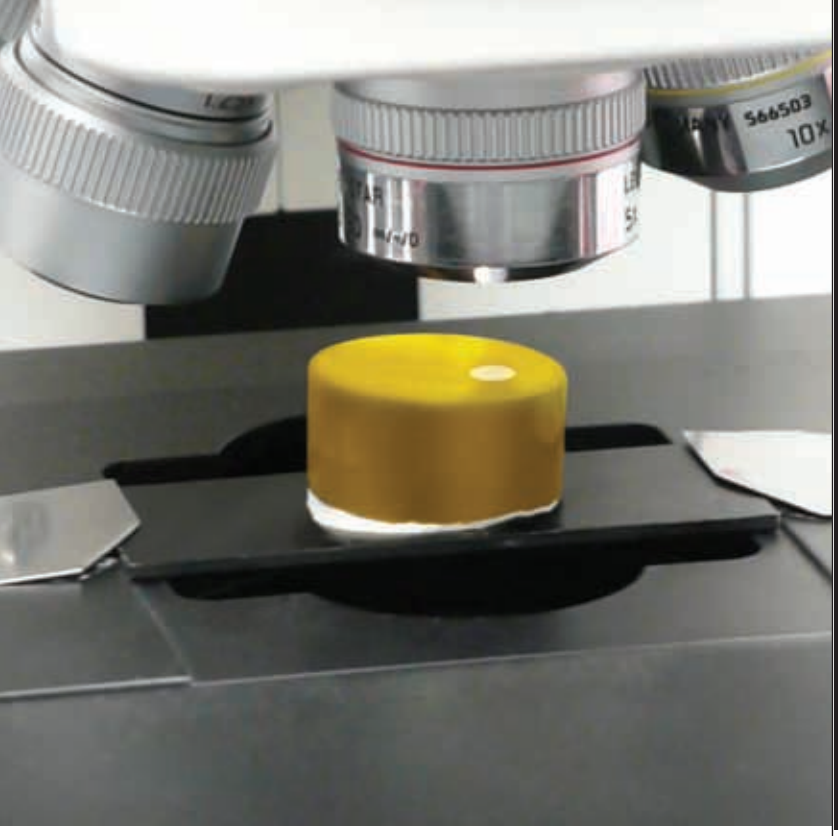


LAS Power Mosaic

Leica
MICROSYSTEMS

Get the Big Picture

LAS Power Mosaic is designed to bring a whole new dimension to microscopy, providing you with a unique understanding of the relationship between microscopic features and the overall structure of the specimen.

LAS Power Mosaic provides the ultimate in high-resolution specimen visualisation. Scan the entire specimen or select a specific region of interest region and it's scanned at high speed. The captured images are immediately combined to form a seamless mosaic image.

Once the scan is complete you can relocate effortlessly to areas of interest with a single mouse click and can view the live microscope image that corresponds to a chosen location. Additionally you can zoom and pan around the entire digitised mosaic image using easy and intuitive "browsing" tools.

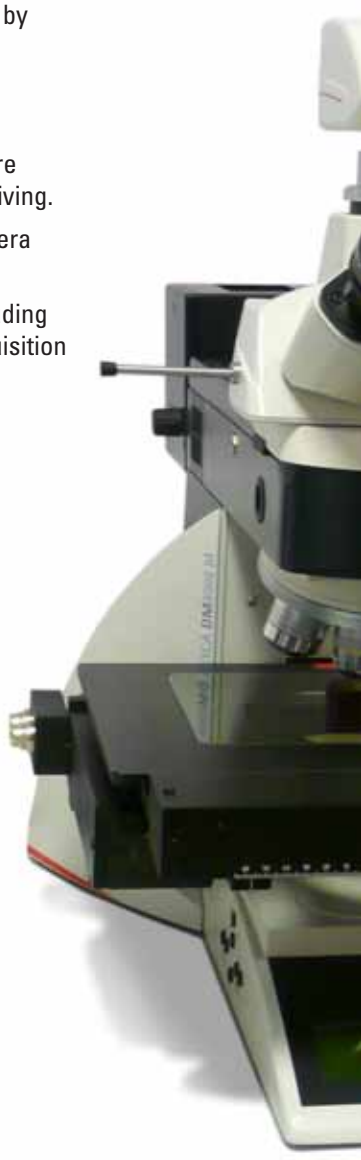
The acquired images, including the entire mosaic can be saved for subsequent review, discussion with colleagues or publication.

LAS Power Mosaic is ideal for both routine and research applications and provides modes of scanning to suit all forms of optical microscopy. It's specifically developed to be both versatile and easy to use. This powerful LAS option provides the microscopist with a high performance mosaic imaging solution without compromising conventional use of the microscope.

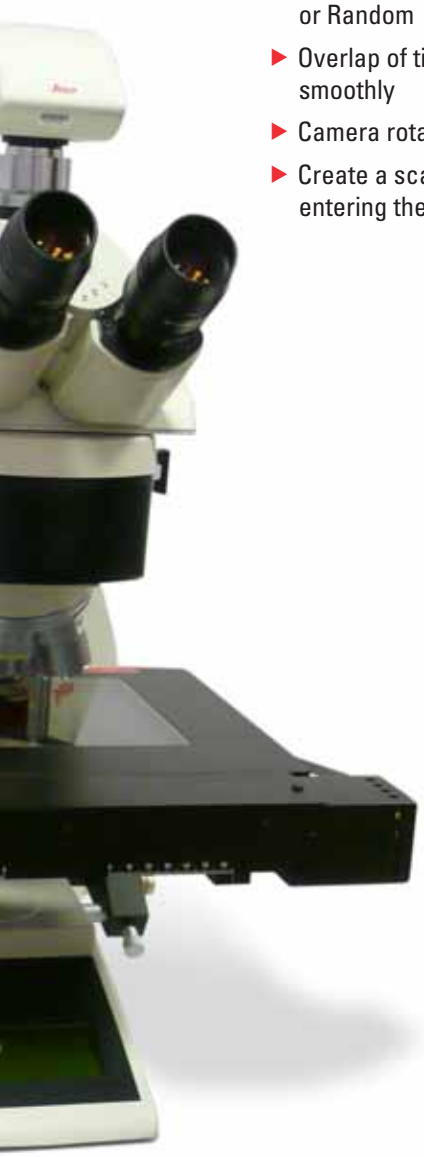
Z-Stack Mosaic
In addition to the standard scanning and review capabilities, the Power Mosaic Plus module further extends the capability using "Z-Stack" acquisition to provide 3-D mosaic imaging and visualisation, ideally suited to specimens with a wide focal range.

Key benefits include:

- Scanning and acquisition at camera frame rates to ensure high speed and rapid throughput
- Tile edge merging provides highest possible image quality
- No restrictions on objective or imaging method
- Fast and accurate relocation with easy and intuitive review tools
- Intelligent memory management supports mosaic sizes limited only by available disk space
- Fully automated focus control and tracking
- User control of image size to ensure suitability for publication and archiving.
- One click calibration for easy camera alignment
- Optional advanced functions, including powerful 3-D Z-Stack mosaic acquisition for powerful focus visualisation



Features at a Glance



Power Mosaic Scanning

- Uses triggered image capture for fast continuous scan and acquire
- Standard scan available using step and acquire for low light applications
- Image streaming for mosaic sizes only limited by disk space
- Additional scans can be easily added to extend an initial scan

Scan Patterns

- Rectangle, Circular, Annular, Cross (+ and x), or Random
- Overlap of tiles allows joins to be merged smoothly
- Camera rotation is automatically corrected
- Create a scan pattern interactively or by entering the exact details

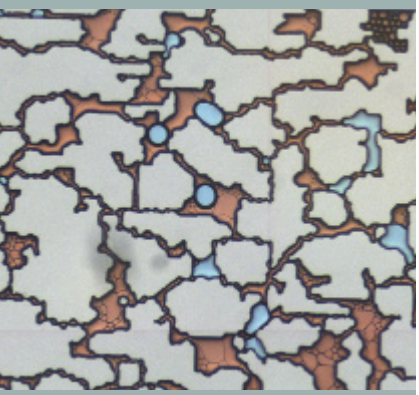
Microscope Automation

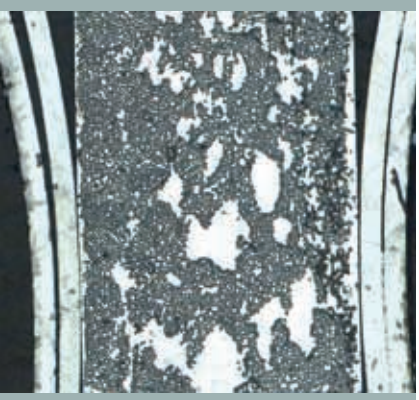
- An Oasis XY stage and Z focus control drive board is used
- A software joystick or Leica smart move can be used for stage and focus movement
- Fully compatible with Leica Microsystems LAS configured microscopes handling focus, turret, condenser and lamp controls as available

Leica DFC Camera

- Exposure, saturation, gain and gamma control from LAS controls
- Triggered acquisition from progressive scan and DFC FX cameras for fastest scans
- Automatic and manual white balance
- Color or monochrome acquisition (8 or 16-bit)
- Shading correction for smooth mosaic results

How it Works



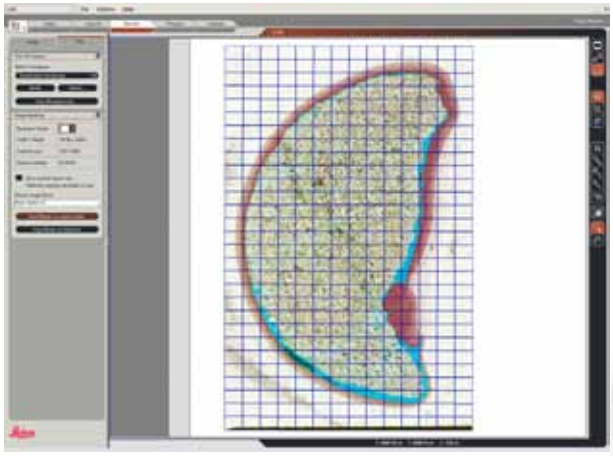


When the system is initially configured a simple, single click calibration procedure is performed for each objective lens on the microscope. This informs the system of the exact correlation between a stage movement and the associated spatial value in microns for the objective. This calibration information enables the system to maintain precise and accurate positional information for each image acquired. In particular, this also compensates for camera rotation and stage orientation.

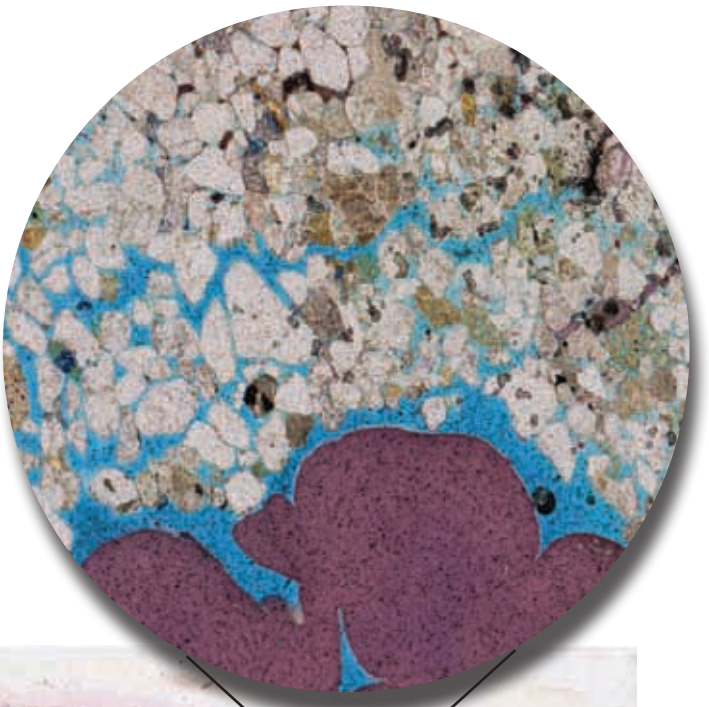
In addition to the spatial calibration of the system, "shading correction" is set-up to eliminate any uneven illumination in the acquired images. Finally the user may, optionally, employ a number of different automatic focussing techniques as appropriate for the scanning method and the nature of the specimen.

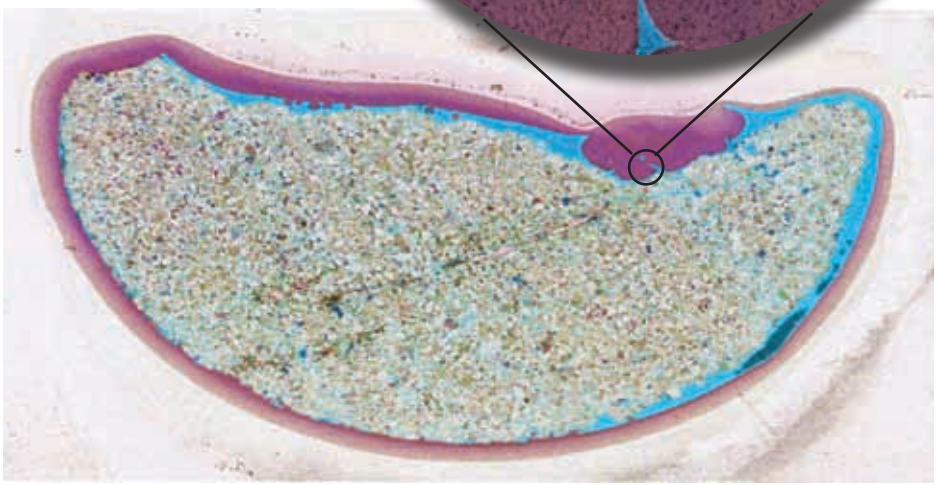
Once the scan area has been defined the system automatically calculates the number of images that need to be acquired to form a complete full resolution mosaic of the chosen area. The user selects the type of scan required and simply starts the scan. The exact nature of the scan performed is controlled by the user and depends on the microscopy contrast method employed and the format of mosaic required. Everything else is handled automatically by the system, using previously defined values to determine speed, focussing method and data format.
When the scan is complete, the user may revisit points of interest with a single mouse click or copy all or part of the mosaic for distribution, publication or discussion with colleagues. Additionally, since the entire area scanned is now available in digital form and at full resolution, the image data is available for annotation or further analysis within applications active in the Leica Application Suite.

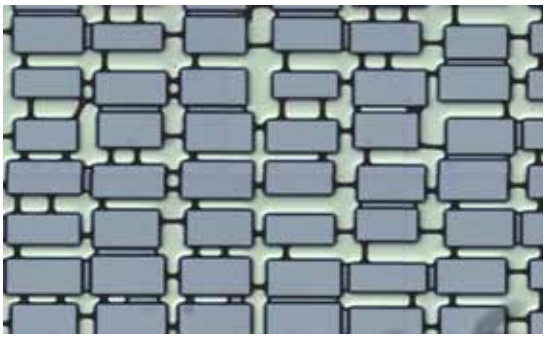
LAS Power Mosaic requires a Leica motorised microscope, Leica Digital Camera, motorised stepper stage, motorized focus with XY control board, a high performance Windows PC and a very large hard drive.

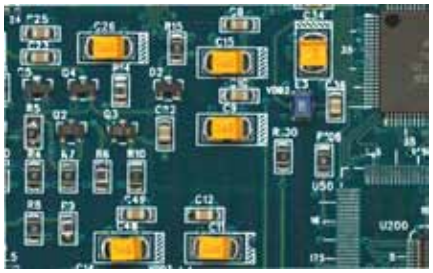


Rock Section









PCI Board topside using extended focus

Time and Space!

The time needed to perform a scan depends on a number of different factors, such as the objective lens used, the illumination method and the area to be scanned. As a general rule, polished specimens can be done at the highest speeds whereas scanning of specimens with surface roughness requiring focus adjustment on each field or using darkfield illumination must be performed using the standard scan method. Some examples of the overall time needed for different types of scan using predictive focus are shown in the table below.

Space is also a variable. LAS Power Mosaic saves all captured digital images to the PC hard drive. Each individual full resolution image captured from a Leica digital camera will require approximately 4.5 Megabytes of storage space. Since a typical scan may comprise of many hundreds, or even thousands, of individual images the storage required can quickly become several Gigabytes. Fortunately, modern PC technology makes this possible.

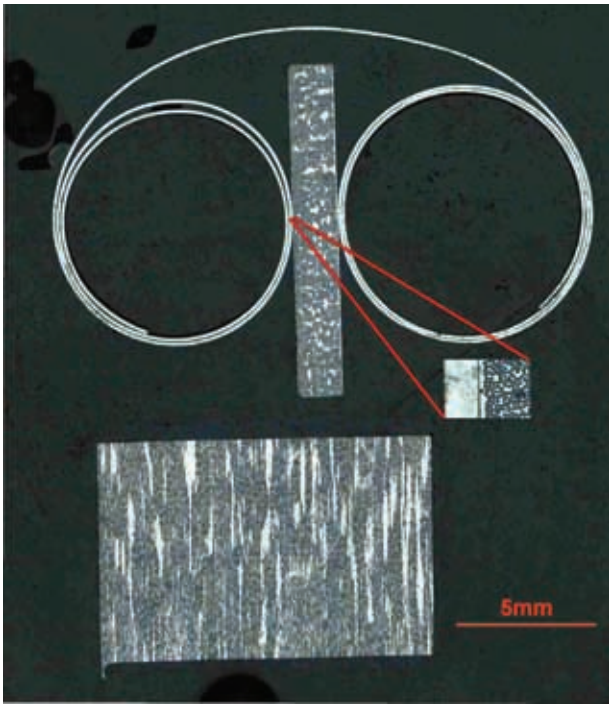
As a general rule the amount of image data that will result from a scan will increase fourfold for each doubling of objective magnification. If, for example, a scan of 100 fields using a 10X objective results in 400Mb of data then scanning the same area at 20X magnification will require 1.6Gb of disk storage. You have the choice of when to save scans permanently and in which format. If a single camera frame requires about 4Mb of storage then, in the example shown, a total of 44Mb will be used to store the Z-Stack data. When executing Z-Stack scans on patterns with a large number of fields you should be aware that very large amounts of data can be generated.

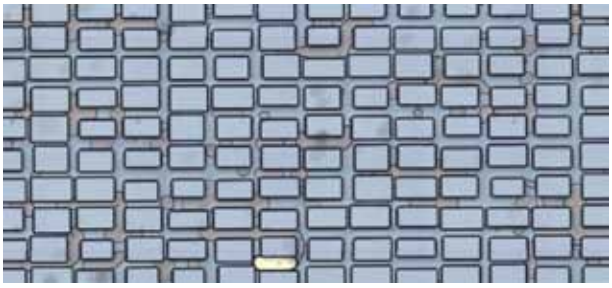
Similarly, since it is necessary in Z-Stack operation for a number of images to be acquired at different Z positions at the same XY location, the total time required for the scan will increase significantly. There are a number of factors that may influence the scan time but as a broad indication the time needed to perform a normal standard scan should be multiplied by the number of Z slices + 50% to give an estimated time for a Z-Stack scan.

Scan Times and Data Volumes (based on DFC 300FX)

Objective	C Mount	Camera	µm/pixel	15mm Fields X	15mm Fields Y	Total Fields	Scan Time Seconds	Scan Time Minutes	BMP Image Size (Mb)
5X	1X	1392 x 1040	1.29	12	16	97	31	0.49	406
10X	1X	1392 x 1040	0.65	24	32	388	116	1.93	1622
20X	1X	1392 x 1040	0.32	48	64	1553	461	7.18	6490
40X	1X	1392 x 1040	0.16	96	128	1842	1842	30.6	25960

Key Applications





LAS Power Mosaic is suitable for a diverse range of applications, both research and routine.

Due to the ability to provide appropriate scanning methods for different microscopy fields, the system has great versatility and is used successfully in many different environments and applications.

Whilst LAS Power Mosaic is the perfect solution for the scanning of polished material specimens and thin geological sections, it is also well suited to recording forensic specimen slides, inspecting electronic components, investigating porous media and many other microscopy applications.

As the system is designed to supplement and enhance Leica microscopes and digital cameras it is a very affordable means to achieve a massive increase in imaging capability and performance without loss of any conventional functionality.

Mosaic Review
A separate viewer program is available to allow Power Mosaic images to be shared with colleagues without the need to install the complete LAS.

An Extra Dimension!

Many scanning applications are performed on flat specimen sections and, with the use of either Autofocus or Predictive Focus, it is possible to achieve a mosaic image of acceptable quality by acquiring a single image tile at each location within the scan pattern. The resulting mosaic image is thus 2 dimensional (X/Y).

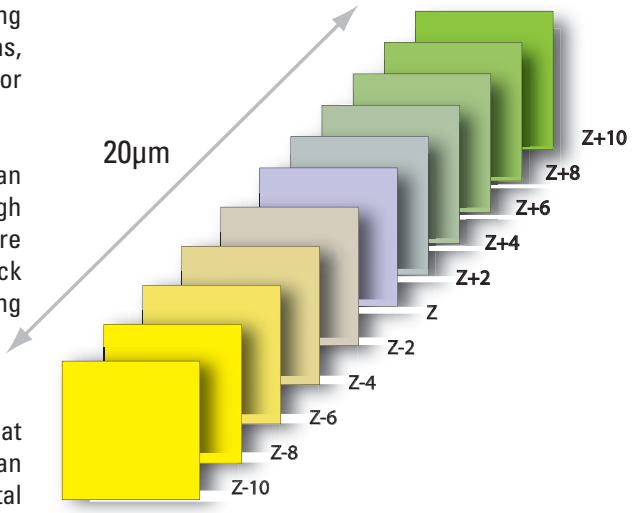
In other cases, the characteristics of the specimen make acquisition of a single image inadequate for complete visualisation because important detail is present at different focal positions within a single image frame. This situation occurs when inspecting the roughness of coatings and surface preparations, particle characterisation and when recording hairs or textile fibres in forensic science.

The Z-Stack technique has been developed as an optional module specifically for imaging these high focal depth specimens and can be applied to an entire scan pattern. Note that due to the nature of Z-Stack acquisition it is only possible in “Standard” scanning mode.

How does it work?
The Z-Stack technique acquires a series of images at a pre-defined Z “spacing” at each location in the scan pattern. You can control both the Z spacing and the total number of images within the stack.

If, for example, you require images at 2 micron intervals over a total focal range of 20 microns the resulting Z-Stack will comprise 11 images of which the central image in the stack will always be the point from which the Z-stack was initiated. This example shows 5 images above and 5 images below the initial focal position, each separated from its neighbour by 2 microns.

The resulting stack of mosaic images can be smoothly replayed exactly as if the microscope focus knob is being adjusted. Moreover, a single mosaic representing the best focus image or the extended focus image can be instantly played.



Specification subject to change

LAS Power Mosaic Module

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