers, Ferranti and GEC.

Vision Engineering Introduction

- The company has come a long way since its humble beginnings in a Nissen hut in Surrey and in June 2018 opened an 84,000 ft2 state of the art manufacturing R&D facility and global headquarters in Send, near Woking, Surrey, UK.
- We have 10 offices around the world.
- Over 90% of what we make goes to export.
- Our innovation and contribution to our customers' success has been recognized by multiple awards, including the 2020 Queen's award (our third).

THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION 2020

World’s first ‘eyepiece-less’ stereo microscope

- In 1994 Vision Engineering introduced the World’s first ‘eyepiece-less’ stereo microscope, the original Mantis, designed to fill the gap between a bench magnifier and a microscope.

- It was an ergonomic revolution that went on to win numerous design and innovation awards and was featured on the BBC TV programme Tomorrow’s World.

- Mantis quickly became the new benchmark for high performance ergonomic stereo magnification.

The most important factor about choosing a microscope system is…

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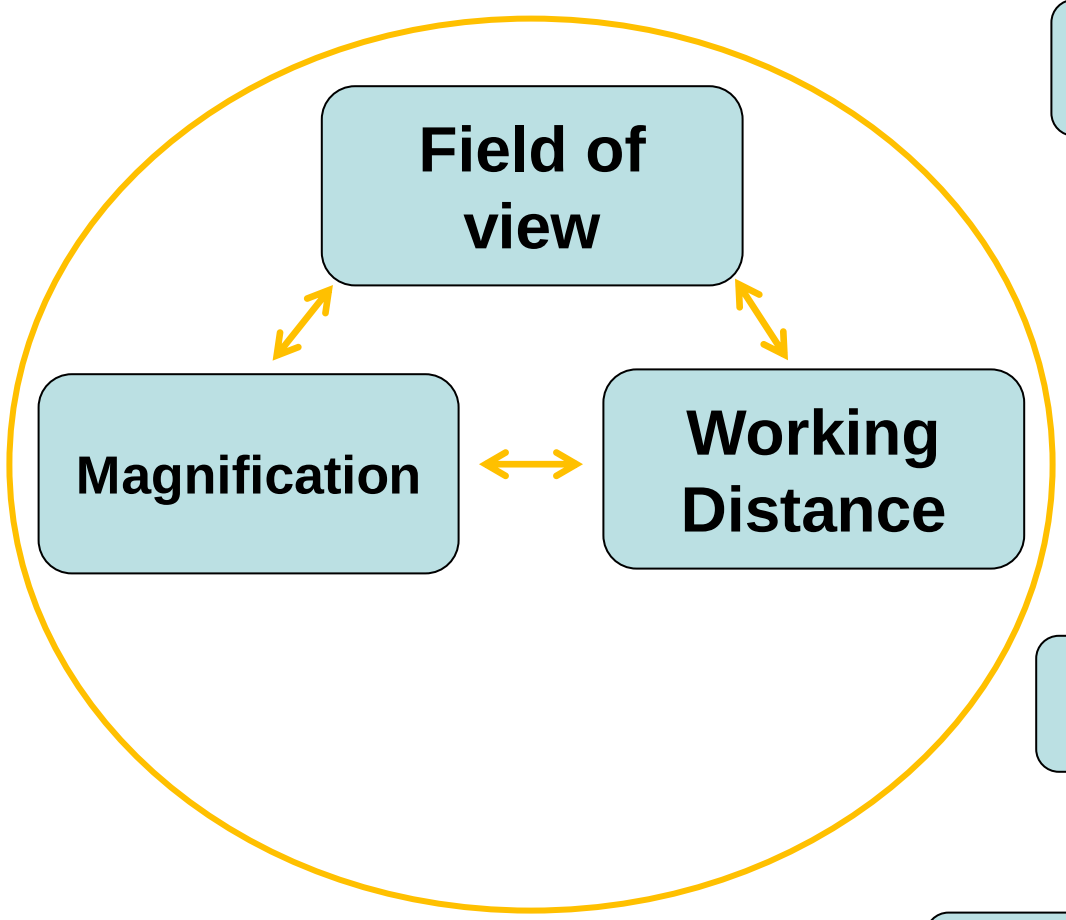
YOU

& your users

What do YOU want to do with the microscope?

- Look at your subject
- Make your subject
- Work with your subject
- Measure your subject
- Capture images of your subject
- Write a report about your subject
- Share a system among multiple users
- Share images with colleagues, suppliers, customers, regulators
- Use one system for different tasks
- Have multiple systems to do the same task

Factors affecting selection



Subject size

Image capture

Multiple users

Customer requirement

Software

Hygiene

Multiple tasks

Lighting

Detail size

Maximum mag.

Zoom

Length of use

Space for tools

Regulation

Depth Perception

Types of system

Mono

High magnifications are possible but only from one viewpoint

Digital mono

Popular easy to use 2D view systems. Typically flexible configurations. Can be very advanced when combined with software

Optical stereo

Popular easy to use 3D systems. Depth perception is good for working with subjects. Can often be combined with software

NEW!

Digital stereo

Latest 3D digital stereo system. Depth perception as with optical stereo. Added capture, review and share 3D view, software and connectivity

Types of system – Pros and Cons

2D digital

Pros
- Easy to use
- Flexible applications
- Large field of view
- Capture, review and share
- Software add-ons

Cons
- No depth perception
- Can have a larger footprint
- Difficult working off axis

Price: £1,000 - £100,00

3D optical

Pros
- Depth perception
- Hand to eye coordination
- Configurable
- Zoom and fixed options
- 3D understanding of 3D subjects

Cons
- 2D image capture
- User position
- User contamination

Price: £1,200 - £30,000

3D digital

Pros
- Depth perception
- Hand to eye coordination
- Capture, review and share
- Software add-ons
- 3D understanding of 3D subjects

Cons
- Large footprint
- High starting price

Price: £ 15,000 - £45,000

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2D Digital
Example Applications

Example 2D digital microscope application

Inspection of machined parts for defects, burrs and residual material

- Team checking turned parts for burrs and surface abnormalities.
  - Checking at the machine
  - Ease and speed of use
  - Multiple viewers at same time
  - Preset configurations

- Configuration
  - Digital 2D microscope
  - Flexible stand for large range of components
  - Remote keypad

Example 2D digital microscope application

Inspection of rubber grommets for defects, flash, pitting and dimension

- Team checking rubber grommets for defects and specification.
  - Large field of view
  - Ease and speed of use
  - Multiple subjects at same time
  - Quick change of settings
  - Overlays to aid checking
  - Simple measurement

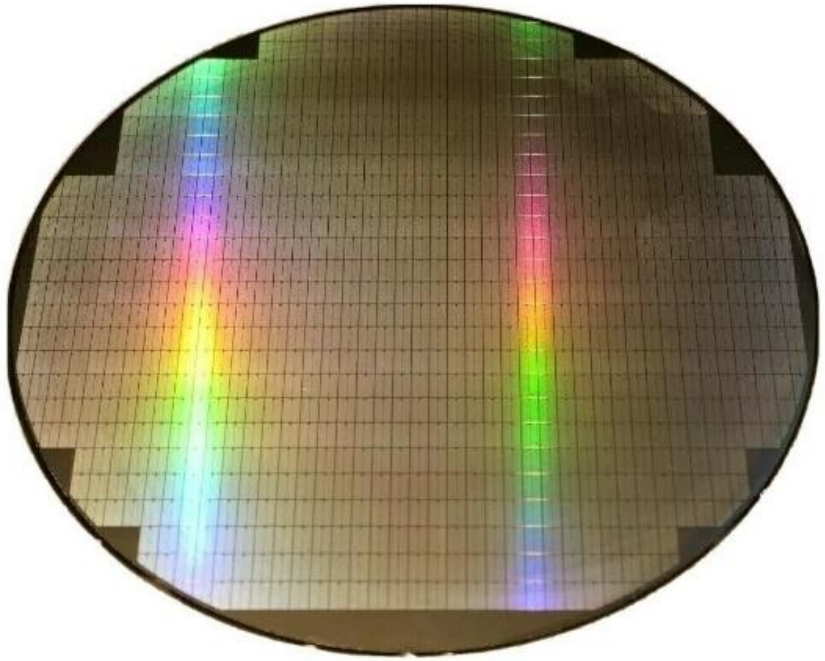
- Configuration
  - Digital 2D microscope
  - Stand with clear working area

Example 2D digital microscope application

Inspection of products used in processing of silicone wafer

- Team checking small holes, for burrs and surface abnormalities.
  - Real-time inspection
  - Configured on the line
  - Multiple viewers at same time

- Configuration
  - Digital microscope
  - Large display screen



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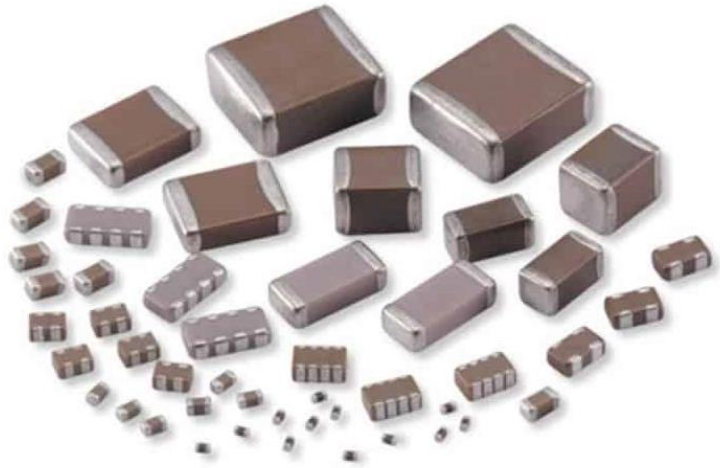
3D Optical
Example Applications

Example 3D optical microscope application

Samsung Electronics: Manufacturing of automotive multilayer ceramic capacitors

- Team involved in the manufacture of MLCC components
  - Comfortable working for long periods
  - Clear view of subject

- Configuration
  - Ergonomic stereo microscope
  - Zoom body
  - Ring-light illuminator



Example 3D optical microscope application

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Deburring machined parts

- Team checking machined parts for burrs, debris, residual material and general finish.
  - Comfortable working position
  - Hand to eye coordination
  - Clear view of subject
  - Long duration concentration
  - Space required for working with tools

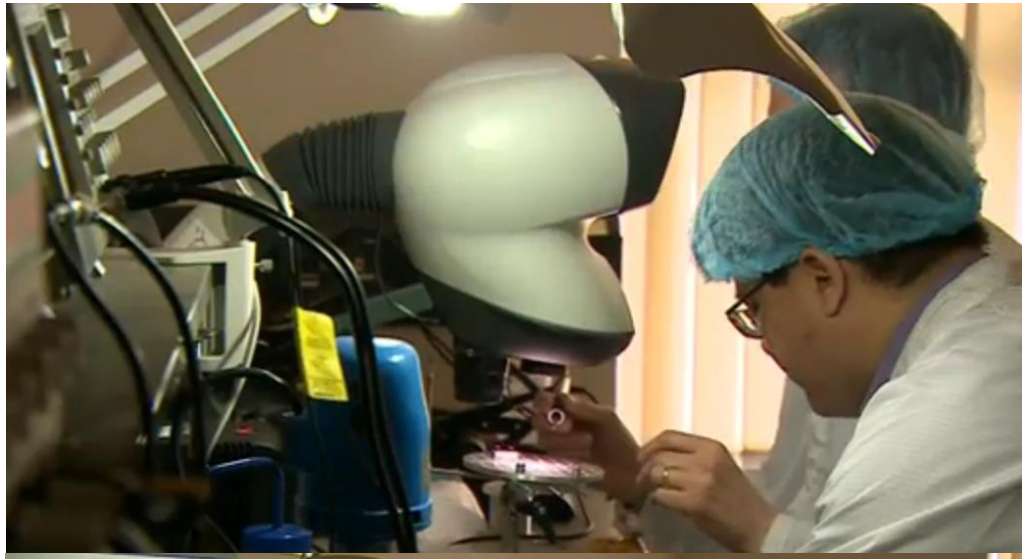
- Configuration
  - Ergonomic stereo microscope
  - Long working distance
  - Fixed objective lenses

Example 3D optical microscope application

Satellite research

- Team working on prototypes and proof of concept models for satellites. Hand production of PCBs.
  - Hand to eye coordination
  - Long duration concentration
  - Specific magnification operation
  - Shared use
  - Space required for working with tools
  - Secondary requirement for image capture

- Configuration
  - Ergonomic stereo microscope
  - Long working distance
  - Fixed objective lenses



Example 3D optical microscope application

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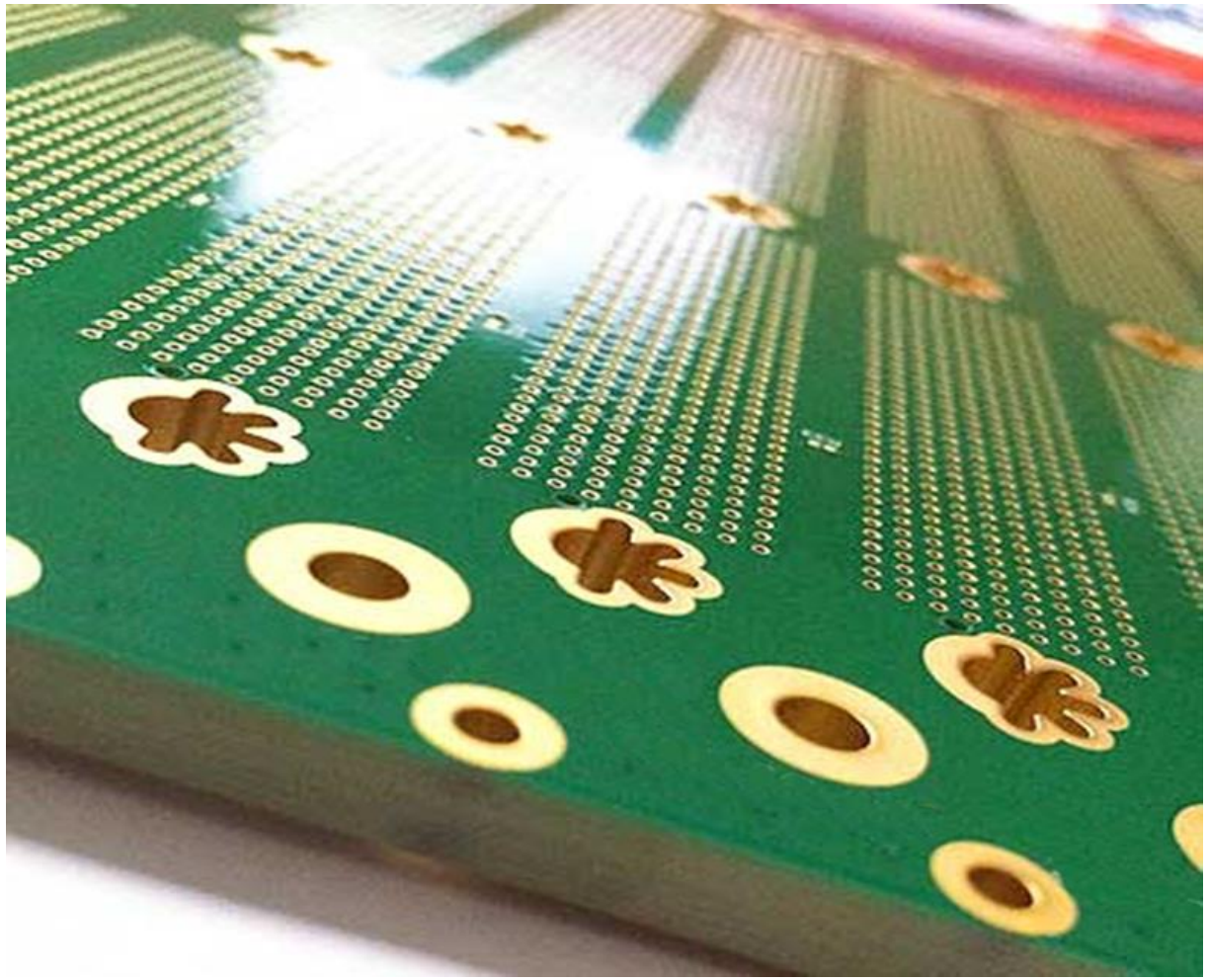
High value PCB rework

- Team checking and reworking high value multi-layered boards. Initial check by AOI system.
  - Zoom magnification
  - Hand to eye coordination
  - High concentration levels
  - Space required for working with tools

- Configuration
  - Ergonomic stereo microscope
  - Large area stand
  - Long working distance objective

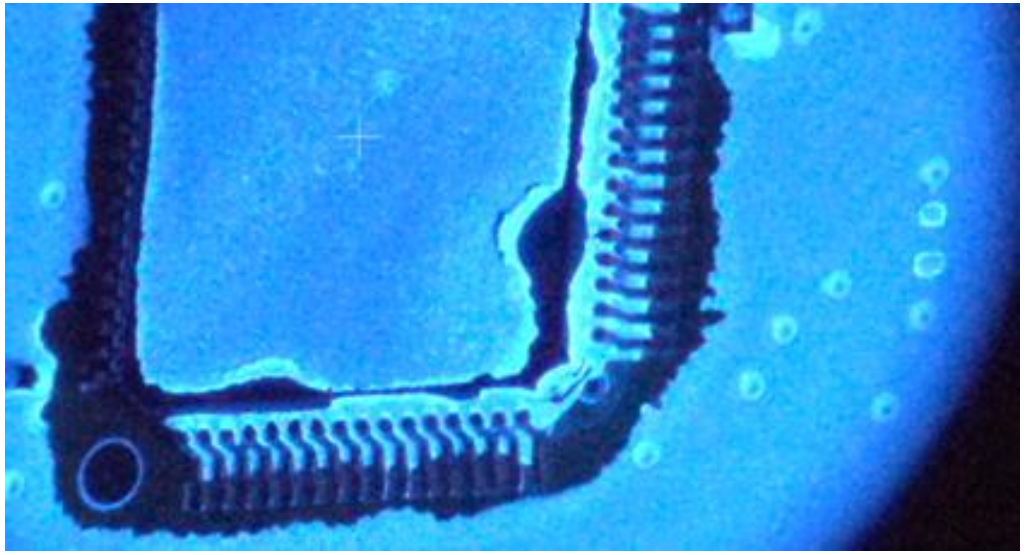


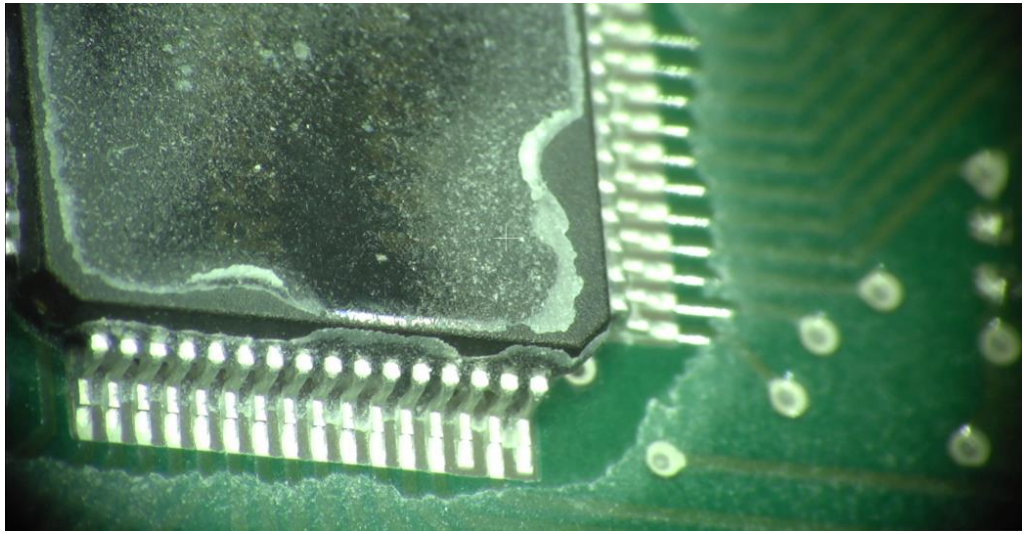
Example 3D optical microscope application

Electronics rework

- Team repairing faulty PCBs from an application requiring protective conformal coatings.
  - Optimal illumination
  - Hand to eye coordination
  - Space required for working with tools

- Configuration
  - White / UV ring-light
  - Ergonomic stereo microscope
  - Long working distance objective



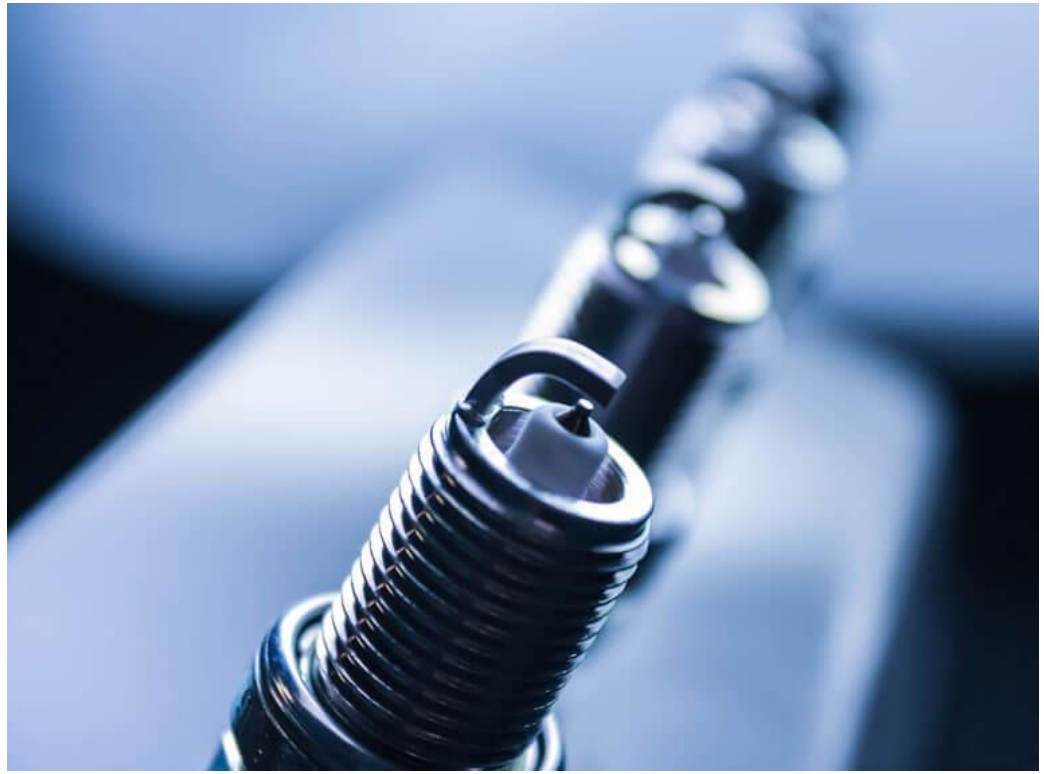


Example 3D optical microscope application

Automotive components

- Team manufacturing components for automotive industry.
  - 3D view of 3D features
  - Hand to eye coordination
  - Comfortable long time working

- Configuration
  - Ergonomic stereo microscope
  - Long working distance objective
  - Large area stand



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NEW TECHNOLOGY
3D Digital
Example Applications

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3D Digital Technology

3D HD VIEW, CAPTURE, SHARE, NOW

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3D Digital Technology

3D image plus real time communications

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Who is it for?

Distributed teams

Distributed functions

Supply chain

Example 3D digital microscope application

Checking item authenticity

- International team checking authenticity of high value items – precision engineering market
  - View, save and ***share*** 3D image - live and recorded
  - Ease of use
  - Large field of view
  - High quality image

- Configuration
  - Digital 3D microscope
  - Ergonomic stand
  - PC connection configuration

Example 3D digital microscope application

Surgiwear: Inspection of titanium alloy self tapping bone screws

Team checking bone screws for quench cracks, wrinkles, surface defects, cutting flutes, rough edges and other defects

- High quality image
- Illumination options
- Speed of inspection
- Large field of view

- Configuration
  - Digital 3D microscope
  - Ergonomic stand
  - Sub-stage illuminator

Example 3D digital microscope application

Inspection of laser cut medical stents

- Team checking medical stents for surface defects, bends, pits, dents, contamination, cutting failures, polishing anomalies.
  - Comfortable long usage
  - Large field of view
  - High quality image
  - Illumination suitable for subject

- Configuration
  - Digital 3D microscope
  - Ergonomic stand
  - Diffuse illumination

RECAP!

NEW!

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Thank you for listening!

Questions

To discuss your application visit us at stand F70