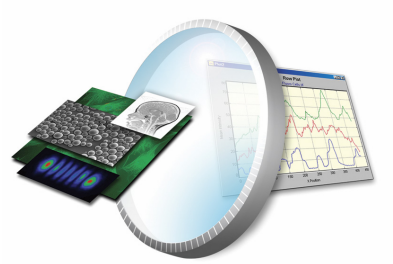
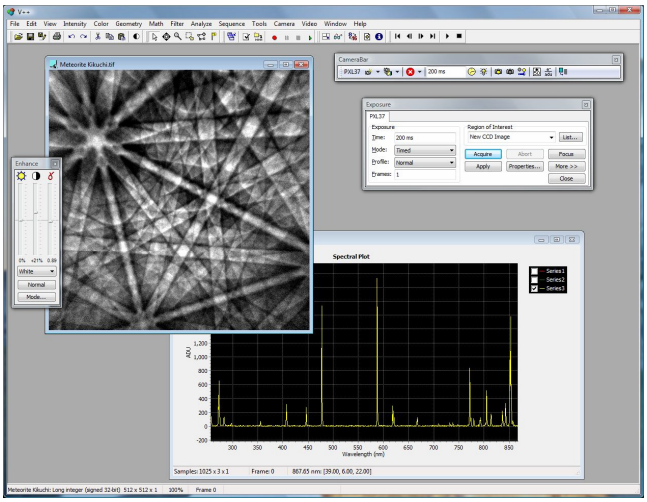
DIGITAL OPTICS
PRECISION DIGITAL IMAGING

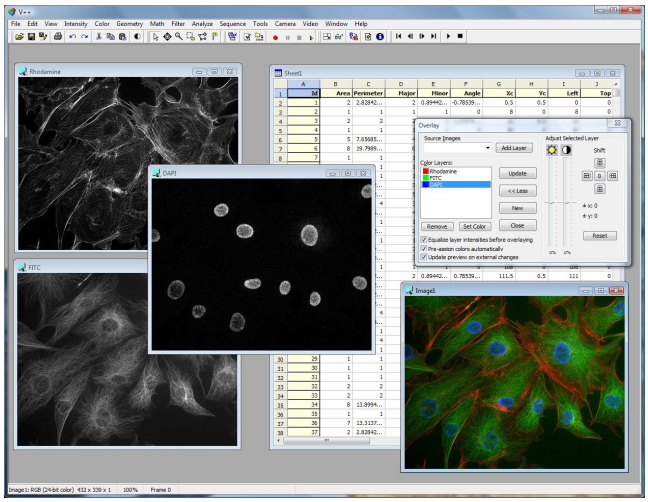


V++

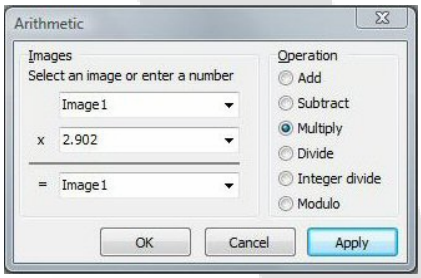
PRECISION DIGITAL IMAGING & SPECTROSCOPY SOFTWARE

Award-winning V++ software from Digital Optics makes advanced scientific imaging and spectroscopy easy. Sophistication, speed, power and full Windows compatibility all come together in a single seamless package. V++ is used in more than 60 countries for thousands of applications in physical, biomedical and forensic sciences.





User Interface
V++ is a sophisticated product but remains easy to use, thanks to its user interface which has been designed to accommodate both novices and experts.



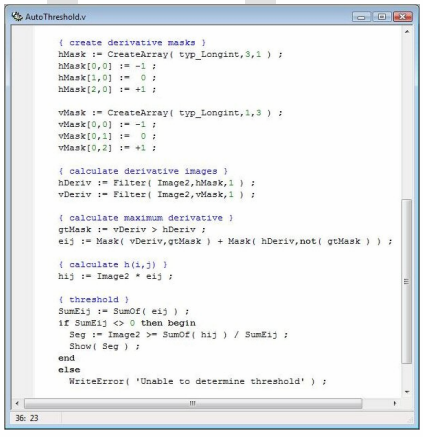
Imaging Functions
V++ incorporates many hundreds of image processing functions, including brightness, contrast and gamma corrections, advanced color processing, shading corrections, geometric transformations, linear and non-linear filters, Fourier processing, histograms, intensity profile plotting, image statistics, image arithmetic, logical operations, relational operations, extended image and complex mathematics, morphological processing, automatic blob counting full object shape analysis, and much more…

Advanced Data Types
V++ leads the scientific imaging industry with its extensive support for advanced data types ranging from simple binary and byte images to 96-bit floating point color and 128-bit complex images. All data types are supported transparently in every imaging operation giving you unprecedented choice and precision for your scientific applications. V++ also provides 100% support for 3D data in the form of image "stacks" or "sequences". Advanced display technology provides for optimum display of all image data types.

Camera Control
V++ is fully integrated with advanced digital cameras, video frame grabbers, and scanners. All device features are accessible, including controlling multiple cameras simultaneously. The innovative CameraBar™ compresses all of the functionality of your camera into an incredibly small on-screen footprint.

Automation with VPascal™
VPascal is a full featured high-level programming language for automating imaging tasks. It has expressions, looping, control structures, variables, functions, multi-tasking and much more, but remains easy to use. VPascal implicitly understands image, vector and matrix math so you can calculate complicated image expressions in a single line of code by simply writing out the formula. Your programs can create their own toolbars and menus.

You can even generate programs automatically with the built-in recorder. There are more than 700 pre-defined functions plus full support for all image and sequence types. If you need to, you can even call your own external library routines.



Connectivity
As well as cameras and frame grabbers, V++ can control a variety of laboratory equipment including scanners, filter wheels, microscope stages and more. You can automate complex serial communications tasks and make full use of Dynamic Data Exchange (DDE), with V++ acting as either a server or a client.

Visit the Digital Optics web site for more information: **www.digitaloptics.co.nz**

V++ 5.0 Feature Summary

Data Types
Binary, byte, signed 16-bit, unsigned 16-bit, signed 32-bit, single precision real (32-bits), double precision real (64-bits), single precision complex (64-bits), double precision complex (128-bits), RGB color (24 and 48-bit fixed point, 96-bit floating point) images. Unlimited image dimensions. Easy conversion between all image types.

Sequences and Stacks
Complete support for multi-frame sequences (or "stacks"). Imaging operations are sequence-aware. Extract, add, delete individual frames. Movie loop display with variable frame rate and looping options. Realtime video display. Volumetric slicing in x, y, or z planes. Ensemble statistics. Export sequences as AVI video clips.

Intelligent Image Display
All image types are displayed with automatic on-screen scaling and format control, as well as non-destructive brightness, contrast and gamma settings. Automatic formatting may be overridden using various manual options. Display settings for individual images are preserved when the file is saved. Sequences may run as movie loops. Display zoom with auto smoothing.

Toolbars
Multiple drag and drop toolbars with floating help captions. Toolbars can be undocked and used as toolboxes.

Color Support
Process and render RGB color images at 24, 48 and 96-bits per pixel. Floating point color support. Color table creation and editing. Color channel merge and split. Multi-layer color overlays with interactive layer adjustments. Color model conversions (RGB, CMY, HSV, XYZ, YIQ). Color matrix transformations. Perceptual intensity calculations.

Contrast Processing
Non-destructive brightness, contrast and gamma controls. Intensity range re-mapping. Inversion. Shading measurement and correction. Logarithmic and gamma corrections. Calculate image statistics with automatic live updates.

Geometric Operations
Image resizing with non-integer scale factors and separate horizontal and vertical scaling. Horizontal and vertical reflection. Image warping for rectification and registration. Alignment operations incorporating rotation through any angle and sub-pixel translations. Nearest-neighbor or bilinear intensity interpolation.

Graph Plotting
Plot and analyze histograms of any image type. Plot intensity profiles of any length, along a simple or complicated path. Plot analyses of row and column intensity statistics. Copy plots to the clipboard.

Arithmetic Operators
Addition, subtraction, multiplication and division of images, including images of different types, and between images & constants. Integer and modulo division.

Logical Operators
AND, OR, XOR, NOT, NAND, NOR, XNOR and IMP operations between images, and between images and constants. SHL, SHR, SAR, ROL, ROR operations.

Relational Operators
Comparisons (>, <, >=, <=, <>) between images and between images and constants.

Extended Mathematics
Logarithm, exponential, absolute value, negative, square, square root, scaling, real part, imaginary part, complex conjugate, phase and rectangular / polar conversions. Trigonometric functions. Polynomial fitting and function evaluation.

Filters
Linear edge detection, smoothing and sharpening filters. User-defined M×N linear filters with any size kernel. Selectable boundary conditions. Non-linear filters, including minimum, maximum, rank, median and range.

Fast Fourier Transform
Ultra fast forward and reverse Fast Fourier Transform (FFT) of images using single or double precision. Enhancement and manipulation in the frequency domain with direct spectrum editing. Unidirectional transforms in X, Y or Z.

Morphology and Set Operations
Erosion, dilation, opening, closing, edge trace. Cross, square and disk structure elements in various sizes. Euclidean distance transform. Set union, intersection, complement and difference.

Object Analysis and Counting
Thresholding, segmentation, and counting. Automatic analysis of area, perimeter, centroid, principle axes, orientation, moments, and object density. Results in spreadsheet format. Interactive path length and area measurements.

Image Acquisition and Correction
Complete user interface and support for advanced digital cameras. Live preview. Auto exposure. Single & multiple region exposures. Concurrent multi-camera control. Sequence acquisition. Full support in VPascal modules. Reference subtraction, flat-field correction. CCD pixel, row and column defect correction. Full support for video frame grabbers, including simultaneous control of multiple devices. Realtime video capture. Hot loading / unloading of drivers. Advanced support for TWAIN cameras and scanners.

VPascal Automation Language
Powerful, multitasking programming language. Automatic module recorder. Variables and constants, for loops, while loops, repeat-until loops, if-then-else, image expression evaluation, procedures and functions. Complex number and RGB support. Chord table handling. Create custom menus and toolbars. Shared variables and procedures. Graph plotting. Serial port control. Hundreds of built-in functions. Link directly to external DLLs (including the Windows API). Sophisticated built-in programmer's editor with multiple windows, syntax highlighting, auto-text and more.

Built-In Spreadsheet
Internal Excel-compatible spreadsheet with formulas. Open and save Excel format files. Automatic data transfer to Excel or Word. Full VPascal control for easy output of results as tables.

Spectroscopy Applications
Spectrum graph display, calibration and correction. Spectrum aware dialogs for intensity, geometry, math, conversion and other functions. Optional RCubed plug-in provides full control of monochromators, imaging spectrometers, single-point detectors, and related optical equipment.

Image File Formats
TIFF 6.0 image format (includes 1, 2, 4, 8, 16, 24, 32, 48, 64, 96, and 128 bits per pixel). Windows device-independent bitmap (BMP). JPEG file interchange format (JPG). Digital Optics XML format (DXML). Flexible Image Transport System (FITS). Photometrics files (PMI). Princeton Instruments files (SPE). Microsoft Excel spreadsheet format (XLS). Comma delimited text (CSV). Tab delimited text (TXT). Image import feature for other file formats and unformatted files. Export raw data. Export AVI video clips.

Connectivity
Full featured DDE server and client. Network DDE support. Remote control of VPascal modules. Serial port transmit and receive on multiple ports. Optional microscope controller.

And Much More...
Industry leading user-interface. Extensive on-line help and tutorial system. Drag-and-drop client. Multi-level undo and redo operations. Clipboard support. User preferences set-up. Printing of images and modules. Multi-language capability.

System Requirements
Microsoft Windows 2000, XP, Vista or later.

Contact
UK and Europe:
www.waterfallsolutions.co.uk

Rest of world:
www.digitaloptics.co.nz