

# Release Notes

Version	Date	Illustrated articles
<a href="#">10.3.10908</a>	November 12 <sup>th</sup> 2024	<a href="#">What's new in 10.3</a>
<a href="#">10.2.10872</a>	October 7 <sup>th</sup> 2024	
<a href="#">10.2.10802</a>	July 29 <sup>th</sup> 2024	
<a href="#">10.2.10765</a>	June 22 <sup>nd</sup> 2024	
<a href="#">10.2.10719</a>	May 7 <sup>th</sup> 2024	<a href="#">What's new in 10.2</a>
<a href="#">10.1.10691</a>	April 9 <sup>th</sup> 2024	
<a href="#">10.1.10643</a>	February 21 <sup>st</sup> 2024	
<a href="#">10.1.10606</a>	January 15 <sup>th</sup> 2024	
<a href="#">10.1.10571</a>	December 11 <sup>th</sup> 2023	
<a href="#">10.1.10559</a>	November 29 <sup>th</sup> 2023	
<a href="#">10.1.10540</a>	November 10 <sup>th</sup> 2023	<a href="#">What's new in 10.1</a>
<a href="#">10.0.10510</a>	October 11 <sup>th</sup> 2023	
<a href="#">10.0.10483</a>	September 14 <sup>th</sup> 2023	
<a href="#">10.0.10433</a>	July 26 <sup>th</sup> 2023	
<a href="#">10.0.10378</a>	June 1 <sup>st</sup> 2023	
<a href="#">10.0.10372</a>	May 26 <sup>th</sup> 2023	<a href="#">What's new in 10.0</a>

## Digital Surf Software Updates

[www.digitalsurf.com/support/software-updates/](http://www.digitalsurf.com/support/software-updates/)

## Digital Surf FAQ

[www.digitalsurf.com/support/faq/](http://www.digitalsurf.com/support/faq/)

## Digital Surf Support solutions

[www.digitalsurf.com/support/support-solutions/](http://www.digitalsurf.com/support/support-solutions/)

1. Profilometry
2. Scanning Electron Microscopy (SEM)
3. Scanning Probe Microscopy (SPM)
4. Spectroscopy
5. Cross Technology

## What's new

	<b>Profilometry</b>
	<b>Curvatures in "Map local properties" operator</b>
Curvature parameters in "Map local properties" operator	Five curvature parameters have been added to the "Map local properties" operator on Surface studiabiles, to highlight certain different characteristics: Local surface variance, Local mean curvature, Local curvedness, Local min curvature, Local max curvature. These last two parameters are particularly useful for surfaces with geometric shapes
Improved calculation speeds	Calculation speeds of all parameters have been improved (4 times faster on a quad-core processor) in the "Map local properties" operator on Surface studiabiles. When the operator is recalled, the result is no longer recalculated but displayed immediately.
	<b>New "Apply a mask" operator</b>
New "Apply a mask" operator	The new "Apply a mask" operator masks the Surface (or a surface channel) studiable with non-measured points of the surface (or a surface channel) coming from another studiable. It can better separate the background and a particular shape from the surface. When applying to a Multichannel image studiable, only two channels of the multi-channel can be used. The operator is available for Surface, Surface + image and Multi-channel image studiabiles.
"Apply a mask" operator using channel threshold	It is possible to mask a Surface studiable using the threshold of another surface. The threshold values can be expressed in relative or absolute units, also for Surface + image and Multi-channel image studiabiles. When applying to a Multichannel image studiable, only two channels of the multi-channel can be used. It applies to Surface, Surface + image and Multi-channel image studiabiles.
Non-measured points dilation in "Apply a mask" operator	In the "Apply a mask operator", an option dilates the added non-measured points.
"Threshold using channels" operator renamed	The "Threshold using channels" operator on Surface-image and Multi-Channel image studiabiles has been renamed "Apply a mask" operator.

	<b>Classification manager and particle workflow</b>
Classification manager and particle workflow	Improvements of "Particle analysis" study listed below in <a href="#">SPM section</a> also benefit Profilometry analysis.
	<b>Comparisons and ergonomics in the "Power spectral density (PSD)" study</b>
Power spectral density (PSD) from multiple studiabes	The "Power spectral density (PSD)" study can now display the power spectral density from multiple studiabes. This allows characterization of the studiable at different sizes and resolutions, with several different instruments, for multiscale analysis. Colors can be chosen for the different studiabes. A legend can be displayed.
PSD showing all the elements of a Series	It is now possible to display the PSD of all the elements of Series of surfaces (or Series of profiles) on the same graph in the "Power spectral density (PSD)" study. This allows the user to see the evolution of the wavelengths affected by a treatment applied to the studiable (e.g. polishing on a surface). Both axes should use a logarithmic scale. The series of profiles color and the profiles color can be changed.
Secondary axis in wavelengths	The "Power spectral density (PSD)" study now shows or hides a secondary X-axis in wavelengths at the top of the graph. The frequency values are converted to wavelengths to make them easier to read. This secondary axis display is available with a linear or logarithmic scale.
Interactive cursors for RMS calculation in PSD	Interactive cursors have been added in the PSD study to more easily define a range of wavelengths (frequency band) for calculating the RMS (Root Mean Square) surface texture parameter. Double-clicking a cursor allows the user to refine the value.
Interactive cursors for power law fit (ISO 10110-8) in PSD	Interactive cursors have been added in the PSD study to define a range of wavelengths (frequency band, between C and D) to fit a power law (represented by a line when using a logarithmic scale) according to ISO 10110-8. Double-clicking a cursor allows the user to refine the value.
ISO 10110-8 specification line in PSD	The user can display technical specifications according to the ISO-10110-8 standard (A (constant) and B (slope)) for an optical element. The specification line as well as the fitted line may or may not be displayed in the PSD study. The user can choose the color, thickness and style of each displayed line. A legend can be added.
	<b>Ball screw analysis in Contour</b>
Ball screw analysis in the "Advanced contour" study	A "Ball screw analysis" is now available in the "Advanced contour" study. This analysis tool allows the user to quickly create a large number of gothic arches. The user can choose the visibility of the created elements (arcs, circles), the radii of the circles to create (availability of a result picker), the contact points of the circles with the profile, the distance between two circles, the parameters to display, etc.
	<b>Improvements in defect removal operators</b>
"Remove outliers" operator on Series of surfaces	The surface correction tool "Remove outliers" operator is now available on Series of surfaces (the settings are applied in a common way to the entire series).
"Remove asperities" operator on Series of profiles	The profile correction tool "Remove asperities" operator is now available on Series of profiles (the settings are applied in a common way to the entire series).
"Remove asperities" operator for profiles with arc of circle	The visualization of defects on profiles with arc of circle shape is improved in the "Remove asperities" operator on Profile studiabes. It is now possible to remove a circular form in the preview.
"Retouch points" operator for profiles with slopes or arc of circle	The visualization of defects on profiles with arc of circle shape or with slope is improved in the "Retouch points" operator on Profile studiabes. It is now possible to remove a circular form or a line in the preview.

	<b>Custom colors in SSFA study</b>
Individual curve style in the “Scale-Sensitive Fractal Analysis (SSFA)” study	In the “Scale-sensitive fractal analysis” study (on Series of profiles and Series of surfaces), the user can now select any curve and change its color and style for better visualization. It facilitates the comparison of measurements made on different materials or coming from several instruments.
	<b>Improvements for micro-CT cubes</b>
Improvements for Micro-CT cubes	The improvements for <a href="#">cubes</a> listed below apply to the volume analysis of Micro-Computed topography measurements.
	<b>Scanning Electron Microscopy (SEM)</b>
	<b>Multi-channel cubes for Volume electron microscopy</b>
	<b>Cutting planes in “3D view” study on cube</b>
Blocks and planes panel in “3D view” study on cubes	The “Blocks and planes” side panel now replaces the previous floating panel in the “3D view” study on multi-channel cube studiabiles. The two sections of the panel (Blocks, Planes) offer display and animation to look inside the multi-channel cube. This panel is displayed by default on the left as a tab next to the Explorer tab.
Basic and segmented planes visualization in “3D view” study for cube	The user can now choose the data displayed by the cutting planes (or the blocks) in the “3D view” study on Multi-channel cube studiabiles. Basic data shows the voxel value data using grayscale (e.g. SE/BSE) or a monochrome palette (e.g. EDX). Segmented data, available if the cube has been segmented, shows the voxel using its class' color. For both options, you can choose which channel to display.
Crop and transparency of planes in “3D view” study for cube	To crop the cube visualization in the “3D view” study on Multi-channel cube studiabiles, the user can now crop before (or after) any X Y or Z plane (or choose Void representation in Blocks). The user can adjust a transparency threshold for the plane thanks to a slider or a value.
Animations of cutting planes in “3D view” study for cube	A slider now allows the user to move the position of the plane (or the block) in the “3D view” study on Multi-channel cube studiabiles. The position value is displayed and can be edited. Animations of the plane position (or block position) can be launched with adjustable speed and direction.
Background plane in “3D view” study for cube	The user can now choose to display the background planes in the “3D view” study on Multi-channel cube studiabiles.
Bounding box in “3D view” study for cube	The user can now choose to display the bounding box (cutting away of the whole cube) around the Multi-channel cube studiable in the “3D view” study.
	<b>Correction tools for cube slices</b>
Shift slices when loading image stacks as cube	The user can activate the “Shift the slices” option to align the slices relative to each other when loading image stacks as a Multi-channel cube studiable. It allows the user to correct offsets that occurred during measurement. Each slice is shifted with reference to the previous slice.
Correct drift when loading image stacks as cube	The user can activate the “Correct the intensity drift” option to remove the intensity drift from slices when loading image stacks (e.g. FIB-SEM images) as a Multi-channel cube studiable. As an option, the user can exclude structures. The correction can be applied to one or all channels.

New "Correct the slices" operator on Multi-channel cube	<p>The new "Correct the slices" operator independently corrects acquisition defects for any slice of a Multi-channel cube studiable (e.g. FIB-SEM images).</p> <p>The user can remove the intensity drift from slices. Standardizing the grayscale values facilitates further segmentation. As an option, the user can exclude structures and refine exclusion.</p> <p>The user can also completely remove anomalous slices or replace them by a slice calculated by interpolation with the neighboring slices.</p>
	<b>Other improvements for cube</b>
"Create multi-channel cube" operator on Series of images	<p>The "Create a Multi-channel cube" operator is now available on Series of images studiabiles (e.g. Series of FIB-SEM images).</p> <p>The user can combine several Series of monochrome images, each Series representing volumetric spectral data for a component (e.g. EDX), to obtain several channels in the Multi-channel cube studiable (one channel per Series and per component).</p>
Segmented view in the "Pseudo-color view" study	<p>It is now possible to display the segmented view of the current slice on Multi-channel cube studiabiles in the "Pseudo-color view" study (if the cube was segmented). This allows visualization of the different elements identified in BSE images for example.</p> <p>This 2D image shows segmentation classes as an overlay on the original images.</p> <p>The transparency of the overlay can be adjusted.</p> <p>A legend (short name and class color) can also be displayed.</p>
Grains segmentation used by the "Multi-channel cube analysis" study	<p>To calculate results on grains, the "Multi-channel cube analysis" study now uses the segmentation contained in the studiable, if available. This segmentation comes from the "Segment the cube" operator in the workflow.</p>
	<b>Classification manager and particle workflow</b>
Classification manager and particle workflow	<p>Improvements of "Particle analysis" study listed below in <a href="#">SPM section</a> also benefit SEM analysis.</p>
	<b>Scanning Probe Microscopy (SPM)</b>
	<b>Classification manager in the "Particle analysis" study</b>
Saving a classification in "Particle analysis" study	<p>The user can save a classification from the Classification dialog in the "Particle analysis" study for future classes sharing.</p>
Loading a classification in "Particle analysis" study	<p>The user can load a saved classification from the Classification dialog in the "Particle analysis" study.</p> <p>Only classifications compatible with the selected studiable type and the used detection method are offered for loading.</p>
New Classification manager in "Particle analysis" study	<p>A new classification manager dialog is available from the [Classifications] button sub menu. It allows the user to visualize all the available classifications. It is also possible to import and export classifications in order to re-use and share them.</p> <p>The classifications are presented in tree form by detection method.</p> <p>The user can change the classification name and description, or delete a classification.</p> <p>The user can also change the location of the directory in which the classifications are stored, for example to use a shared directory.</p>
	<b>Particles workflow in the "Particle analysis" study</b>
"Workflow for particles"	<p>The user can now display a list of post-processing steps applied after the initial detection in the "Particle Analysis" study. The new "Workflow for Particles" information parameter displays a line per post-processing step (Remove small particles or Particles on edges, Merge or split particles, morphological correction, Smooth the contour, etc.), and gives details on the refinement settings used. The order of the lines corresponds to the order in which they are applied by the algorithms.</p>

Additional parameters in Particle analysis	<p>The user can now choose to display more information or calculated parameters in the results table of the “Particle analysis” study.</p> <p>Available parameters or results: Classifications, “Threshold 1” (Threshold detection), “Height pruning” (Watershed detection), “Height pruning” (Edge detection) and “Threshold”, “Min diameter (for detection)”, Max diameter (for detection)” (Circle detection).</p>
	<b>“Line edge roughness (LER)” study on topographies</b>
“Line edge roughness analysis” study on topographical surfaces	<p>The “Line edge roughness analysis (LER)” study is now available on topographical Surface studiabler to characterize the roughness of edges and the width of bands of straight structures. It is particularly useful in the field of semiconductors (e.g. to characterize the irregularity of the edges of a conductive line in an integrated circuit, measured using an AFM, for example).</p> <p>The study can calculate LER parameter for each edge line, LWR (line Width roughness), Pitch, and Critical dimension for each band. The user can select transparency.</p> <p>It applies to Surface studiabler, or on channels in Multi-channel image or Surface + image studiabler.</p>
	<b>Ergonomics in the “Critical dimension (CD)” study</b>
Results and graphical elements in the “Critical dimension (CD)” study	<p>The user can now select the results to show or hide in the “Critical dimension (CD)” study results table: Individual results, Global statistics.</p> <p>There is a greater choice of customization of graph elements in the study. Other styles are available to highlight dimensions on profiles on the graph for better visibility.</p>
	<b>Spectroscopy</b>
	<b>New “Colocalization coefficients” study on Surface and Image</b>
New “Colocalization coefficients” study on Surface and Image	<p>The “Colocalization coefficients” study uses two images to display them at the same location, and calculate Correlation Coefficient parameters. It applies to Surface, Image, Surface + image, Series of surfaces, Series of images and Multi-channel image studiabler.</p>
Coefficient calculation in “Colocalization coefficients” study	<p>The “Colocalization coefficients” study calculates the “Pearson's Correlation Coefficient” (PCC).</p> <p>The coefficient is calculated on the common part of the two surfaces / image. The coefficient can also be calculated on manually user-defined regions of interest (shapes).</p>
Display in “Colocalization coefficients” study	<p>The “Colocalization coefficients” study displays the two images using the studiabler's color (green and red is used if the studiabler has no color attribute).</p>
	<b>Classification manager and particle workflow</b>
Classification manager and particles workflow	<p>Improvements of “Particle analysis” study listed above in <a href="#">SPM section</a> also benefit Spectroscopy analysis.</p>
	<b>New “Convert to Spectral map” operator</b>
New “Convert to spectral map” operator	<p>The new “Convert to spectral map” operator converts an Image studiabler to a spectral map in the form of a non-topographic Surface studiabler.</p> <p>The operator is designed to be used on monochrome images representing the distribution of a component or a physical property. The operator automatically removes legends or annotations. It detects and attributes the color to the generated Surface studiabler (or surface-type channel of the studiabler).</p> <p>When applied to an image, the operator generates a Surface-type studiabler. When applied to a Multi-channel image studiabler, the operator generates a Multichannel-image studiabler, image channels being converted into surface channels. When applied to applied on a Series of images studiabler, the operator generates Series of surfaces studiabler.</p>



	<b>New “Convert to Hyperspectral image” operator</b>
New “Convert into Hyperspectral image” operator	The new “Convert into Hyperspectral image” operator converts Series of images or surfaces studiabiles into a Hyperspectral image studiabile. It is useful when spectral data is contained using one image by wavelength.
	<b>Improvements on spectra correction operators</b>
New “Convert W-axis” operator for spectra	<p>The new operator “Convert W-axis” converts the units of the spectral axis (W) of Spectrum and Hyperspectral image studiabiles into another physical quantity.</p> <p>Different conversions are available: Wavelength [nm] &lt;-&gt; Raman shift [cm-1], Wavelength [nm] &lt;-&gt; Wavenumber [cm-1], Wavelength [nm] &lt;-&gt; Energy [eV].</p> <p>New parameter "Laser Wavelength" has been added to be set when selecting "Raman Shift" type conversion (both directions).</p> <p>User can apply Jacobian intensity correction to the Z axis (intensity) when selecting a conversion between “nm” and “eV” (in both directions).</p> <p>It applies to Spectrum curve and Hyperspectral image studiabiles.</p>
New “Multiply/Divide” operator on spectral studiabiles	<p>The “Multiply/Divide” operator is now available on spectral studiabiles.</p> <p>The operator multiplies or divides a Spectrum curve studiabile by a single Spectrum curve studiabile to be used as multiplier or as divisor. This can be used to correct the response (in function of the wavelength) of a device/detector.</p> <p>It applies to Spectrum curve and Hyperspectral image studiabiles.</p>
New “Retouch points” operator on spectral studiabiles	<p>The “Retouch points” operator is now available on spectral studiabiles.</p> <p>It can be applied to one element or to all elements of the series (default).</p> <p>It is possible to replace points by a smooth shape, straight line, or non-measured points. It is also possible to fill-in only non-measured points on a zone.</p> <p>It applies to Spectrum curve and Hyperspectral image studiabiles.</p>
New “Fill in non-measured points” operator on spectral studiabiles	<p>The “Fill in non-measured points” operator is now available on spectral studiabiles. You can use a straight line or smooth shape to fill-in non-measured points.</p> <p>An option allows you to ignore entirely non-measured curves, whereas curves set to zero will be visible and included in calculations.</p> <p>It applies to Spectrum curve and Hyperspectral image studiabiles.</p>
Set average of zone to 0 in the “Correct the baseline” operator	<p>When subtracting a horizontal line in the “Correct the baseline” operator, it is now possible to set the average of a selection zone to 0. The user can either choose a Polynomial setting with degree 0, or choose the Intensity offset setting.</p> <p>This applies to spectrum curves and Hyperspectral image studiabiles.</p>
Simplification in “Subtract” operator	<p>The “Subtract” operator now subtracts a single Spectrum curve studiabile (and not a Series), for the sake of simplification. The “Subtract” operator dialog has been reorganized, and its icon has been moved to the “Correct” section of the Operators ribbon.</p> <p>It applies to Spectrum curve, Hyperspectral image, IV curve and IV Spectroscopy image studiabiles.</p>
	<b>Interactive spectral bands in Summary for “Use spectral bands” operator on Hyperspectral image</b>
Interactive colored bands for Hyperspectral image	<p>Interactive colored bands are now displayed in the “Summary of current operator” study of the “Use Spectral Bands” operator on a Hyperspectral image, allowing the user to visualize and change bands in the document without recalling the operator.</p> <p>Information about parameter and bands positions is also displayed.</p>
Band position for Hyperspectral image	The channel name of the spectral map generated by the “Use spectral bands” operator now contains the position and unit of the colorized band.
Obsolete “Colorized bands” study	The “Colorized bands” study is now obsolete, replaced by the “Use spectral bands” operator, together with its “Summary of the current operator” study.

	<b>Non-measured points spectra</b>
Non-measured points on spectra managed	The non-measured points on the spectra are now managed with the exception of the “Extract component” and “Use reference spectra” operators, which require using the operator “Fill in non-measured points”.
	<b>Cross technology features</b>
	<b>Renaming parameters using aliases</b>
Aliases allowing parameter renaming	It is now possible to create new parameters which are aliases of other parameters. This allows the user to customize the parameter names in Table of results or export. This also makes it possible to define several tolerances on the same parameter.
Aliases in Table of results and export	Aliases are seen as a normal result and any operation on results are possible: display in Table of results, Tolerances, Result picker, select for export.
Batch alias creation	It is possible to create multiple aliases in one step by selecting several results. Aliases are automatically named with a number added.
Alias display in Result manager	The aliases appear in the Results Manager, grouped in an “Aliases” section and sorted alphabetically. A warning is displayed when the alias is invalid.
New “Alias check” preference	An “Alias check” preference has been added to the Global preferences (Document/Save section) to check aliases before saving the document. This is useful to avoid saving documents with empty aliases.
	<b>Summary</b>
“Summary of the current operator” study redesigned	The “Summary of the current operator” study now gives access to all the functionalities of the default study of the source studiabile of the operator. This applies to all studiabile types and their operators.
	<b>Optimization of the display of the “Table of results” study</b>
Improved resizing for “Table of results” study	The “Table of results” study resizing has been improved to optimize place: When resizing in “Results in one row” mode, optimal sizes of all columns are now taken into account. The texts in “Results on one line” mode is truncated and replaced with dots in the middle. The full name is displayed when hovering over the cell. When a tolerance limit column is next to a result column, the title of the latter is centered on both columns to save space. The units in “Results on a single line” mode are now displayed in the left column, just after the name of the parameters.
	<b>Adding parameters from add-on operators</b>
Parameters from add-on operators	Add-on operators can now add parameters in the Result manager similarly to add-on studies.
	<b>Other ergonomics</b>
Default visibility of the File Explorer panel	The File Explorer panel is pinned by default. This makes it easier to get to grips with the software when you discover it.
Auto place frames at the bottom of the document	A “Jump to the bottom” option is selectable in the Page section of the Global preferences of the software, to always add newly created frames (studies and illustrations) at the bottom of the document.
Style of curves dialog redesigned	The “Style of curves” dialog box has been redesigned for easier use of styles for Series. A checkbox has been added to apply the settings in real time allowing the user to see the changes directly in the study (the legend in the study is also synchronized). The user now can also individually select each curve in the graph and colorize it with a different color. It applies to Spectrum curve studiabiles, to the “Histogram and Abbott curve” study, the “Power spectral density” study and the “Scale-sensitive surface analysis” study on Series of profiles and Series of surfaces.



Paste a list of values in "Edit T-axes" operator	It is now possible to fill in several values at once in the "Edit T-axes" operator using the Paste button. The operator dialog has been homogenized. It applies to Series of profiles, Series of Surfaces and Series of images studiabiles.
	<b>Completed and updated Analysis examples and example studiabiles</b>
Ready-to-use templates renamed	The Ready-to-use templates have been renamed Analysis examples in the Help menu.
Analysis examples: Enhance volume visualization, FIB Volume Segmentation and Analysis	Analysis examples have been added to illustrate new features: Enhance volume visualization, Volume Segmentation and Analysis to the SEM index.
	<b>Reference Guide and translations</b>
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-8499	A	The "Scale-sensitive fractal analysis (SSFA)" study on Surface, Surface + image, Series of surfaces, Profile and Series of profiles studiabiles provides erroneous results when changing unit preferences in a particular case.
MNT-9848	A	A crash may occur when applying the Patch operator to a lot of large Surface studiabiles.
MNT-10211	A	A crash may occur when reading TEXT format files with very large amounts of information in its lines.
MNT-10223	A	A crash can occur when opening the "Use reference spectra" operator on Hyperspectral image studiabiles in a particular case.
MNT-504	B	Angles displayed in the Results Manager are incorrect after applying the "Level" operator on Profile, Series of profiles, Surface, Series of surface, Surface + image, Multi-channel image studiabiles if the data is non-metric on all axes.
MNT-7344	B	The automatic bin setting and the unit setting does not work in the "Slope distribution study" on Surface studiabiles.
MNT-8322	B	The rendering mode for deviations is incorrect on Shell studiabiles.
MNT-8786	B	The German translation of "Close" is incorrect in the interface of the software.
MNT-9222	B	Peaks can be missing from Spectrum studiabiles in the Spectrum curve study if the Z scale is changed from Linear to Logarithmic mode.
MNT-9494	B	Compatibility with old documents can fail in the "3D reconstruction using four quadrant images" operator on SEM image studiabiles due to incorrect placement of the images in the document.

MNT-9503	B	Compatibility with old documents can fail in the "3D reconstruction using four quadrant images" operator on SEM image studiables due to incorrect placement of the images in the document.
MNT-9770	B	Classes in a classification are not reordered correctly in the "Manage Classifications" dialog box of the "Particle Analysis" study on Image, Surface and Multi-channel image studiables after deleting a class.
MNT-9882	B	An error can occur during rendering when applying the "Rotate" operator on Shell studiables.
MNT-9937	B	The Histogram study results are incorrect when substituting a Multichannel image studiable with an entirely unmeasured studiable.
MNT-9943	B	The "Manual pre-alignment" on the actual data and the nominal model does not work correctly in the CAD compare study on Shell studiables.
MNT-9954	B	Some peaks are not removed on Spectrum studiables when applying the "Remove spikes" operator in automatic mode.
MNT-10043	B	The translation of Cancel, Close, OK, Lighter, Type, Hex, Cut, Copy, Paste and Clear is incorrect in certain languages in the interface and in the Reference Guide.
MNT-10076	B	The Undo / Redo displays an error in the "Particle analysis" study in a particular case of use of the Particle analysis study on a Multi-channel image studiable.
MNT-10077	B	The insertion of an operator before any other operator applied on more than one studiable does not always give the expected result. Applies to all types of studiables.
MNT-10092	B	The mathematical function operator applied on a Surface studiable and using a created real type variable is not deleted (while its parent studies are) when saving and reloading the document.
MNT-10114	B	Managing short class names on Multi-channel cube studiables does not work when applying the "Segment the multi-channel cube" operator and modifying the short names of the classes.
MNT-10125	B	The 3D display of the "Summary of the current operator" study does not work. This applies to all operators whose summary can display 3D studies. Studiables that have operators whose summary can display as a 3D view are affected.
MNT-10136	B	Some studiables in OPD format cannot be loaded.
MNT-10140	B	The Histogram study loads with the attributes of the "Abbott curve" study (instead of the attributes of the Histogram study) when applying the Histogram study to an "Abbott curve" study on a Surface studiable (and vice versa).
MNT-10147	B	Rotation angles are incorrect in the Result manager when applying the Level operator in "Minimum zone plane" (MZPL) mode to Surface, Series of surfaces and Multi-channel image studiables after saving and reloading the document or disabling and re-enabling the operator.
MNT-10166	B	The results of the "Fit an asphere" operator on Profile studiables in the Result manager are incorrect.
MNT-10224	B	The values of the I0 and Ip0 Indentation parameters of the "Force curve analysis" study displayed in the Result manager may be shown in the wrong units.
MNT-10227	B	The Abbott curve study on Surface, Surface + image, Series of surfaces, Profile, Series of profiles and Multi-channel image studiables is incorrect if there are invalid results. A value higher than the max can be observed.
MNT-10233	B	Shell studiables in OBJ and PLY format cannot be opened if the OBJ or PLY file filter is selected in the open studiable dialog box.
MNT-10235	B	Visualization of series of profile studies is incorrect if a zoom is applied and the user navigates through the series.
MNT-10241	B	The pre-alignment points are not created at the clicked points in the "CAD Compare" study on flat surfaces of Shell studiables.

## What's new

Improved resizing for Table of results	The "Table of results" study resizing has been improved to optimize place. When resizing in "Results in one row" mode, optimal sizes of all columns are now taken into account. The texts in "Results on one line" mode is truncated and replaced with dots in the middle. The full name is displayed when hovering over the cell. When a tolerance limit column is next to a result column, the title of the latter is centered on both columns to save space. The units in "Results on a single line" mode are now displayed in the left column, just after the name of the parameters.
Parameters from add-on operators	Add-on operators can now add parameters in the Result manager similarly to add-on studies.

## Bug corrections (A and B type)

	Type	Bug Description
MNT-9721	A	Unit lengths are not correctly taken into account when loading point clouds in TXT format as Shell studiabes.
MNT-9936	A	A crash may occur when loading a document containing the "Correct the baseline" operator on Spectrum or Hyperspectral image studiabes if the form to be removed in the operator is a polynomial of degree zero.
MNT-6282	B	The surface can be inverted and the axis values badly placed in the 3D View study on surface studiabes when clicking in the study.
MNT-9340	B	Add-on studies are incorrectly placed in the document when using the PositionInMm property.
MNT-9392	B	The shell studiable on which a Rotate operator is applied before calling the Fit a form operator is not updated if the Rotate operator is deactivated.
MNT-9485	B	The Nominal model is not correctly to scale in the CAD compare study on Shell studiabes.
MNT-9506	B	The Z-scale of the deviations in the CAD-compare study on Shell studiabes can be incorrect in some particular cases.
MNT-9602	B	The result of the "Extract areas" operator applied to the Intensity channel of a Surface + image studiable does not conform to the preview displayed in the operator dialog box if the Circular extraction shape is selected.
MNT-9678	B	Borders and in-fills of Text box and Screen note illustrations are incorrectly printed when using the Print to PDF and Save as PDF functions.
MNT-9729	B	The preview of the Fill in non-measured points operator does not show the filled in studiable in the Result view of the dialog. Applies to Profile, Series of profile and Multi-channel profile studiabes.
MNT-9790	B	The choice of Axis settings is not taken into account on a surface studiable if the surface has been created using the Extract areas operator on a 3D View study.

MNT-9792	B	An error can be observed on the Z axis in some studiabes in *.SPM format.
MNT-9805	B	The name of the ISO 25178-2 standard is incorrectly displayed in the Sk parameters study on surface studiabes.
MNT-9858	B	The scale-sensitive fractal analysis study on Surface, Series of surfaces, Surface + image, Profile and Series of profiles studiabes displays an error when the general preferences of the software are configured to show imperial units.
MNT-9863	B	The Table of results study showing statistical results is not updated if the selected statistical results are modified.
MNT-9865	B	Unit modification in the "Convert into surface using palette" operator on Image studiabes is not taken into account when the operator is recalled.
MNT-9897	B	The Use MATLAB operator on Surface, Surface + image, Series of surface, Profile, Series of profiles, Contour profile and Multi-channel image studiabes does not work.
MNT-9909	B	The insertion of Python addon operators in the workflow does not work correctly if the result is only computed in the OnRunOperator function.
MNT-9933	B	Some studiabes in *.SPM format cannot be loaded.
MNT-9948	B	The number of curves in the resulting series of spectrum curves studiable is incorrect avec applying the "Add/remove spectrum curves" operator.
MNT-1019	B	The profiles are not correctly aligned in the "Shift profiles" studiabes on Series of profiles studiabes.
MNT-1029	B	Undoing a Retouch operation on a specific layer of a multi-channel image studiable does not work correctly when substituting with a new multi-channel image studiable having less channels.

## What's new

	<b>Graduations and global amplification settings for profiles</b>
Graduations and global amplification settings for profiles	<p>It is now possible to view all the profiles of one or more documents with the same X and Z amplifications with respect to the page. This is useful for comparison.</p> <p>Moreover, grid line graduation intervals can be customized. (See details below)</p> <p>This applies the following studies on profiles and series of profiles: Profile curve, Filtered profile, WD filtered profile, Profile motifs, Morphological envelopes, Parameters table, Distance measurement, Step height calculations, Advanced contour analysis, Thickness analysis, Wear or deposit analysis, Critical dimensions (CD), Area of a hole or a peak, Rk profiles studies.</p>
Customized graduations for profiles	The user can now set the division interval, for grid line graduations. Horizontal and vertical lines can be set independently (ie: 500µm per division in X, 2µm per division in Z).
Amplification ratio between actual profile size and page size for profiles	<p>The division interval between the grid lines can be fixed with respect to the page size (ie: 1cm page = 1µm profile).</p> <p>The profile size then does not change when the study's frame is enlarged or reduced, and comparison between profiles is facilitated.</p> <p>When zooming, an information dialog is displayed and the user can switch back to the fixed ratio between division and page size.</p>
Division size display for profiles	The user can display the division size on the profile's studies.
Amplification ratio display for profiles	The user can display the amplification ratio on the profile's studies, if the division interval has been fixed. (ie: 1cm page = 1µm profile corresponds to an amplification of x10000)
	<b>Miscellaneous improvements</b>
Result picker for Oriented segment in Advanced Contour study	The length and the angle of an oriented segment can be picked, in the Advanced contour study on profile studiabiles, from previously calculated results in the document.
Preview improvement in the Retouch operator on profiles	In the Retouch operator for Profile studiabiles, the user can remove a form to get a better visualization of outliers. This form removal only has an effect on the preview and not on the retouched profile.

# Bug corrections (A and B type)

	Type	Bug Description
MNT-9489	A	The extraction line showing where the Extract profiles operator has been applied (under the function Show extraction on source) in the 3D view study on surface studiables remains visible when the operator is deleted. Moving the extraction line after deletion of the operator results in the software crashing.
MNT-9588	A	A crash can occur in documents containing a "Summary of current operator" study of the "Extract profiles" operator on Surface studiables if only the operator is deleted from the workflow and not all of its dependent studies at the same time.
MNT-9670	A	The statistical parameters calculated on Series of profiles studiables have incorrect management of units.
MNT-536	B	In the workflow, undoing and redoing the actions of deleting a studiable generated dynamically in the "Advanced contour" study on Profile studiables provokes an error message at the top of the document.
MNT-8379	B	Undoing and Redoing background transparency modifications in the "Advanced contour" study on Profile studiables may display errors at the top of the document.
MNT-8426	B	Undoing and redoing the actions of deleting in the workflow an exported studiable generated in the "Advanced contour" study on Profile studiables generates an error message at the top of the document.
MNT-8978	B	Hasp v9.15 drivers used by the software license may not be found preventing Mountains from starting.
MNT-9287	B	The "3D reconstruction using four quadrant images" operator on Image studiables does not work when reloading a document.
MNT-9318	B	The "Download new major version" option in the [Search for updates] button in the Help tab does not work.
MNT-9452	B	The values calculated in the "Threshold" operator on Image studiables are erroneous if the "Stretched histogram" method for thresholding is selected in the operator.
MNT-9541	B	The shape indicating the position of the colocalization is missing from the PDF printout of the colocalization study on Image and Surface studiables.
MNT-9546	B	Zero threshold value is excluded in the "Segmentation setting" dialog of the "SEM-BSE (Multiple threshold segmentation)" particle segmentation method on Image studiables.
MNT-9572	B	The size of the XY axes does not adapt to the displayed layer of the Multi-channel image studiable in the "Parameters table" study.
MNT-9586	B	Tolerances defined using the Result picker do not work when reopening a document if the variable used in the Result picker is in a different unit from the parameter for which the tolerance is applied.
MNT-9587	B	The font type of the "Advanced contour study" elements on Profile studiables are not restored after clicking on the [Restore default style] button of the Residue menu.
MNT-9596	B	The scroll bar does not appear and scrolling with the mouse wheel in the workflow is not possible in a particular case.
MNT-9601	B	Z = NaN values are not interpreted as non-measured points when importing X, Y, Z CSV files with irregular coordinates.
MNT-9618	B	The Y axis of the surface loaded from TXT files is sometimes inverted if the dialog is hidden due to preferences.
MNT-9619	B	Studies created in the workflow via a SmartFlow application do not increment the numbers from the highest ID already created in the document.
MNT-9641	B	The reading of the Z unit in the topographic channel of a Multi-channel image studiable in Molecular Imaging format is incorrect.
MNT-9645	B	Redoing actions of a "Result picker" suppression in the "Advanced contour" study on Profile studiables generates an error message.



MNT-9676	B	An error can occur in the "Remove form" operator on Surface studiabes when removing a spherical shape on a sub-part of the studiable.
MNT-9680	B	An error message (anonymous error dialog) may be displayed during the license update.
MNT-9698	B	Particle numbers in the Particle analysis study are not consistent between the software and the CSV file when exporting results from a Particle analysis study to a CSV file.

## Bug corrections (A and B type)

	Type	Bug Description
MNT-9275	A	The software may crash on Multi-channel cube studiabiles when exporting the 3D view study as image.
MNT-9317	A	The software may crash when applying an Undo/Redo action on the Quick-assembly operator "Level" on Surface studiabiles.
MNT-9342	A	Flatness parameters are incorrectly calculated on surface studiabiles if the surface contains non-measured points and no filtering or leveling option is applied.
MNT-9367	A	The circular extraction in the Extract profiles operator on Surface, Surface + image, Multi-channel image studiabiles does not work correctly when using results from the results manager to define the extraction shape.
MNT-4800	B	Artefacts are sometimes visible in the studiable resulting from using the "Extract projected surface" operator on a Shell studiable generated by the "Mesh the point cloud" operator.
MNT-6005	B	Tolerances do not correctly handle negative values on angles expressed in degrees/minutes/seconds.
MNT-9241	B	The new Rak1/Rak2 and Pak1/Pak2 parameters of the ISO 21920-Rk standard on Profile studiabiles are missing from the "Parameters table" study.
MNT-9309	B	'Pass/Fail' symbols are not displayed in the "Tolerance limits" study. Concerns all types of studiabiles.
MNT-9335	B	The windowing function is enabled by default in the Power spectral density (PSD) study on surface studiabiles.
MNT-9339	B	A new page is not created in the document when inserting an addon.
MNT-9379	B	Results generated by the "Statistical summary" study applied on series of results are badly displayed in the Result manager.
MNT-9399	B	The printing of the PDF file of the "Particle Analysis" study on Surface, Surface + image, Multi-channel image studiabiles is not identical to the study displayed when a zoom is applied.
MNT-9418	B	Mountains freezes when recalling the "Create series of profiles" operator and deleting or substituting one of the profiles from those used to create the series.
MNT-9429	B	The [OK] button remains grayed out after selecting the parameters in the dialog box of the "Parameter table" study on Profile studiabiles when selecting the VDA 2006 and VDA 2007 standards.
MNT-9454	B	The "Cinema" mode does not work in the Histogram study on Series of surfaces studiabiles.
MNT-9455	B	A crash may occur when applying the Stereoscopic reconstruction operator on Image studiabiles in a particular case.
MNT-9480	B	There is an error in the number of detected particles in the Particle analysis study on Surface + image studiabiles when selecting the "Watershed" detection mode if the Calculation channel is different to the Detection channel.

MNT-9484	B	It is not possible to delete the Shell studiable generated by the CAD compare study in a particular case.
MNT-9518	B	The Z-unit of the "Standard deviation" surface generated by the "Extract a specific surface" operator on Series of surfaces studiabiles is incorrect.
MNT-9537	B	Non-measured points are not reported on the "Standard deviation" surface obtained from the "Extract a specific surface" operator on Series of surfaces studiabiles if this point is non-measured in all the surfaces of the series.
MNT-9539	B	The "Standard deviation" surface generated by the "Extract a specific surface" operator on Series of surfaces studiabiles is entirely non measured if a surface without deviation is present.

1. [Profilometry](#)
2. [Scanning Electron Microscopy \(SEM\)](#)
3. [Spectroscopy](#)
4. [Scanning Probe Microscopy \(SPM\)](#)
5. [Cross technology](#)

## What's new

	<b>Profilometry</b>
	<b>New “Assemble point clouds” operator</b>
New “Assemble point clouds” operator	The new “Assemble point clouds” operator allows multiple Point cloud studiabes, measured at different orientations, to be assembled in a single Point cloud studiable. Overlaps are automatically detected and stitched together. User can apply a pre-fit. Applications include the measurement of a surface around an object, by multiple scans.
Three modes to assemble a Point cloud	The “Assemble point clouds” operator proposes three assembly modes: Point clouds can simply be concatenated if they are measured within the same coordinate system and without positional errors. Point clouds can be assembled and adjusted, if they are measured within the same coordinate system with possible positional errors. Overlapping areas are adjusted by a best-fit optimization. Point clouds can be assembled and adjusted, even if they are measured in different coordinate systems. Each point cloud is matched automatically to its corresponding neighbors, and adjusted by a best-fit optimization.
	<b>New tools for X-ray Computed Tomography</b>
New analysis tools for X-CT	New 3D representations of volumetric data from X-ray Computed tomography are now available. A shell can be extracted from volumetric data for further analysis. Please refer to the sections: <a href="#">Redesigned 3D view study for Multi-channel cube</a> <a href="#">New “Segment the cube” operator</a> <a href="#">Threshold operator on Multi-channel cube</a> <a href="#">Sub-cube and substitution when loading a Multi-channel cube from images SURF format for Multi-channel cube</a>
	<b>CAD compare: nominal model from the workflow</b>
Nominal model from the workflow in CAD compare study	The user can now directly load a model studiable from the workflow into the “CAD compare” study (in addition to loading from disk).

	<b>New “Power spectral density” study</b>
New “Power spectral density” (PSD) study	<p>The new “Power spectral density” (PSD) study displays a graph of power spectral density values against frequency. A manual cursor allows the user to display wavelength, frequency and magnitude values.</p> <p>For surfaces, it can calculate one direction PSD, or Isotropic PSD from a 2D PSD graph.</p> <p>The “Power spectral density” study applies on Surface, Surface + image, Series of surfaces, Profile, Series of profiles and Multi-channel image studiabiles.</p>
RMS value in PSD study	The “Power spectral density” study allows the user to calculate Root Mean Square values (similar to Pq/Sq parameter) in a user-defined frequency band.
A and B value of ISO10110-8 standard in PSD study	<p>The Power spectral density study can display the graph in logarithmic scale for both axes.</p> <p>In logarithmic scales, the study can fit a power law in a user-defined frequency band, in order to display the corresponding regression line and calculate A and B parameters of the ISO10110-8 standard for optical parts.</p>
	<b>Modernized “Average spectrum” study</b>
“Average spectrum” study modernized	<p>The “Average spectrum” study has been simplified: the logarithmic scale mode has been removed as well as the ‘All directions’ method for surfaces.</p> <p>A log display for the y axis only has been added.</p> <p>Zoom is now managed with the mouse wheel (the dominant wavelength is no longer dependent on the zoom level).</p>
Reloading old “Averaged power spectral density” study	When opening old documents containing an “Averaged power spectral density” study, in linear scale, the study is renamed Average spectrum study. In logarithmic scale, the study is replaced by the Power spectral density study.
	<b>Feature parameters configuration in the Parameters table</b>
Open and closed feature parameters configuration in Table of parameters	<p>The definition of the open and closed motifs of the ISO 25178-2 and ISO 21920-2 ISO standard in the “Parameters table” study on Surface and Profile studiabiles has been improved.</p> <p>The options for the motifs type now are “all motifs” (by default), “open motifs”, “closed motifs”, so as not to lead to confusion with the notion of interior motif. Choosing an open or closed pattern gives access to a threshold that defines the height of the thresholding plane. An option has been added to allow the user whether or not to take into account motifs in contact with the edges.</p>
Feature parameters pruning configuration in Table of parameters	Feature parameters of the ISO 25178-2 and ISO 21920-2 ISO standard in the “Parameters table” study on Surface and Profile studiabiles now have three new pruning options, in addition to the default value “% of Sz”: additional options are “height in $\mu\text{m}$ ”, “%of surface area” and “area in $\mu\text{m}^2$ ”. These options are the same as in the Watershed detection method in the Particle analysis study. This allows the user to better control how elements are detected.
Feature element discrimination in Table of parameters	Discrimination thresholds used in the “crossing-the-line” segmentation for RSm, Rpc, parameters of the ISO 21920-2 standard in the “Parameters table” study on Profile studiabiles can now be configured. This allows the user to better control how elements are detected.
	<b>Critical Dimensions</b>
Critical Dimensions (CD)	<p>The new “Critical dimensions” study automatically measures steps on geometrical shapes (peaks and trenches, e.g. semiconductor engraving).</p> <p>It automatically calculates widths, height, and sidewall angles.</p> <p>Refer to the section:  <a href="#">New “Critical dimension” study</a></p>
	<b>Tools and improvements in Advanced contour study</b>
LER and LWR in Contour study	The tools “Calculate line edge roughness” and “Calculate line width roughness” have been added in the “Advanced contour analysis” study on Profile studiabiles. On segments created on straight profiles, the user calculates the Line edge roughness (LER) parameter. Line width roughness (LWR) parameters are calculated on parallel profiles, and the band between the two profiles displayed in color. These options are enabled by the CD and Trenches module.

Elements creation in Contour study	Some tools for element creation have been added in the “Advanced contour analysis” study on Profile studiables: “Create segment (from whole profile)” creates a segment by clicking once on the profile. “Create nearest point on profile” or “Create farthest point on profile” creates a point from a reference point and the profile. “Create projected point” orthogonally projects a point onto an element (segment, arc, circle and ellipse). “Create ellipse (from profile)”, “Create ellipse (from closed profile)” and “Create ellipse (from points)” creates entire ellipse element.
Various functions in Contour study	Some tools have been added in the “Advanced contour analysis” study on Profile studiables: A result picker can be used for entering the radius of the circle used for gothic arch analysis. The user can now display the residue amplification factors in the residue label. The minor axis of the ellipses is shown when hovering the mouse over them, within the limits of the ellipse, to distinguish it from the major axis. For the tool “Create contact segment (on profile)”, on hover, an arrow indicates the direction of the force by which the object was created.
Force profile matching in Contour study	The user can activate the new “Force contour profile matching” option to force profiles or sub-profiles to be matched (by re-association). It is useful when using automation features (Templates, SmartFlows, substitution).
Automation compatibility for Contour study	The user can now apply a Template document containing “Contour profile” studiables to classic Profile studiables.
Channel displayed in Contour study	The user can display one of the channels of a Surface + image studiable in the “Advanced contour analysis” study on Profile studiables when a background is used.
	<b>Usability improvements</b>
Custom cut-offs in the “Bandpass filter bank” operator	The user can now select the start and end wavelengths in the “Bandpass filter bank” operator on Profile and Surface studiables in order to be able to effectively compare several surfaces of different sizes or spacing. A button has been added to switch from automatic calculation mode to manual mode. Result pickers have been added to set the min and max cut-offs.
Rotate operator on Series of surfaces	The Rotate operator is now available on Series of surfaces studiables.
Spkx and Svqx parameters added in the “Sk parameters” study	The Spkx and Svqx parameters have been added in the “Sk parameters” study on Surface studiables. Those parameters can be displayed in the graph and in the table of the study.
SSFA study information	The parameters Number of points, Domain scale and Reg scale parameters in the “Scale sensitive fractal analysis” study are now displayed in the “Information” table in the study.
Current value of the “picked result” in “Tolerance limit” study	The user can now configure how information is displayed in the “Tolerance limits” study and in the Result manager when result pickers are used to define tolerances on parameters. The user can display only the current value of the picked result and not only the name of the picked result, or the name of the picked result as well as its current value.
Shell deviations and colors exported in text format	The TXT export of a Shell studiable now includes Shell attributes for each point (deviations and colors).
Distribution graphs title	A title is displayed in the graph of the “Threshold” operator on Surface and Profile studiables.
	<b>Scanning Electron Microscopy (SEM)</b>
	<b>New “Line edge roughness analysis” (LER) study</b>
New “Line edge roughness analysis” study on Image	The new “Line edge roughness analysis” (LER) study is now available on Image studiables. It allows the detection of regular vertical structures on SEM images (e.g. semiconductor engraving), and characterizes the roughness of edges and the width of bands.



"Threshold detection" in LER study	Line edges can be detected by "Threshold detection" method, based on grayscales values, in the "Line edge roughness analysis" study. It is possible to choose an automatic detection to place the slider at the right grayscale value to separate the substrate from the patterns. (Useful for automation). An option allows the user to detect bands between trims, if the areas lighter than the threshold do not represent the bands but the borders of the bands.
"Canny edge detection" in LER study	Line edges can be detected by the "Canny edge detection" method, in the "Line edge roughness analysis" study. The 'Canny edge detection' method is useful when the measurement reveals an asymmetry in charge effects on the SEM Image studiable. The user can apply preprocessing (Gaussian filtering) as well as two hysteresis threshold adjustments for edge tracking. The user defines the edges to keep or exclude in order to keep only the edges allowing a clean edge to be reconstructed.
LER parameter in LER study	The LER (Line edge roughness) parameter can be calculated for all edges in the "Line Edge roughness analysis" study.
LWR parameter in LER study	The LWR (Line Width Roughness) parameters can be calculated for all bands in the "Line edge roughness analysis" study.
Interactive display of edges and bands in LER study	All detected edges or bands can be displayed as an overlay on the image. Clicking on a detected edge (respectively bands) on the image highlights the corresponding edge (band) in the result table and vice-versa.
CD and Pitch in LER study	The CD (Critical dimension) and Pitch parameters are calculated on light or dark bands in the LER study. They can be displayed as overlay on the image.
Generation of edge contour from LER study	The user can generate the detected edges of the LER study as a dynamic "Contour profile" studiable in the workflow, for further analysis in the "Contour analysis" study.
Overlay elements color	In the LER study, the user can choose the color and thickness or the elements on overlay: edges, band transparency, CD and Pitch parameter.
	<b>Sub-cube and substitution when loading a Multi-channel cube from images</b>
Sub-cube loading from a stack of images	The "Load a multi-channel cube" function (to load image stacks as a Multi-channel cube studiable) now proposes that the user only load an area of the images and/or a selection of slices. This sub-cube loading increases speed and focuses on the data of interest for volumetric analysis (FIB SEM).
Cube substitution with a stack of images	The "Load a multi-channel cube" dialog is now the dialog by default displayed when substituting a Multi-channel cube studiable, if the cube was loaded from a stack of images.
	<b>Redesigned 3D view study for Multi-channel cube</b>
3D view for MCC significantly improved	The 3D view study for Multi-channel cube has been completely redesigned for significant improvements in volume visualization and ergonomics. Various visualization modes are now available, including transparency effects and combination of channels. Segmentation settings have been transferred to a dedicated operator.
"Volumetric" rendering in "3D view" study for MCC	"Volumetric" rendering of the 3D view study on Multi-channel cubes uses an opacity curve to assign color and transparency settings according to the voxel intensity in order to highlight certain voxel groups. The opacity curve can be saved and reused. Opaque voxels benefit from Roughness and Metalness settings.
"ISO surface" rendering in "3D view" study for MCC	The "ISO surface" rendering of the 3D view study on Multi-channel cubes allows to visualize a two-dimensional surface representing regions within the volume where the voxel values are equal to a specified threshold value. The user can change the color, the roughness and the metalness effect. Predefined material rendering (color, roughness and metalness sets) are available (e.g. Plastic, Gold...).
"MIP" rendering in "3D view" study for MCC	The "MIP" rendering (Maximum Intensity Projection) of the 3D view study on Multi-channel cubes applies a user-defined color palette to the voxel having the highest (dominant) intensity, for each projected line of voxels, in the current view of the cube. The user can iron out voxels with values considered to be noise values. The visual effect evokes medical x-ray images.

Segmentation classes rendering in "3D view" study for MCC	Some renderings are available in the 3D view study on Multi-channel cubes after the segmentation using the "Segment the cube" operator. Segmentation class rendering shows segmentation classes using one color by class. Grains rendering shows random multicolor segmented grains.
Multi-channel rendering in "3D view" study for MCC	The "Multi-channel rendering" of the 3D view study on Multi-channel cubes, proposes Mixed, Dominant and Combined rendering for cubes with several channels. The Mixed rendering mixes the different color from the different channels, for each voxel. The Dominant rendering shows the color of the channel having the highest voxel intensity. The Combined rendering combines a proportion of Mixed and dominant rendering.
Thumbnails in "3D view" study for MCC	Channel thumbnails can now be displayed in the 3D view study on Multi-channel cube studiabiles. This allows visualization of which channels is displayed. The user can switch between the different channels.
Settings tab in workflow panel in "3D view" study for MCC	Some study settings (rendering) are now located in a Settings tab of the Workflow panel, to complement the settings located in the ribbon of the 3D view study on Multi-channel cube studiabiles.
Floating panel in "3D view" study for MCC	The "Blocks and planes" floating panel can be shown using a button in the ribbon.
	<b>New "Segment the cube" operator</b>
New "Segment the cube" operator for MCC	The new "Segment the cube" operator segments the data contained in a Multi-channel cube studiable into different classes according to the intensity values of the voxels. The operator creates a Multi-channel cube studiable with additional information in the segmented channels. The user chooses the channels to segment by checking them on the thumbnails. The operator is available on SEM/BSE images and for chemical channels (EDS/Raman).
Class definition in "Segment the cube" operator for MCC	In the "Segment the cube operator" on Multi-channel cubes, and for each channel, the user can define several classes by their separation in intensity threshold values (in intensity or in ratio). For each class, it is possible to define a color, a name and a short name. Voxels can then belong to a certain class, or to no class at all.
Preview in "Segment the cube" operator for MCC	The "Segment the cube" operator allows the user to visualize the preview of the segmented cube by slices. A color overlay is applied with transparency, associating each pixel with the color of the class to which it belongs.
Icon for segmented channels for MCC	On the thumbnails, a colored contour icon identifies the segmented channels in the segmented cube preview of the "Segment the cube" operator dialog and in the studies created subsequently on the Multi-channel cube studiable.
	<b>New "Extract shell" operator on Multi-channel cube</b>
New "Extract shell" operator on MCC	The new "Extract shell" operator on Multi-channel cube studiabiles takes a cube of voxels containing the density as input, and generates a shell by thresholding the value contained in the voxel. It is useful for volume data obtained by FIB-SEM (or by Micro Computed Tomography). Compared to Shell extraction formerly available from 3D view study, the resolution is improved (a sub-voxel calculation of the position of the vertices), and the ergonomics is better. The "Extract shell" operator is applied when loading old documents replacing the obsolete generation from the Cube study.
	<b>Threshold operator on Multi-channel cube</b>
Threshold operator on Multi-channel cube	The threshold operator has been adapted to Multi-channel cube studiabiles The "Intensity distribution histogram" is displayed in the preview of the operator dialog and allows the user to set the intensity threshold (in intensity or ratio) for each selected channel to remove the noise. Minimum value after threshold can be set to zero value.

	<b>SURF format for Multi-channel cube</b>
Multi-channel cube in SURF format	It is now possible to save Multi-channel cube studiabiles in SURF format.
	<b>Spectroscopy</b>
	<b>Secondary axis with chosen physical unit for spectra</b>
Secondary abscissa axis for spectra	The user can now display a secondary axis at the top of the graph of spectral studies in order to display W abscissa axis in another physical unit. It applies to: "Hyperspectral image view", "Spectrum curve view", "Peak fitting", "Normalized view", "Stacked view", "Strips view" and "Colorized bands" studies.
Axis conversion for spectra	For the secondary abscissa axis in studies showing spectra, the user can choose the conversion between wavenumer [ $\text{cm}^{-1}$ ], Raman shift [ $\text{cm}^{-1}$ ], wavelength [nm], energy [eV] and frequency [Hz]. For the Raman shift conversion, the user can also manually define the laser wavelength value used (if the studiable does not contain this information in its measurement parameters).
	<b>Spectral axis orientation</b>
Increasing and Decreasing spectral axis	The user can show the W abscissa axis in studies showing spectra with increasing or decreasing values. It applies to "Hyperspectral image view", "Spectrum curve view", "Peak fitting", "Normalized view", "Stacked view", "Strips view" and "Colorized bands" studies.
Orientation preference for spectral axis	The choice of default orientation of the spectral axis W (Increasing or Decreasing) for "Hyperspectral image view", "Spectrum curve view", "Peak fitting", "Normalized view", "Stacked view", "Strips view" and "Colorized bands" studies and for operators preview can be saved in the "Orientation of the spectral axis W" section added in Global Preferences.
	<b>Axes display in "Hyperspectral image view" study</b>
Ergonomics of axis in "Hyperspectral view" study	The user can now choose to show independently the image axis and the curve axis in the "Hyperspectral image view" study. The user can also choose a unique and specific color for the axes on the image and the curve.  The grid can be displayed on the image and the curve when the axis is displayed on it. The user can also choose a unique and specific color for the grid.
	<b>Peak fitting improvement</b>
Constraints for fitting in "Peak fitting" study for spectra	It is now possible to define min-max constraints for the fitting in the "Peak fitting" study on Spectrum curve and Hyperspectral image studiabiles. The constraint can be applied to each fitting parameter (Peak position, FWHM, and Amplitude).
"Curve fitting parameters" dialog reorganized in "Peak fitting" study for spectra.	The "Curve fitting parameters" dialog box of the "Peak fitting" study has been reorganized to offer a better visibility of the options.
"Smooth the spectrum curves" operator dialog reorganized	The dialog box of the "Smooth the spectrum curves" operator on Spectrum curve studies has been redesigned. The spectra are now directly displayed for better readability. The "Remove noise" preview has been removed.

	<b>New tools for volumetric analysis</b>
New tools for volumetric analysis	<p>New 3D representations of volumetric data from X-ray Computed tomography are now available. A shell can be extracted from volumetric data for further analysis.</p> <p>Please refer to the sections:</p> <p><a href="#">Redesigned 3D view study for Multi-channel cube</a></p> <p><a href="#">New “Segment the cube” operator</a></p> <p><a href="#">Threshold operator on Multi-channel cube</a></p> <p><a href="#">Sub-cube and substitution when loading a Multi-channel cube from images SURF format for Multi-channel cube</a></p>
	<b>Scanning Probe Microscopy (SPM)</b>
	<b>Critical dimension</b>
	<b>New “Critical dimensions” study</b>
New “Critical dimensions” study	<p>The new “Critical dimensions (CD)” study automatically measures grooves on geometrical shapes (peaks and trenches, e.g. semiconductor engraving). It automatically calculates widths, height, and sidewall angles.</p> <p>It allows to display statistics by profile or by Step, and to discard outliers.</p> <p>This “Critical dimensions” (CD) study is available on Profile, Series of profiles, Surface, Series of surfaces and Multi-channel image studiabes.</p>
Peaks or trenches in CD study	It is possible to analyze either peaks or trenches in the CD study.
Parameters calculated in the CD study	<p>The new “Critical dimensions” study calculates: Top CD, Middle CD, Bottom CD, Height, Sidewall angle (left and right), Pitch, and Width/pitch ratio.</p> <p>Individual Critical dimensions, and pitches value can be displayed on the graph.</p> <p>When results are set by step, the study can generate mean and standard deviation by step for all profiles. When results are set by profile, the study can generate mean value by profile for all steps.</p> <p>Statistical parameters on those values are available, as well as information on settings.</p>
Step discrimination in CD study	<p>To define the upper and the lower reference lines in the CD study, the user can exclude thin steps and step edges.</p> <p>Incomplete first and last steps can also be discarded from the parameter calculations.</p>
Upper and lower segments line in CD study	<p>To define intersection points used to calculate widths and slopes in the CD study, the user can adjust the offsets from the upper and lower reference lines (as a percentage or as a metric distance).</p> <p>The intersections between the profile and the segment lines are displayed on the study.</p>
Discard outlying parameter values in CD study	The user can refine the results in the “Critical dimensions” study to identify (with a red square) or to exclude outlying values.
Styles in CD study	Various display options are available (curve settings, segment color...) in the CD study.
Interactivity with selected profile in CD study	In the “Critical dimensions” study on surfaces, moving the position of the profile on the surface highlights the corresponding profile in the table and vice-versa. (available also for Surface-image and Multi-channel image studiabes).
	<b>New ‘Critical dimensions &amp; Trenches’ module</b>
New Critical dimensions module	The ‘Critical dimensions & Trenches’ module offers tools such as the “Critical dimensions” study and the “Line Edge Roughness” study, to characterize grooves on geometrical shapes (peaks and trenches, e.g. semiconductor engraving).

	<b>Force curve</b>
	<b>New “Correct the segments” operator</b>
New “Correct the segments” operator	The new “Correct the segments” operator on Force curve and Series of force curves studiabiles allows the user to correct the discrimination error between the approach and retract segments. It uses the maximum deflection on both types of segments as a separator.
	<b>Envelope and Mean force curve extraction</b>
Envelope and Mean Force curve extraction	The “Extract force curve” operator on Series of force curve and Force volume studiabiles can now extract the mean curve, the upper and the lower envelope.
	<b>Manual fitting in relative Force: new indentation settings</b>
Two limits for indentation force range on force curve analysis study	In manual fitting for indentation of Force curve studiabiles, it is now possible to define a manual range using an offset in force from the position of i0. It is possible to define the two limits of the force range in force value or in percentage.
	<b>Smoother resizing/zooming</b>
Smoother resizing and zooming of Force curves	The Envelope calculation method on Series of force curves and Force volume studiabiles has been optimized to smooth resizing and zooming.
	<b>Force curve style enhancement</b>
Thickness for indentation and stiffness curves	The user can now change the thickness of the indentation curve and the stiffness curve in the “Force curve analysis” study.
	<b>Cross technology features</b>
	<b>Export and display possibilities when applying template</b>
Studiabiles to export when applying template	The user can now choose to export any studiable of the workflow when applying templates. The export behavior is stored in the document, and can be set by right click on the studiable in the workflow, or from the Studiabiles tab.
File format for export when applying template	You can now set a file format preference for studiable export when applying templates.
Operator dialogs to display when applying template	The user can now choose which operator dialog box to display when applying templates. This display behavior is stored in the document, and can be set by right click on the operator in the workflow.
Compatibility with old documents	It is still possible to export the last studiable of the workflow or to open all operator dialog boxes when applying template, even if no export or dialog behavior is stored in the document. This keeps compatibility with documents created in previous software version.
Command file, ActiveX, and document substitution	The export and display possibilities described above, also apply to template application when using Command file or ActiveX, and to document substitution.
	<b>Refining in Watershed and Edge detection for Particle analysis</b>
Merge or Split for Watershed and Edge detection in Particle analysis study	The user can now use the “Merge or split” dialog when using the Watershed or Edge detection segmentation in the Particle analysis study, in order to rework certain grains by merging or separating them manually or semi-automatically according to chosen criteria.
Exclusion of image background for Watershed and Edge detection in Particle analysis study	It is possible to exclude the background from an image when using the Watershed or Edge detection segmentation method. A slider has been added in the detection dialog allowing the user to adjust the threshold value. The background pieces are thus eliminated and do not bias the calculation of particle statistics. It applies on Image studiabiles and on topographic Surface studiabiles.
Detection channel in Particle analysis study	The Detection channel parameter can now be displayed in the Particle analysis study.

	<b>Statistics</b>
Statistical tests	It is now possible to apply a statistical test in a statistical document, or for studies generating a series of results. The Fisher (F-test) and Student (T-test) tests have been added in statistical studies, with the calculation of p-values. They make it possible to characterize either a discrimination or a correlation.
	<b>Addition and deletion of studiables on operator recall</b>
Addition and deletion of studiables in operator recall	Flexibility has been introduced in the choice of studiables to generate when recalling operators generating several studiables. So, in the dialog box of these operators, the user can now change (add/delete) the studiables to be generated. Deleting a generated studiable in the workflow modifies the studiables selected when the operator is recalled.
	<b>Automating the export to CSV format in ActiveX</b>
Automating the export to CSV format in ActiveX	It is now possible to export studiables in CSV format automatically with ActiveX integration.
	<b>Functions in action buttons</b>
Functions in action buttons	These functions can now be launched using an action button in a document: Save the document, Print the document, Recall operator, Edit variable value, and Save studiable.
	<b>Addition of the Z-offset removal on Series (profiles/ surfaces)</b>
	The positioning option "Use Z-offset" has been added in the dialogs for creating/modifying a series of profiles or surfaces in order to reset all Z offset of the series of studiables to zero. The Z offset removal is also available when adding/removing an additional studiable in an already-created series.
	<b>Better ergonomics</b>
	<b>Dynamic workflow display</b>
Workflow dynamic display	A button in the Workflow panel activates an automatic mode to collapse all items, except the items of the selected studies in the document. The user can thus have a more compact view of the workflow and only see the current part. This Dynamically collapse mode remains compatible with the possibility of manually folding/unfolding workflow items. This mode is deselected by default.
	<b>Error message ergonomics</b>
Error messages	Error displays (messages, warnings, padlocks) have been greatly optimized and their aspect homogenized. When an application pilots Mountains as an ActiveX application, messages transmitted are more complete and clearer. These error messages provide the user with efficient control over its operations and are a guide for corrections.
	<b>Better visibility of the detection methods in the Step height study on Profile</b>
Visibility of the detection methods in the Step height study on Profile	The four step-detection methods offered in the Step height study menu on Profile studiables (Automatic method, Manuel Method, ISO5436-1 A1 method and ISO 5436-1 A2 method) are now displayed with an icon each.
	<b>Zoom over the entire study display area</b>
Zoom over the entire study display area	All available display space in the studies is now used when zooming into the area of studies that have a reduced rectangular display space.
	<b>Order of columns in the Table of results</b>
Column order in the Table of results	It is now possible to choose the order of the columns in the Table of results.



	<b>Alphabetical order of file format lists</b>
Alphabetical order for file formats	Lists of file formats are now presented in alphabetical order by format extension.
	<b>Other</b>
Resizing of operator dialogs	The size of option group frames is now automatically adjusted in all operator dialogs when resizing the dialog.
Improved calculation speed in operators	Calculations time have been optimized on some operators. A studiabile size option in the Preferences, prevents calculation on large studiabiles in the operators' dialogs. It applies to: Filter (S-Filter (Is), Metrological filter, Spatial filter), Level, Remove form, Fill in non-measured points.
	<b>Dialogs and menu homogenization</b>
	<b>Homogenization of sliders and icons</b>
Homogenization of sliders	The sliders have been homogenized. All operator or study dialog sliders now have the same appearance.
"Manual method" icon in the "Step height" study on Surface	The "Manual method" step detection icon in the "Step height" study ribbon on Surface Studiabiles has been replaced. All Mountains "Manual method" icons are now standardized.
	<b>Renamed studiabiles and operators</b>
Parametric profile renamed'	The Parametric profile studiabile has been renamed Contour profile.
Renaming of some operators	The "Extract planar contour" operator on Surface studiabiles has been renamed "Extract planar contour profile". The "Extract profile" operator on Series of profiles studiabiles has been renamed "Extract a specific curve". The "Extract force curve" operator on Series of force curves studiabiles has been renamed "Extract a specific force curve". The "Extract individual Spectrum curves" operator on Spectrum curve studiabiles has been renamed "Extract a specific spectrum curve". The "Extract individual IV curves" operator on IV curve studiabiles has been renamed "Extract a specific IV curve".
"Averaged power spectral density" study renamed	The "Averaged power spectral density" study has been renamed Average spectrum.
Profile-type composing the Profile renamed	The profiles composing the Profile studiabile have been renamed sub-profiles
Vocabulary and example for Contour Study	The "Parametric profile" studiabile has been renamed "Contour profile". The profiles composing the Profile studiabile have been renamed sub-profiles. Three example Contour profile studiabiles have been added.
	<b>Other minor changes</b>
Screen notes display	The design of the screen notes has been optimized to display a more realistic rendering when resizing.
Frequency analysis section reorganized in the ribbon	The Frequency analysis section of the Studies ribbon has been reorganized.
Dongle insertion during installation	At the end of the installation of Mountains, users are now asked to insert their dongle (if applicable) before validating the software launch.
	<b>Completed and updated Index, Templates, Tutorials and example studiabiles</b>
"Critical dimension" and "Line Edge roughness" templates.	Templates and example studiabiles have been added to illustrate new features: "Critical dimension" to the SPM index and "Line Edge roughness" to the SEM index.
Updated Spectral imaging and SEM templates index	The templates "Band analysis", "Peak fitting" and "Datacube visualization", have been updated in the "Spectral imaging" index of the software.
Addition of Contour-type example studiabiles in the Explorer	Three examples of Contour-type studies have been added to Mountains Explorer.

	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). Note: The table of contents of the Japanese Reference Guide is displayed in English. It will be available in Japanese in the upcoming version 10.2.1.
Translations of user interface texts	Texts visible in the user interface related to new features have been translated into all available languages. A small part of the Japanese translations will be added in the upcoming version 10.2.1

## Bug corrections (A and B type)

	Type	Bug Description
MNT-8894	A	A crash may occur when manipulating parameters in the Result manager.
MNT-9232	A	The software may crash when the "3D reconstruction using four quadrant images" operator on Image studiables is recalled in certain cases.
MNT-3073	B	The Z axis settings are not conserved when applying the "Averaged power spectral density" study on Multi-channel image studiables.
MNT-6123	B	The choice of the "T -axis" display is not saved in the "Control chart" study after saving the document and reloading it.
MNT-6260	B	The selection shape center is not centered on the center of the Frequency spectrum obtained using the Fast Fourier Transform (FFT) in the "Filter the spectrum" operator dialog box on Surface studiables.
MNT-6850	B	The peaks and holes at the start and end of the profile are erroneously taken into account in the calculation of the parameters Rp, Rpt, Rv, Rvt, Rz and Rzx of the ISO 21920-2 standard.
MNT-7434	B	Duplicate characters appeared in the "Text box" illustration when writing in Korean.
MNT-8173	B	The "Result" preview in the "Retouch" operator dialog on Surface + image studiables is incorrect if non-measured points have been added to an Intensity layer.
MNT-8792	B	The values of the "Area" parameter calculated in the "Use spectral bands" operator on Hyperspectral image studiables is erroneous.
MNT-8810	B	Some filtering operations may fail on profiles with more than 100 million points without an explanation.
MNT-8845	B	The [Automatic base line] button in the "Peak fitting" study is erroneously grayed out when adjusting the zone selections.
MNT-9153	A	A dialog is displayed every time the preview of an image is generated in the studiable explorer in products allowing Image studiables but not the "Edit axes" operator for these studiables.
MNT-9159	B	Applying the "Extract series of spectrum curves" operator on "Hyperspectral image" studiables modifies the value of the Length and Spacing parameters in the "Identity card" study.
MNT-9162	B	Deleted particles reappear in the "Particle analysis" study when the selected particle detection method dialog box is canceled.

MNT-9178	B	There is an inconsistency in particle IDs between the results table and the number displayed on the image in the "Particle Analysis" study on Surface, Surface + image, Image and Multi-channel image studiabiles.
MNT-9210	B	Applying the "Convert into surface" operator on Image studiabiles may not work if the files are in h5 format.

## 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 studiabes in specific cases such as after an insertion, a deletion, a deactivation or an activation of an operator. Affects all types of studiabes.
MNT-8961	B	The segmentation method does not work in the profile motifs study on profile studiabes if no pruning has been applied.
MNT-8969	B	The layers of a Multi-channel image studiabe are not displayed when using the Grid View option on Multi-channel image studiabes generated from Hyperspectral image studiabes.
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.
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## 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 studiabes.
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 studiabes 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 studiabes in H5 format.
MNT-8747	B	The Auto-localize function for Multi-channel image studiabes 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 studiabes 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 studiabes 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).
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## 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 studiabiles 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 studiabiles.
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 studiabiles when changing the slice.
MNT-8347	B	Studiabiles 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 studiabiles.
MNT-8542	B	An error appears when displaying the Tolerance limit study on Surface studiabiles 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 studiabiles 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.
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## 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" studiabes 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 studiabes 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 studiabes 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 studyable. (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 studiabes 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 studiabes 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 studiabes 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 studiabes 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 studiabes 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 studiabes 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 studiabes changes when selecting an oblique extraction shape on the source Profile studiabe 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 studiabe when applying the "Map local properties" operator to Multi-channel image studiabes.
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 studiabes.
MNT-8413	B	The summit of some particle peaks/pits in the "Particle analysis" study on surface or image studiabes 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.

1. [Cross technology features](#)
2. [Spectroscopy features](#)
3. [SPM features](#)
4. [Profilometry features](#)
5. [Shell features](#)
6. [Other cross technology features](#)
7. [Reference Guide and translations](#)

## What's new

	<b>Cross technology features</b>
	<b>SmartFlow ergonomics and batch process</b>
	<b>Minidoc renamed SmartFlow and new icon</b>
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.
	<b>SmartFlow access from ribbon</b>
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.
	<b>SmartFlow application in batch</b>
SmartFlow in batch	The user can now apply a SmartFlow as a batch on several selected studiabls at the same time. The SmartFlow is then applied on each of the studiabls. 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 studiabls. The SmartFlow is then applied on each of the loaded studiabls.

	<b>Default SmartFlow when loading data</b>
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.
	<b>SmartFlow management dialog</b>
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.
	<b>SmartFlow icons dialog</b>
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.
	<b>Other ergonomic improvements on SmartFlows</b>
Simplified Save SmartFlow dialog	The Save SmartFlow dialog has been simplified. The user just needs to type the SmartFlow name.
Multiple-studiabiles SmartFlow dialog	The dialog box for applying a SmartFlow containing multiple root studiabiles 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.

	<b>Particle analysis ergonomics</b>
	<b>Improvements to the Particle analysis ribbon</b>
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 studiabiles incompatible which do not allow a selected detection method have their thumbnails grayed out in the method segmentation dialog box.
	<b>Thumbnails in Particle analysis</b>
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.
	<b>Classification dialog: better ergonomics</b>
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 studiabiles.



	<b>Spectroscopy features</b>
	<b>Extract custom ROI on Hyperspectral images</b>
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.
	<b>Improved display in Hyperspectral image view</b>
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).
	<b>New “Remove spikes” operator</b>
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.
	<b>Improvements for spectrum baseline corrections</b>
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 studiabiles.
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 2 <sup>nd</sup> 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.
	<b>New “Use spectral bands” operator</b>
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 studiabiles.
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.
	<b>"Sort by a parameter" operator</b>
"Sort by a parameter" operator	The "Sort by a parameter" operator can now be applied on Hyperspectral image and Series of spectrum curves studiabiles. This allows the user to keep or discard spectra using very precise criteria.
	<b>New "Create multi-channel cube" operator from MCI</b>
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.
	<b>New "Create multi-channel cube" operator from Series of surfaces</b>
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.
	<b>SPM features</b>
	<b>New "Filter line by line" operator</b>
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 studiabiles.
	<b>Custom fit range for Force curve indentation</b>
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.
	<b>Force volume ergonomics</b>
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.
	<b>Improvements on IV curves</b>
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.
	<b>Profilometry features</b>
	<b>Z scale and default filter for "Rk parameters" and "Sk parameters" studies</b>
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.
	<b>Rk default filter in Parameters table</b>
Default filter for Rk parameters	In the "Parameters table" study, the default L filters ( $\lambda_c$ ) 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 studiabiles.  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).
	<b>Automatic thresholds in "Volume parameters" study</b>
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.
	<b>Correlation graph in SSFA</b>
SSFA : R <sup>2</sup> curve display	The R <sup>2</sup> curve can now be displayed in the "Scale Sensitive Fractal analysis" study (SSFA) on Surface and Profile studiabiles. It shows the graph of correlation in function of the scale.
	<b>"Remove form" operator on Series</b>
"Remove form" operator on Series of profiles	The "Remove form" operator has been adapted to the Series of profiles studiabiles.
"Remove form" operator on Series of surfaces	The "Remove form" operator has been adapted to the Series of surfaces studiabiles.

	<b>Standard deviation and mean removal on Series of surfaces</b>
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.
	<b>New type of variable to be used in Result picker</b>
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.
	<b>Result picker for Filter in “Parameters table” study</b>
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.
	<b>Asphere calculation: complements</b>
Asphere fitting; better calculation accuracy	The user can now individually select the coefficients to fit in the “Fit an asphere” operator dialog on Surface studiabiles. 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 studiabiles: “sag” and “radial slope(s)”.
Accelerated calculations	Calculations are now slightly faster.
	<b>Shell features</b>
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.
	<b>Other cross technology features</b>
	<b>Free trial and license interface</b>
	<b>Simplified Free trial</b>
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.
	<b>Offline license update from Help menu</b>
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.

	<b>Launching Free Trial for unauthorized versions</b>
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.
	<b>Direct access to Support center</b>
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.
	<b>Minor changes to operators</b>
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 studiabiles. 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 studiabiles.
	<b>Automation ribbon customization and reorganization</b>
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.
	<b>Global Preferences reorganized</b>
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.
	<b>Dialogs and menu homogenization</b>
	<b>Operator dialogs organization</b>
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 studiabiles, a "Studiable to generate" group now replaces check boxes or radio buttons.
	<b>Ribbon display optimization</b>
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.
	<b>Optimized document titles</b>
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.

	<b>Other minor changes</b>
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 studiabiles (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 studiabiles.
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.
	<b>New MRC file format export</b>
New MRC file format export using command	It is now possible to export Multi-channel cube studiabiles 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.
	<b>Reference Guide and translations</b>
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 studiabiles, if the "Default study by study type" option for Shell studiabiles is set to None in the Global preferences of the software (Data display). This also applies to Surface studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles is grayed out.
MNT-7746	B	The brightness of the shell is too high in the 3D view study on Shell studiabiles.
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 studiabiles 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 studiabiles.
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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles] button in the "Studiabiles" 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 studiabiles 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 studiabiles, 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 studiabiles 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 studiabiles.
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 studiabiles.
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	<p>The elements of Parametric profile studiabler 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.</p> <p>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.</p>
Customization of the title of the Table of results	<p>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).</p> <p>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.</p>
"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 studiabler) 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	<p>The dialogs concerning requests about Mountains® software have been updated to now take into account the processing of requests directly by the software.</p> <p>This applies to the dialogs for a "Free Trial", "Quote request", "License update", "Extension request" and "SMP".</p>
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 studiabler 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles.
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 studiabiles if leveling is requested using an F-operation.
MNT-7405	A	Some unavailable parameters for "Asphere analysis" on surface studiabiles 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 studiabiles.
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 studiabiles 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 studiabiles 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 studiabiles in the MountainsSPIP® Premium and MountainsSpectral® Correlate products.
MNT-7242	B	The application of the "Wavelet transform" operator on Surface studiabiles 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 studiabiles 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" studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles 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 studiabiles.
MNT-7439	B	A question mark replaces the name of the studiabiles in the workflow when opening a document containing a "Convert into monochrome image" operator on Image studiabiles if there are studiabiles 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 studiabiles 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 studiabiles 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 studiabiles may cause an infinite loop involving the generation of studiabiles (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 studiabiles.
MNT-7146	B	Parameters "Lead angle" and "Lead depth" disappear from the table in the Lead analysis study on surface studiabiles 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 studiabiles 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 studiabiles 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

1. [Cross technology features](#)
2. [Profilometry features](#)
3. [Point Cloud and Shell features](#)
4. [Correlation & Spectroscopy features](#)
5. [SEM features](#)
6. [SPM features](#)
7. [Light microscopy features](#)
8. [Reference Guide and translations](#)

	<b>Cross technology features</b>
	<b>Extract profile tool augmented and redesigned</b>
Multiple extraction, new shapes and improved ergonomics for Extract profiles on all studiabiles	<p>The Extract profiles operator benefits from significant improvements, including multiple extraction, enhanced automation and new cross, parallel and radial shapes.</p> <p>The improvements are available for Surface, Images, Surface-image, Multi- channel images, Series of surfaces and Series of images studiabiles.</p>
	<b>Extraction of several profiles in the operator</b>
Multiple simultaneous profiles extraction	<p>It is now possible to extract multiple profiles from a Surface studiable in the Extract profile operator.</p> <p>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).</p> <p>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.</p>
Shape selection in Extract profile	<p>In the Extract Profiles operator dialog, the user can navigate through successive profiles and shapes using scroll arrows.</p> <p>The display of the profile selection in the graph is linked to the selection of the corresponding extraction shape in the preview.</p>

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 studiabiles.
	<b>New extraction tools: cross, parallel, radial</b>
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.
	<b>Automation tools</b>
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.
	<b>Improved ergonomics</b>
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.

	<b>Structure detection at a given position</b>
Management of the position of the detected structures	<p>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).</p> <p>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.</p> <p>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.</p> <p>The operator generates studiabes containing the selected structures in their order of selection. This order can be reorganized on a XY-grid by clicking on a button.</p> <p>This new method and the improvements listed below are available for Surface, Multi-channel and Image studiabes.</p>
Interior structure sorting in Detect structure	<p>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.</p>
Order of structures by X/Y-positions	<p>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.</p>
Generation of a fixed number of structures	<p>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).</p> <p>All the sorted structures can still be generated.</p>
Information on the structures on hover	<p>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.</p>
Displaying structure result preview	<p>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.</p>
Non-measured points taken into account in structure detection	<p>A new option has been added in the Detect structures operator dialog to take into account non-measured points in the correlation calculation.</p>
Detect structure dialog redesign	<p>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.</p> <p>The dialog has been adapted to standards. It integrates an information tooltip and/or error messages for better user information.</p>
Detect structures in full screen	<p>The user can resize the Detect structures operator dialog and display it full screen.</p>
	<b>Automation more accessible</b>
	<b>New Automation tab</b>
New Automation main tab: direct access to automation functions (Minidocs, Templates, Statistics, Interface customization etc.)	<p>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.</p> <p>The tab contains the following functions: Minidocs and access to their settings, the application of a template, studiable substitution, the creation of statistical documents.</p> <p>The user also has access via the Automation tab to settings useful during automation (Lock the document, Lock the whole program).</p> <p>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).</p> <p>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).</p>

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).
	<b>Improved driving of document creation from external applications</b>
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.
	<b>Fiber analysis on topography</b>
Fiber analysis study on topography	The Fiber analysis study has been added on Surface, Surface + image (surface channel), Multi-channel image (one topography channel) studiabiles 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.
	<b>Absolute palettes and two-color cursors</b>
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.

	<b>Fresh look for the interface</b>
	<b>Resizable operator dialogs</b>
Full screen display and resizing in operator dialogs	<p>The user can resize many operator dialogs and display them in full screen.</p> <p>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).</p>
Operator dialog reorganisation	<p>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.).</p> <p>Operator dialogs integrates information tooltips and/or error messages for a better user information.</p> <p>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).</p>
	<b>Better ergonomics for customizing study titles</b>
Study titles: better ergonomics	<p>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.</p> <p>The title can now also include the date of the measurement (when present in the studiable).</p>
	<b>Better display for studiable names</b>
Better display for studiable names	<p>The display of studiabiles 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).</p> <p>A tooltip displaying the full name of the studiable with all its operators has been added when the mouse is hovered over it.</p>
	<b>Custom path tool in Manual measurement study</b>
New Custom path tool in Manual measurement study	<p>The [Custom path] button has been added in the Manual measurement study to measure the distance along a defined path.</p> <p>This applies to Surface, Image, Surface + image and Multi-channel image studiabiles.</p>
	<b>Pasting an image as an Image studiable</b>
Pasting an image as an Image studiable	<p>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.</p> <p>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).</p>

	<b>Better ergonomics in the workflow: operator insertion with several antecedent studiables</b>
Insertion in the workflow of operators with several antecedent studiables	<p>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.</p> <p>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).</p>
	<b>Better display in Threshold operator</b>
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.
	<b>Direct download of the most version authorized</b>
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.
	<b>File explorer in detail view by default</b>
File Explorer in detail view by default	The File explorer now opens in detailed view mode by default.
	<b>Display of studiables larger than 2 gigabytes</b>
Display of large datasets	It is now possible to display images or surfaces larger than 2 Giga bytes.
	<b>Multilayer removed from version 10</b>
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.
	<b>New dark gray theme and Color theme preference enhancement</b>
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.
	<b>Updated icon design</b>
Modernized icon design	Icons have been redesigned in the new the style of the software (shortcut icon etc.)
	<b>Updated Welcome and About dialogs</b>
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.

	<b>Completed and updated Index, Templates, Tutorials and example studiabes</b>
Updated Templates and Tutorials	Templates, Tutorials and Index documents have been redesigned, reorganized and extended to illustrate new features. Example studiabes have been added.
	<b>Profilometry features</b>
	<b>New “Fit an asphere” operator</b>
New “Fit an asphere” operator	<p>The new “Fit an asphere” operator on Surface and Profile studiabes, fits aspheric geometries.</p> <p>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).</p> <p>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).</p>
	<b>Image beneath contour profile</b>
Contour study: Showing images (or surfaces) beneath contour profile	<p>It is now possible to display one or more backgrounds in the Contour study on Image and Surface studiabes.</p> <p>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 studiabes available in the document.</p> <p>The backgrounds can be hidden by using the [View] button in the Contour study.</p>
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).
	<b>Total Least square for leveling and form removal</b>
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 studiabes 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	<p>The Total Least Squares PLane (TLSPL) method has been added in addition to the Least Squares PLane (LSPL) in the Level operator on Surface studiabes. The operator allows the user to define and define the plane using the total least squares fitting method.</p> <p>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).</p> <p>This modification does not apply to the 3 points and Minimum Zone methods that do not use Least square.</p>
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	<p>The Total Least Squares Line (TLSLI) method has been added in addition to the Least Squares Line (LSLI) in the Level operator on Profile studiabes. The corresponding leveling operations are linked to the fit method: subtraction for Least squares line, and now rotation for Total least squares line.</p> <p>This modification does not apply to the Minimum Zone and Two bars methods that do not use Least square.</p>
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 studiabes.
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 studiabes, and the form is systematically removed according to the normals.



Parameter table on Surface and Profil: Total Least Squares in F- operation	<p>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).</p> <p>The TLS method is applied when loading old documents replacing the LS old version method.</p> <p>The Total Least Squares SPHERE (TLSSP) fitting method replaces the Least Squares SPHERE (LSSP) in the F-operation on Surface.</p> <p>The Total Least Squares Circle (TLSCI) fitting method replaces the Least Squares Circle in the F operation on Profile.</p>
	<b>Result picker in the Parameters table</b>
Result picker in the Parameters table: better automation	<p>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).</p> <p>The user can thus centralize a cut-off value applied to several Parameters tables or Filters.</p> <p>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.</p> <p>The Result pickers are available in the Parameters table on Profile, Series of profiles, Surface, Series of surfaces studiabiles as well as in the Parameters table in the Advanced contour analysis study.</p>
	<b>New 2D motifs parameters</b>
Characterization of repeating patterns in Profile motifs	<p>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.</p> <p>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).</p>
	<b>Adaptation of existing tools to Series of profiles and surfaces</b>
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	<p>The Scale-sensitive fractal analysis study has been adapted to Series of profiles and Series of surfaces studiabiles. 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.</p> <p>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.</p> <p>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.</p>
	<b>Point cloud and Shell features</b>
	<b>CAD compare, calculation of deviations</b>
New CAD compare study for Shell	A new CAD compare study is available for Shell studiabiles. 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).
<b>New Remove outliers operator on Point cloud</b>	
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).
<b>Enhancement of Mesh the point cloud operator</b>	
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.
<b>Correlation &amp; Spectroscopy features</b>	
<b>New Peak fitting analysis study</b>	
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	<p>The Peak fitting analysis now has a dedicated study: Peak fitting study on Spectrum curve and Hyperspectral image studiabiles</p> <p>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.</p> <p>It is possible to apply the same fitting settings to all the spectra, or spectrum by spectrum.</p> <p>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).</p> <p>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).</p> <p>The user also can also add/remove an automatic baseline for the selected fitting zone.</p>
	<b>New Parameter map operator</b>
New Parameter map operator for spectra	<p>The software can now generate a parameter map from the study results, thanks to the new Parameter map operator.</p> <p>For example, the user can generate maps of the calculated peaks positions and peaks amplitudes.</p> <p>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.</p>
	<b>Correct the baseline operator: ergonomics enhancement</b>
Correct the baseline operator: better ergonomics	<p>The Correct the baseline operator dialog on Hyperspectral image studiabiles 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.</p>
	<b>New MountainsSpectral® Analyze product</b>
New MountainsSpectral® Analyze product	<p>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.</p> <p>This completes the MountainsSpectral® products: MountainsSpectral® Correlate, MountainsSpectral® Expert, MountainsSpectral® Premium.</p>
	<b>New Correlative microscopy module</b>
New Correlative microscopy module	<p>The Correlative microscopy module offers tools for spectral image processing. Data colocalization is available. Advanced visualization allows the user to perform data correlation analysis.</p>
	<b>SEM features</b>
	<b>FIB-SEM: direct opening of a set of images to form a cube</b>
Direct loading of a Multi-channel cube from multiple images	<p>A new "Load a Multi-channel cube" entry has been created in the File menu to simplify the creation of Multi-channel cube studiabiles.</p> <p>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.</p>

	<b>Multi-channel cube: new Pseudo-color view</b>
New Pseudo-color view on Multi-channel cube	The Pseudo-color view study has been added on Multi-channel cube studiabiles. 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.
	<b>New image correction operators in Multi-channel cube: Shift, Spatial filter, Correct, and Scale the image</b>
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.
	<b>Extract area on cube</b>
New Extract area operator on Multi-channel cube	The Extract area operator extracts a region of interest on the Multi-channel cube studiable.
	<b>SPM features</b>
	<b>New Parameter map operator</b>
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 studiabiles.
New Parameter map operator for IV curves.	The Parameter map operator described above is also available for IV curve and IV spectroscopy image studiabiles.

	<b>Light microscopy features</b>
	<b>New Image instrument family for light microscopy</b>
New Image instrument family	<p>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.</p> <p>Dedicated to the study of any B&amp;W or color image (without topography) obtained using a camera or imaging system, this new instrument family offers tools for image processing.</p> <p>The Image products complement the existing range, in addition to Profilometry (2D), Surface Topography (3D), Scanning Electron Microscopy, Scanning Probe Microscopy and Spectral products.</p>
	<b>New studies on images</b>
New Color segmentation method in Particle analysis	<p>The 'Color segmentation' method has been added to the "Particle analysis" study for processing images from light microscopy.</p> <p>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.</p> <p>The user indicates the number of colors to detect in the image and visualizes the result of the detection in real time.</p> <p>This applies to RGB Image studiables.</p>
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	<p>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.</p> <p>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.</p>
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	<p>The Optimize option is now directly accessible via the [Enhancement] button in the "Pseudo-color" view or the "True color" view on Image studiables.</p> <p>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.</p>
	<b>New operators on images</b>
New Extract profiles operator from image luminance	<p>It is now possible to extract a luminosity profile on the image layer of a Surface + images studiable.</p> <p>It is now possible to convert Image studiables into Series of profiles using luminance.</p>
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 studiabiles 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 studiabiles 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 studiabiles. 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 activated in the "Scale the image" operator on Image studiabiles, 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 studiabiles. 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.
	<b>New Image Index and templates</b>
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.
	<b>Reference Guide and translations</b>
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 studiabes. 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 studiabes 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 studiabes in a particular case.
MNT-7132	A	The software may crash when applying the Remove form operator on a Profile studiabe 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 studiabes if this was the configuration for the previous use.
MNT-5343	B	The colors of the different channels of Multi-channel studiabes (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 studiabes when "Use a sample structure" is selected as detection method, if the sample structure studiabe 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 studiabes.
MNT-5967	B	The "Fully automatic" method in the Stitch operator on surface studiabes 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 analysis study on a Hyperspectral image studiabe, 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 studiabes.
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 studiabes 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 studiabes is erroneous.
MNT-6590	B	The axis settings of the studies on Spectrum curve, Hyperspectral image, IV curve and IV spectroscopy image studiabes 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 studiabes.



6631		
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 studiabiles.
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 studiabiles.
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 studiabiles are not correctly assembled when opened.
MNT-7006	B	Applying the « Scale-sensitive fractal analysis study on Surface studiabiles 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 studiabiles, or on the image channels of Surface + image or Multi-channel image studiabiles.
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 studiabiles.
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 studiabiles 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.