Mountains® Version 10

Release Notes

Version	Date	Illustrated articles
10.0.10483	September 14th 2023	
10.0.10433	July 26th 2023	
10.0.10378	June 1st 2023	
10.0.10372	May 26th 2023	**What's new in 10.0**

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Bug corrections (A and B type)

	Type	Bug Description
MNT-7183	A	Spatial profile parameters according to the ISO 21920 standard do not take evaluation length into account.
MNT-7324	A	The Fiber Analysis study does not work on a “Surface + image” studiable without an image layer if no fibers are detected.
MNT-7524	A	A crash can occur on recalling the "Extract surface" or" Extract profile" operators on Series of surfaces and Series of profiles studiables if the different results of the operator are not consecutive in the workflow.
MNT-7710	A	Mountains® freezes in some documents containing operators that use numerical results when clicking the [Delete unused studiables] button in the "Studiables" ribbon.
MNT-7753	A	Points coordinates created in contour studies are incorrect when loading old documents if a modification of the offsets was performed.
MNT-5362	B	The duplication of a thickness study displayed in 3D does not work.
MNT-7295	B	The Fiber analysis study on a Multi-channel image studiable does not update when substituting the studiable.
MNT-7312	B	All the structures detected in the "Detect structures" operator” on Surface studiables are not detected when reloading the document in a particular case.
MNT-7369	B	The “IV spectroscopy image” studiable in “3DS - part 2” format is not read correctly.
MNT-7390	B	Empty studies can be created after recalling the "Extract surface" operator on Series of surfaces studiables, if the different results of the operator are not consecutive in the workflow.
MNT-7425	B	The profile extraction from a Surface studiable using the Matlab operator generates a non-measured studiable if the result of the Matlab operator is not of the same type as the input studiable.
MNT-747	B	Some fibers in the Fiber analysis study on Image studiables have a zero-diameter value and some interstices have a negative area.
MNT-7514	B	The current page systematically switches to first page when selecting/unselecting a study if the “Page by page” mode is selected in the Edit tab.
MNT-7523	B	The value of the unit of the mean half width is erroneous in the in the "Extract profile" operator when converting units to "Imperial units (in, mils, µm...)" in the Global preferences of the software.
MNT-7596	B	Animation instructions are not respected on Multi-channel cube studiables.
MNT-7626	B	The contours of particles are blurred in the Particle analysis study if the display is full screen. .
MNT-7627	B	The management of the full screen is incorrect in the Particle analysis study on Multi- channel image studiables.
MNT-7637	B	Malfunctions may occur when applying a Minidoc using the [Custom (no studiable] button in the Automation tab.

MNT-7639	B	Default zoom in the "Averaged power spectral density (PSD)" study on Multi- channel image studiables results in an empty display in certain cases.
MNT-7642	B	The Minidoc list is incorrect and there is no preview in the "Load a studiable" dialog when switching from multi-selection to single selection in some cases.
MNT-7654	B	The results when recalling the "Sort by a parameter" operator on Spectrum curve studiables are incorrect after changing settings.
MNT-7690	B	The entry "Apply a Minidoc"' in the "File explorer" contextual menu when selecting a studiable does not contain the right Minidocs when the studiable list is sorted.
MNT-7697	B	The contour study on Profile studiables is not able to determine robustly which intersection point is the nearest to an element in some specific cases.
MNT-7704	B	Creating a Point cloud studiable using the ActiveX function "CreateParametricSurfaceStudiable" does not work.
MNT-7761	B	The result picker field dedicated to the number of extracted profiles in the "Extract Profile" operator does not synchronize when the result is changed.
MNT-7762	B	It is not possible to use the custom extraction shape in the "Extract Profile" operator on Surface, Series of surfaces, Surface + image, Image, Multi-channel image studiables if it only contains 2 points.
MNT-7764	B	A black vertical line appears in studies at certain zoom levels on Surface studiables if the surface has a very large x/y ratio.
MNT-7783	B	A crash can occur when generating an RTF export of a document in Korean.
MNT-7792	B	The definition of tolerance on parameters in addon studies does not work.

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.
Customization of the title of the Table of results	The user can now customize the title of the "Table of results" study thanks to the different options now added in the [Title] button of the ribbon (Name of the measurement date, Name of the studiable (short or long version, root studiable), Name of the study generating the result). Two new buttons have been added to the "Table of results" study ribbon to display in columns the name of the studiable and the measurement date for each parameter of the study.
"Join two profiles" operator renamed	The "Join two profiles" operator has been renamed "Concatenate two profiles" operator.
"Join" operator renamed	The Join operator (to assemble multiple Hyperspectral image studiables) has been renamed "Concatenate along W-axis" operator.
"Concatenate series of profiles" operator renamed	The "Concatenate series of profiles" operator has been renamed "Aggregate series of profiles" operator.
"Concatenate spectrum curves" and "Concatenate IV curves" operators renamed	The "Concatenate spectrum curves" and "Concatenate IV curves" operators have been renamed "Aggregate spectrum curves" and "Aggregate IV curves" operator.
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.
Mountains® request dialogs simplified	The dialogs concerning requests about Mountains® software have been updated to now take into account the processing of requests directly by the software. This applies to the dialogs for a "Free Trial", "Quote request", "License update", "Extension request" and "SMP".
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-7292	A	A crash is observed in the "Create correlation maps" operator dialog on Hyperspectral image studiables if the operator is recalled in a previously created document, the full selection removed and then a spectrum is selected.

MNT-7307	A	A crash is observed in the "Create correlation maps" operator dialog on Hyperspectral image studiables when the operator is first called if the complete selection of spectra is removed and then a spectrum is selected.
MNT-7314	A	A crash can occur when opening a "CAD compare" study on a Shell studiable if another document with a CAD compare study on a Shell studiable is already opened.
MNT-7349	A	A crash may occur when rebuilding studiables from operators when opening a complex Mountains® document in a specific case.
MNT-7353	A	The software may crash and a DMP file is not created when loading Parametric profile studiables in XP3 file format.
MNT-7362	A	The software may crash when recalling the "Filter using PCA (Principal component analysis)" operator after a substitution on IV spectroscopy image studiables.
MNT-7363	A	A crash may be observed when modifying the Mountains® color theme through the COM interface.
MNT-7383	A	Intermittent crashes may occur in the Parameters table study on Profile studiables if leveling is requested using an F-operation.
MNT-7405	A	Some unavailable parameters for "Asphere analysis" on surface studiables are indicated as being present.
MNT-7417	A	The parameters "Skeleton length", "Fiber length" and "Fiber width" are not calculated in the "Manual measurements" study on Image studiables.
MNT-7450	A	A third 3D mesh appears in the result view of the "Manual prefit" mode in the CAD compare study on a Shell studiable when clicking on the nominal preview to create a point of interest.
MNT-6935	B	The study generated by the application of the "Extract profiles" operator on surface studiables is locked after applying the factory settings on the operator if the resulting study type is modified by this factory setting.
MNT-7066	B	The 3D view study in a document exported to pdf is not the same as shown in the Mountains® document.
MNT-7225	B	The application of the "Tip deconvolution" operator on Surface studiables is incorrect when the number of checked results is changed in the operator dialog box when opening the document.
MNT-7229	B	The "Multi-channel profiles" is grayed out in the "Result to generate" section of the "Extract profiles" operator dialog box on Multi-channel image studiables in the MountainsSPIP® Premium and MountainsSpectral® Correlate products.
MNT-7242	B	The application of the "Wavelet transform" operator on Surface studiables is incorrect when the number of checked results is changed in the operator dialog box when opening the document.
MNT-7272	B	The "Exclude first and last detected steps from results" option in the "Settings" dialog box of the "Step height" study on Series of profile studiables is not memorized when reopening the Settings dialog box.
MNT-7274	B	The "Select all channels" box checked in operators' dialogs on "Multi-channel image" and "Surface + image" studiables containing non topography channels is not unchecked when checking the "All topography channels" box.
MNT-7284	B	The maximum size limit of the "Half width" value of the "Average the profile" option in the "Extract profiles" operator dialog box on Surface, Series of surfaces, Surface + image, Image, Multi-channel image studiables for the extraction shapes other than Parallel is erroneous.
MNT-7286	B	The OK button is grayed out when opening a document containing a "Sort IV curves" operator when all the results to be generated are unchecked and then one or more results to be generated is selected.
MNT-7287	B	The generated studiables are either empty or completely non-measured and the names are given as question marks in the workflow when opening a document containing a "Sort IV curves" operator when some results to be generated (other than the first one or the second) are unchecked.
MNT-7293	B	Profiles operator on Surface, Series of surfaces, Surface + image, Image, Multi-channel image studiables when using the radial extraction shape extracting diameters on a full circle.

MNT-7301	B	There is an error in the management of non-measured points in the "Detect structures" operator on Surface or Image studiables in Automatic detection mode.
MNT-7310	B	Results of the analyses (indentation, adhesion and snap-in, WLC....) in the "Force curve analysis" study are not changed when moving a point of the analysis on the graph in the study.
MNT-7319	B	The Japanese translation of "Point" in the Units option in the "Extract profiles" operator dialog box on Surface, Series of surfaces, Surface + image, Image, Multi-channel image studiables when using the radial extraction shape extracting diameters on a full circle. is incorrect.
MNT-7329	B	Calculation of the Median, Decile and Quartile statistical results does not use the most common method.
MNT-7395	B	The V-groove analysis does not work in the Contour study on Profile studiables.
MNT-7439	B	A question mark replaces the name of the studiables in the workflow when opening a document containing a "Convert into monochrome image" operator on Image studiables if there are studiables to be generated in the operator dialog box that are unchecked.
MNT-7440	B	The application of the "Convert into monochrome image" operator on Image studiables is incorrect when the number of checked results is increased in the operator dialog box and the document reloaded.
MNT-7441	B	The graph display limits of the "Scale sensitive fractal analysis" study are sometimes incorrectly calculated on Series of profiles or Series of surfaces, or after changing the displayed curve.
MNT-7474	B	The elements of the ‘Available profiles’ and ‘Profiles in the series' lists in the “Add/remove profiles” operator dialog box on Series of profiles studiables cannot be distinguished. The same is true of other types of series (Surfaces, Images).
MNT-7496	B	The colocalization study on Surface + image and Multi-channel images studiables may cause an infinite loop involving the generation of studiables (Whole content, 3D View) after modifying the transparencies, in some cases.

What's new

Incomplete step exclusion in Step height study on Profile	The user can now choose whether or not to take into account the incomplete steps on the ends of Profile in the Step height study on Profile and Series of profiles. It is particularly useful for calculating statistical parameters.
increased processing speed in CAD compare	The fitting operation of a measured Shell with a reference Shell (which can be a CAD model) have been accelerated in the CAD compare study on Shell.
Spectrum curve analysis renamed	The Spectrum curve analysis study has been renamed Spectrum curve view.
Access to license details in ActiveX	The new ActiveX interface now allows displaying details for all Mountains licenses available to the user (serial number, products, modules, SMP expiration date).

Bug corrections (A and B type)

	Type	Bug Description
MNT-3817	B	The Japanese translation of "Save the current studiable" is incorrect.
MNT-6917	B	Z values are not symmetrical around the center of the spectrum in the "Threshold the spectrum" operator on Surface and Multi-channel image studiables.
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-7187	B	Some profile parameters according to ISO 12780 are not recalculated if a Leveling operation, previously included in the study, is deactivated.
MNT-7189	B	Applying predefined settings on an operator in the workflow (with a right click) does not generate any changes.
MNT-7210	B	Multi-channel studiable Y axis unit is incorrect in a particular case.
MNT-7219	B	Some IV Spectroscopy image studiables of certain types of file formats are not loaded correctly.
MNT-7227	B	Add-on operators may fail if their calculated result generates a different type of studiable than that on which they are applied.

What's new in 10.0

	Cross technology features
	Extract profile tool augmented and redesigned
Multiple extraction, new shapes and improved ergonomics for Extract profiles on all studiables	The Extract profiles operator benefits from significant improvements, including multiple extraction, enhanced automation and new cross, parallel and radial shapes. The improvements are available for Surface, Images, Surface-image, Multi- channel images, Series of surfaces and Series of images studiables.
	Extraction of several profiles in the operator
Multiple simultaneous profiles extraction	It is now possible to extract multiple profiles from a Surface studiable in the Extract profile operator. The user can choose to generate individual profiles (one Profile studiable for each extracted profile), or a Series of profiles (all extracted profiles gathered in a single series studiable). The user has flexibility in extracting profiles. He can modify, add or delete the extracted profiles when the operator is recalled. Adding an extracted profile in the operator generates a new profile studiable without a study in the workflow or a new profile in the series. Deleting an extracted profile is possible in the operator or via studiable deletion.
Shape selection in Extract profile	In the Extract Profiles operator dialog, the user can navigate through successive profiles and shapes using scroll arrows. The display of the profile selection in the graph is linked to the selection of the corresponding extraction shape in the preview.
Three display modes in the preview	All profiles can be visualized together in the Extract profiles operator dialog, (as well as the upper or the lower envelope). The user can choose the Z-scale either to display the current profile in a full-scale mode, or to visualize all profiles points (in centered or in absolute Z-scale). These visualizations have no effect on the generated studiables.

	New extraction tools: cross, parallel, radial
Cross profiles extraction shape	A new Cross profiles extraction shape is available in the Extract profiles operator dialog. It allows the user to extract two perpendicular profiles (horizontal and vertical). The center of the cross can be automatically positioned on the maximum or minimum point.
Parallel profiles extraction shape	A new Parallel profiles extraction shape is available in the Extract profiles operator dialog. It allows the user to extract a defined number of parallel profiles in any direction.
Radial profiles extraction shape	A new radial profiles extraction shape is available in the Extract profiles operator dialog. It allows the user to extract a defined number of profiles centered on a point (diameter or radius of a circular feature). It is also possible to extract a single profile passing through a point in a defined direction. The center of the radial extraction can be automatically positioned on the maximum or minimum point.
Shape features for new extraction shapes	The new Cross, Parallel and Radial extraction shapes of the Extract profiles operator dialog benefit from the following features: averaging, result picker, and interactive display of the shape on the source study or in the Summary of the operator, including 3D views.
	Automation tools
Result picker for profile extraction coordinates	All profile extraction coordinates in the Extract profiles operator can now use the Result Picker tool. The extraction coordinates can thus be defined using the results of previous studies or variables. This facilitates the automation of profile extractions.
Direct Quick Profile extraction	Profile extraction is now directly accessible via the Quick extraction operator's button.
Circular and oblique extraction shapes: automatic positioning	In the Extract profiles operator, it is now possible to create circular extractions whose center is automatically the highest/lowest point of the surface. The user can also now create oblique profiles passing automatically through the highest/lowest point of the surface.
	Improved ergonomics
Straight profiles (horizontal, vertical) merged with oblique profile	The horizontal, vertical and oblique extraction segments can now be manipulated completely freely in the Extract profiles operator dialog and in the study of the source studiable. Segments close to a vertical or horizontal position will snap magnetically into place. Users can deactivate this option using the Shift key.
Profile extraction averaging over a larger width	Profile averaging is now possible over a larger width, equivalent to up to half the surface.
Display of the profile averaging width	The width of the band to take into account for the averaging of the extracted profile can now be displayed in the studies of the source studiable.
Direction arrows on profile extraction segments	Directional arrows now appear on extraction segments for better visualization.
Redesign Extract profiles dialog	The Extract profiles operator has been redesigned to be coherent with the standard operator dialogs in the software (settings on the left, tool buttons, preview on the right etc.). It integrates an information tooltip and/or error messages for better user information.
Extract Profiles dialog in Full screen	The user can resize the Extract profiles operator dialog and display it full screen.

	Structure detection at a given position
Management of the position of the detected structures	A new “Manually selected structure (by position)” method has been added to the “Detect structures” operator. The user can thus now easily generate a structure at a given (XY-position). In an automation context, or when modifying the operator’s source studiable, the initial XY position of the structures is used to select and define the order of the generated structures. A selection can be made among the structures after sorting by correlation, and using the new “Interior structure” setting. This selection is made by a double-clicking on structures in the source preview. The operator generates studiables containing the selected structures in their order of selection. This order can be reorganized on a XY-grid by clicking on a button. This new method and the improvements listed below are available for Surface, Multi-channel and Image studiables.
Interior structure sorting in Detect structure	A new sorting tool has been added to the Detect structures operator dialog to exclude structures on the edges that are partially outside of the surface. A checkbox has been added to maintain compatibility with the pre-existing « Overlap » sorting tool.
Order of structures by X/Y-positions	The user can now choose to sort the generated structures by XY positions in the “Detect structures” operator, in addition to sorting by decreasing correlation.
Generation of a fixed number of structures	The user can now choose to generate a fixed number of structures (“N structures with the best correlation” option) which is useful when the number of expected structures is known (but not necessarily the correlation values). All the sorted structures can still be generated.
Information on the structures on hover	The correlation, the percentage of points inside the surface and the structure number are now displayed when hovering the mouse over the structures in the source preview in the “Detect structures” operator dialog.
Displaying structure result preview	The result preview is now displayed in the “Detect structures” operator dialog. The user can navigate between the generated structures, and identify the corresponding structure in the preview.
Non-measured points taken into account in structure detection	A new option has been added in the Detect structures operator dialog to take into account non-measured points in the correlation calculation.
Detect structure dialog redesign	The Detect structures operator dialog has been redesigned. Selected generated structures and unselected points are displayed using two different palettes (rainbow and gray-scale by default). A result preview has been added. The dialog has been adapted to standards. It integrates an information tooltip and/or error messages for better user information.
Detect structures in full screen	The user can resize the Detect structures operator dialog and display it full screen.
	Automation more accessible
	New Automation tab
New Automation main tab: direct access to automation functions (Minidocs, Templates, Statistics, Interface customization etc.)	The Automation tab replaces the Minidoc tab. The automation functions, customization tools and settings useful during automation are now placed in the Automation tab. The user now has a single visible place where all the tools for successful automation are directly accessible for high productivity. The tab contains the following functions: Minidocs and access to their settings, the application of a template, studiable substitution, the creation of statistical documents. The user also has access via the Automation tab to settings useful during automation (Lock the document, Lock the whole program). Time-saving customization tools are also present in the Automation tab (management of operator and frame custom settings, customization of study and operator ribbons, customization of operators, parameters and studies and use of Python add-ons). Finally, there is a link to the dedicated section of the reference guide and a link to SDK documentation (use of external commands, ActiveX integration to drive the software).

Result Pickers in Extract profiles and Parameters table	Profile extraction operators and Parameters table studies now allow Result pickers, for even better automation (refer to descriptions above and below).
	### Improved driving of document creation from external applications
Personalized addition of Mountains® studies and operators from an external application	The user can now create studies and operators (including Add-ons) in the Mountains® document from an external application (acquisition software for example). The dialog box settings can be changed. The user can choose to display or hide the the generated study as well as the dialog box. This allows the external application to completely drive and automate the creation of a document.
Version 3.11 of Python for add-ons	To create customized add-ons, it is now possible to use the recent version 3.11 of Python in addition to version 3.02. The user chooses the Python version to use in the Global preferences of the software (System preferences).
New X3P and SMD file formats export using command	It is now possible to export Surface studies in X3P and SMD formats using the Save Studiable command.
	## Fiber analysis on topography
Fiber analysis study on topography	The Fiber analysis study has been added on Surface, Surface + image (surface channel), Multi-channel image (one topography channel) studiables to allow this kind of analysis on topography data. Two threshold detection methods (ridges or furrows) detect fibers or scratches that are clearly identifiable as ridges on a background or furrows below a background.
	## Absolute palettes and two-color cursors
New absolute palettes	It is now possible to create (in the 'Palette manager') a palette that uses absolute values. The cursors will then align exactly on the chosen absolute value. This allows users to display the same color for the same Z-values in different studies. Having a palette with absolute values is useful for thickness and wear measurements or for making comparisons.
Two-color cursors to visualize threshold effects	Users can now give their palette cursors two colors, thus make a sudden jump in the palette, at a given place, to visualize threshold effects. The min and max cursors can also have two colors. The "Use two-color" option for the cursor is accessible via contextual menu on each control point. The user can make color gradients between the control points of the palette, allowing to visualize of shape.

	Fresh look for the interface
	Resizable operator dialogs
Full screen display and resizing in operator dialogs	The user can resize many operator dialogs and display them in full screen. This applies to the following operators: Mirror (Surface, Series of surfaces, Surface + image, Multi-channel image), Spatial filter, Retouch surface points, Retouch image points, Extract profiles (Surface, Surface + image, Image, Multi-channel image), Extract series of profiles (Series of surfaces), Extract planar contour, Detect structures, Remove form (Profile), Scale the image, Filter the spectrum (Surface, Multi-channel image), Correct the baseline (Spectrum curve), Extract slice (Multi-channel cube), Convert into surface (from an RGB Image), Convert into monochrome image, Extract surface (Series of surfaces), Shift (Multi-channel cube), Threshold (Surface, Profile), High-pass / Low-pass filter (Image), Metrological filter (Surface, Profile), Rotation (Surface, Image), Create surface + image, S-filter (λs) (Profile), Filter spectrum (Profile), Morphological filtering (Profile), Extract area (Profile), Sort spectrum curves (Spectrum curve, Hyperspectral image), Smooth the spectrum curves (Spectrum curve, Hyperspectral image, Force curve).
Operator dialog reorganisation	Some operators have been redesigned to be coherent with the standard software dialogs (settings on the left, tool buttons, preview in the center, results on the right etc.). Operator dialogs integrates information tooltips and/or error messages for a better user information. This applies to the following operators (all new operators follow the standards): Extract area (Image), Extract profiles (Surface, Surface + image, Multi-channel image), Extract series of profiles (Series of surfaces), Detect structures, Remove form (Profile), Scale the image, Convert into surface (Image), Extract surface (Series of surfaces).
	Better ergonomics for customizing study titles
Study titles: better ergonomics	The user can now directly select the information to display in the title of the study, using check boxes in the Title menu in the ribbon. The title can now also include the date of the measurement (when present in the studiable).
	Better display for studiable names
Better display for studiable names	The display of studiables in all operator and study dialogs now contains the name of the source studiable and the name of the last operator with its index (with an additional square bracket). A tooltip displaying the full name of the studiable with all its operators has been added when the mouse is hovered over it.
	Custom path tool in Manual measurement study
New Custom path tool in Manual measurement study	The [Custom path] button has been added in the Manual measurement study to measure the distance along a defined path. This applies to Surface, Image, Surface + image and Multi-channel image studiables.
	Pasting an image as an Image studiable
Pasting an image as an Image studiable	The user can now directly paste an image from the clipboard into the document as an Image studiable. The choice to apply when pasting an image (Paste the image as an illustration or load it as an Image studiable) can be saved in the new preferences section “Image from clipboard” added in Global Preferences. The user can also choose to show a dialog when pasting an image (to allow the user to select the most appropriate pasting option and save his choice).

	Better ergonomics in the workflow: operator insertion with several antecedent studiables
Insertion in the workflow of operators with several antecedent studiables	It is now possible to insert into the workflow operators with several antecedent studiables. These operators can only be disabled if they have a single parent. New insertable operators by studiable: Profile (Join 2 profiles, Subtract profiles, Intercorrelate two profiles), Surface (Subtract two surfaces, Intercorrelate two surfaces, Patch, Stitch, Divide two surfaces, Mathematical function), Series of profiles (Concatenate series of profiles, Metrological filter), Series of Surfaces (S-filter(λs), Metrological filter), Image (Stitch, Convert into monochrome image, Surface + image (Stitch, Patch), Spectrum curves (Subtract spectrum curves, Concatenate spectrum curves), Hyperspectral image (Subtract spectrum curves, Concatenate spectrum curves, Join, Filter using PCA), IV curves and IV spectroscopy image (Subtract IV curves, Filter using PCA), Multi-channel image (Stitch).
	Better display in Threshold operator
Clearer display in Threshold operator	The preview display in the Threshold operator dialog on Surface and Multi-channel image studiables has been improved. The included points now do not change color while the excluded points change when the threshold is moved.
	Direct download of the most version authorized
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.
	File explorer in detail view by default
File Explorer in detail view by default	The File explorer now opens in detailed view mode by default.
	Display of studiables larger than 2 gigabytes
Display of large datasets	It is now possible to display images or surfaces larger than 2 Giga bytes.
	Multilayer removed from version 10
Multilayer removed from version 10	Multilayer studiables have been removed from version 10 because they are deprecated and replaced by Multi-channel images. The option not to convert Multilayer to Multi-channel image no longer appears in Preferences.
	New dark gray theme and Color theme preference enhancement
Added dark gray color theme	Mountains® 10 introduces a new contemporary "dark gray" screen theme. The Gray theme has been renamed Light gray (White, Black, Orange and Blue themes remain the same). In the Black theme, the Very Peri color replaces the yellow color.
Color theme Preference enhancement	The color theme Preferences dialog has been improved. The colors of the themes are now displayed in the dialog and the grayscale themes are separated from color themes.
	Updated icon design
Modernized icon design	Icons have been redesigned in the new the style of the software (shortcut icon etc.)
	Updated Welcome and About dialogs
Clearer Home dialog	The Home dialog page has been modernized to highlight a first level of resources.
Modernized About dialog	The About dialog has been modernized.

	Completed and updated Index, Templates, Tutorials and example studiables
Updated Templates and Tutorials	Templates, Tutorials and Index documents have been redesigned, reorganized and extended to illustrate new features. Example studiables have been added.
	Profilometry features
	New “Fit an asphere” operator
New “Fit an asphere” operator	The new “Fit an asphere” operator on Surface and Profile studiables, fits aspheric geometries. The measurement made on an asphere can be automatic or manual. The user can set reference geometry and adjust the parameters (radius, conic-constant, polynomial coefficients). The “Fit an asphere” operator then generates the calculated asphere and the residue (disparity between measured data and reference). The user can thus check if the fitting was done correctly or if there are visible defects. A result table containing the calculated parameters is generated. The position of the center X, Y, Z is also displayed as well as the aperture (angle of the lens).
	Image beneath contour profile
Contour study: Showing images (or surfaces) beneath contour profile	It is now possible to display one or more backgrounds in the Contour study on Image and Surface studiables. The new [Use background] button has been added to the Contour study ribbon to allow the user to choose the background to display among the studiables available in the document. The backgrounds can be hidden by using the [View] button in the Contour study.
Display settings for image beneath contour	The user can adapt the Surface or Image visualization of the background in the Contour study, by using different visualization options: background transparency, palette selection (for the Surface).
	Total Least square for leveling and form removal
Total Least Squares (TLS) method for leveling and form removal operations on Surface and Profile	The Total Least Squares TLS (TLS) method is now proposed for leveling and form removal operations on Surface and Profile studiables as well as the Ordinary Least squares method (OLS). This new option is suitable for steep slopes (large tilt angles).
Level operator on Surface: TLSPL method for rotation	The Total Least Squares PLane (TLSPL) method has been added in addition to the Least Squares PLane (LSPL) in the Level operator on Surface studiables. The operator allows the user to define and define the plane using the total least squares fitting method. The corresponding leveling operations are linked to the fitting method: subtraction for Least squares plane (LSPL) and now rotation for Total least squares plane (TLSPL). This modification does not apply to the 3 points and Minimum Zone methods that do not use Least square.
Partition and level operator on surface: TLS method for rotation	The TLS method is now used for rotation in the Partition and level operator.
Level operator on Profile: (TLSLI) method for rotation	The Total Least Squares LIne (TLSLI) method has been added in addition to the Least Squares LIne (LSLI) in the Level operator on Profile studiables. The corresponding leveling operations are linked to the fit method: subtraction for Least squares line, and now rotation for Total least squares line. This modification does not apply to the Minimum Zone and Two bars methods that do not use Least square.
Remove form operator on Surface: TLSSP method for sphere fitting	The Total Least Squares SPhere (TLSSP) fitting method replaces the Least Squares SPhere (LSSP) in the Remove form operator on Surface studiables.
Remove form operator on Profile: systematic TLSCI method	The Total Least Squares CIrcle (TLSCI) option replaces the Least Squares CIrcle fitting (LSCI) in the Remove form operator on Profile studiables, and the form is systematically removed according to the normals.

Parameter table on Surface and Profil: Total Least Squares in F- operation	The options Total least squares line (TLSLI) (for Profile) and Total least squares plane (TLSPL) (for Surface) have been added in the options list of F-operation in the Parameter table dialog (in the ISO-25178 revision, the default association method is TLS). The TLS method is applied when loading old documents replacing the LS old version method. The Total Least Squares SPhere (TLSSP) fitting method replaces the Least Squares SPhere (LSSP) in the F-operation on Surface. The Total Least Squares Circle (TLSCI) fitting method replaces the Least Squares Circle in the F operation on Profile.
	### Result picker in the Parameters table
Result picker in the Parameters table: better automation	Result pickers are now available in the "Parameters table" study dialog for cut-off selection. The new added item "Pick a result" allows the user to select a result (either a result generated by studies, or a variable). The user can thus centralize a cut-off value applied to several Parameters tables or Filters. In the "Parameters table" study, the name of the selected result or variable is displayed along with its value. The name of the selected result or variable is displayed in green in the study dialog to show that there is a link. If this link is broken, the display turns red. An error message in the Parameters table (with a hypertext link) then alerts user on the origin of the problem. The Result pickers are available in the Parameters table on Profile, Series of profiles, Surface, Series of surfaces studiables as well as in the Parameters table in the Advanced contour analysis study.
	### New 2D motifs parameters
Characterization of repeating patterns in Profile motifs	Three new categories of roughness motif parameters have been added in the Profile motifs study: Motif height parameters, Motif width parameters, Motif slope parameters. These parameters make it possible to analyze periodic profiles that have an asymmetry on one side or the other (the hole being not necessarily in the center of the pattern). They improve the characterization of the shape of periodic or semi-periodic profiles. These new parameters make it possible to qualify both the heights on the left and the heights on the right but also, the width on the left, the width on the right, the slope on the left and the slope on the right. Thus, it is possible to generate statistics and ratios. For each parameter there is an associated standard deviation parameter (with a q at the end of the name).
	### Adaptation of existing tools to Series of profiles and surfaces
Metrological filter operator on Series of surfaces and profiles	The Metrological filter operator is now available on Series of profiles and Series of surfaces.
SSFA study on Series of surfaces and profiles	The Scale-sensitive fractal analysis study has been adapted to Series of profiles and Series of surfaces studiables. This allows the user to compare the fractal behavior on different samples in order to differentiate populations, e.g. the calculation can be done on any element of the series. Two visualization modes are available: the Scale-sensitive graph displays the curves in gray and the current curve in color. The parameters displayed as well as the information on the graph correspond to the current profile. The Complexity graph displays the series with different colors (a color scheme of the curves is predefined for the first 15 curves) as well as a legend and average parameters on the series.
	# Point cloud and Shell features
	### CAD compare, calculation of deviations
New CAD compare study for Shell	A new CAD compare study is available for Shell studiables. A measured Shell can now be compared with a reference Shell (which can be a CAD model) to calculate differences. The user can thus, for example, compare the Shell "before" with the Shell "after" when studying the wear.

Prefit in CAD compare	In the CAD compare study, two methods of pre-alignment are available: one automatic and one manual. In the Manual Prefit method, the user selects points of interest. This is particularly useful when the measurement is partial compared to the CAD model (for example: measuring just a part of the engine) or when the prefit fails.
Fit in CAD compare	In the CAD compare study, the fitting allows the user to more finely align a measured Shell model with a CAD model. The fitting is generally carried out after the pre-alignment operation. The two superimposed models can be viewed independently of each other. The fitting operation generates a studiable result in the workflow.
Deviations display from a reference CAD model, parameters calculations on deviations	The user can display the deviations in the 3D view from the reference CAD model in order to estimate the differences. The palette or material rendering can be changed to modify the representation. The export function is available. The deviation parameters are calculated and displayed in the study (mean error, min error, max error).
	### New Remove outliers operator on Point cloud
New Remove outliers operator on Cloud	The new “Remove outliers” operator detects and removes outlying points or cluster points. This allows the user to get rid of incorrect points that may appear when using optical technology, or to discard parts of the points clouds that are not of interest (object base for example). Two methods are available to remove outliers: The “Remove points (from distribution)” method is suitable for isolated points. The points at a distance from the rest of the nearby population are statistically identified. They are considered as outliers and deleted. The “Remove clusters smaller than” method is suitable when the acquisition includes elements of the decor that users do not wish to keep. Dense groups of points that are isolated from other groups (clusters) are created on the point cloud. This makes it possible to separate the main point cloud from the peripheral clusters, which are then considered as outliers to be eliminated. These will then be eliminated in order to allow subsequent correct meshing. Outliers and clusters can be viewed in real time in the operator dialog (in red).
	### Enhancement of Mesh the point cloud operator
Mesh enhancement on Shell	The Mesh the point cloud operator has been improved for the mesh of point clouds containing points on distant profiles. Changes have been made in the mesh function to be able to mesh clouds representing simple geometric shapes scanned under specific conditions (plane measured as a spiral, cylinder measured in rising helix etc.) The meshing is also improved when the distance between points is locally larger or if the point cloud is composed of several disjointed sub-clouds.
Invert normal by double-click when meshing	The result of the Point Cloud Mesh operator can give a mesh composed of several sub-meshes (parts) with possibly different (normal) orientations (inside and outside can differ from one sub-mesh to another). To make these orientations consistent, the user can now double-click on the areas to be inverted.
	# Correlation & Spectroscopy features
	### New Peak fitting analysis study
Peak fitting functions moved to a new Peak fitting study	The Spectrum curve analysis study has been split into two studies: Spectrum curve analysis study, and Peak fitting study. The Spectrum curve study keeps the curve display, and the creation of manual and automatic cursors. The Peak fitting study is dedicated to the fitting of peaks according to a mathematical function.

New Peak fitting analysis study	The Peak fitting analysis now has a dedicated study: Peak fitting study on Spectrum curve and Hyperspectral image studiables The new Peak fitting study now makes it possible to apply peak fitting to all the spectra of a Spectrum curve studiable or Hyperspectral image studiable. It is possible to apply the same fitting settings to all the spectra, or spectrum by spectrum. Two new parameters can be calculated: Area of the peak, and Peak shift (difference between the Peak position and a reference value defined in the Curve fitting properties dialog). User interface has been improved: The areas of fitting are differentiated by color, and are visible by default. Various display options are available (style, axis, curves to display, envelope etc.). The user can thus easily define one or more fit functions in the fitting zone using standard functions (Gauss, Lorentz, Pseudo-Voigt). The user also can also add/remove an automatic baseline for the selected fitting zone.
	### New Parameter map operator
New Parameter map operator for spectra	The software can now generate a parameter map from the study results, thanks to the new Parameter map operator. For example, the user can generate maps of the calculated peaks positions and peaks amplitudes. This operator generates a Multi-channel image studiable (or surfaces) when applied on a hyperspectral image, and a Multi-channel profile studiable (or profiles) when applied on a Series of spectra.
	### Correct the baseline operator: ergonomics enhancement
Correct the baseline operator: better ergonomics	The Correct the baseline operator dialog on Hyperspectral image studiables has been modified to display the spectrum curves in the source preview. The dialog interfacel is now the same as that of the spectrum curves.
	### New MountainsSpectral® Analyse product
New MountainsSpectral® Analyze product	The MountainsSpectral® range is extended with the addition of the Mountains Spectral® Analyze product, for the complete spectral analysis of Raman, IR and cathodoluminescence spectral curves. This is destined for users working with spectra only (without imagery), like for example time series. This completes the MountainsSpectral® products: MountainsSpectral® Correlate, MountainsSpectral® Expert, MountainsSpectral® Premium.
	### New Correlative microscopy module
New Correlative microscopy module	The Correlative microscopy module offers tools for spectral image processing. Data colocalization is available. Advanced visualization allows the user to perform data correlation analysis.
	# SEM features
	### FIB-SEM: direct opening of a set of images to form a cube
Direct loading of a Multi-channel cube from multiple images	A new "Load a Multi-channel cube" entry has been created in the File menu to simplify the creation of Multi-channel cube studiables. The dialog box is more intuitive and allows the user to directly create a cube from a batch of FIB-SEM images, and show it in the current document. Options for inverting the image stack (“Invert stack”) and colors (“Invert colors”) have been added.

	Multi-channel cube: new Pseudo-color view
New Pseudo-color view on Multi-channel cube	The Pseudo-color view study has been added on Multi-channel cube studiables. This 2D study shows the successive pseudo-color views of the different XY slices composing the Multi-channel cube. This is now the default study when loading a Multi-channel cube.
	New image correction operators in Multi-channel cube: Shift, Spatial filter, Correct, and Scale the image
New ”Shift” operator for Multi-channel cube image processing	The Shift operator shifts the slices of the Multi-channel cube studiable in order to align them for a better cube construction.
New Spatial filter operator for Multi-channel cube image processing	The Spatial filter operator applies a Smoothing / Denoising-type filter or Binning-type filter on the slices of the Multi-channel cube studiable. The binning filter allows the user to reduce the resolution of images.
New Correct operator for Multi-channel cube image processing	The Correct operator corrects the slices of the Multi-channel cube studiable, slice by slice. The user can for example correct the brightness of a slice when it is too dark. It can also completely remove erroneous slices or replace them by interpolation of the neighboring slices.
New Scale the image operator for Multi-channel cube image processing	The Scale the image operator allows the user to use the known length of the graphical scale bar (if the images contain a dimension block), or the known length of a motif or feature visible on the image, in order to edit and recalculate the dimensions of the XY-axes. In addition, the user can manually or automatically choose which part of the image to use. This is in particular useful when working with SEM images or microscope images.
	Extract area on cube
New Extract area operator on Multi-channel cube	The Extract area operator extracts a region of interest on the Multi-channel cube studiable.
	SPM features
	New Parameter map operator
New Parameter map operator for Force curves.	The Parameter map operator makes it easier to create a Parameter map and manipulate data (Young’s modulus, adhesion, energy etc.) This allows the user to create it directly from numerical results coming from a force-volume dataset or a series of force curves. The operator automatically generates in the workflow either a single studiable (Multi-channel profile/Multi-channel image) or a studiable for each selected parameter (Profile/Surface), useful for further analysis (use in overlay for example). The operator applies to Series of force curves and Force volume studiables.
New Parameter map operator for IV curves.	The Parameter map operator described above is also available for IV curve and IV spectroscopy image studiables.

	Light microscopy features
	New Image instrument family for light microscopy
New Image instrument family	Version 10 sees the Mountains® software family extend further, with the arrival of the new MountainsImage® branch to light up image analysis. Mountains® offers three products in the new Image instrument family for light microscopes: MountainsImage® Starter, MountainsImage® Expert and MountainsImage® Premium. Dedicated to the study of any B&W or color image (without topography) obtained using a camera or imaging system, this new instrument family offers tools for image processing. The Image products complement the existing range, in addition to Profilometry (2D), Surface Topography (3D), Scanning Electron Microscopy, Scanning Probe Microscopy and Spectral products.
	New studies on images
New Color segmentation method in Particle analysis	The 'Color segmentation' method has been added to the “Particle analysis” study for processing images from light microscopy. This segmentation methods allows the detection of particles according to their color or gray level. It automatically creates a classification. The particles are colorized according to the detected color class. This can be useful for corrosion or wear evaluation, using for example the coverage parameter. The user indicates the number of colors to detect in the image and visualizes the result of the detection in real time. This applies to RGB Image studiables.
New Histogram study on Image	The Luminance histogram has been added on Image, Series of image and Multi-channel image studiables. The histogram allows the user to observe the luminance distribution of the image.
New Pseudo-color view on Image	The Pseudo-color view on Image studiables has been added in addition to the True color view. It allows the user to display 2D images with false color to represent luminance This is interesting for viewing grayscale SEM images for example. The functions available in the ribbon are the same as for a surface, including easy image optimization and studiable color modification. The default study used when loading an Image studiable remains the True color view study.
New Slices study on Image	The Slices study has been added on Image, Series of image and Multi-channel image studiables. The Slices study operates a segmentation of the image into two or three-color shades, based on luminance information.
New Texture isotropy study on Image	The Texture isotropy study has been added on Image, Series of image and Multi-channel image studiables. The Texture isotropy study is based on luminance information.
Direct access to Optimize image	The Optimize option is now directly accessible via the [Enhancement] button in the “Pseudo-color” view or the “True color” view on Image studiables. It automatically optimizes the luminance when applied in the True color view study. It automatically optimizes the color scale when applied on Pseudo-color view study.
	New operators on images
New Extract profiles operator from image luminance	It is now possible to extract a luminosity profile on the image layer of a Surface + images studiable. It is now possible to convert Image studiables into Series of profiles using luminance.
New Threshold luminance operator on Image	The new Threshold operator on Image allows improvement of contrast or saturation removal. The user can fill-in thresholded points with Black & White, or with Min/max luminance values (optional histogram expand).
Invert image luminance	A dialog has been added to the "Invert Color" operator. Besides color inversion, the user can thus choose to invert only the luminance (and keep the color), or choose to invert the luminance and average its intensity with the source.

Extract image chrominance	It is now possible to extract Chrominance information in the Convert into surface operator on images The operator dialog has been redesigned to be coherent with standard software dialogs. The generated studiables are gray level images associated with a red, green or blue color attributes.
New Convert into monochrome image operator on Image	The Convert into monochrome image operator converts an RGB image to gray level images by extracting one or more components (Luminance, Inverted Luminance, Red, Green or Blue Channel, Red, Green or Blue Chrominance, Optimal contrast). The generated “Red channel”, “Green channel” and “Blue channel” Image studiables are gray level images associated with a red, green or blue color attributes.
New “Scale the image operator” on Series of images	The Scale the image operator now applies to Series of images studiables. The user can scale all images at once, and scroll through the images of the series.
Oblique segment to scale the image	Oblique segment has been activates in the “Scale the image” operator on Image studiables, to calculate the XY-dimension of the image from a known feature. This is particularly useful when working with SEM or other microscope images. The cursors magnetically snap from oblique to horizontal/vertical position when the cursor is near the horizontal/vertical position.
Definition of a color for Image	It is now possible to define a color as an attribute of Image studiables. The visualization of the image with the studiable color is available in the Pseudo color view. The color intensity is based on the luminance.
Gray level image distinction in the workflow	In the workflow, gray level images (Red value = Green value = Blue value) have a distinct gray level icon.
	New Image Index and templates
New Image index and templates	A new “Image” Index has been created to guide the user to Templates illustrating the new features of the Image instrument family.
	Reference Guide and translations
Updated Reference Guide	The Reference Guide has been updated with the descriptions of the main new features and improvements. It is available in English for the moment. Translation 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-5351	A	The software can crash when modifying a cursor shape in the 3D view of the Thickness analysis study if undoing and then redoing all actions.
MNT-6987	A	A freeze of the application may be observed after selecting the profile in the Advanced contour analysis study and then clicking on the [Material side] button in the ribbon.
MNT-6999	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	A	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-7113	A	It is not possible to use the relative coordinates for axes on Multi-channel cube studiables in a particular case.
MNT-7132	A	The software may crash when applying the Remove form operator on a Profile studiable if it is entirely non-measured.
MNT-2993	B	The “Automatic detection” method is selected by default in the “Detect structures” operator dialog when the operator is applied on two compatible studiables if this was the configuration for the previous use.
MNT-5343	B	The colors of the different channels of Multi-channel studiables (chemical cubes) are not visualized in the thumbnails of Histogram &Abbott; Texture direction, Frequency Spectrum, Averaged power spectrum, Texture isotropy studies.
MNT-5381	B	No warning is displayed in the Detect Structure operator dialog on Surface, Image, Surface + image and Multi-channel studiables when "Use a sample structure" is selected as detection method, if the sample structure studiable cannot be used.
MNT-5895	B	Filtering of values by a text-type parameter is not correctly applied in the Box plot study on results from the Particles analysis study on Surface, Image studiables.
MNT-5967	B	The "Fully automatic" method in the Stitch operator on surface studiables only allows the selection of one surface. No error message is displayed in case of incompatibility or overlap.
MNT-5987	B	All the results selected in the [Select results] button dialog box of the "Statistical summary" study, from a Spectrum curve analyis study on a Hyperspectral image studiable, are not displayed in the study; the displayed parameter names are incorrect. The "Statistical summary" is not updated when modifying the parameters selection and then validating the dialog.
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-6407	B	The visualization of the image is reversed on the Y axis in the preview of the Extract slice operator dialog on a Multi-channel cube studiables.
MNT-6437	B	The "Measure distance between point and segment/arc" option of the [Advanced results] button in the "Advanced contour analysis" study on Profile studiables does not work.
MNT-6515	B	Mouse wheel or touchpad navigation has no effect on the Explorer scrollbar on some PCs.
MNT-6516	B	The management of non-measured points in the operators “Use reference spectra” and “Extract components” on Hyperspectral image studiables is erroneous.
MNT-6590	B	The axis settings of the studies on Spectrum curve, Hyperspectral image, IV curve and IV spectroscopy image studiables are incorrectly named X.
MNT-6604	B	File Explorer behavior may be incorrect when changing icon size.
MNT-	B	The Comparison slider view changes the rendering for some studiables.

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MNT-6751	B	The Automatic detection method in the “Scale the image” operator dialog gives invalid results in certain cases.
MNT-6755	B	Imperial units are not correctly managed in the “Scale the image” operator on Image, Series of images and Multi-channel image studiables.
MNT-6969	B	The software may never stop when selecting the "Surface scale (1 corner)" method in the [Analysis method] button of the "Scale Sensitive Analysis" study ribbon on Image studiables.
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-7006	B	Applying the « Scale-sensitive fractal analysis study on Surface studiables with non-metric axes (volt, Hz, etc.) gives random results. No error message is displayed.
MNT-7010	B	The calculation of the luminance in the Extract profile operator is not homogeneous on Image studiables, or on the image channels of Surface + image or Multi-channel image studiables.
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-7035	B	The slider for scrolling spectra in the Correct the baseline operator dialog does not work smoothly.
MNT-7071	B	The settings using the [Enhancement] button are not saved on the channels of Multi-channel image studiables.
MNT-7090	B	Applying the “Substract profiles” operator to the identical studiable does not generate a flat result studiable.
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-7115	B	The «Color mix" and "Segmented grains" display options on Multi-channel cube studiables do not use the same axis values.
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-7133	B	The contours of the structures are not at the correct position in the shown layer of the "Detect structure" operator dialog.
MNT-7136	B	The Grid view study on a Multi-channel image studiable is not correctly displayed if the studiable has only one channel.