Mountains Version 10

Release Notes

Version	Date	Illustrated articles
10.1.10691	April 9th 2024	
10.1.10643	February 21st 2024	
10.1.10606	January 15th 2024	
10.1.10571	December 11th 2023	
10.1.10559	November 29th 2023	
10.1.10540	November 10th 2023	**What's new in 10.1**
10.0.10510	October 11th 2023	
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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Digital Surf, 16 rue Lavoisier, 25000 Besançon, France
www.digitalsurf.com - support@digitalsurf.com - Tel : +33 38150 4800

Bug corrections (A and B type)

	Type	Bug Description
MNT-8901	A	The result is calculated and no error message is displayed when the calculation is interrupted by clicking on STOP in the calculation bar.
MNT-8959	A	Watershed Wolf pruning for Xpd profile parameters and Spd surface parameters sometimes gives invalid results, especially with studiables having very low resolution.
MNT-8971	A	A crash may occur in the Scale-sensitive fractal analysis if the studiable is a flat surface studiable.
MNT-8994	A	A crash may occur in the Scale-sensitive fractal analysis study on small Surface and Profile studiables.
MNT-9011	A	The display of the "Z-calibration" dialog box in the "Calibration for four-image reconstruction" operator on Image studiables is partially black and controls are hidden.
MNT-9106	A	Some parameters according to ISO 25178 are computed on all motifs, rather than only on interior motifs, on Surface, Image, Surface + image, and Multi-channel image studiables.
MNT-9111	A	A crash occurs when deleting a Box plot study with no numerical result that can be used on Surface, Image, Surface + image, and Multi-channel image studiables after reopening the "Observed results" dialog box and then canceling it.
MNT-9136	A	The software may crash when loading text file as a Point cloud studiable including Intensity data (Point cloud: Coordinates (X, Y, Z) and intensity (I)).
MNT-8764	B	Assembly operators (Create series, Create multi-channel studiables etc.) do not correctly handle the suppression of an element creating the result studiable. Affects all types of studiables.
MNT-8764	B	Assembly operators (Create series, Create multi-layer or Multi-channel studiables, etc.) do not correctly handle the suppression of an element creating the result studiable. Affects all types of studiables.
MNT-8867	B	The optimization of the palette does not work correctly in the Strips view study on Hyperspectral image studiables.
MNT-8919	B	All of the layers might not be accessible or displayed in the default Grid View studies on a Multi-channel image studiables generated from Hyperspectral image studiables.
MNT-8926	B	The Particle analysis study is not updated when substituting a surface-type studiable if the "Threshold detection" method is applied and the threshold "Material ratio" is selected.
MNT-8938	B	Applying a Smartflow using ActiveX commands does not replace all studiables in a document containing more than one studiable.
MNT-8948	B	The name of a channel is not automatically refreshed in the Particle analysis study on Multi-channel image studiables.
MNT-8950	B	The Add/Remove spectrum curves operator displays a warning and assembles only one spectrum instead of all requested spectra on Spectrum curve studiables.
MNT-8951	B	Email addresses containing a final space character are considered as invalid.
MNT-8958	B	Settings of operators can sometimes be mistakenly adapted to new studiables in specific cases such as after an insertion, a deletion, a deactivation or an activation of an operator. Affects all types of studiables.

MNT-8961	B	The segmentation method does not work in the profile motifs study on profile studiables if no pruning has been applied.
MNT-8969	B	The layers of a Multi-channel image studiable are not displayed when using the Grid View option on Multi-channel image studiables generated from Hyperspectral image studiables.
MNT-8986	B	The text "NaN" is interpreted as a value (instead of as a non-measured point) when importing TXT or CSV files if the file contains only Z values.
MNT-8992	B	Elements in the Advanced contour analysis study can be lost when substituting a profile if the original profile uses parameters calculated on results given in the results manager and substituting with the new profile causes the number or order of the results to be changed.
MNT-9028	B	Double clicking on a residue or Gothic arch element in the Advanced contour study does not open the "Select parameters" dialog.
MNT-9088	B	Peaks and pits of Waviness parameters according to ISO 21920 are averaged on the number of sections requested instead of the number of sections actually contained in the profile.
MNT-9089	B	The results reported in the Result manager are removed when the Result manager is reduced. They become visible again when the mouse is hovered over the icons and available again when the user clicks in the Result manager.

What's new

Copiable serial number in the About dialog	The user now can select the serial number in the About dialog for improved communication with the Support Center.

Bug corrections (A and B type)

	Type	Bug Description
MNT-8741	A	A crash may occur when modifying the settings in the "Remove multi-plane form" operator dialog on Surface, Surface + image and Multi-channel image studiables.
MNT-8849	B	Offsets are lost in the Colocalization study with a Colorized bands map result.
MNT-8695	B	Angle parameters configured in degrees/minutes/seconds are not always displayed in these values in the Result manager.
MNT-8696	B	Results from the Result calculator are not displayed in either the Table of results or Result Manager when applying a SmartFlow.
MNT-8706	B	The behavior of the "Hidden" check box in the "Styles of curves" dialog box of the "Force curve analysis" study on Force curve studiables is inverted.
MNT-8711	B	The Result calculator does not generate results in degrees minutes seconds, even when the result unit is specified as the unit of a result defined in this unit.
MNT-8717	B	Updating a document on a Multichannel image or on a Surface + image studiable after applying a template defined on a Surface studiable does not work.
MNT-8727	B	It is not possible to use upper and lower cases of the text to facilitate filtering of some parameter names such as 'Ra' in the filter applied in the Result manager (for export, in the selection of parameters in several dialogs...)
MNT-8733	B	Optimization functions do not work on image layers of studiables in H5 format.
MNT-8747	B	The Auto-localize function for Multi-channel image studiables does not work anymore when changing the calculation channel.
MNT-8767	B	Deleting an arc created on the profile between built points in the "Advanced contour analysis" study deletes the built points and their dependencies.
MNT-8824	B	The spectra display in the previews of the "Calculate derivatives" operator on Hyperspectral image studiables are not synchronized.
MNT-8866	B	The Enhancement option of the [Enhancement] button of the ribbon of the "Strips view" study does not work.

MNT-8869	B	The export in TXT-ASCII format of Surface or Multi-channel image studiables can lose precision when choosing to export the offsets (options "Add offset to Z-coordinate or "Add offset to X and Y-coordinate of the "Export data to a Text file" dialog box).

What's new

External commands to manage statistical populations	External commands have been added to manage documents in statistical populations. The user can now add all or one document in a folder to a statistical population and delete all or one document of a statistical population.
Restart using external command	A new external command now allows the user to restart the software.

Bug corrections (A and B type)

	Type	Bug Description
MNT-8100	A	Mountains® freezes in the "Advanced contour analysis" study on Parametric profile studiables when selecting the background studiable in the "Select backgrounds" dialog of the [Use backgrounds] button.
MNT-8569	A	A warning is displayed and there is no result when applying the "Extract local contour" operator on Surface studiables.
MNT-7334	B	An error message is displayed when applying a template containing a studiable with only one channel on a document containing a Multi-channel image or Surface + image studiable.
MNT-8170	B	The thumbnails are incorrectly displayed on Multi-channel cube studiables when changing the slice.
MNT-8347	B	Studiables in Sem3D format cannot be loaded.
MNT-8520	B	It is possible to save a "Page background" document as a SmartFlow.
MNT-8521	B	Applying the "Visualization of a surface" SmartFlow to a Surface studiable hides existing studies in the document and its application does not appear in the Undo/Redo button actions list.
MNT-8524	B	The results in the "Parameters table" study are incorrect and the red cursors in the "Histogram & Abbott curve" study in interactive mode are no longer placed on the curve on large Surface studiables.
MNT-8542	B	An error appears when displaying the Tolerance limit study on Surface studiables when calling the Feature parameters of the ISO 25178 standard if the document contains an old version of the "Parameters table" study.
MNT-8641	B	The OK button sometimes remains grayed in the "Add variable" dialog box in the Results manager and from the button in the top ribbon of the Results tab.
MNT-8655	B	It is not possible to define a zone to extract in the Extract area operator on Multi-channel cube studiables if the operator has previously been applied and validated on a zone of less than one point.

What's new

Height parameters on Profiles: best averaging calculation	The averaging mode of the Height parameters Rp, Rpx, Rv, Rvx, Rz in the ISO 21920 standard is now adjusted to better account for peaks and valleys in section lengths, in accordance with the latest ISO recommendations.

Bug corrections (A and B type)

	Type	Bug Description
MNT-8423	A	The translation on the OK button is incorrect in some languages.
MNT-8500	A	A crash may occur when applying the "Use reference spectra" or the "Create density map" operator to "Spectral curve" studiables if you click on a spectral curve name in the list in the operator dialog box to select it.
MNT-2767	B	The ISO 25178-2 Feature parameters in the "Parameters table" study on Surface studiables do not all have the same settings available.
MNT-8385	B	It is not possible to modify the position or enlarge the nominal model data to create reference points in the "CAD compare" study on Shell studiables in some cases.
MNT-8445	B	The result of the Slices study on a Surface + image study is incorrect if the study is called when the image layer is selected.
MNT-8451	B	Images contained in a Page background in use when creating a SmartFlow are included during the application of the SmartFlow on another studiable. (The page background should not form part of the SmartFlow.)
MNT-8457	B	Insertion, in the workflow, of the Sort spectra operator before an Extract areas operator on hyperspectral image studiables can generate incompatible results.
MNT-8511	B	The drawing of the unselected zone and the cursors in the "Distribution of the frequency spectrum" view in the "Threshold the spectrum" operator dialog box on Surface studiables is incorrect.

Bug corrections (A and B type)

	Type	Bug Description
MNT-8354	A	Unwanted drawings may appear in the preview of the "Extract profiles" operator dialog box on Surface, Image, Surface + image or Multi-channel image studiables when extracting an average profile with a 0% width.
MNT-8357	A	The preview of extracted profiles is not updated in the "Extract Profiles" operator dialog box on Surface studiables when aborting the creation of a new extraction shape leading to occasional crashes.
MNT-8301	B	A Color scale using the default palette is displayed in the “Pseudo-color view” study on Multi-channel image studiables when the current channel is an Image channel if the Composite rendering mode is activated (the Color scale should not be displayed).
MNT-8352	B	The display of the images along the Z depths in the material in the “Extract area” operator on Multi-channel cube studiables is incorrect when all the slices are not extracted.
MNT-8373	B	The extracted profile preview in the "Extract profiles" operator dialog box on Surface, Surface + image, Image or Multi-channel image studiables changes when selecting an oblique extraction shape on the source Profile studiable if the "Average the profile" option is checked, set to zero and then unchecked in a particular case.
MNT-8374	B	The maximum value of the "Average the profile" option in the "Extract profiles" operator dialog box is incorrect if the units in the "Settings for automation" section are changed to percentage or number of points.
MNT-8376	B	It is not possible to generate a Multi-channel image studiable when applying the "Map local properties" operator to Multi-channel image studiables.
MNT-8412	B	It is possible to insert the "Subtract profiles" operator before an operator in the workflow even if it is not compatible with the operator before which it is inserted (ex. Level). Affects Profile and Series of profiles studiables.
MNT-8413	B	The summit of some particle peaks/pits in the "Particle analysis" study on surface or image studiables may be positioned outside of the particles when the "Watershed detection" method is selected and the option "Smooth the contour" is activated in the [Refine Detection] dialog box.

What's new

	Cross technology features
	SmartFlow ergonomics and batch process
	Minidoc renamed SmartFlow and new icon
Minidoc renamed SmartFlow	Minidoc has been renamed SmartFlow in Mountains® interface texts, and Reference Guide. Using a SmartFlow is a smart and quick way to include an analysis workflow in the document.
Smartflow icon	A new icon has been created to identify SmartFlows. It represents a stopwatch, because using SmartFlows saves time.
	SmartFlow access from ribbon
SmartFlow direct application	A simple click on a [SmartFlow] button in the Automation ribbon can now apply a SmartFlow on your data and append it in the document.
[Apply SmartFlow] button	The application of all SmartFlows is now available by default in a sub-menu of the [Apply SmartFlow] button of the Automation ribbon. (It is however possible to move this access to a direct ribbon button). The "Apply document as a SmartFlow" option has been moved there also.
	SmartFlow application in batch
SmartFlow in batch	The user can now apply a SmartFlow as a batch on several selected studiables at the same time. The SmartFlow is then applied on each of the studiables. This is also possible when applying a document as a SmartFlow.
SmartFlow in batch when loading	The user can now apply a SmartFlow as a batch when loading several studiables. The SmartFlow is then applied on each of the loaded studiables.

	Default SmartFlow when loading data
Default SmartFlow	It is now possible to define a default SmartFlow to apply when loading a studiable. You can define it from the renamed “Default SmartFlow and studies” section of the preferences. The actions to be applied when loading a studiable are now placed in this sub-section.
	SmartFlow management dialog
SmartFlow management dialog	The SmartFlow management dialog has been reorganized to give direct access to all the properties of a SmartFlow. The dialog is available from the [Manage SmartFlows] button in the SmartFlows group of the Automation tab.
SmartFlows tree	SmartFlows are sorted by studiable type in an unfoldable tree in the SmartFlow management dialog. The user can directly see and modify the properties of the selected SmartFlow (Content, Name, Tooltip, Icon, Shortcuts, lock status). It is possible to select several SmartFlows to make changes. The user can delete a SmartFlow using a button or the Delete key.
Direct [SmartFlow] button in the ribbon	The user can now choose to display a SmartFlow as a button in the Automation ribbon. Available from the SmartFlow management dialog.
SmartFlow icon in ‘Favorites’ panel	The user can choose to display the SmartFlow in the ‘Favorite’ panel, from the SmartFlow management dialog.
Hiding system SmartFlows	The user can choose to hide system SmartFlows in the software, in order to give more visibility to the custom SmartFlows. Available from the SmartFlow management dialog.
Sharing SmartFlows	Solutions to share SmartFlows with colleagues are also available from the SmartFlow management dialog.
	SmartFlow icons dialog
Easier SmartFlow icon management	The “Select an icon” dialog is available from the “SmartFlow management“ dialog. It allows easy management of icons, to illustrate and identify your custom WorkFlows.
Easier Smartflow icon creation	Custom SmartFlow icons can now be easily created from image files. Simply load an image, or drag it from Windows File Explorer, or paste it from the clipboard by Ctrl+V. Available from the Select an icon dialog. You can delete a custom icon from the icon storage, using a button or the Delete key.
SmartFlow page as icon	The user now can use the first page of a SmartFlow as the SmartFlow icon.
Predefined SmartFlow icons	In the “Select an icon” dialog, you now have a greater choice of predefined icons.
	Other ergonomic improvements on SmartFlows
Simplified Save SmartFlow dialog	The Save SmartFlow dialog has been simplified. The user just needs to type the SmartFlow name.
Multiple-studiables SmartFlow dialog	The dialog box for applying a SmartFlow containing multiple root studiables has been improved.
SmartFlow management access	The information line displayed at the top in SmartFlow edition mode contains a direct access to the SmartFlow management dialog.
SmartFlow indication in title bar	The indication [Smartflow] is displayed after the SmartFlow name in the application title bar.
Save SmartFlow shortcut	The Shortcut to save a document as a SmartFlow is now Ctrl+Alt+F.
Undo/Redo on SmartFlows	You can now undo/redo the complete SmartFlow application. The Undo action will remove all the operators, studies and frames contained in the SmartFlow at once. The redo action reapplies the complete SmartFlow.

	Particle analysis ergonomics
	Improvements to the Particle analysis ribbon
Direct access to detection methods	Direct access to the detection methods is now possible in the “Particle analysis” study thanks to buttons directly visible in the ribbon. Available methods (depending on studiable type): Threshold detection, Watershed detection, Edge detection, Circle detection, SEM-BSE (Multiple threshold detection), ‘SEM-SE (Object oriented detection), Color detection, Component detection.
Group reorganization in “Particle analysis” study	A Post-processing group contains the operations that can be performed on the detected particles in “Particle analysis” study. Post-process: Refine, Merge or Split particles, Morphological correction, Spherical caps and Skeletonize). A Display group contains Rendering and Display options. Rendering options: Overlay, Monochrome, Color, Transparency. Display options: Classification legend, Values, Contour, Peaks/pits symbols. The [Particle classification] button has been moved to the Parameters group.
Sphere and skeleton parameters visibility in “Particle analysis” study	Sphere and skeleton parameters are now available in the “Select parameters” dialog box of the “Particle analysis” study even if the objects are not displayed in the image.
Renaming in “Particle analysis” study	Buttons or groups have been renamed for more clarity and concision in the “Particle analysis” study ribbon.
Visibility of available detection methods	In order to facilitate the user’s choice, only detection methods available for the displayed studiable are visible in the Particle analysis ribbon. Channels in the Multi-channel image studiables incompatible which do not allow a selected detection method have their thumbnails grayed out in the method segmentation dialog box.
	Thumbnails in Particle analysis
Identification by thumbnails in the “Particle analysis” study	Channel thumbnails can now be displayed in the “Particle analysis” study for Surface + image and Multi-channel images. This allows visualization of which channels are used for detection and for calculation. On the thumbnails: A black triangle indicates the selected calculation channel. A colored contour icon identifies the detection channel, and opens the detection method dialog by simple click.
Better access to detection and calculation channels in the “Particle analysis” study	The Calculation channel dialog has been modified for better selection and visualization of the chosen Calculation channel for Surface + image and Multi-channel images in the “Particle analysis” study. The user can now select the Detection channel via the dialog boxes of each detection method. It is possible to synchronize/desynchronize the Detection and the Calculation channel.
Thresholded value visualization in the “Particle analysis” study	The user can now clearly visualize the values excluded by thresholding settings in the “Particle analysis” study: They are colored red in the distribution diagram.
	Classification dialog: better ergonomics
Manage classification dialog ergonomics in “Particle Analysis” study	The “Manage classifications” dialog box in the “Particle analysis” study benefits from ergonomic improvements for creating, using and combining classifications. The classes are now grouped by linked classes as a tree structure in the Classification dialog of the “Particle analysis” study. The buttons to split a class and to delete it have been moved to a new row under each class. The splitting of a class now doesn’t modify previous settings. The eye symbol to show or hide the class’s particles has been replaced by a check box. The color of the class can be changed by a click on the color box of the class. The title of a class generated by intersection, union and subtraction is clearer. The user can now duplicate a classification. A text informing the user that the particle belongs to the lowest compatible class in the table has been added. This applies to Surface, Image, Surface + image, Multi-channel image studiables.

	Spectroscopy features
	Extract custom ROI on Hyperspectral images
Custom ROI for hyperspectral images	The user can now extract custom Region of Interest and circular zones in the Extract areas operator on Hyperspectral images. It is also possible to extract several zones at the same time.
	Improved display in Hyperspectral image view
Displayed curves in Hyperspectral image view	Lower and upper envelope curves are now displayed in a "Hyperspectral image view" study. There is more flexibility in the choice of displayed curve.
Optimized Z-scale in Hyperspectral image view	Choice of Z-scale for spectra is now available in a "Hyperspectral image view" study. From the ribbon, the user can optimize the visualization either for the current curve, or for all curves. The user can also choose to display the spectra in a normalized scale.
Cursor visibility in Hyperspectral image view	The cursor in the "Hyperspectral image view" study is more visible (dotted lines in the shape of a cross).
	New "Remove spikes" operator
New "Remove Spikes" operator	The new "Remove spikes" operator removes erroneous outlying points from spectral data (cosmic rays, "dead" pixels of a detector). It is available for Spectrum curves and Hyperspectral images.
Spike removal methods	Two methods are available in the Remove spikes operator: You can use a rectangular shape to manually select spikes; the top of a spike must be located inside the shape. Or you can automatically eliminate an outlier by defining its size (minimum height and maximum width). Spikes are removed down to the baseline.
	Improvements for spectrum baseline corrections
Improved spectrum baseline correction	The "Correct the baseline" operator has been improved to better adjust the spectrum baseline. The improvements listed below are available for Spectrum curve and Hyperspectral image studiables.
Calculating spectrum baseline with zones	In the Polynomial form method, it is now possible to use portions of the spectra to calculate the baseline. You can add different custom calculation zones, which will be used by the software to fit and remove the baseline.
Line and 2nd order spectrum baseline fit	It is now possible to fit the spectrum baseline with a line (first order polynomial), or a second order polynomial in the Polynomial form method.
Flat line spectrum baseline	It is now possible to offset the spectrum curve by setting its lowest point to zero (or the lowest point of a selection zone). You can also subtract a fixed offset value.
Baseline settings in spectral axis units	Settings values expressed in the unit of the spectral axis (rather than points or percentages) are now used for automation or after the modification of the upstream workflow.
Baseline correction ergonomics	Settings for the "Robust Gaussian" and "Lower morphological filter" options now use a sliding cursor. The polynomial order can be selected in a drop-down menu. Spectra visualization buttons have been also added to the toolbar of the Source and Preview results.
	New "Use spectral bands" operator
New "Use spectral bands" operator	The new "Use spectral bands" operator creates spectral maps from bands of user-defined wavelength intervals. Each band generates a spectral map. This simple method completes the available operators for spectral map creation from hyperspectral images. This operator is available on Hyperspectral image and IV spectroscopy image studiables.
Band parameters for spectral bands maps	In the "Use spectral bands" operator, you can choose Area, Maximum amplitude, maximum position, or "Full Width at Half Maximum of the bands" to generate a colored spectral map. Basic baseline correction is also available.

Use spectral bands ergonomics	In the “Use spectral bands” operator, an interactive cursor allows the user to display any spectral curve of the hyperspectral image to visualize the bands. The user can choose to use the full Z-scale of the current curve or optimize the Z-scale to represent all curves in full scale. The operator shows a preview of a generated Multi-channel image with thumbnails.
	“Sort by a parameter” operator
“Sort by a parameter” operator	The “Sort by a parameter” operator can now be applied on Hyperspectral image and Series of spectrum curves studiables. This allows the user to keep or discard spectra using very precise criteria.
	New “Create multi-channel cube” operator from MCI
New “Create multi-channel cube” operator from Multi-channel images	The new “Create multi-channel cube” operator combines a stack of several compatible multi-channel images (taken at different Z depths in the material) to create a cube.
Create multi-channel cube dialog	The “Create multi-channel cube” operator dialog allows the user to freely select and order the MCI (slices) in the cube, and to define the cube size in Z.
	New “Create multi-channel cube” operator from Series of surfaces
New “Create multi-channel cube” operator from Series of surfaces	The new “Create multi-channel cube” operator combines one or several stacks in the form of compatible Series of surfaces to create a cube. Each Series of surface scrolling must represent the evolution of a component along the Z depths in the material. Each Series creates a channel in the Multi-channel cube.
Create multi-channel cube dialog	The “Create multi-channel cube” operator dialog allows the user to freely select and order the Series (channels) in the cube, and to define the cube size in Z.
	SPM features
	New “Filter line by line” operator
New “Filter line by line” operator (1D FFT)	The new “Filter line by line” operator aims at removing noise introduced during scanning acquisition. It is also called 1D FFT. It filters the surface line by line (or column by column) from the average spectrum of the X (or Y) profiles. The result of the filtering and the residue can be generated. The interface is similar to the “Filter the spectrum” operator on profiles. This operator is available on Surface and Multi-channel image studiables.
	Custom fit range for Force curve indentation
Manual “Range for fitting” improved	The manual Fitting range in the Indentation configuration dialog of the “Force curve analysis” study benefits from improvements for better Young’s Modulus calculation. Range for fitting can be optimized along the separation axis using relative references defining a Working window. It is also possible to define a Working window with relative references on the Force Range.
Indentation dialog box reorganized	Indentation dialog box of the "Force Curve Analysis" study has been reorganized to offer a better visibility of the options.
	Force volume ergonomics
Cursor visibility in Force volume view	The cursor in the “Force volume view” study is more visible (dotted lines in the shape of a cross).
Displayed curves in Force volume view	Lower and upper envelope curves are now displayed in a “Force volume view” study. There is more flexibility in the choice of displayed curve.

Optimized Z-scale in Force volume view	Choice of Z-scale for force curves is now available in a “Force volume view” study. From the ribbon, the user can optimize the visualization either for the current curve, or for all curves.
	### Improvements on IV curves
Cursor visibility in “IV image view” and "Force volume view”	The cursor in the “IV image view” and "Force volume view" studies is more visible (dotted lines in the shape of a cross).
Displayed curve in IV image view and Force volume view	Lower and upper envelope curves are now displayed in IV image view and Force volume view studies. There is more flexibility in the choice of displayed curve.
	# Profilometry features
	### Z scale and default filter for “Rk parameters” and “Sk parameters” studies
Z scale for Sk (Rk) parameters study	The user can now set the Z axis of the Sk (and Rk) parameters studies, allowing a common Z-scale when comparing several profiles/surfaces.
ISO standard selection in “Rk parameters” study	The parameter names and the default filter can now be adapted to the chosen standard (21920-2 or 13565-2) in the “Rk parameters” study on profiles. The filter defined for the selected ISO standard is displayed in the study.
	### Rk default filter in Parameters table
Default filter for Rk parameters	In the “Parameters table” study, the default L filters (λc) is: Robust Gaussian for 21920-Rk parameters, or Double Gaussian for ISO 13565. This applies to profiles and series of profiles.
Separation in three 21920 families	To enable different default filters, the ISO 21920 standard has been split into three families: ISO 21920-Rk, ISO 21920-Feature and ISO 21920-Main (all other ISO 21920 parameters), in the Parameters table on Profile and Series of profiles studiables. When loading documents created with previous versions, the user can choose whether or not to divide the Parameters table into several studies at the first opening of the parameter’s selection dialog (if the table contains parameters from a single ISO family, the conversion is done automatically).
	### Automatic thresholds in “Volume parameters” study
Limits of volume parameters: automatic calculation	An option has been added to the "Volume parameters" study in order to calculate the material ratio limits automatically. The limits are then adapted to the profile or surface instead of being fixed. The 40% method is the same as in the Rk/Sk parameters study. With the automatic method, material ratio limits are adapted to the profile/surface instead of being fixed.
	### Correlation graph in SSFA
SSFA : R^2 curve display	The R^2 curve can now be displayed in the “Scale Sensitive Fractal analysis” study (SSFA) on Surface and Profile studiables. It shows the graph of correlation in function of the scale.
	### “Remove form” operator on Series
“Remove form” operator on Series of profiles	The “Remove form” operator has been adapted to the Series of profiles studiables.
“Remove form” operator on Series of surfaces	The “Remove form” operator has been adapted to the Series of surfaces studiables.

	Standard deviation and mean removal on Series of surfaces
Standard deviation and mean removal on Series of surfaces	The “Extract surface” operator on Series of surfaces has been completed to enable the user to extract the standard deviation surface, and the series from which the average has been removed.
	New type of variable to be used in Result picker
Filter-type variable	New types of variables have been created that can be used in the Result pickers: Filter-type, Integer-type, Boolean-type. The Filter-type has been created in order to configure the “Parameters table” studies using variables. These types of variables can be created or updated via COM interfaces.
“Add variable” dialog reorganized	The “Add a new variable” dialog box has been reorganized, “Number variable” and “Text variable” entries are now available in the same dialog.
	Result picker for Filter in “Parameters table” study
Result pickers for filters	Selection by the Result picker mechanism has been added to the Filter type selection dialog in the “Parameters table” study. If the variable value becomes invalid, the Filter-type selection field is displayed in red.
Result picker dialog simplified	The Result picker dialog has been simplified.
“No filtering” option in Parameters table	“No filtering” option has been added to the Filter-type selection dialog in the “Parameters table” study to replace the Filter check box.
	Asphere calculation: complements
Asphere fitting; better calculation accuracy	The user can now individually select the coefficients to fit in the “Fit an asphere” operator dialog on Surface studiables. This selection offers better precision in asphere calculations (particularly for aspheres which are defined only with the first terms, the others being zero).
New “sag” and “radial slope” parameters	New parameters are now calculated on the aspheres on Surface studiables: “sag” and “radial slope(s)”.
Accelerated calculations	Calculations are now slightly faster.
	Shell features
Delete a point of interest in CAD compare	It is now possible to delete a point of interest in the CAD comparison study when using the Manual Prefit method.
Shell file formats from CAD model	New file formats have been added to load a CAD model as a shell studiable in the workflow (IGS, BREP and STEP file formats). In this case, the model is sampled and loaded as a shell studiable.
	Other cross technology features
	Free trial and license interface
	Simplified Free trial
Simplified Free Trial dialog	The Mountains® Free Trial interface has been simplified for greater ease of use.
Immediate extension to 30 days	The first Free Trial extension to 30 more days is now immediate. Verification of eligibility is performed afterwards.
Contact	A [Contact us] button is now available from all Free trial dialogs.
Easier conversion to Commercial License	Free Trial license can be converted to commercial license using an activation code.
	Offline license update from Help menu
Offline update in Mountains® Help menu	New buttons are now available in the Help/License dialog. They allow file exchange in order to update the software license without internet connection.

	### Launching Free Trial for unauthorized versions
Free Trial available for unauthorized version	A [Start Free trial] button has been added in the SMP renewal dialog. Users are now allowed to launch a Free trial for a software version not authorized by their commercial license.
	### Direct access to Support center
New [Support center] button	For DigitalSurf products, a [Support center] button has been added in the Help menu. Users now have a direct access to Digital Surf Support center. They can thus submit a question, an incident, a suggestion or any other request.
	## Minor changes to operators
Fill in NMP with user-defined value	The "Fill in non-measured points" operator now allows the user to choose a defined fixed value to replace NMP on Surface, Surface + image, and Multi-channel image studiables. The Result Picker can be used. In the case of spectral maps, replacing the PNMs by 0 can be useful.
Mean structure display in Detect structure	The mean structure used in the automatic mode in the “Detect structure” operator is now displayed on Surface or Image studiables.
	### Automation ribbon customization and reorganization
Automation ribbon customization	It is now possible to choose which buttons to display in the Automation ribbon. It allows the user to highlight often-used features (for example, Custom SmartFlows), and to hide the rarely-used features (for example, integration documentation). The Automation Ribbon customization is available from a button of the Automation tab, and by right-clicking in the Automation ribbon.
Automation ribbon reorganization	SmartFlows group buttons have been reorganized in the Automation tab. The access to documentation about Integration with a third party software, and Custom operators and studies, is now grouped in an [Integration] button in the” More information Group” of the Automation ribbon.
	### Global Preferences reorganized
Preferences sections reorganized	Preferences sections have been slightly reorganized to follow process logic (User interface, Loading data, Data display, Metrology, Document, Exporting & printing, System). The Loading data section in the Global preferences has been reorganized.
	## Dialogs and menu homogenization
	### Operator dialogs organization
Homogenization of operator dialogs	All operator dialogs are now resizable. Some operator dialogs have been reorganized to follow the user-interface rules. The preview titles are now standardized. For operators generating several studiables, a "Studiable to generate" group now replaces check boxes or radio buttons.
	### Ribbon display optimization
Suppression of submenu icons	The submenus of ribbon buttons do not display icons anymore except if they perform an action. The icon is replaced by a checkmark which is clearer.
	### Optimized document titles
Document type added in Mountains® title bar	The document type has been added in brackets in the Mountains® title bar: [SmartFlow] for SmartFlow edition mode, [Background] for “Page background” mode, [Statistics] for a statistical document.

	Other minor changes
Optimize option in Surface + image and Multi-channel image	The [Optimize] button is now available in the submenu of the [Enhancement] button of the ribbon on Surface + image (Pseudo-color view, True color view studies) and Multi-channel image studiables (Pseudo-color view, Grid view, 3D view studies) when selecting an image channel.
'Shortcuts' panel renamed'	The 'Shortcuts' panel has been renamed 'Favorites' panel. This gives a one-click access to favorite SmartFlows, studies or operators.
Photo image (realistic) submenu in operator's previews' toolbars	A Photo image (realistic) submenu is now used to better visualize the settings in the toolbars of the previews in some operator dialogs on Surface, Surface + image, Multi-channel image, Hyperspectral image, Force volume and IV spectroscopy image studiables.
Tooltips visible when hovering over operator preview toolbars	Tooltips are now displayed when hovering the mouse over buttons with a submenu in the preview toolbars of the operators' dialogs. Submenus are displayed on click.
	New MRC file format export
New MRC file format export using command	It is now possible to export Multi-channel cube studiables in MRC format. Limitations: MRC format only supports one channel. Units are implied (X/Y/Z axes in metric). The voxels axis has no unit.
	Reference Guide and translations
Updated Reference Guide	The Reference Guide has been updated with the descriptions of the main new features and improvements. It has been translated into all available languages (French, German, 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-7445	A	The generated Shell studiable is not displayed in the workflow when selecting the "Generate segmented shell" option in the "3D view" study ribbon on multi-channel cube studiables, if the "Default study by study type" option for Shell studiables is set to None in the Global preferences of the software (Data display). This also applies to Surface studiables when selecting the "Generate as dynamic Image studiable of the study" option in the "Pseudo-color view" study ribbon, if the "Default study by study type" option for Image studiables is set to None in the Global preferences of the software (Data display).
MNT-7748	A	The software may crash when applying the "Mesh the point cloud studiable" operator on a Point cloud studiable if it was obtained by applying the "Convert to point cloud" operator on a Shell studiable containing colors.
MNT-7964	A	The progress bar is not displayed and it is not possible to stop loading a "Particle Analysis" study requiring a lot of calculations and taking a long time in a particular case.
MNT-445	B	It is not possible to see all the icons in the drop-down list of the [Custom (no studiable)], [Custom (single studiable)] and [Custom (multiple studiable)] buttons of the Automation tab when there are too many of them.
MNT-7640	B	The "In absolute height" option checked in the "Threshold options» dialog of the Slices study on Multi-channel image studiables is lost after saving the document and reloading it.

MNT-7684	B	The results of classifications calculated in the “Particle analysis” study cannot be selected in studies that can use these results, such as the ’Tolerance limits’ study, if the current language is changed.
MNT-7701	B	The “Remove form” operator dialog box on Profile studiables is blinking when resized
MNT-7876	B	The [Search for updates] button in the Help menu opens the Reference Guide in some particular cases (rather than accessing updates).
MNT-7915	B	Some studiables in SPM format cannot be loaded.
MNT-7924	B	Creating studies, re-reading documents and modifying them takes a lot of time when Mountains uses multiple Addon studies that declare a large number of items in the Result manager.
MNT-7927	B	The value of the R, Rx, W and Wx parameters displayed in the results table of the “Profile motifs” study on Profile studiables is not the same when modifying the detection method in the study ribbon.
MNT-7935	B	The “Normalize” operator does not work in some cases on Hyperspectral image studiables if the “Area option” is checked in the “Normalization method” section of the operator dialog.
MNT-7949	B	The values of the "Band definition" section displayed in the "Modification of a spectral band" dialog box of the [Edit] button in the "Colorized band" study on Hyperspectral image studiables are erroneous (divided by ten).
MNT-8088	B	The “Automatic detection” option of the "Area to extract" section in the “Scale the image” operator dialog box on Image studiables does not work when substituting the studiable.
MNT-8099	B	The extraction shape is not at the right position in the “Scale the Multi-channel image” operator dialog box on Multi-channel image studiables when the “Automatic detection” option of the "Area to extract" section is checked.
MNT-8137	B	The “Start Free Trial” option is present in the “Software Maintenance Plan” dialog box of the [Maintenance] button of the Help menu when launching a version10 of the software having an active SMP (the option should not appear).
MNT-8144	B	Inserting a bitmap image as an illustration or inserting a logo using the [File Image] and [Company logo] buttons of the "Edit" tab of the documents, loading an icon using the [Minidoc management] button of the “Automation” tab of the document, or loading an image as an Image studiable does not take into account the orientation of the image.

Bug corrections (A and B type)

	Type	Bug Description
MNT-7972	A	A crash can occur when recalling the "Extract areas" operator and enlarging the selection on Surface studiables under certain conditions.
MNT-8018	A	A crash can occur when saving a new Minidoc in a folder for which it does not have the appropriate authorizations.
MNT-8037	A	Undoing certain actions in the Advanced contour study on Profile studiables generates an error message.
MNT-7371	B	The "Imposed scale" fields in the "Scale range" section of the Axis settings dialog box are grayed out on Multi-channel image studiables if the studiable only includes topography or non-topography channels.
MNT-7374	B	The "Optimize palette" option of the [Optimization] button in the image layer of the "Volume of a hole or peak" study on Surface + image studiables is grayed out.
MNT-7746	B	The brightness of the shell is too high in the 3D view study on Shell studiables.
MNT-7847	B	The parameters' numbers, added when they are duplicated but using different settings, in the "Parameters table" study do not appear in statistical documents.
MNT-7851	B	There is a difference in rendering for studies on Surfaces studiables if the X/Y ratio is very large.
MNT-7890	B	The locked date of a template or minidoc is not updated when the template or minidoc is applied, and therefore does not correctly reflect the creation date/time of the resulting illustration.
MNT-7896	B	There is no display in the "Colored particles" section of the "Manage classification" dialog box on Surface, Surface + image, Image and Multi-channel image studiables.
MNT-7940	B	Force curves in ARDF and HDF5 format do not load correctly in some cases.
MNT-8039	B	The "Insert an operator before" function of the workflow is not correctly handled in the Colocalization study.
MNT-8068	B	The result names of the "Remove asperities" operator on Profile, Spectrum curves, Hyperspectral image, IV curves and IV spectroscopy image studiables are all identically named, rather than being technology-specific.
MNT-8075	B	The curve is not recalculated in the "Scale sensitive fractal analysis" study on Surface and Surface + image studiables when opening the "Special options" dialog and changing a setting and then doing the same with the "Calculation options" dialog.

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.