Mountains 9

Release Notes

Note:
From version 9.3.10393, the Release Notes will no longer be updated.

Version	Date	Illustrated articles
9.3.10393	June 16th 2023	
9.3.10333	April 17th 2023	
9.3.10281	February 24th 2023	
9.3.10249	January 23rd 2023	
9.3.10200	December 5th 2022	
9.3.10179	**November 14th 2022**	**What's new in 9.3**
9.2.10170	November 5th 2022	
9.2.10130	September 26th 2022	
9.2.10042	June 30th 2022	
9.2.9994	**May 13th 2022**	**What's new in 9.2**
9.1.9957	April 6th 2022	
9.1.9949	March 29th 2022	
9.1.9908	February 16th 2022	
9.1.9882	January 21st 2022	
9.1.9837	**December 7th 2021**	**What's new in 9.1**
9.0.9820	November 20th 2021	
9.0.9789	October 20th 2021	
9.0.9733	August 25th 2021	
9.0.9677	June 30th 2021	
9.0.9653	**June 6th 2021**	**What's new in 9.0**

Digital Surf Software Updates

www.digitalsurf.com/support/software-updates/

Digital Surf FAQ

www.digitalsurf.com/support/faq/

Digital Surf Support solutions

www.digitalsurf.com/support/support-solutions/

Version 9.3.10393

What's new

Flexibility for elements created from point in the Advanced contour study	The elements of Parametric profile studiables reconstructed from points (segments, arcs, circles, points) in the Advanced contour analysis study can now be reconstructed during automation provided that the minimum number of points necessary for their creation is present. Two valid points are necessary for a segment, three are necessary for an arc or a circle, and five are needed for an arc of ellipse.
Direct download of upper major version	If the license entitles the user to run an upper major version, the direct download is now offered in the dialog box of the [Search for update] button.

Bug corrections (A and B type)

	Type	Bug Description
MNT-6987	A	The parameters epLsar and NewEplsar are not calculated in the Scale-sensitive fractal analysis study on some Surface studiables. Those parameters, and the special parameters of the analysis method Area-scale and Multi-scale Sdr, are not displayed if the user saves them as default settings.
MNT-7072	B	The display of the 3D view study on Surface and Surface +I mage studiables does not work if the Mountains installation path contains a special character.
MNT-7132	B	The software may crash when applying the Remove form operator on a Profile studiable if it is entirely non-measured.
MNT-3817	B	The Japanese translation of "Save the current studiable" is incorrect.
MNT-6170	B	The unit of the tolerances defined on the individual values of the series of results is not always correctly defined. Loading a document with different unit preferences then might cause the tolerances to be erroneous.
MNT-6516	B	Non-measured points are taken into account in the "Use reference spectra" and "Extract components" operators on Hyperspectral image studiables, although they should be ignored.
MNT-6972	B	Profile extraction calculation times are very long when substituting a document in some cases.
MNT-7000	B	Some mapx files for Image studiables are not correctly assembled when opened.
MNT-7031	B	The "Update and Upgrade Possibilities" page is not displayed when selecting the [More Info] button in the Help tab.
MNT-7034	B	Spectra display is incorrect (the spectra are flashing) in the 'Hyperspectral image' view study when the spectra cannot be displayed (spectra containing unmeasured points for example).
MNT-7066	B	The 3D view study in a document exported to pdf is not the same as shown in the Mountains® document.

MNT-7071	B	The settings using the [Enhancement] button are not saved on the channels of Multi-channel image studiables.
MNT-7106	B	The numbering of the particles is different when exporting the results of the "Particle analysis" study depending on the option chosen in the dialog box of the [Export results] button (Export each result in a new row, Export all results in the same row) if previously the particles on edge have been removed from the studiable ("Remove particles on edges" option of the [Refine] button).
MNT-7124	B	The "Creation date» field (date and hour) of files in FITS format is not read correctly and its display in the Identity card study is erroneous.
MNT-7136	B	The Grid view study on a Multi-channel image studiable is not correctly displayed if the studiable has only one channel.
MNT-7146	B	Parameters "Lead angle" and "Lead depth" disappear from the table in the Lead analysis study on surface studiables if the image is hidden.
MNT-7164	B	The calculation of the "Area of the hole or a peak" in the Area of a hole study on Surface, Surface + image, Multi-channel image studiables is incorrect.
MNT-7178	B	Unavailable shapes (ellipse and custom) are not hidden in the Extract area operator on Image studiables.
MNT-7219	B	Some IV Spectroscopy image studiables of certain types of file formats are not loaded correctly.

Version 9.3.10333

What's new

Improved visibility for user consent:	In keeping with our ongoing dedication to data collection transparency, a checkbox to allow the user to accept being contacted by the software provider has been added to the "Software Maintenance Plan", "Request Extension", License Update and "Request a Quote" dialog boxes.

Bug corrections (A and B type)

	Type	Bug Description
MNT-6773	A	The primary profile parameters Psmq and Pcq are erroneous in a particular case.
MNT-6774	A	The software may crash if the overlap size is too small in the "Join two profiles" operator dialog.
MNT-6801	A	Xp, Xv, Xpt, Xvt, Wz and Xzx parameter calculation results in the Parameters table on Profile studiables may be imprecise in specific cases if the number of profile points is too low.
MNT-2136	B	The Japanese translation of "Substitute the studiable" is incorrect in the workflow, as is the name of the studiable generated by applying the "3D reconstruction using four quadrant images" operator.
MNT-5922	B	The representations in the 3D View study are not correct when printing or saving as a PDF document compared to their representation in the Mountains® document.
MNT-6358	B	The preview of the extracted contour can be incorrect in the "Extract planar contour" operator dialog on a high resolution studiable.
MNT-6481	B	A series of spectrum curves are displayed in the "Summary of current operator" study after applying the "Extract individual spectrum curve" operator on spectrum curve studiables (instead of displaying the default "Spectrum curve" analysis study of the extracted curve). This also applies to IV spectrum curves and Series of force curves studiables.
MNT-6453	B	The "Average components" result studiable generated by applying the Extract area operator on an "IV spectroscopy image" studiable contains series of spectrum curves of several signals (instead of the series of spectrum curves of the selected signal only) when the "k-means" or "PCA + kmeans" methods is selected in the operator dialog if the IV curve studiable contains multiple signals.
MNT-6541	B	The two Surface studiables are not aligned correctly after applying the "Align to create a thickness layers pair" operator when using the "Point positioning method" if the surfaces have a different size in X and in Y.
MNT-6608	B	The software cannot detect a valid network license if there is an obsolete software-based protection key (such as an obsolete free trial license) installed on the user's PC.
MNT-6627	B	Thumbnails of EDS data are not displayed in the correct order in H5OINA datasets.

MNT-6678	B	The option "Split selected particles" in the "Merge or split" operator dialog box on a particle analysis study is not taken into account when the selection is validated.
MNT-6694	B	A memory leak may occur on very large or long repetitions when using a template environment via a command file.
MNT-6732	B	The parameters header is repeated for each document in the exported CSV file when applying a template on Profile studiables with the option to export results if there are tolerances in the document.
MNT-6756	B	The Japanese translation of the "Merge or Split" tootip in the Particles analysis menu is incorrect.
MNT-6806	B	The individual results of the elements of a Series of force curve studiables are not exported.
MNT-6810	B	It is not possible to export a new set of results to a server having a "." character in the server's name.
MNT-6842	B	The changes using the Enhancement button on Multi-channel image studiables do not apply to the Grid view study (applies only to the thumbnails).
MNT-6868	B	The background logo in the generated PDF document is not that of the template when applying a Template on a folder.
MNT-6879	B	"Approach" and "Retract" options in the "Segment to fit" drop-down list box in the "Configuration of the indentation model" dialog box on force curve studiables are reversed in the Japanese translation.
MNT-6886	B	Some links in the Reference Guide to blog posts on the Digital Surf website do not work.
MNT-6890	B	The value of the "Max caliber" parameter in the Fiber analysis study is erroneous in a particular case.
MNT-6893	B	The junction of segments is erroneous in the Advanced contour study if the segments have been created in different spaces (due to a modification of the offset or the alignment of the views).
MNT-6924	B	Structures manually selected in the Detect Structures operator on Surface and Surface Series studies are lost after saving the document and reloading it.
MNT-6951	B	Explanation of measurement parameters in the Identity card study is not interpreted and displayed correctly.

Version 9.3.10281

What's new

Identification of spectra using KnowItAll software	It is now possible to export the current Spectrum curve to KnowItAll software for an identification. This is available for the current spectrum in the "Spectum curve analysis" and "'Hyperspectral image' view" studies. The user can choose the acquisition technique for the export (Raman, Near IR, IR, UV-vs). The KnowItAll software will then perform a reference spectrum search in the corresponding database.
Updated Reference Guide	The Reference Guide has been completed and translated. It is available in English, German, French, and Japanese.

Bug corrections (A and B type)

	Type	Bug Description
MNT-6655	A	It is not possible to load documents containing Advanced contour studies in some rare cases containing specific types of construction.
MNT-6485	B	The calculation of the spherical caps is incorrect in the Particle analysis study on Surface studiables if the surface contains non-measured points.
MNT-6532	B	Some units and information on Spectrum curve and Hyperspectral image studiables are incorrect or lost after saving them in SPC format then reloading them.
MNT-6553	B	The calculation of the spherical caps is incorrect in the Particle analysis study on Surface studiables if the surface has a different spacing in X and in Y.
MNT-6566	B	It is not possible to use the Result picker in the "Extract areas" operator dialog box on Profile studiables if the "Length" fields result is selected in the Position section.
MNT-6589	B	Only the first force curve result is reported when exporting the results of a series of force curves studiables from the Result manager or applying a template and requesting the export of results.
MNT-6595	B	Circular and Custom profile extractions can be visible but unusable in the Extract profile operator (or as a Quick extraction operator) on Surface studiables if the product does not include these features.
MNT-6596	B	The preview of a circular extraction in the Extract profile operator dialog on surface studiables is incorrect when recalling the operator if the profile has been created using the Quick extraction operator and the surface is not square-shaped.
MNT-6601	B	The "Create highest point" and "Create lowest point" tools in the Contour analysis study on Profile studiables are always disabled.
MNT-6617	B	The error message displayed when installing a software-based license on a virtual machine is not helpful.
MNT-6638	B	The palette of the 3D view of the Thickness study on Surface layers is incorrect in a particular case.

Version 9.3.10249

What's new

	Especially useful for SEM users:
	NEW Fiber analysis
New Fiber analysis study on Images	The new Fiber analysis study detects and quantifies crossing and interwining fibers on a grayscale image, obtained with a SEM or an optical microscope. You can calculate global results on the **fibers** and **interstices** of the image (e.g., mean diameter), or individual results for a selected fiber segment or interstice. Several detection methods are available according to the type of image (Light fibers on dark background, dark fibers on light background, fibers with dark center and light edges (typical of SEM-SE images) and fibers showing in gray on gray (typical of SEM-BSE images)). Each method has a setting dialog to adjust detection.
Global parameters in Fiber analysis study	The Fiber analysis study table can display global parameters on fibers and interstices identified in the image: Mean diameter of fibers, Fiber diameter standard deviation, Min diameter of fibers, Max diameter of fibers, Fiber coverage, Interstice coverage.
Histogram of diameters in Fiber analysis study	The Fiber analysis study displays a histogram of the fiber diameters along all of the detected segments. If the user clicks on a fiber segment (on an image), its contribution to the histogram will be highlighted in the histogram.
Individual fiber parameters in Fiber analysis study	The Fiber analysis study table can display individual parameters on fibers segments detected in the image: Mean diameter, Diameter standard deviation, Orientation, Segment length.
Individual interstice parameters in Fiber analysis study	The Fiber analysis study table can display individual parameters on interstices detected in the image: Area, Equivalent diameter, Maximum caliber, Inscribed circle diameter.
Interactive fiber and interstice selection	It is possible to click on an image to select an individual fiber segment or interstice in the Fiber analysis study: The element is highlighted in the images and the result line is highlighted in the table of the study. Conversely, the user can click on a fiber line or an interstice line in the table, to highlight the same in the images.
Split interstice in Fiber analysis	An option to "split interstices having a narrowing" is available, in order to better represent the actual filtering abilities of interstices. This will replace the narrowest interstice straits with isthmuses.

Image display in Fiber analysis study	You need to choose to display one or two image frames in the Fiber analysis study. Each frame can represent one of the following:
	• the raw image,
	• an image illustrating an intermediate step in the calculation of the results (Binarized image, Distance map image, and Segmentation image),
	• or a final result image: Diameter image or Directional image.
	  - The Diameter image shows segments with a solid color depending on average diameter, and
	  - the Directional image shows all fibers with pixel colors depending on the local fiber direction.

	Especially useful for Spectroscopy users:
Spectrum curve and Hyperspectral image saved in SPC file format	It is now possible to save Spectrum curve and Hyperspectral image studiables in the SPC file format.

	Useful for all users
Display of tolerance limit in contour deviation	It is now possible to display or hide the values of the tolerance limits defined on the deviations in the Advanced contour analysis study.
Parameters table on Surfaces in ISO 25178 standard: S-filter performed before F-operator	The S-filter is now performed before the F-filtering operation in the Parameters table on Surface studiables when the ISO 25178 standard is selected for primary or roughness surfaces.
Parameters table on Profiles in ISO 21920 standard: S-filter performed before F-operator	The S-filter is now performed before the F-filtering operation in the Parameters table on Profile studiables when the ISO 21920 standard is selected for primary or roughness profiles.
Redirection to Digital Surf web site for the update of the security key drivers	The user is now redirected to the Digital Surf web site when the drivers for his security key have to be updated.

Bug corrections (A and B type)

	Type	Bug Description
MNT-6316	A	Intermittent crashes may occur when computing parameters on shells
MNT-6351	A	The "Add limited residue profile" tool in the Advanced contour analysis study on Profile studiables sometimes does not work.
MNT-6308	B	The values of the "Max caliber" parameter are erroneous in the Particle analysis study on Surface, Image and Multi-channel image studiables.
MNT-6340	B	Calculation of Flatness parameters according to ISO 12781 can take far too much time under certain conditions.
MNT-6389	B	The display of STRx Straightness parameters on profiles according to ISO 12780 is lost from the table of results when reloading the document.
MNT-6416	B	The parameters header is repeated for each document in the exported CSV file when applying a template on Profile studiables with the export of results option.
MNT-6426	B	Loading a Multi-channel cube from a series of images studiable is incorrect if the Resampling option has been applied.
MNT-6427	B	The "Use calibration" option of the Advanced calibration group is grayed out and the "Remove slope" of the "General shape correction" group is checked in the "3D reconstruction using four quadrant images" operator's dialog box when loading documents created using an old version and that use advanced calibration contexts for four-image reconstruction.
MNT-6440	B	There is an error in the association of the images with the "Rotate image detectors" in the "3D reconstruction using four quadrant images" operator on RGB Image studiables after clicking on the Suggest button when switching between 'plus' and 'cross' organization.

Version 9.3.10200

Bug corrections (A and B type)

	Type	Bug Description
MNT-6293	A	V9.3 cannot be launched on a network license key in some cases.
MNT-6309	A	The offline extension of a Free trial license soft key is not possible if the license was activated offline with a P2V/P2C exchange.
MNT-6339	A	The software crashes when a study containing a parametric profile is duplicated.
MNT-5510	B	The list of "Available Force Curves" in the "Add/Remove Force Curve" and "Create Force Curve series" operator dialog boxes is not complete and doesn't show all available series in the document.
MNT-6184	B	Point cloud studiables containing color information are not loaded with their colors.
MNT-6253	B	The "Lead analysis" representation is displayed completely black in the Lead analysis study on Surface studiables.
MNT-6258	B	Launching the software may take up to two minutes longer than normal if there is no internet connection or access to the license server.
MNT-6275	B	The threshold bar is always set to zero in the Threshold method dialog box of the Particle analysis study on Surface and Image studiables.
MNT-6290	B	Minidocs that contain studies which generate studiables cannot be applied to their respective studiable types.
MNT-6317	B	The use of series of values in a statistical document is not possible when creating a population in this statistical document.

What's new in 9.3

	Generic tools useful for all users:
	Smoother template application
Deactivation of document saving in Template	It is now possible to disable saving of documents generated by the template application (simple template or template on a folder), and therefore not crowding memory space when only numerical results (or exported files) are of interest.
Handling long name in Template	Generation of documents in a template environment is no longer blocked if the file path and name is too long. An informative message is displayed at the top of documents, and all documents are created anyway with a truncated name.
	Preferred study
Preferred study	The user can now choose which study to visualize in the document when loading a studiable and applying an operator. The user can also choose not to display any study (for further Minidoc application for example). Thus, if the user has a preferred often-used study, this new preference allows the studiable to be directly displayed in this chosen study (ex: 3D view, Step height…). It is possible to reset to the factory settings.
	Tolerance and result picker
Result pickers to manage tolerance limits	You can now insert Result pickers in "Define Tolerance limits "dialogs, in order to use numerical results from the Result manager. Typically, you can create a variable containing a tolerance value, and use this variable in several Tolerance limits dialogs. If you study another part with another tolerance, when you change the variable, all the tolerances are smoothly updated. If a result picker is used for a tolerance, its parameter name is displayed instead of the tolerance value. The result pickers can be used in Tolerance limits of the result manager, and in the Tolerance limits, the Advanced contour analysis and the Table of results studies.
Clickable warning in Tolerance limits	A warning is displayed in the Tolerance limits study when a tolerance is set to an invalid result. A clickable tooltip message is then displayed in the study. It indicates the name of the result(s) causing the problem. The user can thus switch to the Define tolerance limits dialog for correction. A warning icon and a message appear in the workflow too.

Warning panel for invalid tolerance	A warning panel sign is now displayed in the Result manager and in the Results table to highlight an out of limits or invalid tolerance.

Aggregation of series of results in statistical document

Aggregation of series of results in a statistical document	The user can now aggregate the series of results of a study from different documents in a single statistical document. This allows the calculation of statistical parameters on all the individual values in the documents. Typically, it is now possible to measure a sample at several locations, create one template document containing, for example, a Particle analysis study, apply this template for all locations, and then create a statistical document in order to display in Statistical summary, the mean and the standard deviation of all the individual particles detected in all documents. Individual values can all be displayed in a Control Chart (identified by document or not), or included in Histogram, Box plot or Scatter plot studies. The individual values can be filtered (included/excluded) according to a particle classification or a text parameter, provided that the classification names are identical in all the documents of the population.
Visibility of individual series values in statistical documents	The series of values are now accessible in the Result manager of the statistical document, and can then be monitored using Tolerance limits, or exported. (Series of values are generated for example by Particles study, Step height study on profile or Parameters table on profile series).

Number of valid values in statistic parameters

Number of valid values in statistics	"Values" has been added to statistical parameters. It contains the number of valid values, that is to say the number of elements of the series on which a parameter can be calculated (for example the number of particles on which it is possible to calculate a radius, or the number of profiles of the series on which it is possible to calculate a particular parameter, or the number of force curves on which it is possible to calculate a Young's modulus result). For statistical documents, it represents the number of documents with a calculated value on the observed parameter in the observed frame. It is available in studies generating series of results (Parameters table on series, Particles, Step heights on profiles, Force curve series, Spectra) and in the Statistical summary in the Results tab. It is also available in the Statistical summary in statistical documents.
Export only valid results from Series	For studies generating series of results, invalid results or results from an empty element may not be exported anymore. This simplifies the export file to make the further analysis easier for the user. This includes parameters that are not calculable on certain particles (Radius of spherical caps when the particle is not spherical, Skeleton length, ...), or indentation that is not calculable on some Force curves, Missing peaks on some spectra, etc.

Improved usability of multiple substitution

Button for multiple substitution	Direct access to Multiple substitution has been added in the Studiable menu, in the Workflow toolbar and in the contextual Workflow menu.
Contextual access to multiple substitution	The Substitution of several root studiables dialog is now opened when performing substitution (Substitute button in the Studiable menu, or Click on a root studiable icon) when the user Drags and drops several files from the File explorer to one of the workflow root studiables, or has selected several studies of several root studiables, or has selected a study on a studiable generated from several root studiables, or has selected several studies generated from several root studiables.

Miscellaneous

Collapse/Expand all in Workflow	Collapse/Expand all buttons have been added in the workflow toolbar for a better navigation in the workflow.
Small reorganization of the ribbons	The "Threshold using channel" button has been moved in the "Correct" group of the Operators menu for Surface + image and Multi-channel image studiables. The "Select results to export" button now appears as a button in the Export group of the Results ribbon to facilitate export management for the user. The buttons of the "Monitoring of results" group in the Results tab have been reorganized to follow the steps of work on Tolerance limits (in order: Define Tolerance limits, Tolerance limits, Table of results).

Faster calculations in Rotate and Mirror operators	Calculations have been optimized in the Rotate and Mirror operators on Surface studiables. This is particularly observed on large studiables.
Faster Abbott curve calculations	Abbott curve calculations are now faster. This is particularly observed on large Profile and Surface studiables. The increase in computation speed is also observed wherever this type of computation is used.
Faster rectangular selection	Rectangular selection area has been optimized. It is particularly visible in the Extract areas operator on large datasets.
Optimized calculation time for Feature parameters of ISO 25178	The time needed for calculation of the Feature parameters according to ISO 25178 (for surfaces) has been reduced.

Specific tools useful for all users:

Result picker in Particles

Result picker in Particle analysis study	A new result picker has been added for threshold detection in the "Particle analysis" study. This allows greater flexibility in an automated environment.

Metric unit and developed area in Slices

Metric values in Slices study	Surface and volume parameters are now available in metric units (and not only in percentages) in the Slices study on Surface, Surface + image, Multi-channel image studiables. Some parameters have been renamed.
Developed area in Slices study	"Developed area" parameter is now available in the Slices study on Surface, Surface + image, Multi-channel image studiables.

Improved usability of Colocalization

Default positioning in Colocalization	The Positioning section of the Add/Remove overlay dialog of the Colocalization study allows the user to directly understand the default positioning method (Use Absolute Values) and, if necessary, change it immediately when adding overlays.
Warning for disparate position in Colocalization	A warning message is now displayed in the add/remove overlay dialog of the Colocalization study when the XY offsets of the background and the overlay(s) are very different.
"Center with the background" in Colocalization	The new "Center with the background" button in the Colocalization study allows the user to center the overlay on the background. Their respective sizes are preserved. The "Align with" button has been removed.
Colocalization interface corrections	In the Colocalization study, the "Add overlay" button has been renamed "Add/remove overlay". The "Select" and "Select all" buttons of the Add/Remove overlay dialog have been renamed "Add" and "Add all". The Pseudo-color and Composite rendering buttons have been moved to the "Rendering" group.
Colocalization enhancements for all supported studiables	The enhancements listed above are available for all studiable types supporting colocalization: Surface, Image, Surface + image, Series of images, Multi-channel image).

New Grid view study on Series of profiles

New Grid view study on Series of profiles	The Grid view study on Series of profiles studiables allows the user to view the profiles of a series side by side. The user can choose the number of columns and rows to display.

Miscellaneous

Absolute coordinate on MCI creation	The "Use X/Y offsets" checkbox is now selected by default in the "Add/remove channel" operator on Multi-channel images. This checkbox is also selected by default in the "Create multi-channel image" operator on Surface and Image studiables.
Improved ergonomy in Furrows	By default, the threshold is set to 50% in the Furrows study dialog, if one of the two settings ("Keep only secondary furrows" and "Keep only main furrows") is checked. Threshold bar has been removed when the "Keep all furrows" option is checked. Settings have been renamed in the Separation of furrows dialog.

Useful for Fourier frequency spectrum users:

Automation and usability in Filter the spectrum on surfaces

Wavelength filtering on "Filter the spectrum" operator on Surfaces	It is now possible to directly filter the wavelengths in the "Filter the spectrum" operator on Surfaces. Low pass, High pass, Band pass and Band reject filters are available. The wavelength values are kept even after the modification of the source studiable (workflow upstream change, or automation).
Enhanced inclusion and exclusion tools in "Filter the spectrum" operator on Surfaces	Improved drawing tools allow the user to define the included and excluded frequencies more ergonomically, and refine the selection when recalling the operator. The wavelength and direction values are kept even after the modification of the source studiable (Upstream workflow change, or automation).
Frequency spectrum understanding in "Filter the spectrum" operator on Surfaces	The user can now see cursor coordinates (Wavelength and Angle) when hovering over the FFT spectrum, allowing a better understanding of this spectrum display.
Frequency spectrum preview enhancements in "Filter the spectrum" operator on Surfaces	To highlight either low or high amplitude frequencies, new options for the magnitude values in Z of the frequency spectrum have been added: Square root and Power. Windowing functions now allow the user to remove a central band effect.
Redesigned dialog box in "Filter the spectrum" operator on Surfaces	The operator dialog box has been redesigned to meet dialog box design criteria for the Filter the spectrum operator.
Surface and Multi-channel studiables in "Filter the spectrum" operator.	The enhancements of the "Filter the spectrum" operator are available on surface and on Multi-channel image studiables.

Automation and usability in Threshold the spectrum

High magnitude threshold in Threshold the spectrum operator	An added High slider in distribution of the frequency spectrum now allows the user to define included magnitude bands in Threshold the spectrum operator dialog on surface and Multi-channel image studiables.
Automation management in Threshold the spectrum operator	The automation environment is better taken into account in the Threshold the spectrum operator on surfaces and MCIs. The values entered in the threshold are now the unit kept as instructions after the modification of the source studiable (workflow upstream change, or automation). You can define the threshold in magnitude value (Linear, Square root or Power), or in comparison ratio with the highest magnitude frequency (Linear normalized, Logarithmic).
Frequency spectrum preview enhancements in Threshold the spectrum operator dialog	New options for the Z-scale have been added to improve visualization in Frequency spectrum, in the Threshold the spectrum operator dialog on surface and MCI studiables: Square root highlights low magnitude frequencies, Power highlights high magnitude frequencies. The Window function can reduce band effects of the frequency spectrum. It is also now possible to zoom in the visualization of the frequency spectrum.
Understanding of Threshold the spectrum operator	Titles are displayed on the distribution of the frequency spectrum in Threshold the spectrum operator on surface and MCI. It improves operator understanding.

Automation and usability in Filter the spectrum on profiles

Redesigned dialog box for "Filter the spectrum" operator on Profiles	Drawing tools have been added in the Threshold the spectrum operator on Profile studiables to include/exclude frequencies and to define the frequencies included in the filtered profile more ergonomically.
Frequency spectrum preview enhancements in "Filter the spectrum" operator on Profiles	New options for the Z-scale have been added to improve visualization in Frequency spectrum in the Filter the spectrum operator dialog on profiles. "Square root" highlights low magnitude frequencies, "Power" highlights high magnitude frequencies. Titles are displayed on axes to improve operator understanding.

Especially useful for SPM users:

Frequency spectrum for Lattice refinement and automation

Lateral calibration renamed "Lattice" study	The Lateral calibration study has been renamed "Lattice and lateral calibration".

Frequency spectrum for unit cell selection in Lattice study	It is now possible to use the Frequency spectrum to accurately fine tune the unit cell size and geometry of a surface with repeating patterns in the Lattice study. Using the new "Adjust unit cell" button dialog box, the user can define the Unit cell from 2 peaks of the frequency spectrum, in a personalized, precise and mathematical way. The corresponding lattice is displayed in real time on the surface. The effective calculation is performed sub-pixel to maintain good precision.
Automatic recalculation for automation in the Lattice study	An Automatic recalculation setting is now available in the Lattice studyin order to enable the recalculation of the suggested unit cell after the modification of the source studiable (upstream workflow change, or automation).
Improved display in the Lattice study	The "Show errors" button has been added in the Lattice study: This allows the user to choose whether to display the X/Y linearity errors curves or not. Only the principal parameters are now displayed by default.
Reorganized ribbon in the Lattice study	Three buttons have been reorganized in the ribbon of the Lattice study to represent the workflow from left to right: Suggest Unit cell, Adjust Unit cell and Save correction settings. The button "Reset Unit cell" has been renamed "Suggest unit cell". The button "Reference values" has been replaced by the "Adjust unit cell" button.

Force curves

Stiffness calculation in Force curve analysis study	You can now calculate stiffness values in the Force curve analysis study. The stiffness value is the slope of the linear regression line on a defined portion of the approach segment on a Force-Separation graph. The considered portion can be defined as a percentage of the Maximum Indentation Force or in Newtons.
New "Convert into series" operator for Force-volumes	A new operator (Convert into series) converts a Force-Volume into a Series of force-curves studiable. This allows combination of force-curves from several measurements at a later time, for comparison or to calculate statistics.
Transmission of indentation settings by "Sort by a parameter" operator	The application of the "Sort by a parameter" operator on "Force curve"-type studiables now always displays a "Force curve analysis" study in the document. On its creation, this study has the same indentation analysis settings as the study selected in the "Parameter for sorting" section of the operator dialog. This saves time and avoids the need to enter the settings again.
Information on Indentation	Two new "Tip shape" and "Tip radius" (or "Half pyramid angle") parameters are now available in the "Indentation parameters" group on "Force curve"-type studiables, allowing the user to display information about the indentation model used.
Pixel coordinates in Force volumes	The user can now choose to display the coordinates of the pixel/cursor in the Force volume study.

Cursor navigation in IV image view study

Single curve display in IV image view study	It is now possible to visualize a single curve in the IV image view study using a movable cursor on the image. This allows the user to directly navigate among the IV curves and discover their aspect. The cursor can be accompanied by a label showing position coordinates (in pixel or metric units). The curve number is also shown in the label when the cursor is moved. This cursor and its associated single curve are displayed by default but can be hidden.
Dissociation of Image and curves display in IV image view study	The display setting of the image and of the curves have been dissociated in IV image view study. The new [IV image view] button has been added in the IV image view ribbon to select image display mode. The new [Curves to show] button has been added in the IV image view ribbon to select curve display mode. It is also possible not to display curves.

Multi-signal view in IV curve analysis study

Simultaneous display of signals in IV curves analysis study	The user can now display several signals simultaneously in the IV curves analysis study using the new [Multi-channel view] button. This is useful for comparisons of the measurement signals. Checkboxes in the thumbnails allow the user to select the signal(s) to show.
Channel thumbnails in IV curves analysis study	The user can navigate more easily from one channel to another using the thumbnails added in the IV curves analysis study on IV curve and IV spectroscopy image studiables.

Z Axis of two channels in IV curves analysis study	Two separate Z axes can be displayed with their names, their own Z-scale range, and their respective color if two channels are selected in the IV curves analysis study.
Common Z-scale in IV curve analysis study	It is now possible to use a common Z-scale for selected channels of the same unit in the IV curve analysis study on IV curve and IV spectroscopy image studiables. The option allows the user to apply a common scale to several signals displayed simultaneously in order to compare them.
Current curve style in IV curve analysis study	It is now possible not to lose user-defined style settings of a curve when it is the current selected curve. (For example, the user can define curve 1 in blue and curve 2 in red, and increase the thickness of the current curve. When the selected curve is 2, this curve will be displayed in the selected thickness but still in red). To allow this, the user can now choose a "no element" option for color, thickness or line style for the current curve.
Curve style access in IV curve analysis study	The user now has a direct access to the channel to be set in the Style of curves dialog. Settings to display the current curve, all curves, envelope and mean value are also available in this dialog.
Multi-signal view for IV spectroscopy images	The above Multi-signal view enhancements are available in the IV curve analysis study for both IV curve studiables and IV spectroscopy image studiables.
	Scale the signal for IV images
"Scale the signal" operator extended to IV spectroscopy images	The "Scale the signal" already available for the IV curves operator has been extended to IV spectroscopy images.
	New "Convert into a series" operator for IV
New "Convert into series" operator for IV spectroscopy images	A new operator (Convert into series) converts an IV spectroscopy image into an IV curves studiable containing a Series of spectra. This allows later combination of IV curves from several measurements for comparison or to calculate statistics.
Edit axes operator extended for IV studiables	The Edit axes operator is now available on IV curve and IV spectroscopy image studiables.
	MCI generated by spectral map creation
MCI from "Extract components" operator	A Multi-channel image studiable is now generated by the Extract components operator on IV spectroscopy image studiables (and no longer a series). An MCI studiable gives more possibility for visualization, colocalization or data processing. When opening documents created with a previous version, series are still generated to keep compatibility (a user information dialog is displayed). The operator dialog box has been redesigned to meet dialog box design criteria.
MCI from "Create correlation maps" operator	Similarly to the "Extract component" operator described above, the "Create correlation maps" operator on IV spectroscopy image studiables now generates Multi-channel images. The user can choose to create non-measured points instead of points at the 0 value. He can also choose to apply the same correlation threshold to all spectra.
	Especially useful for SEM users:
	Innovative method and interface of the four-image reconstruction operator
Objects on a flat background in "Four image reconstruction" operator	A new innovative reconstruction method for images containing objects on a flat background is now available in the "Four image reconstruction" operator on SEM images. This allows accurate determination of the topography of the upper part of objects on a flat background, even if their edges contain slopes bigger than 45 degrees.
Rotate source images in Four image reconstruction operator	It is now possible to automatically calculate or to enter a custom angle for image detector position in the "Four image reconstruction" operator on SEM images. This allows the user to manage apparent non-orthogonal angular positions of the 4-quadrant detectors, such as beam torsion effects generated by the magnetic lenses.
3 color channels in Four image reconstruction operator	In post-processing, the image supplied with the topography can now be colorized using three colors (previously only two) in the "Four image reconstruction" operator on SEM images.

Redesigned dialog box in "Four image reconstruction" operator	The dialog of the "Four image reconstruction" operator has been reorganized for a clearer presentation.
	Miscellaneous
Thumbnail size reduced in Stereoscopic reconstruction operator	The thumbnail size in the preview of the Stereoscopic reconstruction operator has been reduced for better viewing.
Faster loading and calculations in the studies on Multi-channel cubes	You now benefit from a better user experience when using multichannel cube studiables. Monochannel cubes with a resolution of 1024*1024*1024 (1 Giga voxel) can be handled in a more reactive interface.

Especially useful for Spectroscopy users:

	Cursor navigation in the Hyperspectral image view study
Cursor navigation for Hyperspectral images	The cursor navigation enhancements listed previously for IV curves analysis study are also available for Hyperspectral image views on Hyperspectral images.
	New "Normalize spectrum curves" operator
New Normalize spectrum curves operator	The new "Normalize spectrum curves" operator allows the user to equalize the importance of the different spectrum curves. The user can choose between different normalization methods (Max intensity, Custom zone, SNV (Standard Normal Variate), Area). It is possible to normalize an area. This applies to the Spectrum curve and Hyperspectral image studiables.
	New "Use reference spectra" operator
New "Use reference spectra" operator	The new "Use reference spectra" operator has been designed to quantify the composition of the studiable by linear combination of reference spectra. It generates a Multi-channel image, each channel contains an abundance map corresponding to a reference spectrum. The user can also generate a residue map. This applies to Hyperspectral image and IV spectroscopy image studiables.
	New "Convert into Series" operator
New "Convert into series" operator for Hyperspectral images	A new operator (Convert into series) converts a Hyperspectral image into a spectrum curve studiable containing a Series of spectra.
	MCI generated by Spectral maps creation
"Create density maps" operator renamed	The "Create density maps" operator has been renamed "Create correlation maps" operator.
MCI from "Extract components" operator	A Multi-channel image studiable is now generated by the Extract components operator on hyperspectral images (and no longer a series). An MCI studiable gives more possibility of visualization, colocalization or data processing. When opening documents created with a previous version, series are still generated to keep compatibility (a user information dialog is displayed). The operator dialog box has been redesigned to meet dialog box design criteria.
MCI from "Create correlation maps" operator	Similarly, to the "Extract component" operator described above, the "Create correlation maps" operator on hyperspectral images now generates Multi-channel images. The user can choose to create non-measured points instead of points at the 0 value. He can also choose to apply the same correlation threshold to all spectra.
	Edit axes for spectrum curves
Edit axes operator extended for spectrum curves	The Edit axes operator is now available on Spectrum curve and Hyperspectral image studiables.
	Multi-signal view in the spectrum curve analysis study
Multi-signal view for Spectrum curves and Hyperspectral images	The Multi-signal view enhancements listed above for the IV curves analysis study are also available for the Spectrum curve analysis study on Spectrum curves and Hyperspectral images.

	Display optimization
Spectra display optimization	The display of all the spectrum curves in the spectrum views is now done progressively in the operators. The full dialog box for the current operator is therefore displayed more quickly. It applies to all operator previews displaying spectra stacks. This progressive display of all curves also applies to the Hyperspectral image view and IV image view.
Spectral maps operator ribbon reorganization	The "Extract components" operator, the "Create correlation maps" operator and the "Use reference spectra" operator buttons are now grouped in a "Create spectral maps" group of the Operators ribbon on Hyperspectral images.
Operators ribbon reorganization for spectral studiables	The "Filter" and "Transform" groups are now merged in a "Correct" group at the beginning of the Operators ribbon for spectral studiables.
	Grayscale chemical images loaded as spectral maps
Loading grayscale chemical images as MCI	The user can now choose to load the grayscale images as spectral maps or as RGB images when loading them as a Multi-channel image (MCI) studiable (with the preference "creating a single studiable when loading similar studiables").

Especially useful for Point Cloud and Shell users:

Unfold the cylinder in shells	The user can now choose to unfold the cylinder in the "Fit a geometric form" operator. It is possible to choose the position of the meridian of origin of the unrolling, which becomes the edge of the surface. The generated result studiable is a flat shell representing the unrolled surface of the cylinder.
Color propagation in Shell Operators	Shell colors are now propagated by the Remesh, Rotation and Extract area operators in the continuation of services related to shells containing color.
Normals in Correct the shell operator	An option to change the direction of normals has been added to the "Correct the Shell" operator in order to show the normals of a mesh in the correct direction when they are incorrectly oriented.
Colored Shell from surface+image	The "Convert to Shell" operator is now available for Surface + image studiables. The color of the image layer of the surface + image is used as color attribute for the facets of the generated Shell.
Faster meshing calculations	Mesh creation calculations from a Point cloud studiable are now faster in the "Mesh the point cloud" operator.

Reference Guide and translations

Updated Reference Guide	The Reference Guide has been updated with the descriptions of the main new features and improvements. Complete translations will follow in a service pack.
Translations of user interface texts	Texts visible in the user interface related to new features have been translated into all available languages.

Bug corrections (A and B type)

	Type	Bug Description
MNT-687	B	The deletion of Series of profiles or Series of surfaces studiables in the workflow takes longer than it should.
MNT-1282	B	The "Average power spectral density (PSD)" study" entry in the Reference Guide contains a few pieces of incorrect information.
MNT-5297	B	The "Correct the shell" operator can generate meshes which remain unusable for the subsequent application of the "Remesh" and "Metrological filter" operators in some cases.
MNT-5376	B	The Bandpass-filter bank operator does not work properly if the "Preferred units" option in the Global preferences of the software is not set to "Always use millimeters (mm)".
MNT-5546	B	The suggested unit cell in the Lattice study is incorrect on a Multi-channel studiable if the two layers have different sizes.
MNT-5792	B	The result of the autocorrelation operator is imprecise and becomes increasingly more so according to the distance to the central lobe. Affects the Texture isotropy parameters on surfaces and the results of the Autocorrelation operator on Profile, Surface and Multi-channel image studiables.
MNT-5874	B	It is not possible to apply operators or studies in batch when loading multiple studiables or creating multiple studies (only the last studiable/study loaded/created) is selected in the workflow).
MNT-5992	B	The order for the addition of overlays is incorrect in the "Add/remove overlay" button dialog box in the Colocalization ribbon for Image, Surface, and Multi-channel image studiables.
MNT-6064	B	The "Apply a template" dialog remains open if a file access error occurs during the application of the template on a folder.
MNT-6177	B	Deleting one of the "Fit a form" or "Metrological filter" operator's result studies in the workflow is not taken into account when the operator is recalled.
MNT-6185	B	The original overlay in a Colocalization study is preselected, which renders visualisation of the addition of a new overlay (using the "Add/remove overlay" function) difficult.

Version 9.2.10170

What's new

Non-measured points color changeable in 3D view study on Multi-channel image	A [Non-measured points (NM)] button has been added in the "3D view study" ribbon on the Multichannel image studiable. The user can thus now change the color of the Non-measured points.

Bug corrections (A and B type)

	Type	Bug Description
MNT-5161	A	The software may crash when loading or substituting a Shell studiable if the studiable is large and the Direct3D rendering option is used.
MNT-5816	A	The software may crash when applying the "Correlation averaging" operator on a Surface studiable if there is not enough available memory needed for the operation.
MNT-6038	A	document created in v9.1 containing a Particle analysis study using the "Segmentation by dominant channel" method may not load in v9.2.
MNT-6063	A	The XVo parameter unit on Profile studiables is always calculated in mm3/mm2 but displayed following the user preferences, leading to values incorrectly displayed by a factor of 1 000 or 1 000 000.
MNT-6196	A	Pp, Pv, Pz and Pzx parameters of ISO 21920 standard can be erroneous when loading documents created in a version prior to v9.2.2.
MNT-4330	B	The Time out zone in the "Information about current license" dialog box is not taken into account when launching Mountains with HASP v8.21 drivers and a network dongle.
MNT-5364	B	Z axis scaling and X axis offset could be wrong when loading a X3P format file.
MNT-5365	B	Min and max points can be moved in the 3D view display of the Thickness analysis study.
MNT-5423	B	The export results of the current item does not work properly for Series of profiles and Series of force curves studiables.
MNT-5628	B	It is not possible to manipulate the handles (showing the extraction planes) in the Source display of the "Extract parametric profile" operator dialog box on Shell studiables.
MNT-5988	B	The image exported from a Histogram study always has the same name when applying a template. (The file is overwritten every time the template is applied.)
MNT-6007	B	The selection area does not work properly in the" Sort spectrum curves" operator when zooming in the Spectrum curve analysis study.
MNT-6008	B	All the statistical parameters of the Control chart study in a statistical document are displayed as repetitions of the first selected statistical parameter.
MNT-6010	B	Some custom or factory settings are not working anymore in the Parameters table study on Surface, Surface + image, Multi-channel image studiables.

MNT-6041	B	The statistical definitions of the statistics synthesis document are not updated when the populations are modified outside of the statistical synthesis document.
MNT-6087	B	The classification is not displayed in the Table of results in the Particle analysis study when selecting the [Particle classification button] if deleting some particles. The classification is also not displayed when using the Undo/redo button.
MNT-6174	B	Point cloud studiables in SDF format may not have correct axis information when loaded.
MNT-6180	B	All elements built after a duplication of a Contour study can be invalid in the new study when this study is applied on a profile with the "profile matching" option activated.
MNT-6207	B	The Y-spacing is not correctly taken into account in the "Bandpass-filter bank" operator for the calculation of the smallest wavelength to use on Surface studiables.
MNT-6210	B	Applying the Extract profile operator on high resolution Surface studiables can take an exaggerated amount of time if selecting the Custom mode of the Extraction type option in the operator dialog box.

What's new

2D parameters in the Advanced Contour study	All profile parameters available in the Parameters table study can now also be calculated in the Residue dialog box in the Advanced contour study.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4971	A	The "Section length" parameters in the ISO-21920-2 standard (Rp, Rpt, Rv, Rvt, Rz, Rzx) on Profile studiables are not calculated according to the definition of peaks and pits.
MNT-5326	A	The "Calculate Derivatives" operator on Hyperspectral image studiables gives inconsistent results when recalling it in the workflow and validating the dialog box without modification.
MNT-5342	A	Peak parameters according to ISO-21920-2 on the Primary profile (Pp, Ppt, Pv, Pvt, Pz, Pzx) on Profile studiables were not calculated on section lengths (Evaluation length/5).
MNT-5548	A	The result of the ISO 21920 Pal, Ral, Wal parameters calculation on Profile studiables is erroneous.
MNT-5624	A	The Extracted area outline is neither visible nor modifiable in the Extract area operator on Image and Series of images studiables when substituting the studiable or applying a template on the document if the outline touches the edge in the original operation.
MNT-5688	A	The Weighted by area display of the Histogram study on multiple "Particle analysis" results is incorrect.
MNT-5700	A	Image files in EMC format are not displayed at the correct scale.
MNT-5760	A	The extracted area outline is neither visible nor modifiable in the Extract area operator on Surface studiables when recalling the "Extract area" operator if the outline touches the edge in the original operation.
MNT-5849	A	Applying the "Filter the spectrum" operator on Surface and Multi-channel image studiables generates an empty (black) study if only one of the two studies (Filtered surface, Residue of filtering) is selected in the dialog box of the operator.
MNT-5921	A	Points of the selected outline in operators incuding Extract area on Surface studiables may be outside the range of the studiable on a second screen with a different resolution. The outlines disappear when recalling the operator.
MNT-4409	B	The weight of the surface area is not taken into account in the Histogram study when the normal curve generated from the Particles analysis study on Surface or Image studiables is displayed and when the "weighted by area" mode is selected.
MNT-4582	B	The results of applying the "Remove outliers" operator are different in the "Pseudo-Color View" to that of the "Grid View" study when factory settings are applied for Surface + image studiables.
MNT-4681	B	Moving the separator between the Results table and the image in the "Particle analysis", "Manuel measurement", "Thickness analysis" and "Wear or deposit analysis" studies on Surface studiables does not work properly if a high-resolution screen is used.

MNT-4918	B	The display resolution of the generated Dynamic image studiable of a Colocalization study is incorrect when zooming simultaneously on the True color view study and the Colocalization study.
MNT-5285	B	The "Detect structures" operator on a Surface studiable does not correctly detect elements when substituting the studiable.
MNT-5389	B	Scaling correction parameters set in the Lateral calibration study (unit cell detection) on Surface studiables are incorrectly applied to the surface in the "Apply lateral corrections" operator.
MNT-5428	B	It is not possible to display/hide the Color scale or to change the palette in the Particle analysis study on Surface studiables.
MNT-5460	B	The "Shift profiles" operator on Series of profiles studiables does not give the best result if there is a large overlap over the selected zone.
MNT-5483	B	Visualization settings for a class are not saved in the Particle analysis study on Image studiables when saving and reopening a document or substituting the studiable if the 'SEM-BSE'-segmentation method is selected.
MNT-5498	B	Changes of the coordinates in the "Edit a built point on the profile" dialog box in the Advanced contour analysis study on Profile studiables are not taken into account after validation of the dialog box
MNT-5551	B	The names of the Statistical parameters Decile 1 to Decile 9 in the "Select parameters" dialog box of the studies are incorrect.
MNT-5641	B	The « Quick pre-processing operators » are not applied with their good settings when applied from the « Quick pre-processing operators » button of the studies' ribbons. Applies to Surface, Serie of surface, Surface + Image, Multi-channel image, Image, Profile, Series of profiles studiables.
MNT-5647	B	The residue inset is not stably positioned in the Advanced contour study on Profile studiables when substituting the studiable or reloading a document. Particularly visible after using an alignment and/or the use of a non-orthonormal display.
MNT-5656	B	All curves composing the series are not displayed in the Normalized view study on Spectrum curve studiables if the "All curves" button has been deselected in the Spectrum curve analysis study.
MNT-5745	B	The results of the Level operator might alter when loading a document created in V8 if a Structure exclusion function is used and the dialog box is validated after recalling the operator. Applies to Surface, Surface + image and Multi-channel image type studiables.
MNT-5755	B	The Z offset of the roughness calculated by a Metrological filter operation can be incorrectly set to zero. Affects all studiables types.
MNT-5757	B	The profile length can be modified by the Resample operator on Profile studiables if the profile is substituted and a document created in an old version is in use.
MNT-5759	B	The software may crash during startup if a network dongle license is detected in some particular cases.
MNT-5776	B	The filter of the "Export results" is not correctly taken into account when only some of the results of a series or statistical results are selected. Applies both to a filtering in the Result manager and via the Export results button in the Results tab.
MNT-5784	B	Addons studies or operators applied on Multi-channel image studiables do not work.
MNT-5790	B	The "Number of values" parameter of the Box plot study in statistical documents is always equal to 0.
MNT-5817	B	A Profile in .RTF file format cannot be loaded if the length of the x axis of the profile is not declared.
MNT-5839	B	The Scaling correction coefficients (Cx, Xy, dx/dy) in the "Reference values" for unit cell" dialog box of the "Lateral calibration" study on Surface studiables are displayed with a metric unit (instead of being unitless).
MNT-5848	B	Hyperspectral image studiables in .SPD file format are incorrectly loaded if they contain more than one signal.
MNT-5855	B	The column headers of the Statistical summary studies on Series of profiles studiables are erroneous.
MNT-5857	B	Filtered results parameter selection is lost when opening the "Observed Results" dialog box of the Control Chart study on multiple Particle analysis results.

MNT-5872	B	The selected vertical axis parameter is incorrect when opening the "Observed Results" dialog box of the Scatter plot study on multiple populations.
MNT-5930	B	Parameters are not recalculated in the Particle analysis study for Surface, Surface + Image, Multi-channel image type studiables when changing the calculation layer.
MNT-5957	B	The result of the Extract area operator on Surface studiables is entirely non-measured when substituting the studiable if the outline of the extraction touches the edge in the original operation and the size of the substituted study is smaller.

What's new

Updated Reference Guide	The Reference Guide has been updated with the descriptions of the main new features and improvements. It is available in English, German, French, and Japanese.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4997	A	The display of the menu is incorrect if a high-resolution screen and enlargement is used.
MNT-5211	A	The "Create circle (in contact with 2 elements)" option in the Advanced contour analysis study on Profile studiables does not work.
MNT-5217	A	A crash can occur in the Thickness analysis study on Profiles when duplicating the study and then removing the source study.
MNT-5220	A	The sign for the "Shift in Y" parameter generated by the Align for thickness operator on surface studiables is incorrect in the Results manager when the "Shift the second layer manually" option of the Alignment in X/Y section in the "Align to create a thickness layers pair" operator dialog box is used.
MNT-5241	A	Multilayer surface or Multichannel image studiables in some products (that do not handle Multilayer surface or Multichannel images) cannot be opened as surfaces extracted from them when opened by double-clicking on the .sur files in the Windows explorer.
MNT-5259	A	The Thickness analysis and Wear or deposit analysis studies on Surface studiables give erroneous results when applying the By rotation option in the Level operator.
MNT-5308	A	A crash can occur in the Parameters table study on Shell studiables if this study has user-defined default settings.
MNT-5315	A	A crash can occur in the Calculate derivatives operator on Spectrum studiables when substituting the studiable or recalling the operator.
MNT-5359	A	A crash can occur when substituting a multiple-signal Hyperspectral image studiable.
MNT-5446	A	The Polynomial option in the "Correct the base line" operator on Hyperspectral image studiables does not work if there are non-measured points.
MNT-4083	B	The Dimension block and Axes system of 3D View studies are not exported when applying the Export as image function or saving in PDF format. The legend setting is also ignored on Multi-channel cube studiables.
MNT-5006	B	The result of the "Extract projected surface" operator on Shell studiables may contain holes when the "Use automatic leveling" option is checked in the operator dialog box.
MNT-5089	B	The new name of a renamed studiable in the workflow is not properly taken into account during substitution or loading a document.

MNT-5126	B	The "Apply palette to all channels" does not work correctly in the Grid view study on Multi-channel image studiables.
MNT-5129	B	The color scale for surfaces is not visible in a Multi-channel image studiable when an image is selected in the Grid view study.
MNT-5157	B	The position of the object in the 3D view study is not remembered when reopening a document created in a previous version. Applies to all the types of studiables that can show the study.
MNT-5174	B	Moving the selection of the extracted area on the source studiable may give an incorrect result on surface studiables if the selection area touches the edges of the studiable and the Show area on source option is activated.
MNT-5175	B	The substitution of Profile studiables in the Thickness analysis study and the "Wear or deposit analysis" study does not work if the two selected profiles have incompatible X axes.
MNT-5181	B	The result of the Correct the shell operator may be incorrect in a particular case.
MNT-5185	B	The results of the "Align to create a thickness layers pair" operator applied on Surface studiables with non-measured points are unstable if the second layer is corrected using a refractive index.
MNT-5187	B	The image is not always refreshed when applying the "Optimize color scale" option of the "Image enhancement" button on Surface, Series of surfaces and Multi-channel image studiables.
MNT-5193	B	The force curve in Force/Separation mode in the Force curve analysis study is incorrectly displayed for .nid format files.
MNT-5201	B	The altitude of a profile leveled using the By substraction option of the Level operator in the Thickness analysis et Wear and Deposit analysis studies is incorrect.
MNT-5222	B	The link to the Reference Guide section is not present in the "Topo - Thickness analysis" and "Topo - Wear analysis" templates documents.
MNT-5223	B	The maximum Adhesion point in the Force curve analysis study on Force curves studiables is incorrectly detected.
MNT-5226	B	The horizontal scroll bar does not appear in the statistical documents.
MNT-5244	B	The palette of a studiable saved in a previous version is incorrect when reloading it in version 9.2.0 and selecting the "Use the palette of the studiable" option.
MNT-5249	B	The X, Y values in Thickness analysis and Wear and Deposition analysis studies on surfaces are not updated immediately.
MNT-5252	B	The kurtosis parameter value for Thickness in the table of results in Thickness analysis and Wear and Deposit analysis studies on Profile studiables is incorrect.
MNT-5253	B	Lines are sometimes missing in the table of results in the Thickness analysis and Wear and Deposit analysis studies on Profile studiables when only one limit is defined (lower or upper).
MNT-5262	B	The Thickness limits in the Thickness analysis and Wear and deposit analysis studies on Profile studiables are not correctly displayed after an Undo action.
MNT-5289	B	The cursor limitations for setting the Bearing ratio in the Histogram and Abbott curve study on Surface studiables are incorrectly defined.
MNT-5306	B	The update of the active signal in the studies on Spectrum, IV curve, IV spectroscopy image and Hyperspectral image studiables is incorrect after recalling the "Calculate derivatives" operator.
MNT-5314	B	The signals in the studies on Spectrum, IV curve, IV spectroscopy image and Hyperspectral image studiables are not all selected in the "Calculate derivatives" operator when substituting.
MNT-5318	B	The Axis Settings dialog box for Histogram studies on Statistical Results does not open.
MNT-5321	B	The result of the "Calculate derivatives" operator on Spectrum curve studiables is not updated when being recalled in some cases.
MNT-5324	B	The gamma correction is applied twice if the correction is used on a specific surface and the modified surface is added to a Multi-channel image or a Multilayer studiable before a gamma correction is applied on the newly created studiable.

MNT-5334	B	The Results table in the "Lateral Calibration" study is not positioned as defined in the settings applicable to the study.
MNT-5335	B	The names for the Segment and for the Cursors are not homogenous in the Table of results in Thickness analysis and Wear or deposit analysis studies on Profile studiables.
MNT-5337	B	The Suggest button in the "3D reconstruction using four quadrant images" operator dialog box on image studiables does not detect the disposition of the detectors.
MNT-5355	B	The update of the tolerance limits for thickness in the Thickness analysis study on surface studiables is incorrect in 3D View rendering.
MNT-5431	B	The results related to thickness limits in the parameters table of the Thickness Analysis study are incorrect when only one limit is used for the surfaces.
MNT-5433	B	The value of the Area result in the lateral calibration study is incorrect if x and y axis units are different.
MNT-5435	B	The thickness layer on Surface studiables is not correctly updated if the tolerance limits for thickness are changed from upper/lower on Wear or Deposit analysis or before/after on Thickness analysis studies.
MNT-5451	B	The Tab key in the Advanced contour analysis study does not allow to switch between several overlaid elements.
MNT-5467	B	The residue disappears in the Advanced Contour analysis study on Profile studiables when the cutoff used for parameter calculation is too high relative to the evaluation length.
MNT-5469	B	The Z-range of the reconstruction in cross mode in the "3D reconstruction using four quadrant images" operator is erroneous.
MNT-5480	B	The Parameters tab of the Select parameters dialog box in the Force curve analysis study is not visible if parameters are added to the indentation model and the document is reloaded.
MNT-5482	B	The results studiables of the "Bandpass-filter bank operator" on Profile studiables are empty when substituting the studiable.

Version 9.2.9994

What's new

	Especially useful for profilometry:
	Thickness analysis
	Alignment of before/after topographies, or of upper/lower layers
New operator: "Align to create a thickness layers pair"	The New "Align to create a Thickness layers pair" operator has been designed to shift and rotate one topography layer, in order to align it with the other layer in the pair. It places them correctly for Thickness analysis, or Wear or deposit analysis, using manual or semi-automatic tools. The two topography layers can come from the same or from different studiables (Surface, Series of surfaces, Surface + Image, Multi-channel image). The layers are generated as two surfaces, a Series of surfaces or a Multi-channel image studiable. The generated study in the document is a Thickness analysis study, or a Wear or deposit analysis study.
	Thickness study on Surfaces
New study on surfaces: Thickness analysis (also named Wear or deposit analysis)	The Thickness analysis study (also called Wear or deposit analysis) allows the user to visualize two interfaces and their thickness, and to calculate thickness and volume parameters, and also the percentage of conformity. The same study is available via two buttons of the ribbon, with different factory settings: the Wear or deposit study shows by default layer 1 and 2 with common Z-scale settings and palette, and with the real distance between layers in the 3D view. The Thickness study shows by default layer 1 and 2 with independent Z-scale settings and palette, and with arbitrary distance between layers in the 3D view. The two topography layers can come from the same or from different studiables (Surface, Surface + image, Series of surfaces, Multi-channel image).
3D view in Thickness analysis	The two layers can be jointly displayed in 3D in the Thickness analysis study (or Wear or deposit analysis) on surfaces.
Localized tools for Thickness analysis	The user can draw areal or linear zones over which to calculate parameters in the Thickness analysis study (or Wear or deposit analysis) on surfaces.
Upper and Lower limits in Thickness analysis	The user can set Upper and Lower thickness limits in the Thickness analysis study (or Wear or deposit analysis) on surface. The out-of-limits points can be visualized as a color overlay on a layer.
Maximum and Minimum in Thickness analysis	The user can display cursors on the image at the location of the maximum thickness and the minimum thickness.
Leveling in Thickness analysis	It is possible to level both layers jointly as a single object in the Thickness analysis study (or Wear or deposit analysis) on surfaces.
Designation of source layers in Thickness analysis	The user can easily change one or two compatible layers using a button of the ribbon. The user can choose either 2 topography layers among one or two studiables, deemed to be the 2 sides of a membrane or the 2 states before/after wear or deposit on the same sample, or a single layer, deemed to represent a thickness. The layers ('Upper'/'Lower' or 'Before'/ 'After') can be swapped.
Generate Thickness in Thickness analysis	The study can generate the calculated thickness as a studiable.

	Thickness study on Profiles
New study on Profiles: Thickness analysis (and Wear or deposit analysis)	The Thickness analysis study on Profiles (also called Wear or deposit analysis) allows the user to visualize two interface profiles and their thickness, and to calculate thickness and enclosed area parameters, and also the percentage of conformity. The same study is available via two buttons in the ribbon, with different factory settings: The Wear or deposit analysis shows layer 1 and 2 with common Z-scale, and with the real distance between layers in the visualization. The Thickness analysis shows layer 1 and 2 displayed in two separate zones independent of each other. The XZ viewing ratio is common to both layers, and the distance between layers is arbitrary. The two topography layers can come from the same or from different studiables (Profile, Series of profiles, Multi-channel profile).
Localized tools for Thickness analysis on Profiles	The user can define linear zones or points over which to calculate parameters in the Thickness analysis study (or Wear or deposit analysis) on Profiles.
Upper and Lower limits in Thickness analysis on Profiles	The user can set Upper and Lower thickness limits in the Thickness analysis study (or Wear or deposit analysis) on Profiles. The out-of-limits points can be visualized as a color overlay on Profiles.
Maximum and Minimum in Thickness analysis	The user can display cursors on the Profiles at the location of the maximum thickness and the minimum thickness.
Leveling in Thickness analysis	It is possible to level both layers jointly as a single object in the Thickness analysis study (or Wear or deposit analysis) on Profiles.
Designation of source layers in Thickness analysis	The user can easily change one or two compatible layers using a button of the ribbon. The user can choose 2 topography profile layers among one or two studiables, deemed to be the 2 sides of a membrane or the 2 states before/after wear or deposit on the same sample. The layers ('Upper'/'Lower' or 'Before'/ 'After') can be swapped.
Generate Thickness in Thickness analysis	The study can generate the calculated thickness profile as a studiable.
	Point cloud and Shell
Deviations used in Parameters table on Shell	The Parameters table study on Shell studiables now allows the use of deviation values stored in the studiable.
Warning in Parameters table on Shell	A warning is now displayed when a filter operator and/or a shape fitting operator already exists in the workflow.
Automatic configurations in the "Mesh the point cloud" operator	The "Mesh point cloud" operator now simplifies the use of the dialog by adding automatic configuration modes for the meshing. The improved algorithm also offers better visualization and faster calculation.
Improved optimize operation in the Remesh operator on Shell	The Optimize option of the Remesh operator has been improved and now allows better management of flat areas. In addition, it is now possible to choose the strength of the optimization, and the split edge option makes it possible to locally increase the resolution of the mesh in the zones of greater curvature. Finally, it is now possible to display the edges in the preview, allowing the user to visualize the change on the mesh (also present in the "Correct the shell" operator).
Subdivide method in the Remesh operator on Shell	A Subdivide method has been added in the Remesh operator to increase the resolution of the mesh (increases the number of points and facets).
New "Fit a geometric form" operator on Shell	The new "Fit a geometric form" operator allows the user to fit a geometric form on a Shell. The fit can be performed on a plane, a cylinder, or a sphere, using the Total Least squares method. This allows the user to visualize the resulting Shell with colors corresponding to deviations from this form. The Fit form operator is also available on Point clouds.
Automatic leveling in the "Extract projected surface" operator from Shell or Point cloud	An "Automatic leveling" option in the "Extract projected surface" operator on Shell and Point cloud studiables allows the user to automatically align the studiable (least squares plane) along the main axes to avoid losses on the leveling of the surface.
Extraction of a Surface + image from colored Shell	A "Generate a surface + image" option in the "Extract projected surface" operator on Shell studiables now allows the user to generate a Surface + image studiable when the shell contains color information and thus access Surface + image functions.
New Convert into Shell operator from Surface	The "Convert into shell" operator on Surface studiables allows the user to transform a surface according to a chosen triangulation into a Shell studiable and thus access shell functions (ie. curvature calculation).
New Convert into Cloud operator from Shell	The "Convert into point cloud" operator on Shell studiables allows the user to transform a Shell into a Point cloud studiable.

"Mean-curvature-flow" filter on Shell	The user can now smooth the mesh in the Metrological filter operator using the new "Mean curvature-flow" filter which is a smoothing method based on mean curvature flux.

Contour study

Robust adjustment of elements in the Contour study

Robust fitting of elements in the Contour study	A Robust method is now available for elements fitted on profiles in the Contour study on Profile studiables. It excludes outliers and local deviations from the calculation, allowing the user to automatically fit a segment, arc, circle or ellipse, even if they show defects or irregularities.
Creation of circle with fixed radius in the Contour study	It is now possible to set a defined radius value for a Circle element. This applies a Least squares fit with a circle with a constrained radius.
Button to display element settings in the Contour study	The dialog used to change the settings of an element (offset points, multiple built points, circle, segment…) can now be opened not only by a double-click on the element but also by using the Settings dialog button. This button is available in the element mini-toolbar, in the object ribbon and in the contextual menu of the Object list panel.
	The dialog used for editing the LS fitting properties of an element is also accessible by clicking on a multi-selection of elements.

Other profilometry features

New Bandpass-filter bank operator

New Bandpass-filter bank operator on Surface and Profile	The Bandpass-filter bank operator performs multiple bandpass filters with increasing cut-offs from smallest to largest. This allows the user to characterize the sample at different wavelengths, to possibly relate them to different functionalities. It generates a Series of surfaces (respectively profiles) or individual Surfaces (respectively individual profiles).

Statistical parameters in Step height study on Profile

Statistical parameters in Step height study on Profile	The statistical parameters are now displayed in the Step height study on Profile studiables as soon as there are several steps.

Useful for all instruments:

Substitution of multiple studiables

Substitution of multiple studiables	It is now possible to substitute several root studiables at once. This is particularly useful for automation in documents in which an operator (or a study) is applied on several studiables (surface subtraction, SEM image reconstructions…), or when several studiables are contained in a single file (ie. spectral images + mean spectra). Studiables can be loaded into a "storage bin" then used for substitution by drag and drop.

Statistics by class in Particle analysis study

Statistics by class in Particle analysis study	The user can now display statistics by class directly in the Particle analysis study, in a Results by class table. For example, it is possible to display the percentage of coverage of each class, or the mean height of only the largest particles.

Colocalization

Improved usability of Colocalization

Axis settings in Colocalization study	The Z-axis settings dialog is now available when an overlay or a background studiable is selected in the Colocalization study. It is now possible to choose absolute or relative coordinates for the X and Y axes for background studiables of the Colocalization study.

Better studiable selection in Colocalization study	The use of thumbnails has been improved to allow the user to select the studiables of the colocalization study more easily.
Better auto-scale in Colocalization study	The Auto-scale content function of the colocalization study now takes into account all the overlays even if they are outside of the background zone.
	Automation enhancement in Colocalization
Interface for overlay positioning in Colocalization	The user can now clearly see in the Positioning list, which method is selected for overlay positioning in the Colocalization study: Manual positioning, Use points, Use absolute values of axes or Auto-localize.
Better XY size management in Colocalization	When a modification is made to the size of a source studiable used in the colocalization (by substitution, template or operator recall) the original size of the viewed studiable is better conserved.

Multi-channel image and Grid view

	Grid view enhancement
Choice of displayed layer in Grid view	The user can now choose which layers to display in the Grid view study on Multi-channel images. The selection is performed using checkboxes on thumbnails.
Synchronized zoom in Grid view	The user can now zoom in when using Grid view; the frame will show the same region of interest at the same time for all layers. This applies to Multi-channel images, Surface + image, Series of surfaces and Series of images.
Z-axis settings in Grid view for Multi-channel images	The Z-axis settings are available in the Grid view study on Multi-channel images.
Presentation functions in Grid view	The Grid view study now offers all the functions of the Pseudo-color view study, to provide better information and visualization (show axes, grid or graphical scale, Basic rendering, color scale for Z-axis…). This applies to Multi-channel images, Surface + image, Series of surfaces and Series of images studiables.
	Thumbnail action modified on Multi-channel images
Thumbnail action modified in composite rendering and comparison slider of studies	When clicking on a thumbnail, the black downward arrow now indicates the currently displayed layer, but does not add the layer to the visualization as previously. (To add the layer it is necessary to check the checkboxes at the top right of the thumbnails). This applies to the comparison slider on Multi-channel images, to the composite rendering of Pseudo-color and 3D studies on Multi-channel images, and to the Multi-channel view on Multi-channel profiles.

Especially useful for SPM and Spectroscopy users:

New Adjust Z-offset operator on Surfaces	The Adjust Z-offset operator allows the user to shift all absolute Z-values by a constant. This allows the setting of the Z-axis reference at a user-defined height. This reference can be defined using different methods (included/excluded zones, Mean plane or bearing height…) thus allowing the user to calculate heights from a reference, and to improve the comparison between 2 studies (ex: Particle analysis). It can be applied on Surface studiables, or channels from Surface + image, Series of surfaces and Multichannel image studiables.
Z-origin change in Threshold	The "Set minimum value to 0" option added in the Threshold operator allows the user to shift all the Z-values so that the minimum value is zero. It applies to the Threshold operator on Multichannel image, Surface, Surface + image and Profile studiables.
New "Calculate derivatives" operator on IV curves and Spectra	The "Calculate derivatives" operator on IV curves and Spectra calculates the first and second derivatives. The user can quickly view the newly calculated signals in the Result view. The generated derivative signals or initial and derivative signals can be exported as studiables.

	General features and GUI:
	General features
Viewing and processing large datasets: faster speed	The display and calculation time on large datasets has been greatly improved. This increase in data processing speed allows the user to work on documents containing large datasets much more easily.
Cartography visualization for big datasets	All points are now visualized in cartography display of big datasets, and the pixel size when zooming is now the point size even for big data sets. The limitation at 3Mixels (formerly in place for performance reasons) has been removed. (It applies to Surface, Surface + image, Multi-channel image, Series of surfaces, Image, Series of images, Force-Volume, Hyperspectral image, IV spectroscopy image).
Reloading deprecated force curves in old documents	The deprecated (non-parametric) Force curve, Series of force curves and Force volume studiables are not available anymore. Customers are invited to save their studiables to continue to work with studiables contained in old documents. When opening a document containing one of these studiables, the studies are displayed with a padlock and the studies can no longer be opened, operators cannot be recalled and substitution is not possible.
	Reference Guide
Updated Reference Guide	The Reference Guide will be updated with the descriptions of the new features and improvements in the upcoming Service Packs. It is available in English, German, French, and Japanese.
Translations of user interface texts	Texts visible in the user interface related to new features have been translated into all available languages.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4904	A	A freeze of the application may be observed after showing a dialog with a 3D display and then calling a 3D view of any study on systems using Intel graphic chipsets when the "Rendering options" of the 3D preferences is set to "Open GL" in the Global preferences dialog box.
MNT-4959	A	The calculated parameters in the Parameters table on Shell studiables may be erroneous when the "Geometric reference form" option is selected.
MNT-5067	A	The result of the Minimum Zone (MZ) Leveling method on Profile studiables may be erroneous if the line segment between the first and the last points do not intersect the profile.
MNT-5156	A	The "Shapes" parameters in the Results table in the "Manual measurements" study on Image studiables are not calculated.
MNT-1817	B	Individual Step height results in the Step height study on Profile studiables are displayed twice in the Results manager when the study is created.
MNT-3479	B	The "Unit system" options in the Global preferences of the software are not taken into account in the 3D view study on Shell studiables.
MNT-3504	B	The Spacing unit of the "Surface size" section in the "Extract surface" operator dialog box on Shell and Point cloud studiables does not follow the unit preferences defined in the General preferences of the software.
MNT-3509	B	The Imperial units option in the Global preferences of the software is not taken into account in parameter calculations on Point cloud studiables.

MNT-4258	B	The displayed slice is incorrect when substituting a Force volume, IV spectroscopy image studiable with a studiable that has fewer slices. The Undo/Redo function does not work correctly either.
MNT-4268	B	The result of the Extract area operator on Point cloud studiables may contain erroneous points.
MNT-4453	B	The layer insertion options "Insert After / Insert Before" in the "Add Overlay Image" dialog of the Colocation study are not taken into account.
MNT-4488	B	The color is not present in the Shell studiable generated by applying the "Extract area" operator on a colored Shell studiable.
MNT-4624	B	The optimized unit for the Young's modulus displayed in the Results table in the Force curve analysis study on Series of force curves or Force volume studiables is not determined according to the average value of all Young's modulus in the series.
MNT-4635	B	The Rotation button in the ribbon is grayed out in the Colocalization study if the angle of the rotation is changed. The Undo action is not applicable, and the Undo / Redo behaviors are not identical when using the keyboard or the arrows.
MNT-4669	B	The OK button in the "Extract surface" operator dialog box on Shell and Point cloud studiables is not grayed out when no results can be generated.
MNT-4717	B	The window for entering the email verification code (sent following a request for an extension of SMP, Free Trial or contact request about the license) closes when the code is entered and the Enter key is pressed.
MNT-4903	B	The display of the 3D view source in the "Extract parametric profile" operator dialog box on Shell studiables is incorrect when recalling the operator.
MNT-4925	B	Studies limiting certain Z axis options may not limit them if created from studies that do not limit them.
MNT-4936	B	The 3D view study displayed from the "Summary of current operator" study on Surface studiables is displayed in 2D.
MNT-4941	B	The "Subtract the mean" option in the "Level line by line" operator dialog box on Surface studiables is not automatically applied when the "LS polynomial" method of correction is selected.
MNT-4956	B	Remesh operator calculations on Shell studiables do not stop if the Decimate option is selected and a very low number of target vertices is given.
MNT-4966	B	The calculation of the deviations in the Parameters table study on Shell studiables can be improved when the Geometric reference option is checked and the "Least squares cylinder" is selected in the F-operation selection box in the Parameters table dialog box.
MNT-4973	B	The intersection between a bisector line and the profile in the contour study on Profile studiables cannot be computed anymore.
MNT-4983	B	Variables with non-metric units can no longer be defined using the "Add a numerical variable" button in the Results ribbon.
MNT-5036	B	The cursor in the Colorized bands study on IV spectroscopy image studiables does not work correctly when zooming in on the study.
MNT-5114	B	The pairs of bars in the Distance measurement study on Profiles studiables is not displayed anymore after it has been moved when an Undo/Redo action is performed.

Version 9.1.9957

Bug corrections (A and B type)

	Type	Bug Description
MNT-4742	A	Displayed values on Surface studiables may be erroneous when the significant digits option "Remove trailing zeros (sequence of zeros without signification to the right of the decimal point)" in the General preferences dialog box is checked.
MNT-4855	A	Some studies on Surface studiables (Furrows, Photo simulation, Contour lines), Series of surfaces studiables (Grid view, Pseudo-color view) or Multi-channel studiables (Pseudo-color view) may cause the application to crash after redoing specific actions.
MNT-4826	B	The result of the "Level line by line" operator application on Surface studiables is incorrect if the "Subtract the polynomial" option is checked.
MNT-4891	B	The Comparison slider of the Pseudo-color view study is not displayed if a Surface + image studiable containing a slider comparison is saved and then reloaded.
MNT-4894	B	The colors of the images are not transmitted in the Particle analysis study on Multi-channel image studiables if the "Dominant channel" method is selected.
MNT-4905	B	The application of the size of the study setting is incorrect if this has been modified in the users settings.

What's new

Build study as a parent of an Addon study	It is now possible to define a study as the parent of an addon study. This one is placed under the parent study in the workflow. The addon study is updated when modifying the parent study.
Averages weighted by the area (or the volume) in Particles analysis study	The user can now calculate and display four new statistical values in the Particle analysis study allowing averages to be weighted by the area or the volume on the calculated parameters: Area-weighted mean, Volume-weighted mean, Area-weighted standard deviation and Volume-weighted standard deviation.
New Force curve Minidocs	Mountains® now offers the user three new Force curve Minidocs: Single Force curve pre-processing, Series of force curves pre-processing and Force volume pre-processing updated with the last force curve functions of the v9.1.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4638	A	The software may crash in the stereoscopic reconstruction operator dialog box on Image studiables when the "Edit size of the source image" option is activated and the selected area is moved in and out of the frame and validated, then the Suggest size for windows option is clicked.
MNT-4808	A	The software may crash when closing a document containing a Particle analysis study if the Cancel button is clicked in the Save document dialog box.
MNT-4818	A	The software may crash if a right click is done when two studiables of different types are selected in the workflow.
MNT-4823	A	The software may crash in the stereoscopic reconstruction operator dialog box on Image studiables when the "Edit size of the source image" option is activated and a very small area is defined for scaling the image. The crash may also occur after this initial stage if the Suggest size for windows option is clicked.
MNT-4871	A	The Rzx parameter in the Parameters table study for Profile studiables is not calculated on the selected number of section lengths.
MNT-2683	B	The frame number of a Parameters table study is not displayed in the Observed results selection when creating a statistical document on a population of documents containing one or more Parameters table studies.
MNT-4503	B	The "Minimum Zone Line" term displayed in the ISO 12781 dialog of the Parameters table on surfaces for the F-operator and in the Reference Guide is incorrect. The "LS-circle" term displayed in the F-operator selection box in the Parameters table dialog box on profiles and in the Reference Guide is incorrect.
MNT-4649	B	The 3D view of the Colocalization study does not open with the Photo rendering.
MNT-4652	B	The configuration of the X/Y-origin option in the General preferences of the software is not taken into account in the display of Y offsets in the list of available studies in the Stitching operator dialog box for Surface studiables.

MNT-4662	B	The background channel's name is not displayed in the pseudo-color view study generated by the "Generate whole content" button application in the Colocalization study, if the background is a Surface + image studiable.
MNT-4671	B	The visualization of the 3D view study generated by pressing the [Generate 3D view] button in the Colocalization menu on a Surface + image studiable is incorrect.
MNT-4673	B	An error message is missing in the Lead analysis Minidoc on Surface studiables when the analyzed surface is not compatible.
MNT-4690	B	Undo/Redo function doesn't work correctly on the dynamic images on Force volume studiables.
MNT-4733	B	The ASCII file loading as a "Surface: (X,Y,Z) coordinates" may be incorrect in some rare cases.
MNT-4755	B	Documents created in a version prior to V7.2.7481 and containing an extract area operator with an extracted area next to the right or bottom border cannot be loaded correctly.

What's new

Colocalization on Surface + image	The colocalization study is now available on Surface + image studiables used as overlay or background.
Add-on operator in the workflow	It is now possible to insert an add-on operator in the workflow which provides a single studiable of the same type.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4519	A	The extraction line of a profile doesn't follow the mouse movement in the Extract profile operator dialog on Surface studiables in the West -East direction.
MNT-4590	A	The software may crash when selecting the "Through the highest point" or "Through the lowest point" positioning option in the Extract profile operator dialog box on Surface studiables if the selection is moved.
MNT-4621	A	A crash can occur when calling the Summary of current operator study on a Force volume studiable if the studiable has more than 2 signals.
MNT-4100	B	A crash or freeze of the application may be observed when closing it using the COM IDongleTools interface.
MNT-4465	B	Incorrect management of the topographic data in .mapx format.
MNT-4471	B	The Extract area operator is not correctly translated in Japanese.
MNT-4510	B	Leaving a full screen view of a study returns the view to the first page of the document, even when this is not where the study is placed.
MNT-4529	B	Previews in operator dialog boxes on Spectrum studiables are empty when using data in AXZ file format.
MNT-4531	B	Zooming in on Spectum curve studiables may change the axes values in some particular cases.
MNT-4563	B	The selection in operator preview dialogs can have unwanted behaviour on Surface, Surface + image, Image, Multi-channel image and Force volume studiables when the selection touches opposing edges in the preview.
MNT-4577	B	It is not possible to hide the selection of the Extract areas or Extract profile in the 3D View study on Surface or Surface + image studiables.
MNT-4584	B	The cursor does not follow the pixel it is positioned on on IV spectroscopy image studiables when zooming in on the image in the Colorized bands view.

Bug corrections (A and B type)

	Type	Bug Description
MNT-4020	A	A crash can occur when applying the "Detect structures" operator on large studiables.
MNT-482	B	The deletion of residues and deviations in the Contour study on Profiles and Parametric profiles that are used to create studiables in the workflow does not have the expected effect.
MNT-676	B	The studiable resulting from the Patch operator application on Surface studiables is not updated when undoing the loading of the studiables added when the option "Always use all compatible studiables (loaded from disk) available in the document" is active.
MNT-3086	B	The data in the "Information" section (number of particles, coverage and density) of the Particle analysis study on Surface studiables is not exported to the CSV file.
MNT-4078	B	The channel legends are not correctly displayed on Multi-channel image studiables in a specific case.
MNT-4256	B	The Step height calculations study on Profile studiables does not work if the styles from the Step height calculations study on a Surface studiable are copied and pasted.
MNT-4259	B	The "Area of a hole or a peak" study on Profile studiables does not work if the styles from a "Volume of a hole or a peak" study on a Surface studiable are copied and pasted.
MNT-4261	B	An error message is displayed when pasting styles from the Pseudo-color view on a Multi-channel image study displayed using the "Comparison slider" to the Pseudo-color view on a Series of surfaces studiable.
MNT-4271	B	The application of the "Scale the multi-channel image" operator application on a Multi-channel image studiable does not position the layers correctly.
MNT-4274	B	The management of the Undo / Redo functions for the studiable color of the overlay in the Colocalization study on Surface studiables is incorrect.
MNT-4280	B	The display of the code verification dialog is incorrect when requesting a license extension in German language.
MNT-4295	B	The PLo/RLo/WLo parameters in the Parameters table study on Profile studiables are not expressed in length units.
MNT-4301	B	The intensity layer of a Surface+image studiable is incorrectly leveled when applying the Level operator using the By rotation option if there are non-measured points present on the topography layer.
MNT-4302	B	The Particle analysis study may expand to several pages when adding a classification.
MNT-4307	B	It is not possible to apply the level operator on a Series of surfaces studiable if there are non-measured points present on a layer.
MNT-4309	B	The Sort curves operator on Spectrum studiables doesn't work if there are less than 4 curves to sort.
MNT-4310	B	Some ASCII files may cause the application to freeze when they are incorrectly read as parametric profiles.
MNT-4323	B	An incorrect error message can be displayed for the input of the X, Y spacing values for the points in the Extract surface operator on Shell studiables.
MNT-4341	B	The loading action preference "Load as a single studiable (series, cube…)" in the Global Preferences dialog box is not taken into account for Spectrum studiables.

MNT-4345	B	Spectrum curve studiables in SPC format are incorrectly loaded.
MNT-4346	B	The x scale of the "Pseudo color view" study of the extracted surface generated by the application of the Extract surface operator on a Shell studiable is hidden.
MNT-4347	B	The scale of the X axis on a surface created by using the Extract surface on a shell studiable is not the same as the scale of the shell it was extracted from.
MNT-4350	B	The histogram on the elements of the classification in the Particle analysis with Dominant Channel is not saved correctly.
MNT-4368	B	Documents saved in V7 containing the now obsolete studies Volume of islands or Motifs, both of which are correctly updated to the new Particles analysis study, cannot be used as templates.
MNT-4396	B	The X Axis of a shell or cloud studiable is not displayed at the correct size in the 3D view study.
MNT-4413	B	Bad display of texts in the license dialog window for requesting license updates in a specific case.

What's new

	General features:
	Customized region of interest and enhanced lighting
Customized region of interest extraction	It is possible to extract multiple areas of different shapes with the Extract area operator. This allows the user to customize regions of interest better adapted to the sample. Rectangular, circular and custom outlines can be combined and modified to define either the area to be extracted, or the areas to be discarded from the extraction. This feature is available for Multi-channel image, Surface, Series of surfaces, Image, Series of image, Surface + Image, Force volume, Hyperspectral image, IV spectroscopy image studiables
New lighting for 3D views	The user can now illuminate above and below the XY plane in the 3D view studies, using the new All-around lighting configuration. This makes the object more visible when viewed from beneath, especially when the object is rotated.
	Study styles transmission for palette, axis settings and visualization settings
Transmission of study styles to new studies	The Palettes, colors and axis settings are now passed on through the creation of study frames in the document: when creating a new study, if another original study is selected, the style of this original study is passed on to the new created study. The transmitted settings are all those without effect on the numerical result (except axis settings). The user can still choose not to transmit the style and to apply previously saved custom settings, by using the arrow beside the study button.
Copy of the style of a study	The user can now copy the style of a study to another study (or to several selected studies), using Copy, then [Paste study style] in the [Edit] tab.
Style of a study applied to the document	The user can apply the style of a study to all the studies of the document using a new option in the [Save/apply settings] button of the studies ribbon.
Operator's dialog with the palette of the study	The operator's dialog now displays the source study's palette: when applying an operator, the dialog previews now use the palette displayed in the selected study if a study was selected. If not, the dialog uses the studiable color if any, and lastly the default palette.
	Color or Monochrome palette stored in the studiable
Color and monochrome palette stored in the studiable	It is now possible to define colors stored in the studiable. This color will be used to display pseudo-color views with monochrome palette, colored profiles or colored segmented grains in a cube. This is particularly useful for a set of spectral images stored in a Multi-channel studiable, where the color represents the chemical element. The color is one of the attributes of the studiable. The user can change the studiable's color via a new button in the study, or from the Studiable menu, or by right clicking on the studiable in the workflow panel. The color will be applied to all the studies on this studiable but also to all the new studiables generated by operators on this studiable. This feature can be used on Multi-channel image, Surface, Multi-channel profile, Profile, and Multi-channel cube studiables.

Display of the studies using the color of the studiable or of the study	The user can choose to display the study either using the color (or monochrome palette) of the studiable, or with a color only used locally by this study. This allows full flexibility in the display. This applies to the monochrome palettes of Surface and Muti-channel image studiables, and to the color of Profiles, Multi-channel profiles and segmented grains in a cube.
Transmission of color (or monochrome palette) by operators	The color (or monochrome palette) stored in a studiable is transmitted through the operator and stored in the studiable generated by the operator. This applies to the monochrome palette of Surface and Muti-channel image studiables, and to the color of Profiles, Multi-channel profiles and segmented grains in a cube.
	Legends with channel color and short names for Multi-channel images and Multi-channel cubes
Color and monochrome palette stored in the studiable	It is now possible to define a short name stored in the studiable. This short name will be used to display a Legend in Multi-channel image studies or in studies of cubes using colored segmented grains. The short name, like the channel long name, is one of the attributes of the studiable. The user can change the long and the short names of the channel in the Studiable menu, or by right clicking on the studiable in the workflow panel. The short or long name will be applied to all the studies conducted on this studiable but also for all the studiables generated by operators on this studiable. The short name can be used in Multi-channel image, Surface, Multi-channel profile, Profile, and Multi-channel cube studiables.
Display of the studies using the color of the studiable or of the study	The user can now display the legend of each channel or component of the Multi-channel image or Multi-channel cube. The legend is displayed with small colored squares using short names, or above the view with a transparent effect using long names.
	Other
Segmentation methods renamed	The Multiple threshold segmentation (SEM-BSE) method has been renamed 'SEM-BSE'-segmentation. The Object-oriented segmentation (SEM-SE) method has been renamed 'SEM-SE'-segmentation The Segmentation by dominant channel method has been renamed Dominant channel.
Windows 11 compatibility	Mountains v9.1 is fully compatible with Windows 11 for updates on or after October 5th, 2021.
	Point clouds and Shells
	Point cloud
Point cloud renamed	The Cloud studiable has been renamed Point cloud.
New Rotate operator on Point cloud	It is now possible to rotate a Point cloud studiable using the new Rotate operator. Rotation can be driven manually by specifying the angles around the XYZ axes or by automatically aligning the point cloud main axes to the XY plane.
Cloud mesh optimization	The meshing of a point cloud is now optimized in the Mesh the point cloud operator on Point cloud studiables. The quality of the mesh is improved (more homogeneous mesh, less holes, management of redundant points) and the result is displayed faster.
Better details detection on Point cloud meshing	A pre-processing option ("Apply on smooth cloud") allows the generation of better details of the shell in the Mesh the point cloud operator on Point cloud studiables
	Shell
New Rotate operator on Shell	It is now possible to rotate a Shell using the new Rotate operator. Rotation can be driven manually, by specifying the angles around the XYZ axes or by automatically aligning the main axes of the point cloud formed by the shell to the XY plane.
Shell triangle size optimizationn	The new "Optimize" option in the Remesh operator on Shell studiables allows the user to obtain more triangles in areas with complex form.

Shell triangle size homogenization	The new "Regularize" option of the Remesh operator on Shell studiables allows the user to homogenize the triangle size of the mesh using a defined edge length.
Faster calculation and better edge management in Remesh on Shell	The speed of the calculation of the Decimation option in the Remesh operator on Shell studiables is increased. The result now provides more precise edge management.
Visualisation of deviations used by parameters on Shell	In the Parameters study on shells, it is now possible to generate the deviations used for the calculation of the surface texture parameters. The deviations are embedded in the Shell that can be generated by the study, and can be visualized as a 3D attribute. It is very useful to visualise the effect of the choice of the reference in the Selection of parameters dialog.

Multi-channel cube (FIB-SEM and spectral tomography)

Multi-channel cube: loading high resolution images

Lower resolution of multi-channel cube from a set of images	The user can now reduce the resolution of a Multi-channel cube during its creation by loading a set of image files stored in a directory. This allows users to load bigger cubes at a lower resolution compatible with the PC/software abilities (16MVoxels is the maximum recommended size in version 9.1).
Assigning a color to each chemical element	The information in the "Color or Monochrome palette stored in the studiable" and "Legends with channel color and short names for Multi-channel images and Multi-channel cubes" paragraphs applies to Multi-channel cubes allowing you to assign a color to each chemical element.
Improved rendering on Multi-channel cube	The rendering of the study of the 3D view on studiable multichannel cubes is improved by the automatic activation of smoothing so that the edges are no longer sharp. A new [Show sharp edges] button has been added.

Spectral imaging

Image group loading in Multi-channel image

Grouped image loading to Multi-channel image	It is now possible to load a group of images containing chemical data as a Multi-channel image studiable.
Assigning a color to each chemical element	The information in the "Color or Monochrome palette stored in the studiable" and "Legends with channel color and short names for Multi-channel images and Multi-channel cubes" paragraphs applies to Spectral imaging allowing you to assign a color to each chemical element in a Multi-channel image studiable.

Force-curves

Custom Extracted area on Force-Volume

Customized region of interest extraction on force-volume	It is possible to extract multiple areas of different shapes in the Extract area operator on Force volume studiables. This allows the user to customize regions of interest better adapted to the sample. Rectangular, circular and custom outlines can be combined and modified to define either the area to be extracted, or the areas to be discarded from the extraction

New Sort force curves operators

New Sort force curves operator	The user can keep only valid curves or curves of interest according to their shape using the new Sort force curves operator. The user can use one or more rectangular selection areas: curves which pass inside these areas are selected and can then be kept or discarded from the studiable. This operator is available on Series of force curves and Force volume studiables.
New Sort by a parameter operator	It is now possible to sort force curves according to a parameter (Young modulus, energies...) with the new Sort by a parameter operator. This allows the user to isolate the different materials composing a sample. The result studiable can be reused and serve as a basis for a second sorting or analysis. Thus, several successive filters can be applied to achieve the desired result. This operator is available on Series of force curves and Force volume studiables.

Force volume visualization improvements

Approach and Retract thumbnails in Force volume view	Approach and retract curves are now displayed as separate thumbnails to allow the visualization of the force of all points having the same distance in the Force volume view study. The user can change the physical quantity (Force, deflexion in nm, or in V) if the constants are known.
Visualization of each force curve in Force volume view	It is now possible to select any point of the image in the Force volume view study and visualize the corresponding curve below using a cursor. The coordinates of the curve, as well that its number, are displayed.

Calculation of Energy parameters in force-curves

New parameters of calculated energy	It is possible to calculate several energies (Dissipated energy, Adhesion energy...) on the Force - Separation graph in the Force curve analysis study. The values can be displayed, and the corresponding zone drawn in color on the graph. Available on Force curve, Series of force curves and Force volume studiables

Fitting range in Force-curve indentation analysis

Fitting range in Indentation analysis	Indentation analysis is enhanced by allowing the user to define the fitting range on the separation axis in the Force curve analysis study. The calculation range used for the fitting of the indentation model can be displayed (in color) on the Force - Separation graph. Available on Force curves, Series of force curves and Force-volume studiables

Non-measured curves in Force volume

Non-measured curves on Force volume	The software is now able to handle Force volume studiables containing points without force-curves (Non-measured force-curves). Non-measured force-curves can be created by the Extract area operator, or by one of the Sort operators.
Visualization of non-measured points	The non-measured force-curves are displayed similarly to the non-measured points of a surface, in the flattened view or slice view in studies, operator previews, dialogs and studiable previews of Force volume studiables.
Visualization of non-measured force-curves	The non-measured force-curves are skipped when changing the displayed curve in graphs. However the user can prefer to display an empty graph with a message in studies, operator and dialog previews of Force volume studiable.

Enhanced base-line detection

New methods for base-line detection	Two new base-line detection methods have been added in the Correct the base-line operator: Remove form and Manual. The Remove form is an alternative method to the Filter detection method. The Manual method allows the user to define the baseline points (same value for all curves) on the Distance axis. Available on Force curves, Series of force curves and Force volume studiable.
Base-line visualization in Force curve graphs	The force-curves base-lines (if defined) can now be displayed as horizontal bars in the Force curve analysis study, and in operator and dialog previews. Available on Force curves, Series of force curves and Force-volume studiables.

Ergonomics

Export and import force curves in text format	It is now possible to export and import in text format the current force curve on Force curve, Series of force curves and Force volume studiables.
Display of all force curves and envelope in graphs	The user can now display all the curves together in the operator views and dialog views on Force curve, Series of force curves and Force volume studiables. The current curve is displayed in color. The Upper and Lower envelope curves can also be displayed, in black.
Axis legends on all force curves graphs	The axis legends are now displayed on all force curve graphs on Force curve, Series of force curves and Force volume studiables. They show the physical quantity represented by each axis.
Better ergonomy for force curve physical quantities	The Z-axis column is now displayed on the left of the X-Axis in the [Physical quantity] button of the Force curve analysis and Force volume view study top ribbon.
Force curve operators order	The order of the operators on Force curves, Series of force curves and Force volume studiables now corresponds the most-current process order.

Force-curve constant renaming	Spring constant is renamed Cantilever spring constant; Sensitivity is renamed Photodiode sensitivity and the category "Individual cursors" is renamed "Individual cursors values" on Force curve, Series of force curves and Force volume studiables.	
Addition of "Obsolete" to the type of studiable for Force Curve, Series of force curve and Force Volume in old formats	The Force curve, Series of force curves and Force volume studiables in an old non-parametric format are renamed Force curve (Obsolete), Series of force curves (Obsolete) and Force volume (Obsolete). They are thus displayed in the workflow as having an obsolete type allowing them to be identified.	
Redesigned icons	The "Analyze indentation" and "Detect unfolding events" button icons have been redesigned in the Force curve analysis study top ribbon.	
	License management	
Clearer user license information	User license information is now clearer in the "Information about current licence" dialog. The user can now check two boxes to set the license as the default license, or request a search for a network license at next software start-up	
	Reference Guide	
Updated Reference Guide	The Reference Guide contains the description of some of the new features and improvements. It is available in English, German, French, and Japanese.	
Interface translations	Interface texts related to new features have been translated in all languages	

Note:

The MountainsCommandDiagnostic.log (log file for the results of a Mountains.log command file) is now only found in the directory specified by the user. By default, this is the TEMP directory, but should this have been modified, any scripts calling Mountains.log files will need to be updated.

Bug corrections (A and B type)

	Type	Bug Description
MNT-3221	A	The software may crash when applying the Add/remove spectrum curves operator on a Spectrum curve studiable containing a great number of spectra (more than 3500) if selecting all the spectra.
MNT-3596	A	The software may crash when requesting an extension of the trial period while entering the verification code sent by email if the [Cancel] button is clicked.
MNT-3728	A	The application of the Remesh operator on a corrected Shell studiable can cause a crash in a specific case when selecting the Decimate option in the operator's dialog box.
MNT-4219	A	The software may crash when applying a Parameters table study including Filtered shell reference option on shell studiables if the Correct the shell operator has not been applied.
MNT-4283	A	Mountains may crash when creating a Date illustration if the user has applied his own default settings to illustration studies.
MNT-1999	B	The workflow does not update following a drag & drop of Surface or Profile studiables on a study that has several parents.
MNT-2158	B	Modifications to the exclusion zone on Profile studiables in the Summary of current operator study, after the application of the Subtract profiles operator, are not managed when applying the Undo / Redo button.

MNT-2439	B	The management of the Undo / Redo functions for the addition of profiles in the Contour analysis study is incorrect.
MNT-3035	B	The display of the graduations in the 3D view study on IV Spectroscopy image and Hyperspectral image studiables is not correctly refreshed when changing the working language in the Global Preferences dialog box.
MNT-3459	B	The height of the Form removed study generated by the application of the Remove form operator on surface studiables can be incorrect if the surface has minimal form.
MNT-3477	B	The display of the graduations is incorrect in the 3D view study on Shell and Point cloud studiables when loading a saved document.
MNT-3614	B	Custom palettes of the Multi-channel image studiable are not selected by default for each overlay layer in the colocalization study.
MNT-3625	B	Clicking on the "Summary of the current operator" study has no effect when applying it on a studiable generated by the application of the Mesh the point cloud operator on a Point cloud studiable.
MNT-3661	B	The contour points of the extraction zone are not measured when applying the "Extract area" operator on Surface, Series of surface, Multi-channel image and Force volume studiables if the "Keep the parent size (do not crop but use non-measured points)" option in the operator's dialog box is selected.
MNT-3669	B	The Distance measurement study on Profile studiables is not updated in real time during the individual movement of the cursors.
MNT-3716	B	The error message displayed in the window when entering an activation code that no longer has any valid activations available does not help the user to understand the origin of the problem.
MNT-3747	B	The message displayed in the error window when entering an activation code on a virtual machine (VM) does not indicate that the installation of a software based license on VM's is not supported.
MNT-3860	B	The Parameters table study with Robust Gaussian filter from a document saved with Mountains v7 is loaded using the second order Robust Gaussian filter instead of the original zero order.
MNT-3921	B	The OK button in the dialog box of the Parameters table on Shell studiables is grayed out when reopening it. The filter option is set to the "Gaussian-like" default filter and the cut-off value is set to zero.
MNT-3990	B	The 'SEM-SE'-segmentation option is missing in the top ribbon of the Particle analysis study when working on Multi-channel image studiables containing images.
MNT-4039	B	The Z-resolution of the polynomial form generated by the Remove form operator is limited to the resolution of the source studiable.
MNT-4075	B	The height of one of the Profile studiables can be erroneous in the Subtract profiles operator if the range of the profiles is very high in certain particular conditions.
MNT-4110	B	The OK button in the Extract slice operator dialog box applied on Force volume and IV curve studiables is not grayed out when recalling the operator after a substitution when the result is non-measured. The extracted region of interest is lost.
MNT-4113	B	The result of the Extract profile operator on a Multi-channel image studiable can give empty layers in certain rare cases.
MNT-4169	B	An automatic exclusion of some data points is automatically applied erroneously in the stitching operator on Surface, Image and Multi-channel images studiables when the line by line leveling pre-processing option is checked and the "on the full lines" option is selected in the operator dialog box.
MNT-4190	B	The outline of the extracted area in the Source view in the "Extract projected surface" operator on Shell and Cloud studiables is invisible.
MNT-4191	B	The effects of the Enable depth selection option in the Extract projected surface operator on Shell and Point cloud studiables is invisible.

What's new

Reading of force curves in obsolete formats	The user is now informed of how to take advantage of the latest functions available when loading a document containing force curves in an obsolete format.
Obsolete force curve studiable name	The Force curve studiables in an obsolete format (used with versions prior to version 8.0.8930) are renamed with obsolete mention. This allows the user to identify them (using the Identify card) in order to save and reload them. This applies to Force curve, Series of force curves, Force volume studiables. It is still possible to use the document as it is but the user will not benefit from the new functions.
Reminder for expiring Software maintenance plan (SMP)	The user can now select a reminder option (2 weeks, 4 weeks, 6 weeks and Never) when the Software maintenance plan (SMP) of his Mountains® software is about to expire. He can thus anticipate its renewal to benefit from the latest version of the software, extended support for applications, free replacement of a damaged USB protection key, etc.

Bug corrections (A and B type)

	Type	Bug Description
MNT-3871	A	The Results manager panel can flash and block the use of the software on Force curve analysis studies on Force volume studiables when the horizontal scroll bar should be shown in the Results manager and the Black color theme is applied to the application.
MNT-3998	A	The preview and the result of the form alone study created by the Remove form operator on Surface studiables are wrong when the "Apply non-measured points to the Form alone" option is selected in the operator dialog box.
MNT-4084	A	The result of the form removal calculated in the dialog box of the Remove form operator on Profile studiables is wrong if the profile contains non-measured points.
MNT-3923	B	The calculation of the deviations in the Parameters table on Shell studiables is erroneous when the Geometric reference and Least squares cylinder options are checked in the dialog box.
MNT-3924	B	The deviations used in the Parameters table study on shell studiables are different from those calculated by the Metrological filter operator.
MNT-4089	B	Wt profile parameter of the ASME B46.1 standard is wrongly considered as not available.

What's new

Preselection of layers in Comparison slider views	The default Comparison slider view in Pseudo-color view studies now has 2 layers preselected. This encourages the user to select the layers for comparison. This slider is available for Surface+image and Multi-channel image studiables.
Shortcuts to move measurement bars	The movement of the measurement bars in the "Distance measurement" and Step height study on Profile and Series of profiles studiables is now done using modified keyboard shortcuts (combination [Shift + arrow] or [Ctrl + arrow] and combination [Shift + Ctrl + arrow]).
Loading of Cloud in PLY format	It is now possible to import Cloud studiables in PLY format.
Export of Shell in color in PLY format	It is now possible to export Shell studiables in color in PLY format.
Commands diagnostic	The user can now find the Volcanyon.log file renamed MountainsCommandDiagnostic.log in the same folder as the Volcanyon command file. The MountainsCommandDiagnostic.log contains information about the execution of commands.
Information about major version	The information displayed when searching for updates now informs the user if a new major version is available.

Bug corrections (A and B type)

	Type	Bug Description
MNT-2428	A	Applying the "Tip deconvolution" operator on a Surface studiable may give erroneous results if the surface contains non-measured points.
MNT-3662	A	The software may crash in the "Convert into surface using palette" operator on Image studiables.
MNT-3675	A	Documents containing duplicated Addon studies cannot be re-read.
MNT-3705	A	The software may crash during a multi-selection of "Force curve analysis" studies if one of the studies selected does not have the requested signal.
MNT-3708	A	The calibration of the "3D reconstruction using four quadrant images" operator may give erroneous results.
MNT-3733	A	It is not possible to calculate the Wsa parameter of the SEP1941 standard.
MNT-3472	B	The "Point cloud rendering" settings (Color and Cloud point size) in the 3D view study on Cloud studiables are not saved.
MNT-3502	B	Applying the "Extract projected surface" operator on a Cloud studiable gives an erroneous result after a studiable substitution.
MNT-3519	B	The Segmentation options are not taken into account in the Particles analysis study when the "Object-oriented segmentation method (SEM-SE)" is selected, or in the Image colorization study, if the "Apply in real time" option is checked and then unchecked before validation of the dialog box.
MNT-3520	B	The "No exclusion" position of the Exclude area slider in the "Segmentation options" dialog box does not work in the Particle Analysis study on Image studiables when selecting the "Object-oriented segmentation (SEM-SE)" method in the top ribbon.

MNT-3525	B	It is not possible to use the "Average the profile" option in the Extract profile operator on Multi-channel image studiables when the channels selected for the creation of the Multichannel profile studiable have different resolutions.
MNT-3531	B	The checkbox for selecting all channels in the "Settings for range thresholds" dialog box does not memorize its setting in the Particle analysis study on Multi-channel image studiables when selecting the "Segmentation by the dominant channel" method in the top ribbon.
MNT-3568	B	The "No exclusion" position of the Exclude area slider in the "Segmentation options" dialog box does not work in the Image colorization study on image studiables.
MNT-3577	B	The Histogram study on Surface studiables can sometimes be created empty, depending on the previous settings defined.
MNT-3581	B	The preview and the result of the "Extract projected surface" operator on Cloud studiables are not recalculated when the "Activate depth selection" and "Hide cut part" options are selected in the operator dialog box.
MNT-3583	B	The color palette of the background in the Colocalization study on Multi-channel image studiables is erroneous when loading a document containing a colocalization study if the "Apply palette to all channels" option of the [Palette] button is selected for the overlay when adjusting the transparency of the overlay using the [Transparency] button.
MNT-3585	B	The "3D curvature configuration" from the 3D attributes button on Shell studiables is not reset to zero if the "Apply in real time" option is checked and then unchecked and the "Cancel" button of the dialog box pressed.
MNT-3593	B	It is not possible to change the Range names in the "Settings for range thresholds" dialog box when selecting the "Multiple threshold segmentation (SEM-BSE)" method in the ribbon of the Particle analysis study for Image studiables. The same problem is observed with Multi-channel cube studiables.
MNT-3601	B	The "Page up", "Page down", "Home" and "End" keys, as well as the corresponding "Page up", "Page down" icons in the status bar, do not allow navigation between pages of the document.
MNT-3605	B	Applying the Tip deconvolution operator on a Surface studiable may give different results from one application to another when defining the same settings.
MNT-3609	B	The studiable's display proportions are not correct in the "Spatial filter" operator dialog box when applying the operator on a Multi-channel image studiable (even if the size normalization option "Respect the aspect ratio and normalize according to the real size of the studiable" in the Global preferences dialog box is checked).
MNT-3624	B	The Minimum height parameter cannot be selected in the "Select parameters" dialog box in the ribbon of the Step height study for Profile studiables if the Manual mode is selected.
MNT-3637	B	The software may crash when selecting the "Generate as dynamic image" option of the [Export as image] button in the ribbon of the Pseudo-color view study for a Multi-channel image studiable if a Comparison slider has been added to the study.
MNT-3668	B	"Undo / Redo" function doesn't work correctly on the "Map local properties" operator on Surface and Surface+image studiables.
MNT-3715	B	The profile generated by applying the "Extract profile" operator in the Oblique direction on a Multi-channel image studiable is "Null studiable" if the starting point of the extraction is set on the bottom edge and the current point at the upper right corner.
MNT-3731	B	Angle calculations on Profile studiables can be erroneous when applying the Extract profile operator if there is a space before or after the units of the axes of the studiables.
MNT-3732	B	It is not possible to remove the first and the last point in the Profile curve and Contour analysis study on Profile studiables when applying the Retouch operator in "Retouch only non-measured point" mode.
MNT-3764	B	The management of non-measured points in the Parameters table study on the ISO 12781 standard on Surface studiables is erroneous if the surface is leveled and not filtered.
MNT-3851	B	The X,Y absolute coordinates are not correctly displayed in the Force volume view study on Force volume studiables when applying the Extract area operator on a studiable defined with absolute coordinates.

Version 9.0.9733

What's new

	Contour analysis study: intersection points, multiple intersection points
New Intersection point: between arc of ellipse, circle, arc of a circle and profile	It is now possible to create an intersection point between an arc of ellipse, a circle, or an arc of a circle and the profile in addition to the segment in the Contour analysis study on Profile and Parametric profile studiables. A dialog box now allows the user to choose an intersection criterion. The Create Profile Point menu has been reorganized into 3 columns for better visibility.
New option: multiple intersection points with profiles.	It is now possible to create multiple intersection points between an element (segment, arc of ellipse, circle, arc of circle) and the profile in the Contour analysis study on Profile and Parametric profile studiables while choosing an intersection criterion.
	Particle analysis study: new segmentation methods
New Segmentation by the Dominant Channel in Particle analysis study	A new "Segmentation by the Dominant Channel" method in the Particle analysis study has been added for Multi-channel image studiables. It allows the definition of particles of a predominant material at each point on the different channels (chemical maps) of the Multi-channel image.
New Object-oriented segmentation (SEM-SE) in Particle analysis study	A new "Object-oriented segmentation (SEM-SE)" method has been added in the Particle analysis study. This method is useful for SE images from SEM instruments. It can be applied on images and improves particle detection using segmentation tools already present in the Image colorization study.
	Cloud: Mesh operator
New "Mesh the point cloud" operator	The new "Mesh the point cloud" operator on Cloud studiables allows the reconstruction of the shell surface.
	Parameters table on Cloud and Shell: new parameters
New basic parameters on Cloud and Shell studiables	A new set of parameters on Cloud and Shell studiables has been added. Basic parameters (center position, standard deviation in X,Y,Z) can be calculated.
Surface texture parameters on low-pass filter Shell	Calculations of height, volume and hybrid parameters are now available from a filtered shell reference (Gaussian-like or bilateral filter) in the Parameter study on a Shell studiable.
	Other features
Multi-Channel Image creation from several MCIs	The Add/remove channel image operator is now available to create a Multichannel image studiable from several Multi-channel images studiables.
Improved handling of loading many studiables	Mountains has changed its behavior when loading multiple studiables: if more than 25 files are loaded, default studies are not created anymore in the documents. Instead, studiables are simply loaded into the workflow to decrease loading time and simplify the document. It is then possible to create a Series, or to apply operators or studies in batch.
Saving and exporting format OBJ and PLY added for Surface and Surface + image	It is now possible to save or export Surface and Surface + image studiables in OBJ et PLY formats.
German, French, and Japanese Reference Guide	The online "Reference guide", accessible when pressing F1, is now available in German, French, and Japanese languages.

Bug corrections (A and B type)

	Type	Bug Description
MNT-3253	A	The Volume parameters study on a Surface studiable is not updated after a studiable substitution. The software may then crash when closing the dialog box of the [Axis settings] button in the top ribbon if called on the Volume parameters study.
MNT-3411	A	The calculation of profile and surface parameters may be erroneous if the 1/2 cut-off from each side option is selected and the profile contains non-measured points.
MNT-3444	A	The software may crash when activating the |Search for update] button in the Help tab if a document is open and if there is no internet connection.
MNT-3448	A	A crash may occur when saving a Multi-channel cube studiable in the File Explorer.
MNT-3478	A	The software may crash when selecting grains and rendering changing on a Multi-channel cube studiable.
MNT-3488	A	The software may crash when applying the Parameter table on a Shell studiable if the "Geometric reference" parameters are checked and if the option "Least squares sphere", "Least squares cylinder" or "Least squares cylindroid" is selected for "F operation".
MNT-2165	B	The positions of the exclusion zones in the Summary of current operator study are not correctly managed for the Subtract profiles operator.
MNT-3071	B	The vertical axis is not updated in the Volume parameters study on Surface studiables when applying a filter and defining a cut-off to remove.
MNT-3141	B	The software may close when launching the software for the first time on a machine with no protection key and pressing "Enter" after entering an activation code.
MNT-3229	B	The Parameters table on Shells studiables may occasionally display Nan (Not A Number) values.
MNT-3230	B	The Parameters table on Shells studiables may occasionally display **** values.
MNT-3246	B	The Relative/Absolute option of the Z Axis settings in the General Preferences of the software on Multi-channel image studiables is not taken into account in the Particles analysis study.
MNT-3247	B	The value of the Frequency (in points) parameter in the Histogram study on Multi-channel image studiables is incorrectly calculated if the selected layer is changed.
MNT-3258	B	Editable fields in the Extract area operator dialog box do not affect the position of the dotted lines as shown in the preview of the area to be extracted if the rectangle shape is selected. Affects Surface, Series of surfaces, Multi-channel image, Multi-channel cube, Image, Series of images, Surface + image and Hyperspectral image studiables.
MNT-3270	B	The ratio values of the Z-axis are modified when recalling the Edit axes operator or when reloading the document after an Undo / Redo action on a Multi-channel image studiable and then saving the document.
MNT-3273	B	Non-measured points and black images are created on Multi-channel image studiables after a studiable substitution if the units of the channels are not of the same family or when Undoing an action after a substitution of this type. The operator is not applied on all channels and a warning appears in the workflow.
MNT-3274		Unmeasured points and black images are displayed at the substitution of a Multi-channel image studiable on which the "Edit axes" operator is applied if all the channels are not of the same family for the X and Y axes.
MNT-3304	B	The identity of a Range can be duplicated in the Particles analysis study on Multi-channel image studiables if the Multiple threshold option is selected and ranges are added and deleted several times.
MNT-3308	B	The value of the "Equivalent diameter of grains volume standard deviation" parameter in the 'Multi-channel cube' analysis on a Multi-channel cube studiable is incorrect.
MNT-3309	B	The Chinese translation for "Contour analysis" is wrong.

MNT-3310	B	The Parameters table study is not calculated on a Multi-channel image studiable if the first channel is an image.
MNT-3319	B	The Parameters table is not updated on Multi-channel image studiables after a studiable substitution if the first channel is an image.
MNT-3330	B	Saved settings are not applied in the Particle analysis study on Image or Multi-channel Image studiables if the "Multiple threshold" option has been selected in the top ribbon.
MNT-3341	B	Classification of particles is not created in the Particles analysis study on Multi-channel image studiables when the dialog box is first opened if the Multiple threshold option is selected in the top ribbon.
MNT-3348	B	The Z offset of the result of the '3D reconstruction using multifocus images' operator on a Series of a Series of Images studiable is wrong.
MNT-3351	B	The T-axis of the series option on Series of images studiables is not correctly taken into account when applying the Multifocus reconstruction operator.
MNT-3364	B	A part of the image is always considered as transparent (not only the black parts) on a Multi-channel image studiable containing image (RGB) channels when using the composite rendering.
MNT-3386	B	The "Source" curve returns to the first position in the Correct the base-line operator dialog box on a Series of force curves studiable when scrolling the curves if changing Z-correction (deflection) for a curve. The correction is then not taken into account.
MNT-3397	B	It is not possible to extract an average profile when applying the Extract profile operator on a Multi-channel image studiable if it contains an image layer having different dimensions to those of the surface layers.
MNT-3398	B	The Force "Adhesion" or "Snap-in" values may be inverted in Force curve analysis studies when activating the WLC model for analysis and then deactivating it.
MNT-3414	B	Operators can be locked in the workflow if an operator is applied twice, and all frames are subsequently deleted in the document then in the workflow followed by an Undo action.
MNT-3418	B	Saving the channels of a Multi-channel image studiable in several files may not work in some specific cases.
MNT-3481	B	The settings in the Extract slice operator dialog box applied on Multi-channel cube studiables are different from one application to another.
MNT-3484	B	The Point cloud rendering option in the top ribbon of the 3D view study on Cloud studiables do not change the rendering.
MNT-3489	B	The automatic mode in the Axis settings dialog box in the Force curve analysis study is incorrect in certain cases.
MNT-3490	B	The Size normalization option in the Axis settings dialog box is not taken into account in the "Extract area" or "Extract profile" operators dialog box on a Multi-channel image studiable.
MNT-3493	B	Built points and elements created on them may not be displayed in the Contour analysis study in current versions if the document containing them was created in version 6 in some rare cases.
MNT-3500	B	The units are not correctly managed in the agregation of results from several studies if the results are displayed in different units in the studies.

What's new

	ISO-21920
Default ISO 21920 in parameters study	ISO 21920 parameters are now set as default 2D parameters in Parameters table study on profile and series of profiles (ISO 21920 - Roughness (S-L) Height parameters: Rq, Rsk, Rku, Rz, Ra).
	Cloud studiable
Example studiables: Cloud studiable	A new Cloud studiable has been added to the available example studiables.
	Force curves style and visibility
Force curves: separate buttons for style and visibility	There are now separate buttons in the 'Force curve' analysis ribbon for the style and the visibility of each phase in the Force curve studies.

Bug corrections (A and B type)

	Type	Bug Description
MNT-370	A	The software may crash after loading a document containing a duplicated ActiveX addon.
MNT-2470	A	Mountains may crash when loading a very large series of spectra.
MNT-3075	A	A crash can occur in a Step height study on a Profile or a Series of profiles studiables if the "ISO 5436-1 A2 method" is chosen and if the profile contains only a few points.
MNT-3103	A	The result of the "Remove multi-plane form operator" on a Surface + image studiable is erroneous.
MNT-3120	A	Network licences are not correctly detected in version 9 if the license is originally for V8, even if the Software Maintenance Plan (SMP) is active.
MNT-3126	A	The non-measured points on Profile studiables are not taken into account in the Parameters table study when the F-operator is configured to minimum zone leveling.
MNT-3152	A	The software may crash when double-clicking in the Box Plot or Scatter plot study from a Particle analysis study with classification.
MNT-3176	A	A crash can occur when opening the Curve style dialog box on a Force curve studiable if clicking on an empty item in the Data group.
MNT-3177	A	The calculation studiable in a Parameters table study on Profile studiables can be generated twice if the factory settings are applied after generation. Deleting the associated Parameters table study can cause the software to crash.
MNT-3188	A	Volume parameters calculated in the "Volume parameters" study on Surface studiables are erroneous when the studiables are filtered.
MNT-3205	A	The software may crash when applying a template on several Multi-channel image studiables if the template was created in v8.
MNT-3209	A	The software may crash when the document is substituted if a non-compatible studiable is selected and the action is canceled when the error message is displayed.

MNT-3225	A	A crash may occur in the Parameters table study on Shell studiables, which depends on the type of form removal in use when the Height parameters are selected.
MNT-3231	A	The software may crash when loading a file in PLY format.
MNT-3019	B	The Length of the profile extracted by applying the Extract profile operator on a Multilayer surface studiable is incorrect.
MNT-3060	B	The Z-axis settings options "Setting by type of channel" and "Setting by Channel" on Multi-channel image studiables are not set to the correct default value in the Particles analysis study.
MNT-3063	B	The "Comparison slider" rendering mode on a Multi-channel image studiable generated by the application of the [Generate whole content] button in the Colocalization study is incorrect when the layers of the studiable do not have the same dimensions (resolution, size, offsets).
MNT-3067	B	The Z offset of a channel in a Multi-channel image studiable may be lost when saving in SUR format.
MNT-3078	B	The Results table created by the Result calculator is sometimes hidden until a new page is added to the document if the pages in the document are almost completely full.
MNT-3080	B	The result of the Stitching operator is different in V9 if a document containing this operator on a Multilayer surface studiable is created in V8.
MNT-3081	B	The loading of a document created in version 8 containing the Edit axis operator applied to a Multilayer surface studiable is incorrect.
MNT-3102	B	The preview in the dialog box of the "Apply lateral corrections" operator applied to a Multi-channel image studiable does not match the operator's result displayed in the workflow.
MNT-3104	B	The dialog box of the Remove multi-plane form operator applied to a Multi-channel image studiable can not be validated if a non-topographic channel is selected.
MNT-3131	B	Non-measured points are not filled in on Multi-channel image studiables if the "Show the operator dialog" option is selected as the loading action in the General preferences of the software and then a studiable containing non-measured points is loaded with the management set to fill the points.
MNT-3154	B	The display of the graph in the Volume parameters study is not modified if "Imposed range" option is chosen for vertical axis (Z) in the Axis settings dialog box and if absolute coordinates are used.
MNT-3168-	B	The X-offset of the profiles extracted in a south-north direction could be wrong depending on the unit of the X-axis.
MNT-3174	B	The application of the Mirror operator on Multi-channel images studiables may change the axes units defined in the General preferences of the software.
MNT-3189	B	The choice to deselect the Use X/Y offsets option in the Add/remove channels operator dialog box on Multi-channel image studiables is lost when applying the Undo / Redo button.
MNT-3196	B	Excluded frequencies in the Filter spectrum operator are incorrect on Profile studiables.
MNT-3207	B	The result of the "Correct the shell" operator is erroneous if one of the Smoothing options is selected in the dialog box and the document is reloaded.
MNT-3208	B	The Z-offset between surfaces in the Stitching operator on Surface studiables is not correctly taken into account.
MNT-3215	B	Some icons are missing in the ribbons if Mountains is used as ActiveX from an executable file which is not stored in the same folder as Mountains and the color theme is not the default one.
MNT-3219	B	The "Extract slices" operator on IV curves studiables is not available in the top ribbon.
MNT-3224	B	In products that contain chemical cubes but not series of images, it is not possible to load chemical cubes from a multiple selection of images.
MNT-3226	B	The Young's modulus is not calculated on Force curve studiables if the Conical or Pyramidal models are chosen in the Indentation configuration dialog box.

Version 9.0.9653

What's new

Useful for all users:

Histogram and Abbott curves study enhancements

New [Histogram] button	A new [Histogram] button has been added beside the [Abbott curve] button in the Studies ribbon. The two buttons display the same Histogram/Abbott curve study but give direct access to different settings. The [Histogram] displays vertical bins, an automatic number of bins and a unit in number of points for the 'Frequency' axis (default settings). The [Histogram] button is available for Profile, Series of profiles, Surface, Series of surfaces, Surface + image and Multichannel image studiables.
Interactive mode for Multi-channel image in Histogram/Abbott curve study	The Interactive mode for Histogram/Abbott curves is now available on Multi-channel image studiables in Histogram/Abbott curve study.
Automatic detection of the 2 main peaks in Histogram/Abbott curve study	A new Two peaks detection method has been added, to automatically place the cursors on the histogram's 2 highest peaks, in the interactive mode of Histogram/Abbott curve study.
Number of points unit in Histogram/Abbott curve study	You can now choose Number of points as the frequency axis unit (instead of %) on histograms of Histogram/Abbott curve study.
Zoom on Histogram/Abbott curve study	You can zoom with the mouse wheel (or with a selection rectangle) in the Histogram/Abbott curve study.
New parameters in Histogram/Abbott curve study	New parameters are shown in the list of parameters below the histogram: Frequency in number of points, Frequency in %, and Number of points between cursors. Some parameters have been renamed. These are displayed by groups and in columns for a better visualization.
Automatic bin number in Histogram/Abbott curve study	You can choose the automatic mode to define the number of bins in the histogram of Histogram/Abbott curve study. The automatic mode calculates the number of bins as the square root of the number of points of the studiable.
Rounded graduation figures in Histogram/Abbott curve study	Graduation on the Z values axis now displays rounded figures, in Histogram/Abbott curve study.
Continuous density curve improved in Histogram/Abbott curve study	The visualization of bins in Continuous density curve mode (which depends on the number of bins displayed on the screen) has been improved in Histogram/Abbott curve study.
Increased maximum bins in Histogram/Abbott curve study	The maximum number of displayed bins is increased to 10 000 in Histogram/Abbott curve study.
Axis names in Histogram/Abbott curve study	Axis names are added (Frequency for Histogram, and Bearing ratio for Abbott curve) in Histogram/Abbott curve study.
Ergonomics of interactive mode in Histogram/Abbott curve study	The ergonomics of the interactive mode have been improved for Histogram/Abbott curve study. The cursor points are displayed on the Abbott curve, and an arrow has been added on the histogram bin where the cursor is located.
Added columns in text file Export in Histogram/Abbott curve study	When the user exports the histogram of the Histogram/Abbott curve study in text format, the titles of the columns correspond to the data: Heights, Frequency or Number of points (%). The button to export the histogram in the Histogram/Abbott curve study has been renamed [Export histogram].

New Result calculator

New Result calculator	It is now possible to perform mathematical operations on numerical result values (eg Sa / Sz). A new [Result calculator] button has been added in the Results ribbon, and the result is displayed in the document in a Table of results. The Result calculator is visualized in the Result manager panel and can be recalled from the Table of results or from the Results manager. Conditional functions can be used in the formulae. The Results calculator can also be used to customize the name of a parameter.

Improved automatic structure exclusion in leveling

Fine tuning of automatic structure exclusion in Level and form removal operators	Structure detection has been improved in the Level, and Remove form operators. Two sliders (Above, Below) have been added to increase or decrease the value of the automatically calculated thresholds (thus increasing or decreasing the number of points excluded from the plane or form calculation). A reset button allows the automatic threshold values to be reset.
Structure exclusion using histogram or references, in Level and Form removal operators	The structure detection threshold can be fine-tuned using the histogram (frequency distribution), in the Level and Remove form operators. The user can open an interactive sub-dialog that allows them to adjust the exclusion thresholds by moving a bar on the histogram. In this sub-dialog, a new drop-down list offers a choice of reference heights for calculations (Mean plane, Absolute, Bearing height, Lowest point, Highest point). The threshold values are then defined in numerical values for automation.
Real-time preview of Structure exclusion mask in Level and Form removal operators	The user can visualize the preview of the structure exclusion mask in real time in the Level and Remove form operators.
Operators concerned by exclusion improvements	All the improvements listed above on structure exclusion, are included in the Level (Least squares), Level line by line and Remove form operators on Surface, Series of surfaces, Surface-image, and Multichannel image studiables.

Global statistical analysis and automation

Statistics on documents	All products that host the multi-document interface, now allow you to create statistical documents. You can identify correlations by the calculation of many statistical parameters, and the display of Control chart, Scatter plot, Histogram, Box plots on numerical results coming from several analysis documents.
Generalised automation tools	The ability to use Tolerance limits, use Minidocs, Apply a template on a folder, and Aggregate results coming from different series of results (Series of profiles or particles) is now available on all Mountains products.
Quick operators	All Mountains products now include quick pre-processing, quick extraction and quick assembly operators.
Quick assembly	It is now possible in one click to assemble several studiables as a series, and apply an operator (or a study) from a Multi-selection. A Quick assembly group is available in the Operators (and in the Studies) ribbon.

New Comparison slider

Comparison slider for Surface+image and Multi-channel images	A new [Comparison slider] button is available for Surface+image and Multi-channel images. It allows the user to view several layers at the same time on portions of the display. The user can display the selected layers with a vertical, or a horizontal movable slider. Palettes are displayed beside the visualization. This slider is included in the Pseudo-color study on Surface+image and Multi-channel image studiables.

Miscellanous improvements for surface texture analysis

New Volume parameter study on profiles	The Volume parameter study is now available for Profile studiables.
Filter settings in Volume parameter study	Filter settings can be defined in the Volume parameter study for profile and surface studiables.

New parameters for volume calculated on profiles (ISO 21920-2)	Functional parameters for volumes calculated on profiles according to ISO 21920-2 have been added. These include Pvmp, Pvmc, Pvvc, Pvvv and Rvmp, Rvmc, Rvvc, Rvvv. The addition of these parameters completes the compatibility of the software with the update of ISO 25178-2 to the 2021 revision already starts in v8.2.9468.
Sdr method for multiscale analysis	A new method based on the Sdr parameter has been added in the Scale sensitive fractal analysis study on surface, Surface-image and Multilayer studiables. It provides faster results while having fewer defects at small scales.
Default settings modified in 3D view study	Some default settings for the 3D view study have been changed to improve visualization. The option for Gloss rendering is defined to Shiny (instead of Soft). The zoom factor is increased slightly to reduce the empty space around. The Optimize setting of Height amplification gives a flatter surface.

Especially useful for correlative analysis:

New Multi-channel image studiable

New type of studiable: Multi-channel image	The Multi-channel image studiable replaces and enhances the Multilayer surface studiable. It allows inclusion of images of any type in true color, in addition to other channels (topography, phase, deflection…), to form a single studiable for simultaneous manipulation and analysis. It gathers, in one studiable, channels with different XY offsets and resolutions. All the operators and studies for the now-obsolete Multilayer surface studiables have been adapted to the new Multi-channel image studiable. This includes the re-reading and conversion of existing documents and the opening of all compatible file formats. The user will have to open and save the old Templates and Minidocs on Multilayer in order to use them on Multi-channel.

Especially useful for SEM users:

Segmentation from gray level in Particles

New Multiple threshold detection in Particle analysis study	A new "Multiple threshold detection" segmentation method has been added in the Particle analysis study. This method is useful for chemical analysis of BSE images from SEM instruments. It can be applied on gray scale images or channels with non-metric units. It detects particles by defining ranges over grey level values and creates a new "Material number" parameter that can be used for the classification.

Post-treatments in Stereoscopic reconstruction

Level option in Stereoscopic reconstruction operator	A new Level option (post treatment operation by subtraction of mean plane) has been added in the Stereoscopic reconstruction operator dialog box. This is useful on flat surfaces with a slope to ease the fine tuning of the other reconstruction settings.
Relief inversion in Stereoscopic reconstruction operator	The new Invert relief option, added in the Stereoscopic reconstruction operator, allows you to mirror the Z data. Inverting the order of the images in the pair then inverting back the heights will give equivalent results but however changes the main angle of view (i.e. the image of the pair on which the calculated heights are mapped); this possibility is e.g. useful to associate EDX maps afterwards on the topography, at the correct vision angle, to avoid a shift between topography and chemical maps.

Especially useful for SPM users:

Indentation models

Improved calculations on indentation models	The detection of the I0 point for the DMT model has been improved and the fitting quality between the model and the real data optimized.

	Coefficient of determination on force-curve indentation
R² coefficient in Force curve indentation	The coefficient of determination R^2 has been added in the indentation parameters of force curves, in order to estimate the quality of the curve, or of the fitting.
	3D view of data cubes
New 3D view study for I-V spectroscopy image	You can now display a "3D view of the I-V spectroscopy image" study on the Hyperspectral image studiables. It allows to slice through the data cube along its different axis (X, Y and ramp axis).

Especially useful for Spectroscopy users:

	New spectral instrument family
New Digital Surf products for the Spectral instrument family	Mountains® now offers three new products for the spectral instrument family: Mountains Spectral Correlate, Expert and Premium. The user can try them with a Free trial licence or an OEM demonstration licence, using the "Product Version Configuration" dialog. The spectral products complement the range, in addition to Profilometry (2D), Surface Topography (3D), Scanning Electron Microscopy and Scanning Probe Microscopy Products.
	Composite renderings
Composite renderings for Multi-channel images	The user can define new composite renderings on Multi-channel image studiables, in order to visualize several chemical maps, or to add a transparency effect. A new [Composite rendering] button is available in the ribbon of the Pseudo-color view, 3D view and Colocalization studies. This new rendering option allows the user to choose the channels used in the composition. A dialog defines how to mix the color: Mixed (color addition per pixel), Unmixed (main color of each channel per pixel) or Saturated (main saturated color of each channel per pixel). Low values can be suppressed by a configurable threshold. It is also possible to visualize one of the channels as a background with transparency effect. The changes are viewed in real time.
	3D view study on Hyperspectral images
New 3D view study for hyperspectral images	You can now display a "3D view of a hyperspectral image" study on Hyperspectral image studiables. This allows you to see inside and slice through the hyperspectral cube along its different axes (X, Y and spectral axis).

Especially useful for Clouds or Shell (freeform surfaces) users:

	Shell
New Metrological filter operator on Shells	The new Metrological filter operator on Shells calculates a reference shell by low-pass filtration (equivalent to waviness) and from it, calculates deviations between the shell and the reference (equivalent to roughness). For each point, roughness values are stored in the studiable as a complementary information called Deviation. The operator can generate the original source Shell completed with deviation values (roughness), and the filtered shell (Waviness) completed with deviation values (roughness). Available filters are: Gaussian-like filter and Bilateral filter. The user can choose the cut-off value that separates long and short wavelengths. This operator can only be used if the "Correct the shell" operator has been previously applied in the workflow for this studiable.

Roughness (deviation) values in color on Shells	The deviation (roughness values) can be displayed as color in the 3D view study on Shells. This allows you to visualize the roughness either on the original shell, or on the filtered shell generated by the Metrological filter operator. A color scale can be displayed, the color palette can be modified, and image enhancements can be applied. This deviation display is only available if the "Metrological filter" operator has been previously applied in the workflow for this studiable.
Surface texture parameters on Shells	Surface texture parameters on Shells can now be calculated in the Parameters table study. The parameters can be calculated from deviations, either from a nominal form if your shell is very close to this nominal form (plane, sphere, cylinder, cylindroid), or from the waviness component with an included adjustable filtering. Height parameters (Sa, Sq, Ssk, Sku, Sp, Sv, Sz) can be selected. Hybrid parameters (Sdq, Sdr, Sdrp, Srf), Functionnal parameters (Smr) and Volume parameters (Vmp, Vmc, Vvc,Vvv) are available only on a nominal form for the moment.
Curvature values in color on Shells	The curvature (local curvature radius) can be calculated and displayed as color in the 3D view study on Shells. Several curvature calculation methods and settings are available in a configuration dialog. The color scale can be displayed, color palette can be modified, and image enhancements can be applied. This curvature display can only be used if the "Correct the shell" operator has been previously applied in the workflow for this studiable.
New Correct the shell operator	The new "Correct the shell" operator detects and corrects non-conformities of a Shell studiable. The user can choose also to smooth the rendering stored in the studiable: with smoothing, each triangle is displayed with a gradient color (instead of uniform color).
New Remeshing operator on Shells	The new Remeshing operator allows you to optimize the localisation of triangles in the mesh. It reduces calculation times thereafter. The user can determine a number of points to reach. This operator can also be used to obtain a shell with a lower resolution. This Remeshing operator can only be used if the "Correct the shell" operator has been previously applied in the studiable workflow.
New Extract area operator on Shells	The "Extract area" operator allows you to extracts an area of interest contained in a rectangular box from a Shell studiable. It generates the extracted sub-part of a shell as a Shell studiable.
New Cloud studiable	
"Cloud": New type of studiable	You can load 3D point clouds into the software as "Cloud"-type studiables from an ASCII file (X,Y,Z), an ASCII file with color information (X,Y,Z, R,G,B) or an ASCII file with intensity (x, y, z, I).
New 3D View study on Clouds	Cloud studiables are displayed in an interactive 3D view study. User can choose the color and size of the dots. Usual 3D view settings are available (Light intensity, brightness and configuration, Display of axis, dimension block, axis system, predefined views, animations, image export…)
New Surface extraction operator from Clouds	The "Extract projected surface" operator on Cloud studiables allows the user to transform a point cloud according to the desired orientation, into a continuous surface studiable type.

	Especially useful for Tomography (FIB-SEM, Spectroscopy) users:
	New Multi-channel cube studiable
New Multi-channel cube studiable type	You can now load a cube of voxels into the software as a "Multi-channel cube" type studiable. This enables the analysis of chemical composition tomography.
	Multi-channel cubes are used to analyse in full 3D the volumic abundance of several chemical elements mixed, for example coming from FIB-SEM or Raman analysis. Each voxel of the cube stores several numbers (one number per channel) corresponding to the chemical abundance of several chemical components.
	As a start for this version, Mountains® will limit the resolution of cubes to 16 megavoxels.
	In the case of SEM-oriented products, in order to handle cubes originating from FIB-SEM tomography in BSE mode, this studiable also allows using a single channel. In this case, each voxel is a single number representing a gray level.
	New 3D view of a cube study
New 3D view study for Multi-channel cubes	The default study for Multi-channel cube is the 3D view study. Three types of representation can be displayed and combined: Plane, Block and Segmented grains.
	The colors can be defined by: - a mixed color mode: mixed contribution all chemical channels, each as a color. - or a segmented mode: for each voxel, only the most abundant material is considered, which forms homogeneous grains of uniform color.
	- A Plane is a section of the cube perpendicular to an axis, movable to any position. You can also display the background, which is composed of the three planes at the bottom of the cube. All these planes are always in mixed color mode. - A Block is a rectangular box, that can be shortened or drilled from inside along any XYZ direction. Blocks can be displayed in segmented or in mixed color modes. - Segmented grains are grains in full 3D, representing a single dominant material in a single color.
	You can launch many customised animations to visualize successive positions of the planes or of the Block edges, or successive channels of the segmented grains.
	A segmentation button of the ribbon allows to define a significancy low threshold for each channel. In the case of BSE (gray level, single channel), segmentation is done by multiple thresholds, which define several channels.
	Segmented grains can be smoothed to avoid the actual voxels being visible as tiny cubes. Usual 3D view settings, animations and exports are available.
	If the 3D view contains segmented grains, or a block with segmented grains, it can generate a dynamic colored Shell studiable.
	New Multi-channel cube analysis study
New Multi-channel cube analysis study	The Multi-channel cube analysis study gives information about grain counts and grain volumes, for each of the channels and as a proportion of the total.

	Multi-channel cube: new Extract slice operator
New Extract slice operator on Multi-channel cubes	The Extract slice operator generates a Multi-channel image (containing the same number of channels) by extracting a slice along the X, Y or Z axis. It can also generate an image (similar to plane in color mix of the 3D vew described above), or one of the channels as an image in gray level.

General features and GUI:

	Dark default color theme
Added color themes	Mountains® 9 introduces a new contemporary "Black" screen theme. A new orange theme is also available beside the classical version 8 gray theme, together with white and blue.

	Updated icons design
Modernized icon design	Icons have been redesigned in the new style of the software.

	Improved workflow visibility
Collapsing and extending a workflow branch	It is now possible to collapse (and expand) the content of the workflow that follows an operator or a studiable, in order to simplify the visualization of a complex workflow.
Search zone in workflow	A search zone allows you to quickly find a Studiable, operator or study in the workflow, using a portion of its name.
Highlight selections in Workflow	The workflow displays new colors for a highlighted selection: blue for studiables, green for studies, and orange for operators. The studiable numbers are now displayed on the left for better studiable identification.
Simplified icons for operators and studies in workflow	The default icons for operators (respectively studies) of the workflow, now simply represent an orange gear (respectively green calliper). The ['Preview' icons] button switches to the display of the icon representing the displayed operator (respectively study).
Multiple selection of results:	It is now possible to select several numerical results in the Results manager, in order to add them in one right-click in the same Table of results, or in a Result calculator formulae. It is also possible to copy several results in order to paste them in another application, and to delete several results from the studies.

	Widespread advanced Plug-ins
Generalised Plug-ins	The possibility to use customized addon plug-ins is now included in all Mountains products.
Improved Plug-ins:	Addon plug-in tools (cutomised Operators and Studies) can now be applied on several source studiables, and on results contained in the Results manager.

	Updated Welcome and About dialogs
Clearer Welcome dialog	The Welcome dialog page has been partly reorganized to highlight the basic resources, and add a link to "What's new in V9.0?"
Modernized About dialog	The About dialog has been modernized.

	New help links in operators
Added Help access	A new [?] button now appears in the title bar of most dialog boxes, to open the corresponding page of the reference guide. The information in the dialogs (in purple) is now replaced by an [i] image and an information tooltip in some dialog boxes.

	Completed and updated Index, Templates, Tutorials and example studiables
Updated Templates and Tutorials	Templates, Tutorials and Index documents have been relooked, reorganized and completed to illustrate new features. Example studiables have been added.

		Renamed studiables
Multi-channel profile renamed		The Multilayer profile studiable has been renamed Multi-channel profile.
Spectral studiables renamed		The Hyperspectral cube studiable has been renamed Hyperspectral image. The CITS spectrum studiable has been renamed I-V curve. The CITS cube studiable has been renamed I-V spectroscopy image.
		Reference guide
Updated English Reference Guide		An updated "Reference guide" is available in English. Some information about new features may still be missing. It will be completed in an upcoming Service Pack. The "Reference guide" in German, French, and Japanese will be made available in the next Service Pack.
		Operating system
Only 64-bit Windows 10 OS is supported		The technical specifications for Mountains version 9 can be found here : https://www.digitalsurf.com/support/technical-specifications/

Bug corrections (A and B type)

	Type	Bug Description
MNT-2379	A	A crash can occur when applying the High-pass /Low-pass filter operator on a very large image if the Robust Gaussian filter is selected.
MNT-2564	A	A crash can occur when applying the Robust gaussian filter on a very large studiable.
MNT-2726	A	The software may crash when saving a large studiable in 3MF format.
MNT-2953	A	Mountains may crash when saving a spectrum studiable in .txt format if one spectrum per column is selected.
MNT-2972	A	It is not possible to apply the Level operator using the By rotation option on a Surface+image studiable if there are non-measured points present.
MNT-854	B	The inclusion and exclusion of spectrum curves in the Sort spectra operator on Hyperspectral image studiables are always active when removing a result from the operator in the workflow and recalling the operator.
MNT-1846	B	The choice of detection and calculation layers is not saved in the settings in the Particle analysis study.
MNT-1986	B	Saving studiables is no longer required when dragging and dropping studiables from the workflow into the studiable explorer.
MNT-2441	B	The result of the Generate as dynamic studiable is not created in the workflow if a residue or a deviation is selected for this feature in the Advanced contour study.
MNT-2517	B	The text 'Activation code' is not translated in the license activation dialog when installing the software.
MNT-2619	B	Multiple built points of the Contour analysis study sometimes disappear after a studiable substitution.
MNT-2625	B	The automatic mode for the positioning of all the cursors in a Force curve analysis study is deselected if a cursor is moved.
MNT-2838	B	The automatic structure exclusion calculation in the Level operator is incorrect on Surface, Surface+image studiable if the studiable contains non measures points.
MNT-2852	B	The Parametric profile studiable generated by the "Extract profile parameter" on a Shell studiable may be erroneous.

MNT-2982	B	The [Cancel] button in the Image Enhancement dialog box for Image studiables doesn't work.
MNT-3005	B	The "Bring the profile next to the DXF" option when importing a DXF file in the Contour analysis study doesn't work.
MNT-3040	B	Memory usage is abnormally large in the 3D View of the Distance measurement study in the SPM - Basic analysis tutorial document.
MNT-3044	B	The Parameters table study on a surface studiable can not be calculated if this surface was generated by the Mathematical Function operator using previously calculated parameters.