

ffTATM

TRACE EVIDENCE ANALYSIS
W O R K S T A T I O N

RAMAN
SPECTROSCOPY

UV-VIS-IR
MICROSPECTROMETRY

GRIM GLASS RI
MEASUREMENT

FLUORESCENT
IMAGING

POLARIZED LIGHT
MICROSCOPY

DIGITAL IMAGE
PROCESSING

For the examination of:
Glass, Paint Chips, Fibres, Drugs, Inks,
Gun Shot Residues, Accelerants & Explosives.

foster+freeman

Forensic Science Equipment

ffTATM

A WORKSTATION FOR TRACE EVIDENCE ANALYSIS

The ffTATM is a powerful and flexible multi-functional system that provides the crime laboratory with a range of analytical facilities on a single microscope operated through a single PC.

By switching from module to module the operator is able to perform a wide range of analytical tasks to extract the maximum amount of forensic evidence in the shortest possible time.



Available modules

RAMAN SPECTROSCOPY

For the study of materials including paint chips, fibres, inks, & drugs

UV-VIS-IR MICROSPPECTROMETRY

Non-destructive analysis of organic compounds including paint & fibres

GRIM GLASS RI MEASUREMENT

Analysis and grouping of glass fragments

FLUORESCENT IMAGING

Identification of biological samples, chemicals, & illegal substances

POLARIZED LIGHT MICROSCOPY

For the examination and identification of natural and synthetic fibres

DIGITAL IMAGE PROCESSING

Enhancement & comparison of images captured using a 5MP digital camera

ffTA™ Modular Design

Built around the Leica DM2700M laboratory microscope with high power LED illumination, the ffTA's unique modular design enables the user to add functions to meet specific laboratory requirements. Using an optical multiplexer the operator simply switches the image from one module to another.

- 1 Optical Multiplexer
- 2 5MP CCD Camera
- 3 GRIM3 Video Camera
- 4 Foram X3 Raman Spectrometer
- 5 Fluorescent Imaging Light Source
- 6 360° Rotating Stage
- 7 GRIM3 Hot Stage

- Incident Illumination Package 8
- DM2700 Microscope 9
- DM2700 Objectives 10
- GRIM3 Processor 11
- Microspectrometer Module 12



System Specification

The modular design of Foster+Freeman ffTA workstations offers the trace examiner increased efficiency and flexibility.

The core ffTA workstation includes a DM2700 microscope connected to a high specification Windows PC. This provides a basic microscopy and image processing system.

At the time of purchase, any number of ffTA modules may be selected alongside the core system to provide the user with further functionality. Post-installation, new modules may be seamlessly retro-fitted to the ffTA at any time.

To configure a ffTA system that meets your laboratory's requirements please contact your local Foster + Freeman sales representative or send an email to sales@fosterfreeman.com

RAMAN SPECTROSCOPY for the comparison and identification of materials

ffTA™ FORAM® X3

Triple Raman Spectrometer Module

The FORAM® X3 module can be equipped with a choice of one or three laser wavelengths: 785nm (invisible), 638nm and 532nm.

High levels of sensitivity can be achieved with the 532nm laser, while the 785nm infrared laser is better able to suppress fluorescence. A balance between power and sensitivity can be achieved through the use of the 638nm laser.



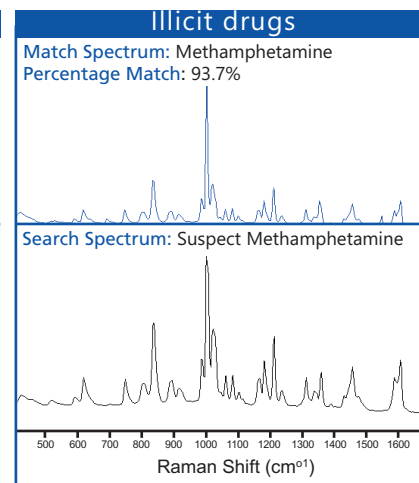
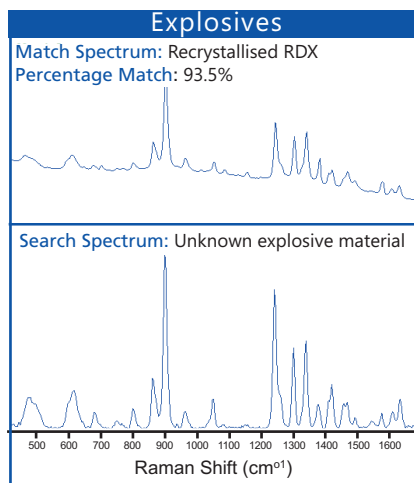
A Powerful Analytical Tool

Raman spectroscopy is widely used in forensic science for the study of a variety of organic and inorganic materials including paint chips, fibres, inks, and controlled substances, as well as residues from explosives, flammables and accelerants.

Through the analysis of Raman spectra, specific to molecular structure, this powerful module is able to provide valuable "fingerprints" for comparing, differentiating and identifying materials.

Raman Spectroscopy features include:

- Non-contact, non-destructive analysis
- Analysis of materials in solid or liquid form
- Rapid examination with minimal preparation



ffTA™ FORAM® Module includes

Select one or choose all three laser wavelengths

- Diode pumped SSL 532nm 10mW laser
- Spectrometer range 250 - 2600 cm⁻¹
- Stabilised 638nm 32mW laser
- Spectrometer range 300 - 3700 cm⁻¹
- Stabilised 785nm 80mW laser
- Spectrometer range 200 - 2400 cm⁻¹

Detector

- Low etalation CCD detector with Peltier cooling.
- Peak Quantum efficiency of greater than 40%.

Software

- Automated and manual Wavelength/Wavenumber and photometric response calibration routines.
- Comprehensive casework management system.

NIST Correction Standards

Relative intensity correction standard for Raman spectroscopy: 785nm & 532nm

Optional Reference Databases

Further enhance the capability of the Foram X3 through the addition of Raman databases for the identification of unknown materials and compounds.

- Materials of Forensic Interest
- Hazardous Chemicals
- Pharmaceuticals, Drugs & Antibiotics
- Minerals & Inorganic Materials

GRIM® GLASS RI MEASUREMENT for the analysis and grouping of glass samples

ffTA™ GRIM®3

Glass Refractive Index Measurement Module

The ffTA™ GRIM®3 module can be used to identify and group fragments of glass through the measurement of their refractive indices using the oil immersion/temperature variation technique.

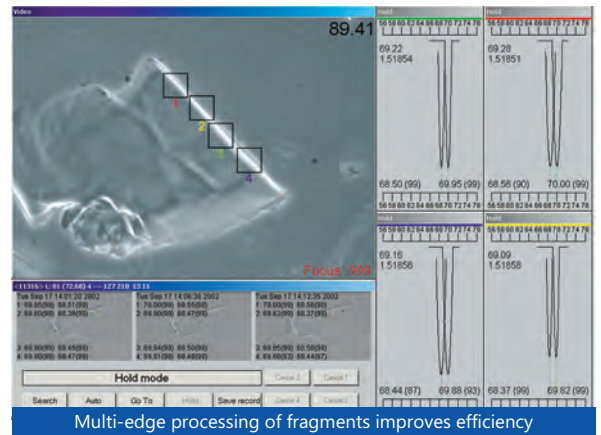
The system can monitor up to four glass fragment edges per operation, speeding the casework examination process, giving improved statistical accuracy and reducing calibration time.



Glass as Evidence

As different types of glass have different refractive indices, it is possible to use this information to group fragments of glass together and to establish whether or not they may have originally been part of the same pane of glass.

The Foster + Freeman ffTA™ GRIM®3 module determines the refractive indices of glass using the widely accepted laboratory standard method of oil immersion / temperature variation.



ffTA™ GRIM®3 Module includes

GRIM 3 glass RI Processor Module

- Monochrome firewire video camera
- GRIM®3 GLASS system operating software
- FRAG Analyser statistical analysis software

Hotstage

- Mettler HS 82 hotstage
- Includes hotstage fixing bracket

Reference Oils and Glasses

- Set of 3 purified silicon oils and 19 glass standards to cover the range of refractive indices.

Phase ring x10 objective and focusing telescope

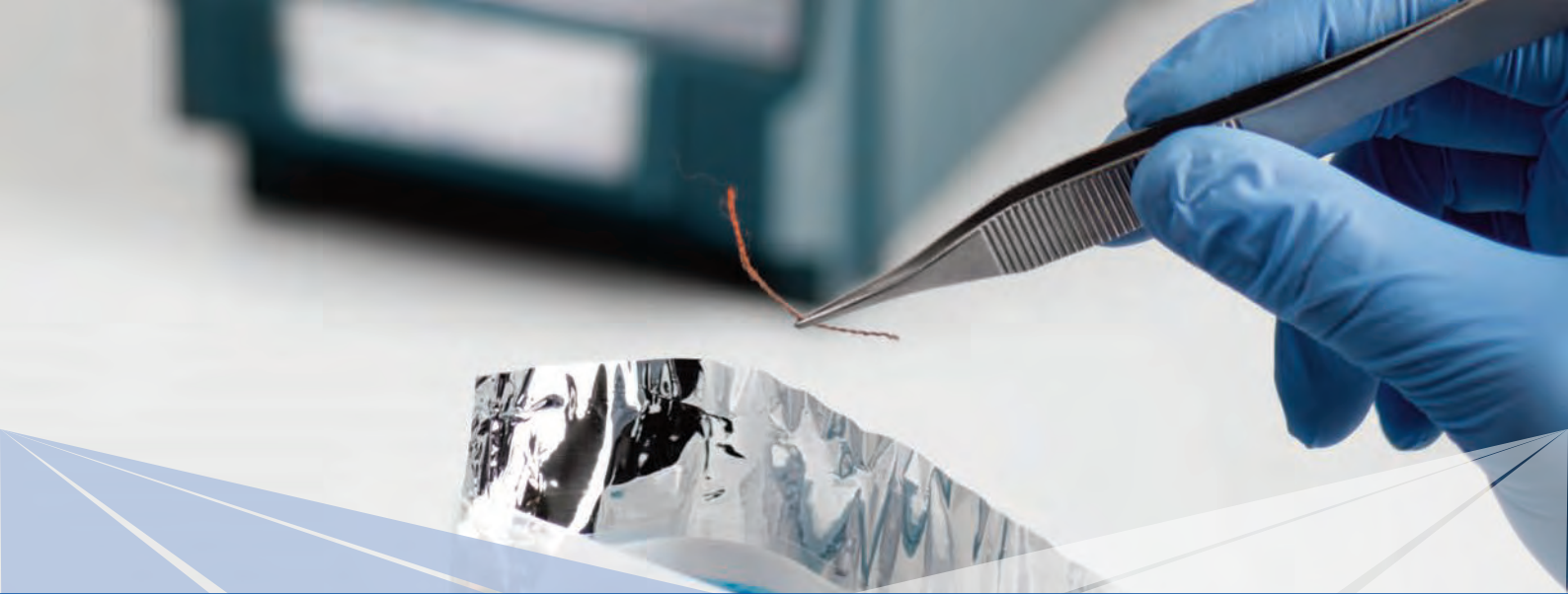
Interference filters

- 488, 589, 656nm

GLASS: Updated system software

The GRIM3 operating software, GLASS, has been updated to provide improved casework management with the following features:

- Searchable case data
- Customisable graphical user interface
- Automated system performance monitoring
- Improved flexible reporting system



POLARISED LIGHT MICROSCOPY for the analysis and identification of fibres

ffTA™ PLM

Light Polarisation Module

Possibly the most widely used application for microscopy in forensic science, Polarised Light Microscopy (PLM) is a valuable tool for the detection and analysis of small unknown particles and for the identification of fibres.

A contrast-enhancing technique, PLM uses the birefringent properties of materials to improve the quality of the images obtained with the microscope.

The addition of a 360-degree circular rotating specimen stage enables the user to make accurate measurements of a sample's birefringence and to quickly identify fibres as acetate, acrylic, nylon, or polyester.

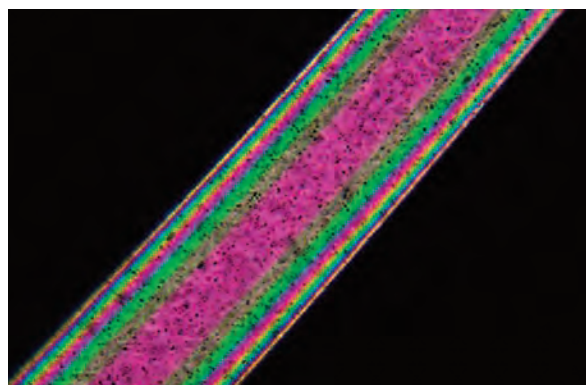


Evidence identified by its birefringence

Birefringence is the decomposition of a single ray of light into two separate rays as it passes through birefringent materials. By taking a measurement of the samples diameter and the colour retardation of the decomposed light, unknown materials can be identified against the interference colour chart.

The ffTA™ Light Polarisation Module consists of a linear polariser mounted on the condenser lens, a second polariser (the analyser) placed in the optical pathway before the observation tubes and camera, and a retardation plate to enhance optical path differences between the cross-polarisers.

Specimens are placed on a 360-degree circular rotating specimen stage equipped with two Vernier scales so that rotation angle can be measured to an accuracy of 0.1 degree.



Cross-polar examination of a fibre

ffTA™ PLM Module includes

360° rotary polarisation stage

- Ball bearing stage with locking clamp
- Stage bracket and condenser holder.
- Stage diameter 178mm
- XY object guide

Microscope Objective

- Hi Plan x63 Polarisation Objective

Polariser

- 52mm mounted linear polariser
- mounted analyser
- 1 x waveplate
- 1 x quarter waveplate

Interference Colour Chart

- Michel-Lévy table of birefringence

Interference Colour Chart

Each ffTA™ PLM Module is supplied with a copy of the Michel-Lévy table of birefringence.

In use for more than 100 years, the chart enables PLM examiners to identify fibres and minerals by measurement of a samples thickness and colour retardation.

FLUORESCENCE IMAGING for multi-spectral visual comparison of evidence

ffTA™ Fluorescence Imaging

Real-time Fluorescence Excitation Module

A widely used technique for the identification and comparison of trace materials including paint chips, fibres and biological materials.

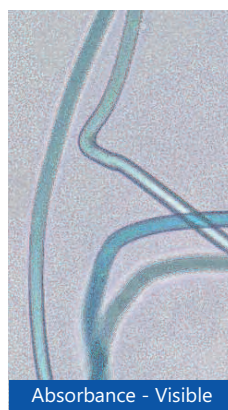
Equipped with four excitation bandwidths: UV, Violet, Blue and Green, this module provides versatile high resolution fluorescence imaging and spectra when used in conjunction with the ffTA™ Micro-spectrometer module.



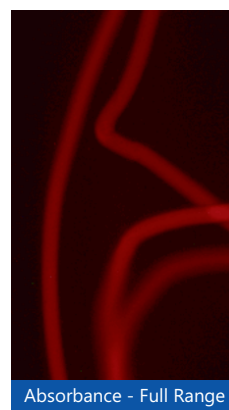
Wide Ranging Applications

In the forensic laboratory, fluorescence imaging is an ideal technique for the inspection of biological samples, examination of accelerants (petrol, diesel, kerosene etc.) and for the characterisation and identification of illegal substances.

In addition to visual inspection, fluorescence microspectrometry is a powerful technique for the discrimination of textile fibres and for the comparison of paint evidence.



Absorbance - Visible



Absorbance - Full Range



Transmission - Full Range

ffTA™ Fluorescence Modules includes

Fluorescence Module A

- External Light Source
- 100W Mercury Vapour Lamp

Or...

Fluorescence Module B

- External Light Source
- 120W Metal Halide Light Source

Filtercubes

- Filtercube A 340-380nm
- Filtercube D 355-425nm
- Filtercube I3 450-490nm
- Filtercube N2.1 515-560nm

Light source selection

Foster+Freeman offer a choice of high intensity discharge light sources.

The Metal Halide lamp is an energy efficient light source offering excellent colour retention over a long service life.

An older technology, the Mercury Vapour light source offers greater lamp life but is less energy efficient.



UV-VIS-IR MICROSPECTROMETER for the analysis of organic compounds

ffTA™ Microspectrometer

Available in a choice of Wavelength Ranges

Micro-spectrometry is a powerful analytical tool that is widely used in forensic science for the study and comparison of trace materials including paint chips, fibres and inks.

Spectra in the visible region provide the user with objective measurements of colour, and through the examination of ultra-violet and infra-red spectra, users are able to make comparisons between two materials that may be indistinguishable to the naked eye.

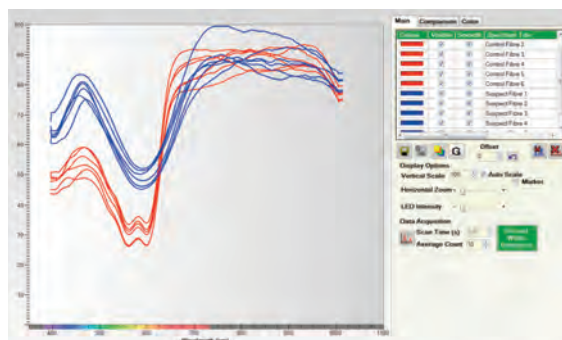


Spectral analysis

Depending on the wavelength range selected, the Microspectrometer will record absorption, reflection and transmission spectra in the UV, Visible or Infrared wavebands.

When used in conjunction with the ffTA™ Fluorescence Imaging module it is also capable of recording fluorescence spectra.

Microspectrometry is highly effective in the discrimination of fibres that may have identical physical properties.



Spectral response of a suspect fibre

<p>ffTA™ Microspectrometer Modules include</p> <p><i>A choice of two fibre-coupled spectrometers</i></p> <p>240-1000nm FWHM resolution better than 2.5nm</p> <p><i>Or...</i></p> <p>400-1000nm FWHM resolution better than 3nm</p>	<p>Incident Illumination Package</p> <p>5MP Camera</p> <ul style="list-style-type: none"> High-res 2/3" 5MP CCD camera 400nm to 700nm spectral response <p>Leica DM2700M objectives</p> <ul style="list-style-type: none"> x5, x10, x20, x40, x50 <p>Optical Multiplexer</p> <ul style="list-style-type: none"> 1x input, 3x selectable outputs 	<p>Traceable Standards</p> <p>To guarantee the accuracy of results, each ffTA Microspectrometer module is supplied with relevant calibration standards including:</p> <ul style="list-style-type: none"> NIST traceable filters NIST wavelength calibration standard Labsphere colour measurement calibration standard
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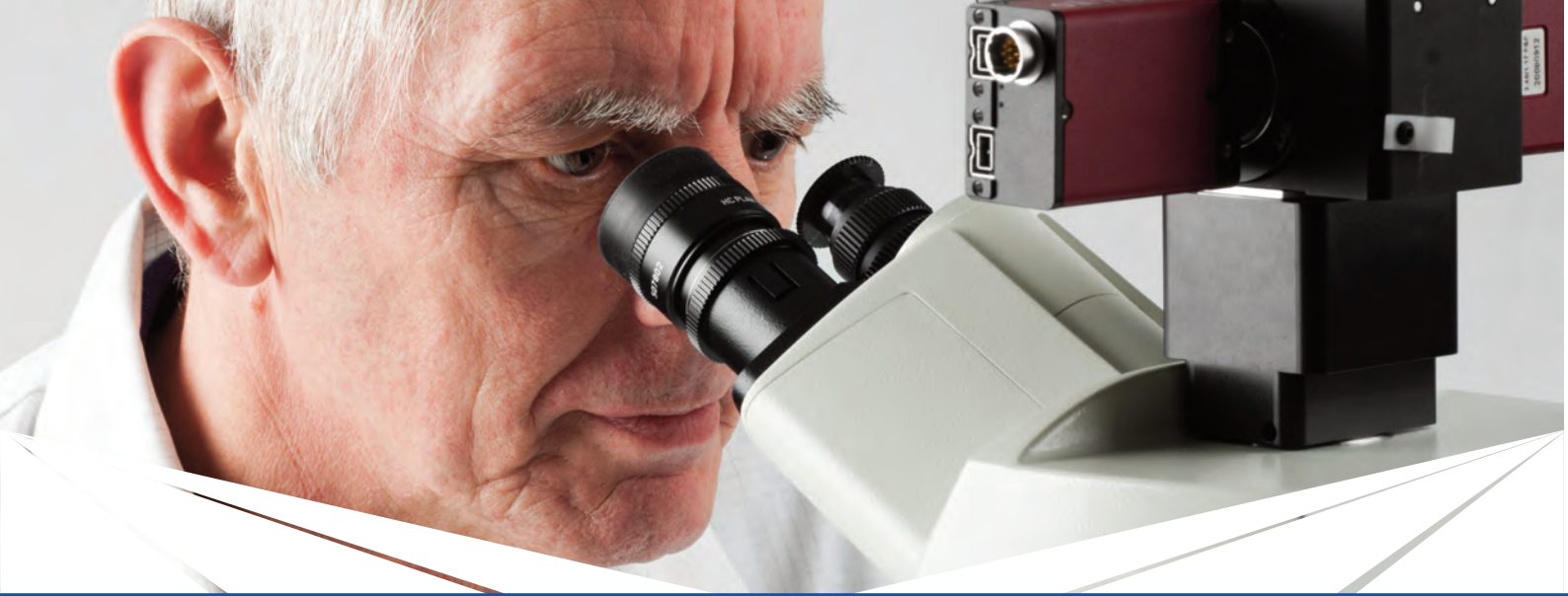


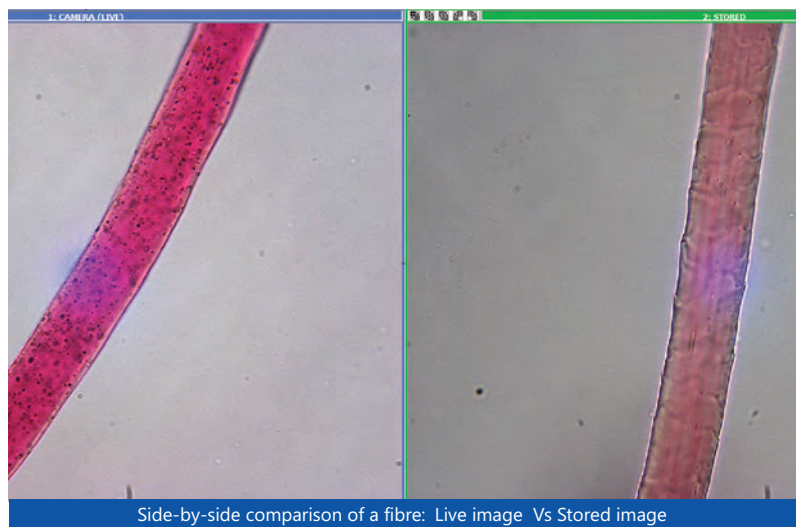
IMAGE PROCESSING enhancement and comparison of high-resolution images

ffTA™ Image Processing High-Resolution Camera and Software Module

A comprehensive module for processing images from a scientific grade 5 million pixel CCD colour camera.

High quality imaging enables the examiner to zoom, orientate and position and item of evidence on screen for critical visual examination.

Live and stored images may be compared side-by-side, subjected to digital enhancement (contrast stretch, Fast Fourier Transform, Sharpen etc.), or measured and annotated.



Side-by-side comparison of a fibre: Live image Vs Stored image

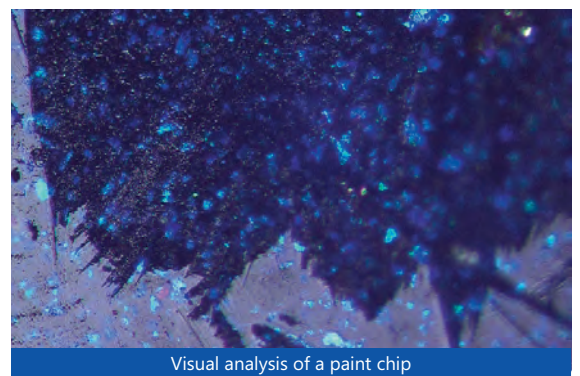
Visual Examination of Evidence

Analysis of almost any item of trace evidence begins with a visual examination, to assess a samples physical characteristics, followed by macro-photography and then microscopic analysis.

The ffTA™ Image Processing Module provides the examiner with a selection of facilities to 'digitally enhance' the visible image of a sample.

Facilities include:

- Image Enhancement
 - Contrast stretch, HSL, RGB, Filters, Equalization, FFT, Gamma Correction
- Image Analysis
 - Measurement facilities for distance, angle and area using calibrated grids
 - Measurements can be added to image.
- Image Annotation
 - Editable image annotation facilities (text and shapes including arrows, lines, boxes and circles)
- Image Comparison & Transformations
 - Side-by-side comparison of live and stored images
 - User adjustable split position
 - Superimposition and subtraction of live and stored image (option of red/green rendered images for extra clarity)
 - Live and stored images can be rotated through 90°



Visual analysis of a paint chip

ffTA™ Image Processing Module includes

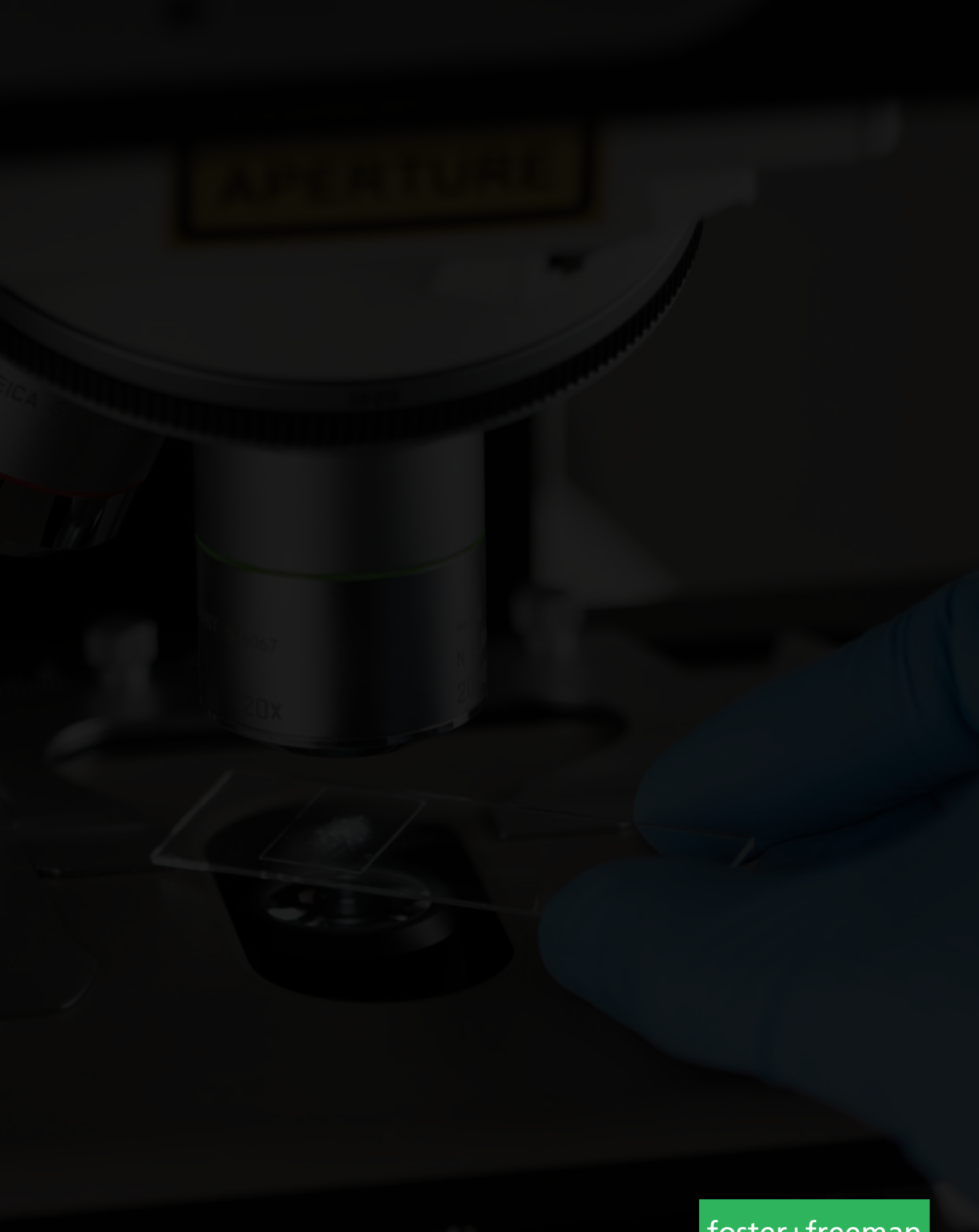
Incident Illumination Package

5MP Camera

- High-res 2/3" 5MP CCD camera
- 400nm to 700nm spectral response
- on-chip image integration from 8mms to 22s

Leica DM2700M objectives

- x5, x10, x20, x40, x50



foster+freeman

Head Office, UK Sales Office
Vale Park | Evesham | WR11 1TD | United Kingdom
Tel: +44 (0)1386 768 050 | sales@fosterfreeman.com

USA Sales Office
46030 Manekin Plaza | Suite 170 | Sterling | VA 20166 | USA
Tel: 888 445 5048 | usoffice@fosterfreeman.com

fosterfreeman.com