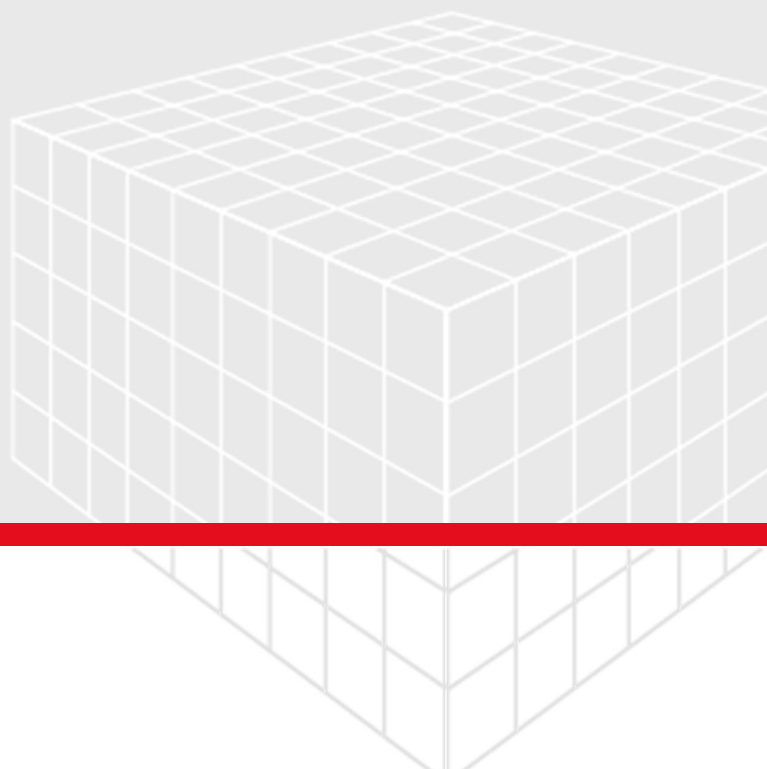


Graphical User Interface

User Guide

GEODICT Release 2026

Published: June 2026



GEODICT

<https://doi.org/10.30423/userguide.geodict>

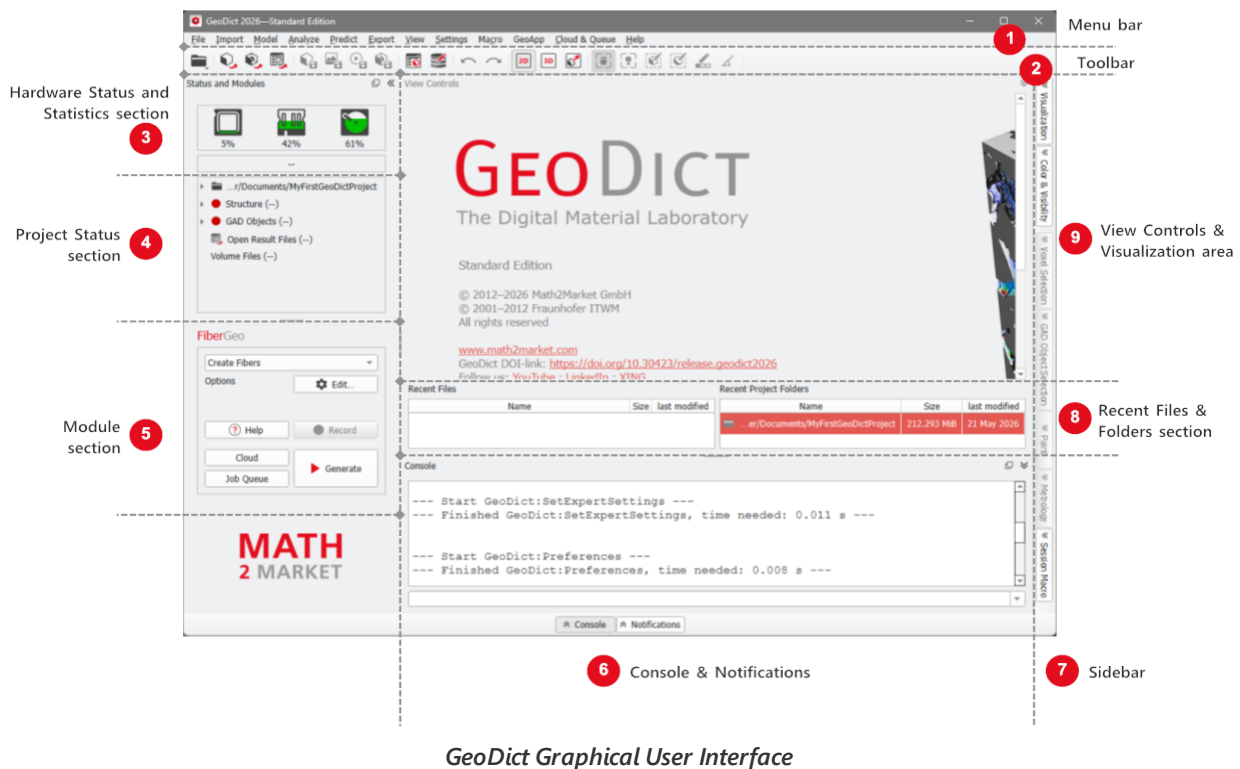
Graphical User Interface

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1 Graphical User Interface

At the program start, the GeoDict home screen is shown.

The heading for the [Module](#)^[81] section refers to one of the licensed modules, e.g., such as the FiberGeo module. The **Visualization area** shows the GeoDict splash screen.



GeoDict Graphical User Interface

Basic elements of the GeoDict GUI

1. [Menu bar](#)^[5], that gives access to the main features of GeoDict.
2. [Toolbar](#)^[43], that provides several shortcuts to the most common tools.
3. [Hardware Status](#)^[47] section and [Statistics Section](#)^[47].
4. [Project Status section](#)^[45], where information about the current project is shown and the loaded structure and volume fields can be edited in the right-click menu.
5. [Module section](#)^[81], where commands and their options for the chosen module can be selected.
6. [Console & Notifications](#)^[84], that display messages from GeoDict.
7. [Sidebar](#)^[90], where modifications of the visualization or the structure can be made.
8. [Recent Files & Folders](#)^[138], which shows the last used folders and files on the start screen.
9. [View Controls & Visualization area](#)^[139], where the structure is shown and visualization settings can be made.



New in GeoDict 2026

- A dark [color scheme](#)²⁴ (Dark Mode) is now available in GeoDict.
- Buttons to load and save volume files were added to the [toolbar](#)⁴³.



Join the conversation

Visit the Community on [GeoDict Forum](#) to be inspired and get answers to top questions.

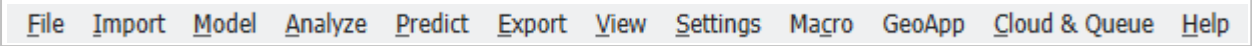
Find illustrative application examples on the [website](#).

Our tutorials and seminar videos give you a first hands-on experience. They are collected in the [Learning Center](#).

Send your [Support Request](#) to our technical Support.

1.1 Menu Bar

The Menu bar gives access to the GeoDict modules and other functionality. The options are accessible by scrolling down in the pull-down menus.



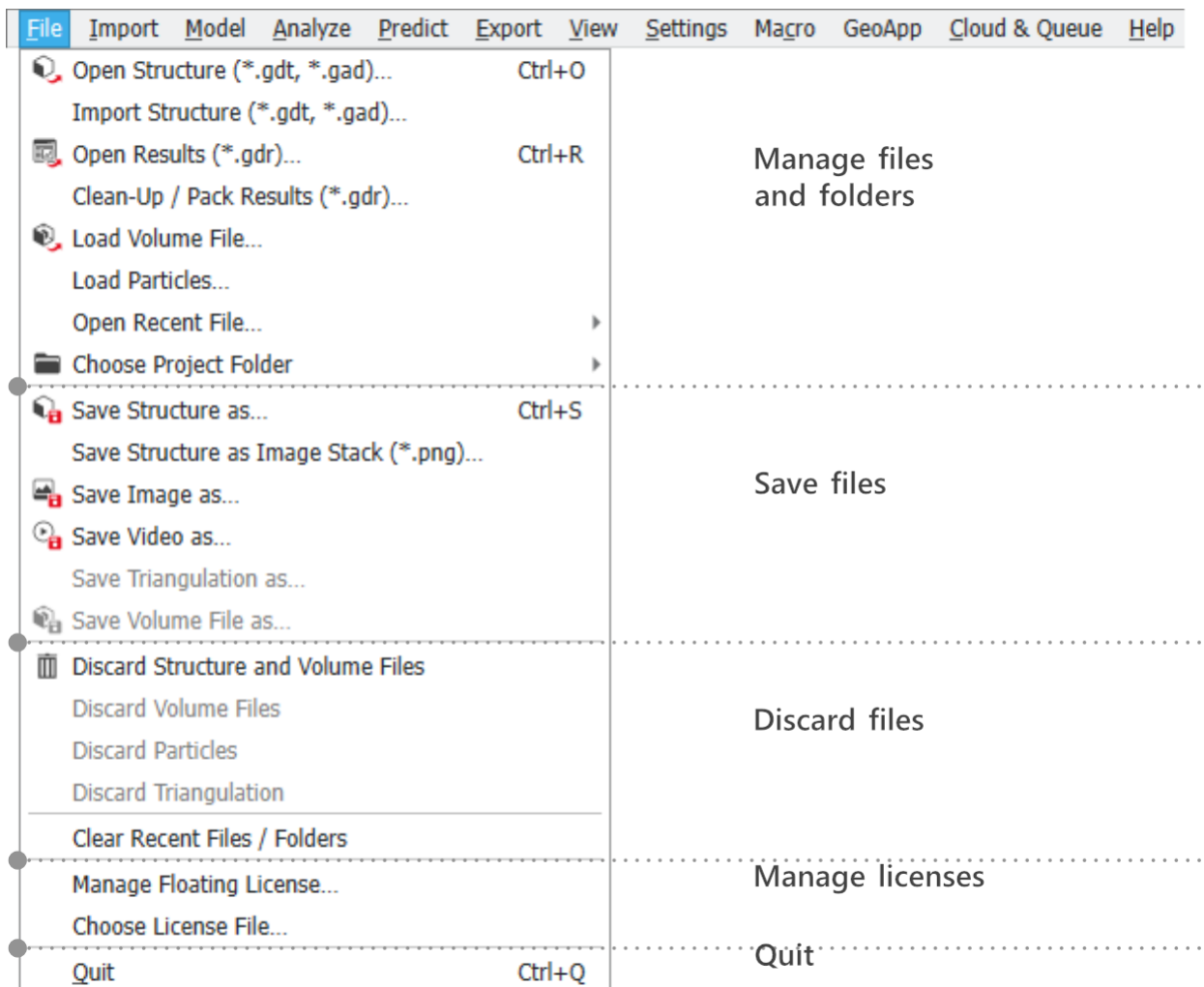
File Import Model Analyze Predict Export View Settings Macro GeoApp Cloud & Queue Help

Menu bar entries

1. Load and save GeoDict files and manage your license via the [File](#)  menu.
2. Do you want to import a 3D scan? Study the Import section.
3. Model and alter statistical digital twins via the structure generators found in the Model menu.
4. Analyze the properties of your materials.
5. Simulate and Predict physical and chemical processes in your materials.
6. Export structures to other file formats compatible with other software packages.
7. Define how to [View](#)  your materials to create beautiful visualizations.
8. Edit the overall [Settings](#)  in GeoDict.
9. Automate your workflows with GeoPython via the [Macro](#) menu.
10. Find many helpful GeoApps shipped with GeoDict or generate your own custom GeoApps.
11. Accelerate your computation time using Cloud or Job Queue.
12. Find [Help](#)  for the GeoDict options.

1.1.1 File

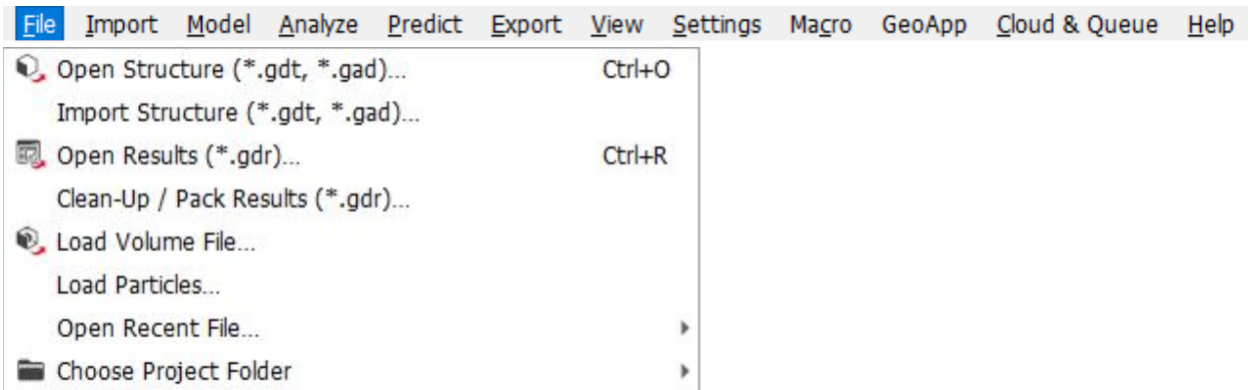
You can load and save GeoDict files, choose your project folder, and manage your license via the **File** menu.



The File menu:

- [Manage Files and Folders](#)^[7]
Open and pack files and choose your project folder.
- [Save Files](#)^[14]
Save GeoDict files and export beautiful images and videos.
- [Discard Files](#)^[17]
Discard structure or simulation results and clear recent files / folders.
- [Manage Licenses](#)^[19]
Choose license and manage floating license.
- [Quit](#)^[20]
Close GeoDict.

Manage Files and Folders



✓ Open Structure (*.gdt, *.gad)

Select **Open Structure (*.gdt, *.gad)...** to browse for a saved structure file and open it. The file can be in **GDT** format (GeoDict compressed format), in **GAD** format (GeoDict analytic data) or in an index image format (*.leS or *.g32).

The **Select File** dialog opens in the currently selected [project folder](#)¹³, but you can also navigate to other project folders you have created.

Loading a *.leS or *.g32 file with **Open Structure** imports the file as a structure in GeoDict, assigning the indices to the 256 Material IDs. First, the index 0 is assigned to ID00. Then, the other indices are assigned to the other 255 IDs equally. That means, index 01 gets ID 01, index 02 gets ID 2 and so on till index 255 gets ID 255. If more than 256 indices are contained in the *.g32, then the IDs are assigned again starting with ID 01 for index 256. Loading such files with **File** → [Load Volume File](#)⁹ instead, loads it as an index image.

The toolbar icon  is the shortcut to open structure files.

✓ Import Structure (*.gdt, *.gad)

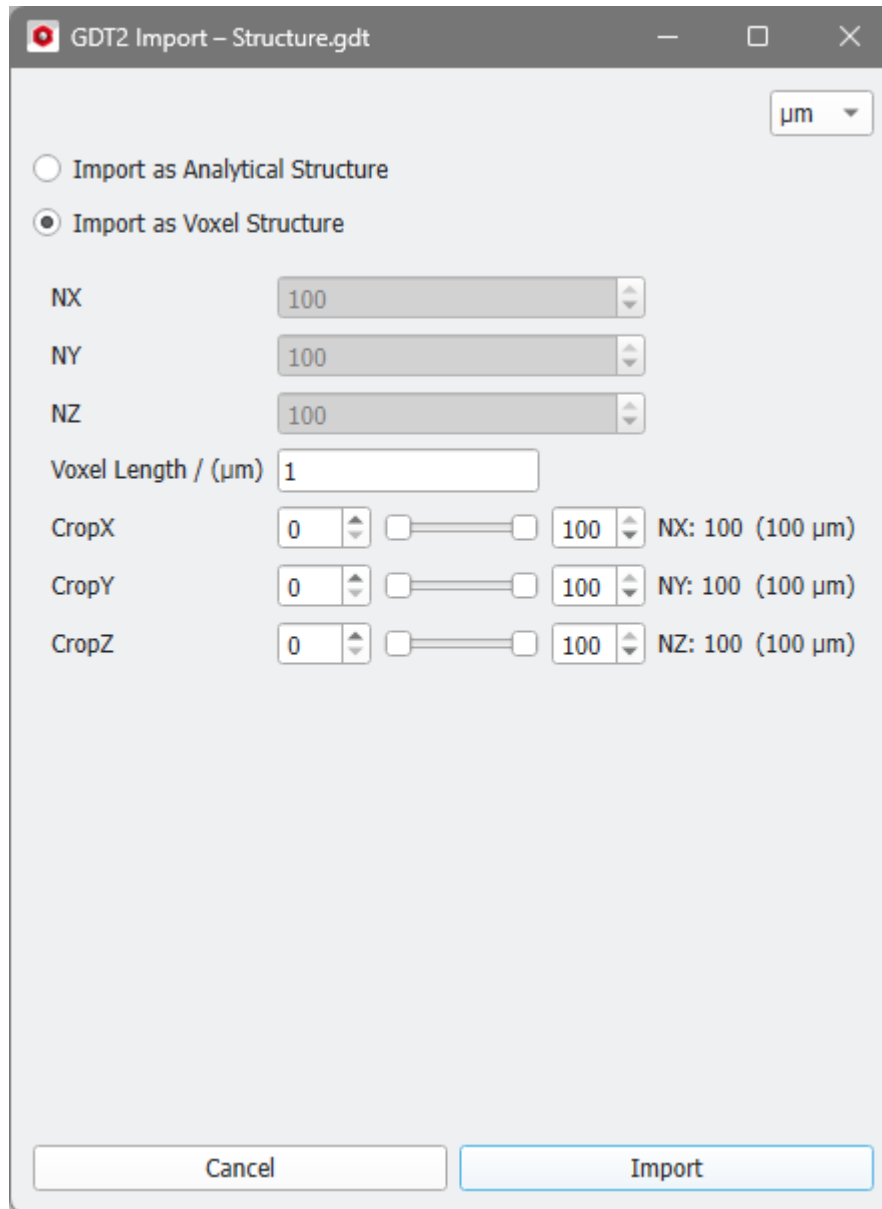
With **Import Structure (*.gdt, *.gad)...** files in **GDT** and **GAD** format can be loaded into GeoDict. In contrast to **Open Structure**, after selecting a file to open, the **Import Structure** dialog offers several options, such as changing the voxel length and cropping the structure.

For a GDT file which contains analytical information of the microstructure, you can decide to **Import** the structure **as Analytical Structure** or to only **Import as Voxel Structure**. For GAD files, only the **Import as Analytical Structure** is selectable. Importing as analytical structure allows, e.g., to change the origin or to rotate the structure. The options are explained in more detail in the Import GAD data section of the [GadGeo](#) chapter.

If **Import as Voxel Structure** is checked, the original values of **NX**, **NY**, **NZ** are shown, but cannot be edited. The **Voxel Length** can be changed and has no impact on the

number of voxels, only the physical size is changed. Select the unit for the voxel length from the pull-down menu in the upper right corner of the dialog.

A sub-region to load can be set by adjusting the sliders for **CropX**, **CropY**, and **CropZ** or entering the exact voxel number in the corresponding boxes. The resulting size in the corresponding direction is shown on the right in number of voxels and length in units.



✓ Open Results (*.gdr)

Select **Open Results (*.gdr)...** to open and load result files in **GDR** format (GeoDict results), obtained, e.g., from a previous run of a GeoDict solver or structure generator into the Result Viewer. Browse for the file to load in the **Select file** dialog, which opens in the current project folder.

The toolbar icon  is the shortcut to open results.

✓ Clean-Up / Pack Results (*.gdr)

Select **Clean-Up / Pack Results (*.gdr)...** to delete or compress additional files that are saved in the result folder of the chosen result file. This functionality is also available in the Result Viewer under Manage Data in the bottom section and described there.

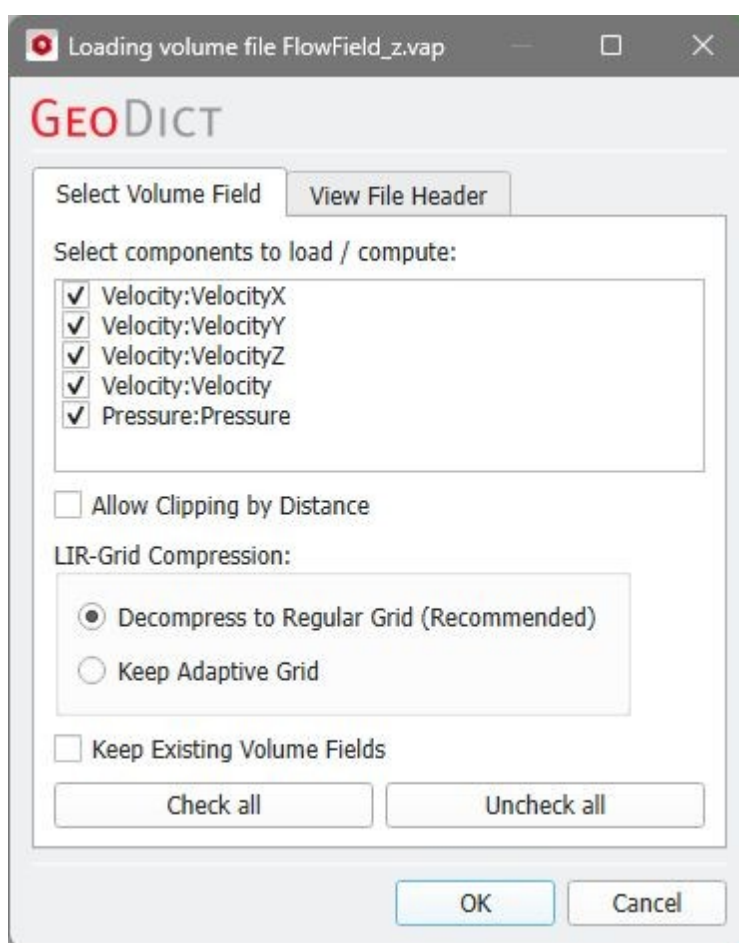
✓ Load Volume File

Select **Load Volume File...** to open volume files and visualize the contained volume fields, e.g., *.vap files (velocity and pressure fields). You can open and load result files for visualization in numerous formats.

Velocity and Pressure File (*.vap)
Scalar Result File (*.hht)
Displacements and Stresses (*.das)
Volume Fractions File (*.gvf)
Pressure and Saturation Data (*.pas)
GeoDict Orientation Data (*.gof)
Concentration and Potential (*.cap)
Distance Transform Data (*.dst)
Electrostatic Result File (*.est)
GeoDict Index Image - Binary (*.g32 *.leS)
Integer Data - Binary (*.raw)
All Files (*.*)

The toolbar icon  is the shortcut to load volume files.

In the opening **Loading volume file** dialog, select the volume fields you want to load. Supplemental fields, as, e.g., the Velocity:Velocity field shown in the dialog, will be computed from the saved fields in the file.



Selecting **Allow Clipping by Distance** also computes a distance field using a signed Euclidean distance transform (see the MatDict-EDT chapter for more information). The distances can then be used to threshold the other loaded volume fields.

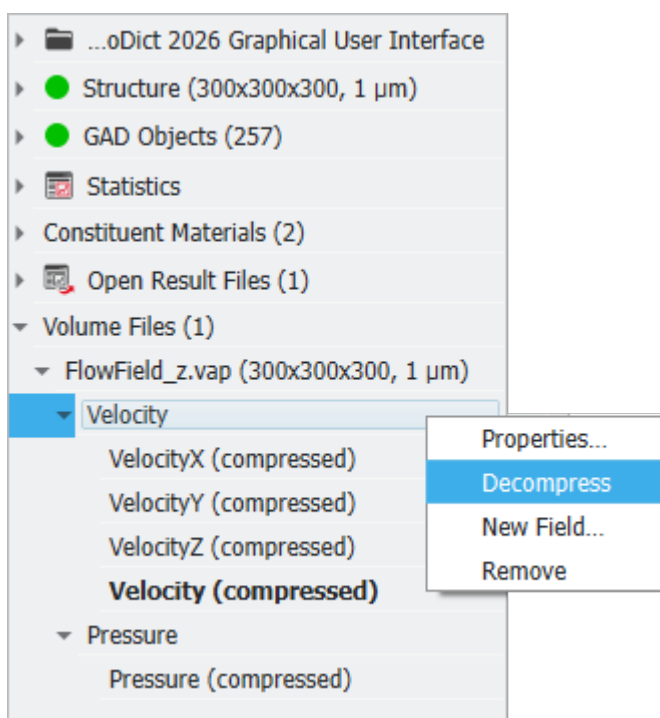
A compressed field is saved when checking **Write Compressed Volume Fields** under the Solver tab of the **LIR Solver Options** dialog. If a compressed volume field is opened, it is possible to choose either **Decompress to Regular Grid** (which is the recommended option) or **Keep Adaptive Grid**, which means to load the field in compressed form.



Important! Some visualization features of volume fields (e.g the visualization of streamlines) are available only if the field is loaded in decompressed form.

However, loading a compressed volume field needs less memory, which can be advantageous for large structures.

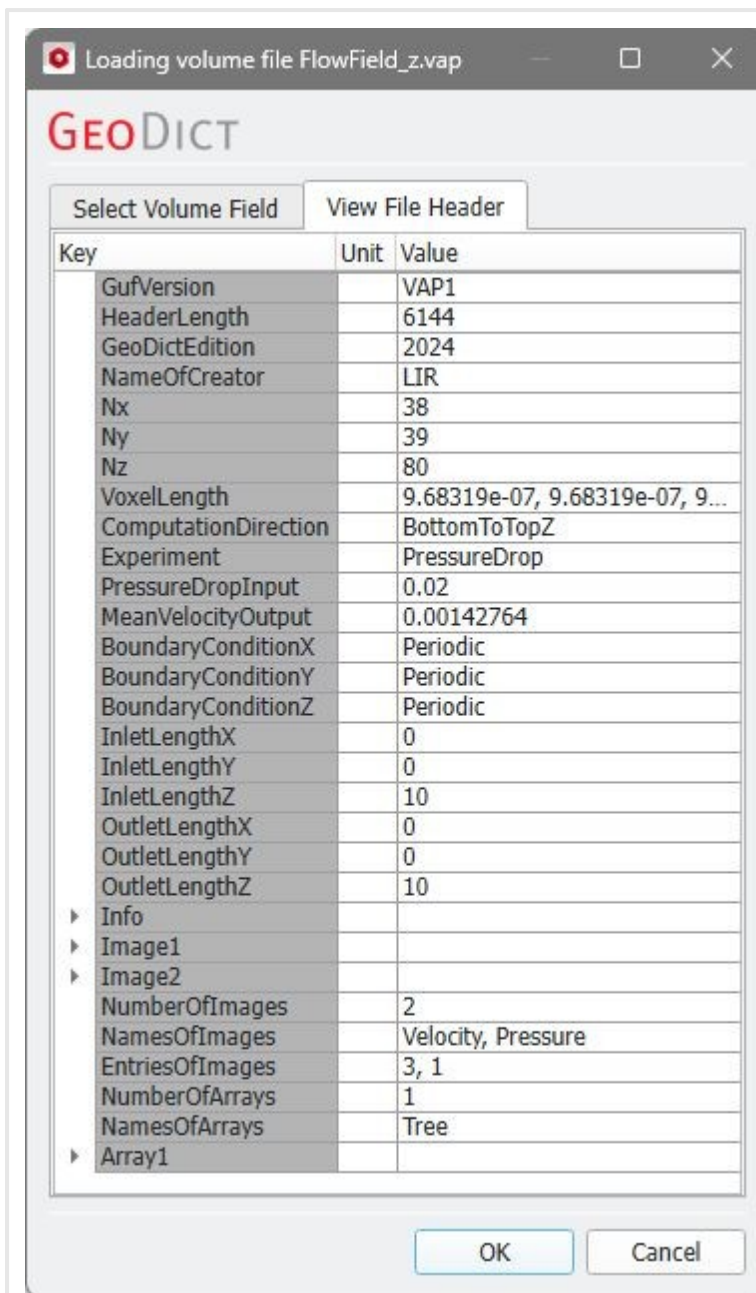
It is also possible to load a volume file in compressed form and decompress it later. In the project status section on the left, right click on the volume image and choose **Decompress**.



Check **Keep existing Volume Fields**, if already loaded volume fields should be kept in the GeoDict memory.

With the buttons **Check all** and **Uncheck all**, the fields from the volume file you want to load can be selected or deselected at once.

In the **View File Header** tab you can see the header of the volume file. The header provides information about the domain size, voxel length, boundary conditions, and many more. Nothing can be edited in this tab, only the available information, depending on the volume file type, is shown.



Know how! You can open a volume file with a text editor to read the header which is the only human-readable part. However, it is more convenient to view this during import in GeoDict. Moreover, large volume files take a long time to open in a text editor, or the editor may be unable to open them at all.

Find more about the content of the header in volume files in the GeoPy Scripting chapter.

Clicking **OK** starts the import of the volume file.

✓ Load Particles

Select **Load Particles...** to open and visualize particle trajectories and particle positions for FilterDict or AddiDict simulations (*.gpt and *.gpp files). This option is only available if a structure is currently loaded into GeoDict.

✓ Open Recent File

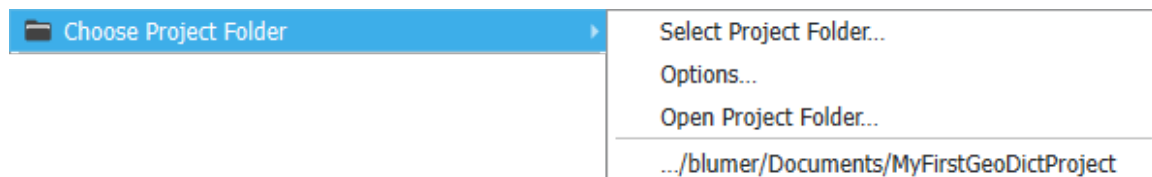
Select **Open Recent File...** to choose a file from the list of the last opened **GDR**, **GDT**, and **GAD** files. This list of files opened or created in the last GeoDict session is also shown in the [Recent Files section](#)¹³⁸ when no structure is loaded.



Know how! Open recent files from the file menu also works when a structure is currently loaded.

✓ Choose Project Folder

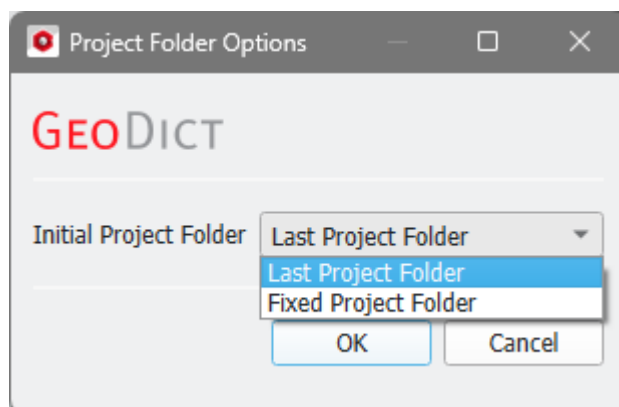
For **Choose Project Folder** a sub-menu opens when hovering above.



The toolbar icon  is the shortcut to the **Choose Project Folder** sub-menu.

Click **Select Project Folder...** to open the **Choose Project Folder** dialog. Find the path to a previously created and already listed project folder, or right-click in the dialog to create a new project folder to save the results and settings files produced with GeoDict.

Under **Options...** to set up how the project folder is selected at the start of GeoDict. Either the **Last Project Folder**, or a **Fixed Project Folder** can be selected.



Click **Open Project Folder...** to open the currently selected project folder with the Windows Explorer or the Linux file manager.

Below, if available, the last project folders are listed as it is done in the [Recent Project Folder](#) ¹³⁸ section.

The project folder will contain the files with the generated structures and the result files from the solvers' computations. You can choose any folder on your disk space as project folder.



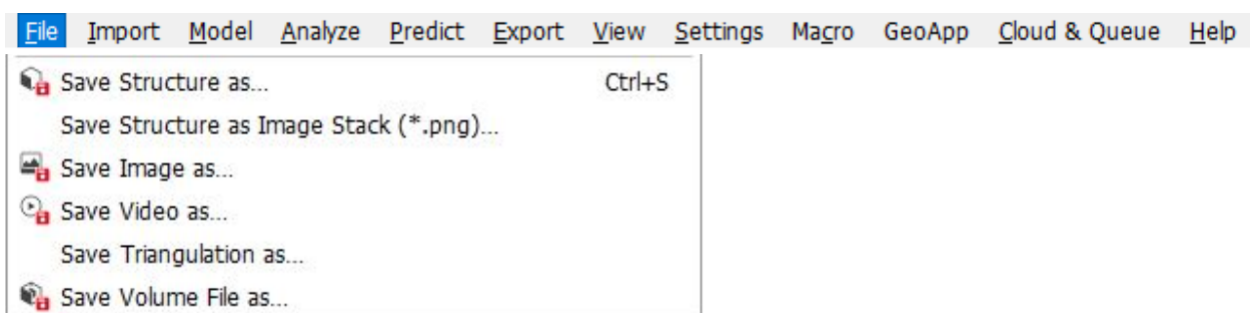
Important! We recommend to not choose a drive as project folder. Instead choose for example `c:\GeoDictResults` as project folder.



Know how! The initial project folder for the first start of GeoDict is located in Windows by default at c:

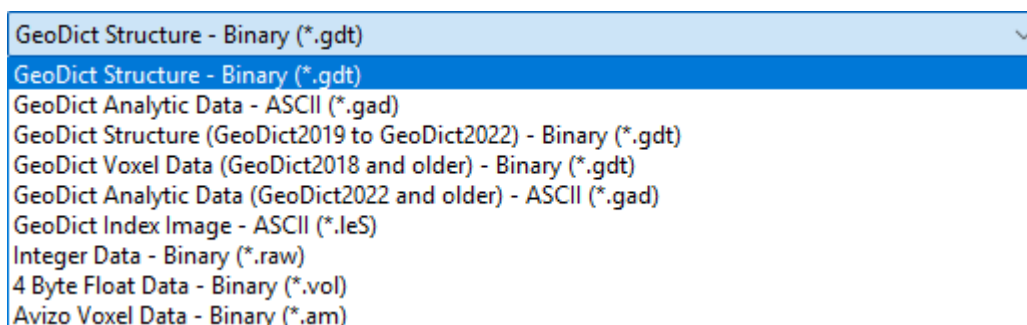
`\Users\username\Documents\MyFirstGeoDictProject`, where username is replaced by your username.

Save Files



✓ Save Structure

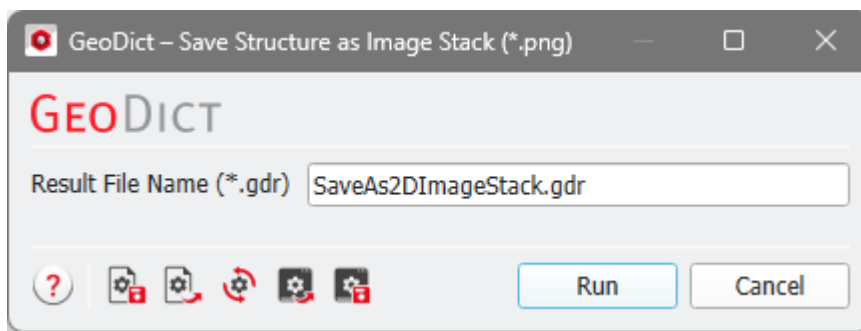
Select **Save Structure as...** to save the currently loaded structure in the supported file formats (**GDT**, **GAD**, **leS**, and **RAW**).



The toolbar icon  is the shortcut to this function.

The automatically chosen folder to save the file containing the structure data is the current project folder. However, it is also possible to choose another location.

✓ Save Structure as Image Stack



With **Save Structure as Image Stack (*.png)...** each Z-slice can be saved as a *.png file. Each Material ID is converted into a gray value.



Note! The Material IDs are mapped to 8-bit grayscale values without scaling. As there are up to 256 Material IDs supported in GeoDict (ID00 - ID255), voxel of Material ID 00 will get gray value 0, Material ID 01 will be converted to gray value 1 and so on, regardless of whether all Material IDs are present.

In the options menu, a **Result File Name** must be specified. The *.png files are then saved into a folder with the same name and a result file will be created.

✓ Save Image

Choosing **Save Image as...** saves the current content of the visualization area in the supported file formats (*.png, *.jpg, *.xpm, *.xbm, *.bmp, *.pgm, *.ppm, and *.pbm) in a selected folder, e.g., the current project folder.



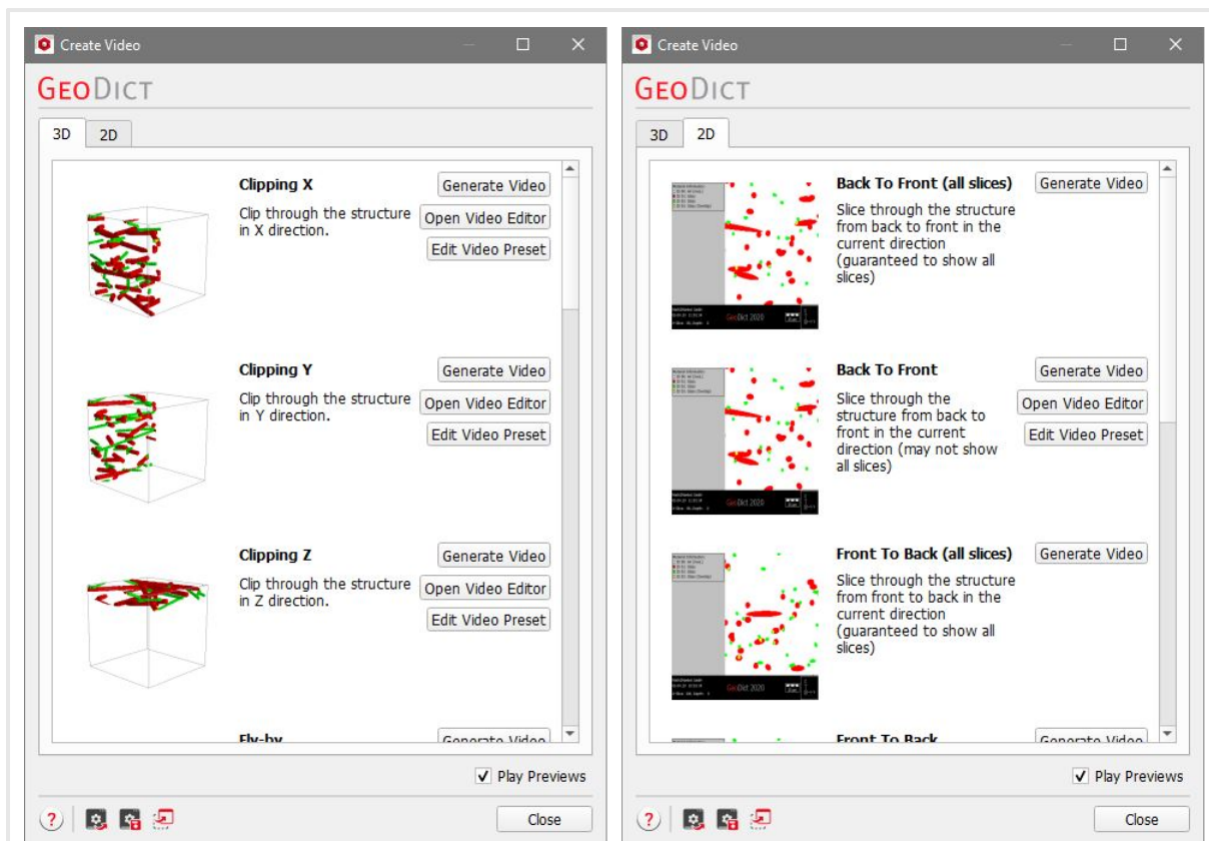
The toolbar icon is the shortcut to this function. The opening dialog is different depending whether 2D or 3D [view](#)²¹ was previously selected. The dialogs are described in the Save Images chapter for 2D view and 3D view, respectively.

✓ Save Video

Selecting **Save Video as...** opens the **Create Video** dialog, which allows choosing preset scripts that execute the making of a video with appropriate standard settings.



The toolbar icon is the shortcut to the **Create Video** dialog. The preset video scripts are organized in the two tabs 2D and 3D.



Clicking on **Generate Video** opens the **Export Video** dialog, where the output options like the video file name can be entered. The video is then created without any modifications of the underlying script.

Click **Open Video Editor** to open the Video Editor for modifications. **Edit Video Preset** allows to change the description of the video preview.

The following preset movie clips are available:

- In 3D: **Clipping X**, **Clipping Y**, **Clipping Z**, **Fly-by**, **Follow Particle**, **Particle Animation**, **Rotate X**, **Rotate Y**, **Rotate Z**, and **Streamlets**. Also given is the option to import settings from the Video Dialog 3D to be listed in the preset video scripts (**Import as Video GeoApp**), to produce a 3D video using 2D images from a stack of scanned images (**Create Video from Image Stack**), and to simply open the Video Dialog 3D editor without loading a specific preset video script (**Open Editor**).
- In 2D: **Back To Front (all slices)**, **Back To Front**, **Front To Back (all slices)**, **Front To Back**, **Import as Video GeoApp**, **Create Video from Image Stack**, and **Open Editor**.

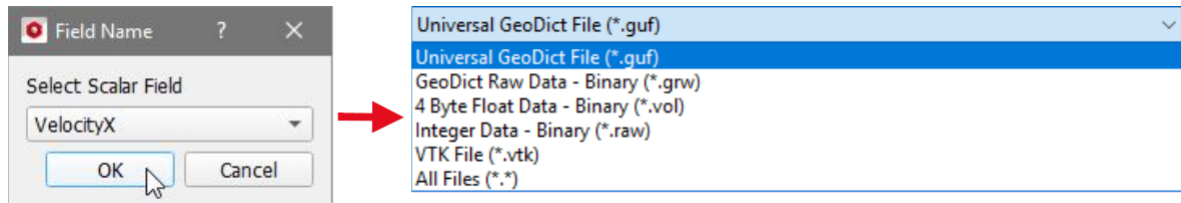
See the Create Videos chapter for more details about creating videos in GeoDict.

✓ Save Triangulation

Select **Save Triangulation as...** to save triangulations obtained by creating a mesh through MeshGeo or by importing in ImportGeo-CAD. The available options are the same as for MeshGeo - Save and are explained in this chapter.

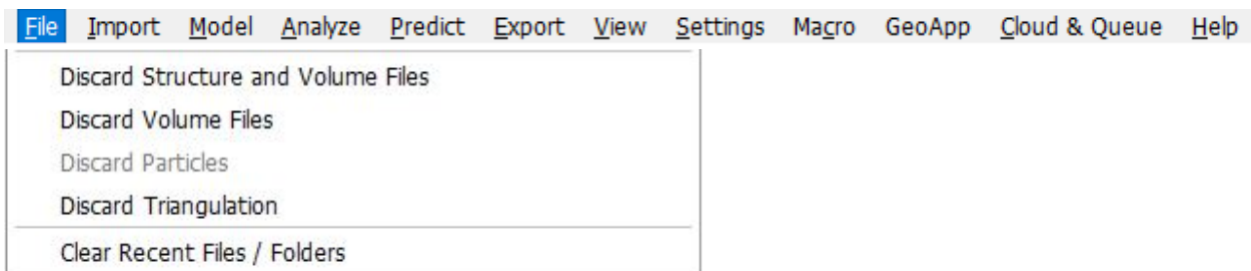
✓ Save Volume File

Select **Save Volume File as...** to save single volume fields of simulation results in several file formats. For example, after running a flow simulation with FlowDict, select a name to save the field of the velocity in X-direction as raw float data (*.vol) or GeoDict universal file (*.guf).



The toolbar icon  is the shortcut to save volume files.

Discard Files

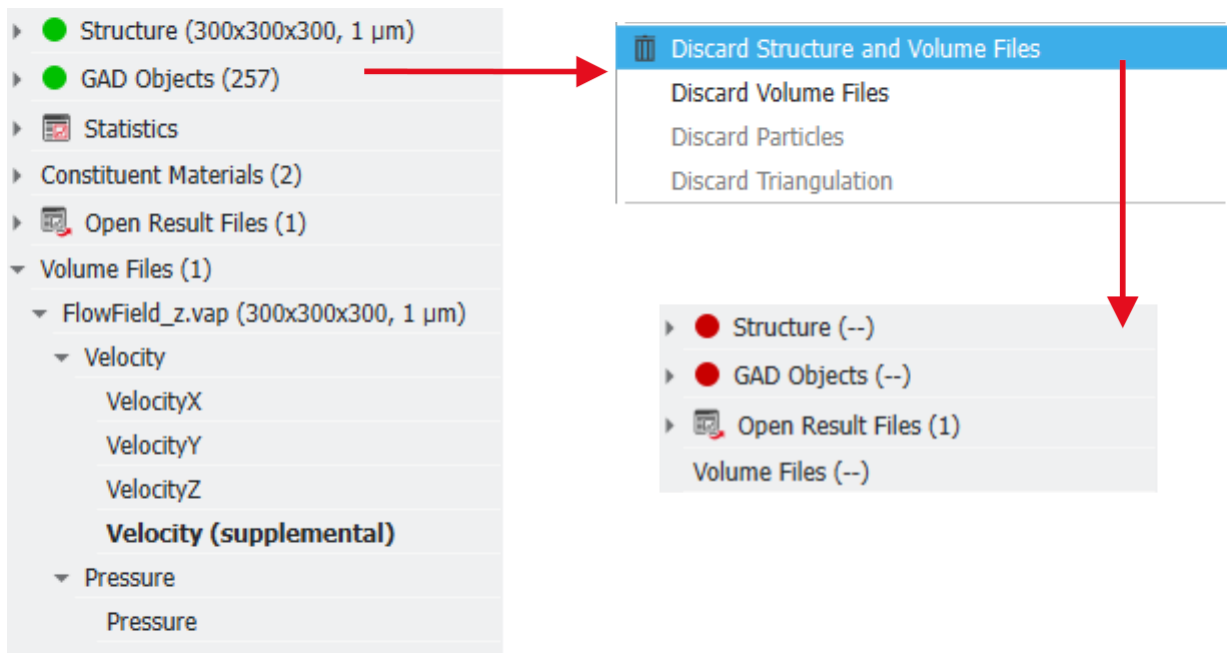


Discard structures and fields

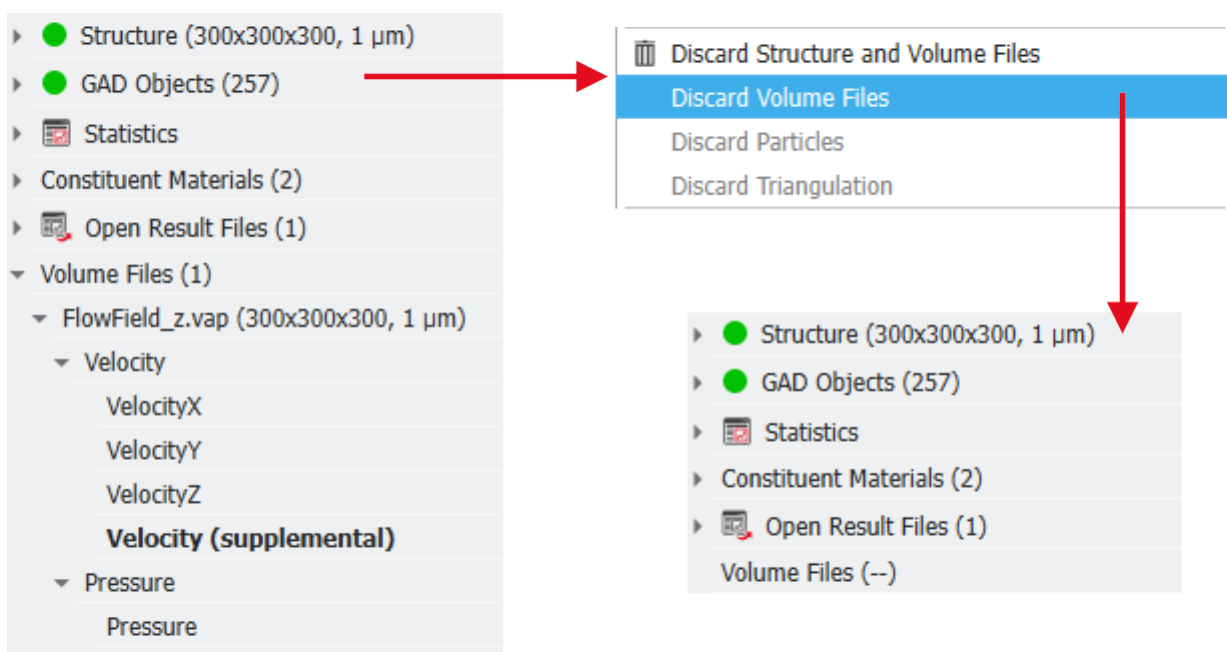
Selecting **Discard Structure and Volume Files** removes the structure and all simulation result fields currently loaded for this structure from memory and from the Visualization area. Instead, the initial GeoDict splash screen appears in the visualization area.

In the example shown here, a fiber structure is loaded in GeoDict, together with the volume fields of velocities in X-, Y-, and Z-direction, loaded from the .vap file of a flow simulation.

Clicking **Discard Structure and Volume Files** removes the structure, and the simulation result fields (volume fields) from the memory.



Selecting **Discard Volume Files** removes only the simulation result fields (volume fields) that are currently loaded. The structure displayed in the visualization area is not deleted.



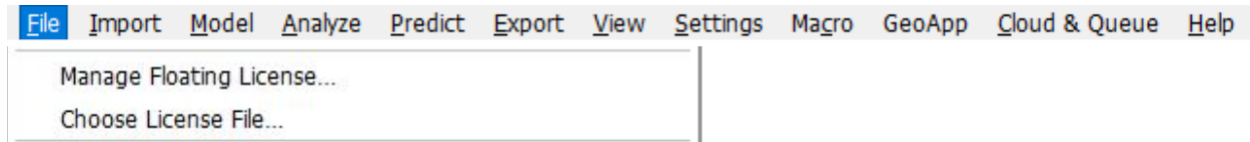
In the same way, for a particle simulation result (created with FilterDict or AddiDict), if particle trajectories or positions are available in GeoDict memory, **Discard Particles** removes the particle information from memory.

Discard Triangulation deletes triangulation data, e.g., structures in STL format (Stereosurface triangulation language), imported with ImportGeo-CAD, or meshes created with MeshGeo.

Clear recent files and folders

Clicking **Clear Recent Files / Folders** clears the list of [Recent Files and Recent Project Folders](#) ¹³⁸ shown in the GUI when the visualization area is empty.

Manage Licenses

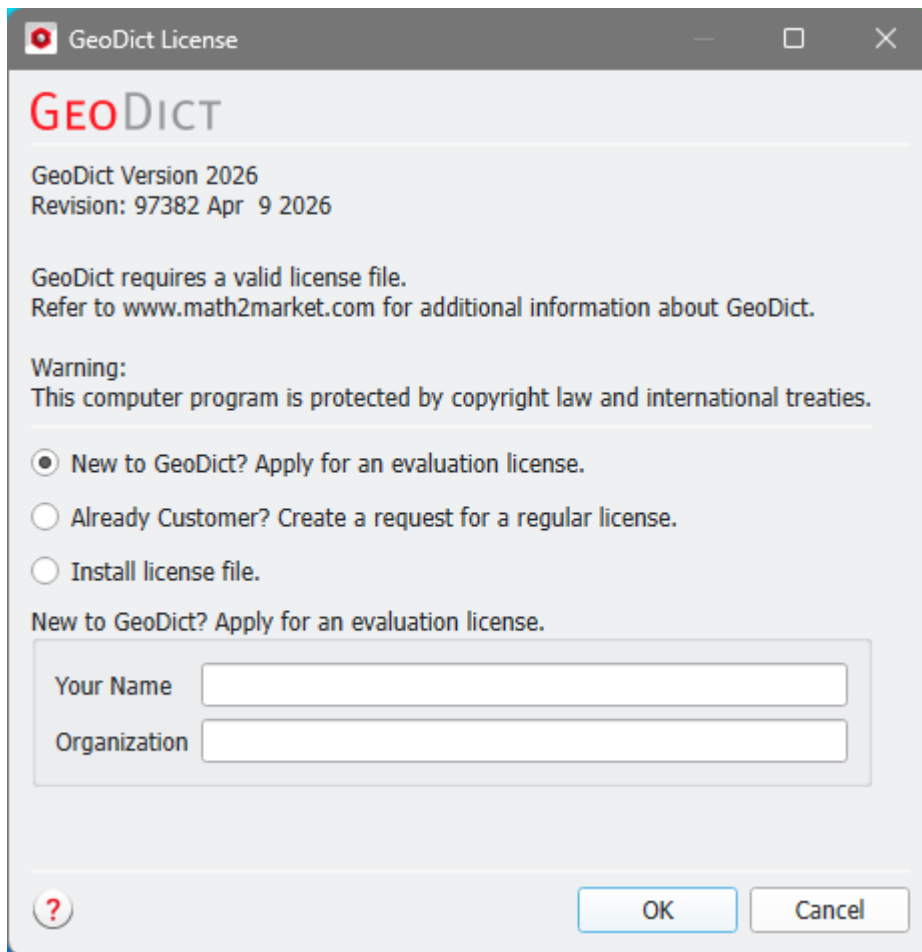


Manage floating licenses

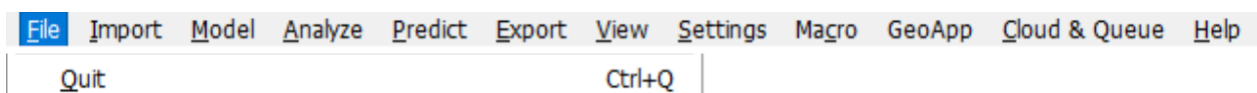
The option **Manage Floating License...** is only available if you have installed a floating license, otherwise it is grayed-out. Here, you can choose which of the licensed modules you would like to use in this session. Deselected modules will be shown as unlicensed in the GeoDict menu, and their license will then be free for other users to use. Find more information in the [Installation & Licensing](#) chapter.

Choose license file

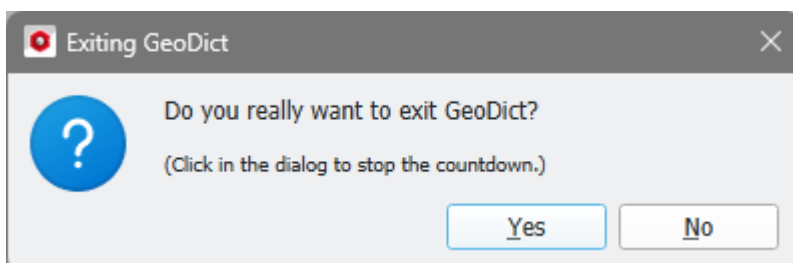
Select **Choose License File...** to select a license file, e.g., to change the license from trial to a purchased or leased license, to upgrade the license for another term, or to request a new license file. Find more explanations in the [Installation & Licensing](#) chapter.



Quit

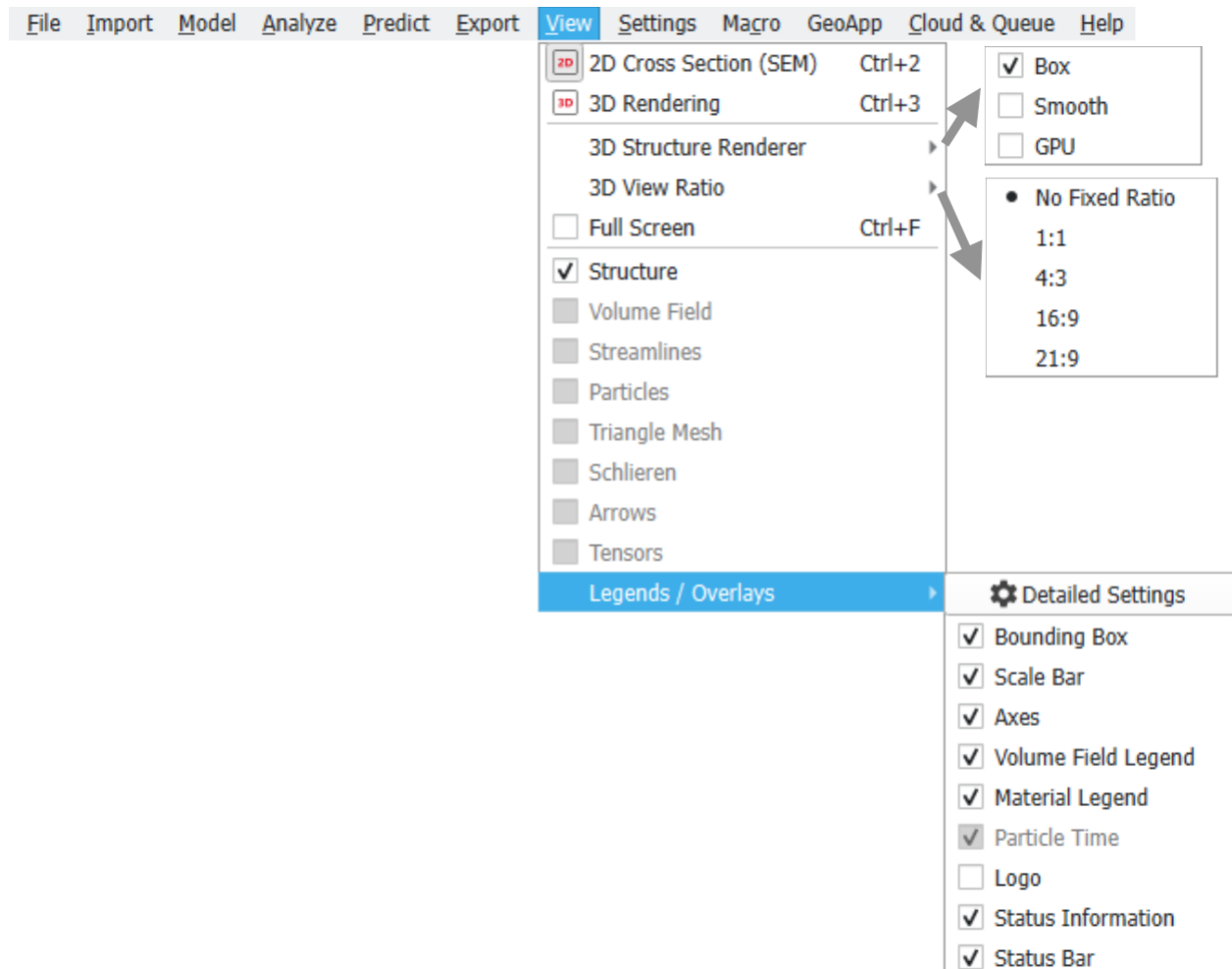


Selecting **Quit** opens the **Exiting GeoDict** dialog, where you have to confirm with **Yes** to end the current GeoDict session. Selecting **No** does not end the GeoDict session. GeoDict can also be terminated by clicking the close button  in the title bar. The exiting dialog also opens here to prevent you from accidentally closing the session.



1.1.2 View

After modeling a structure, either by generating it in GeoDict or after importing 3D μ CT or FIB/SEM images, define how to view your material in the **View** menu by changing the visualization settings.



Set visualization type

Choose the visualization type to be **2D Cross Section (SEM)** or **3D Rendering**, which has additional settings under **3D Structure Renderer** and the **3D View Ratio**.

In 3D Rendering, the **Structure Renderer** can be chosen. The structure can be rendered using the graphics card (**GPU**) or the main processor (**Box** with raycasting or **Smooth** with raycasting). Volume raycasting is an image-based volume rendering technique that computes 2D images from 3D volumetric data sets. Examples to these options can be found [here](#).

Selecting **Full Screen** makes the Visualization area occupy the entire screen. Pressing the **Esc** key on the keyboard returns the program to the normal display containing all the components of the GeoDict layout.

Show / hide components

Select which components are displayed in the visualization. The options available depend on the currently loaded file types, e.g., if no Volume Field is loaded, the Volume Field option is grayed-out.

When unchecking one of the components, it disappears from the display. Some components can only be visualized in **3D Rendering** so the effects are only visible when 3D Rendering is chosen.

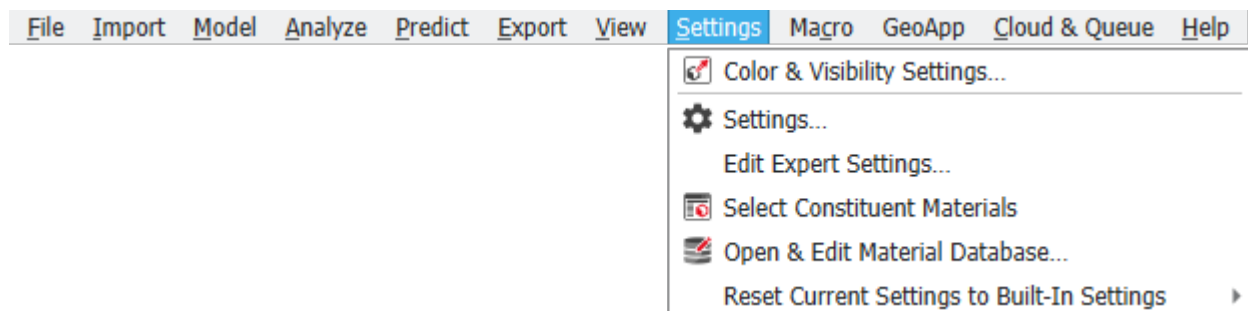
Among the choices for the visualization are **Structure**, **Volume Field**, **Streamlines**, **Particles**, **Triangle Mesh**, **Schlieren** (Line Integral Convolution), **Arrows**, and **Tensors**.

Legends and Overlays

Hover over **Legends / Overlays** to choose which legends or additional information is displayed in the visualization area. Select **Legend / Overlays** → **Detailed Settings** to access the corresponding settings in the **Visualization** tab of the sidebar. All settings are explained here.

1.1.3 Settings

Through the **Settings** menu, you can change the materials and their colors, edit general settings, set expert settings, or edit the material database.



The Settings menu:

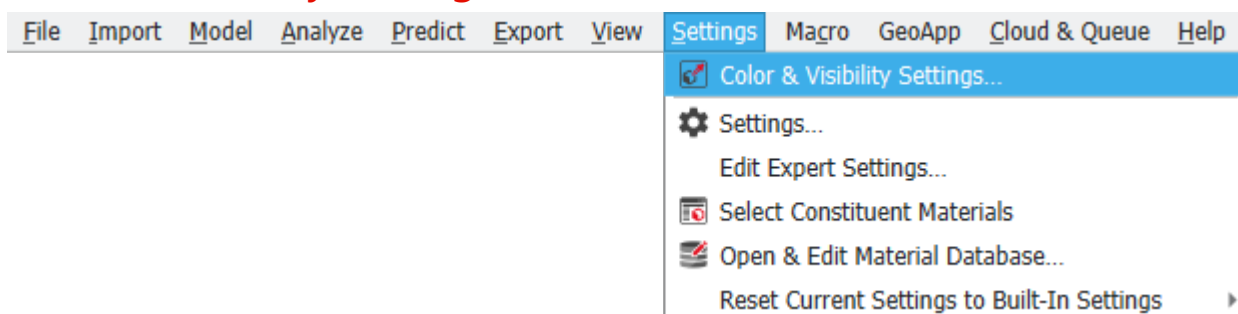
- [Color & Visibility Settings](#)^[23]
Change the colors and the visibility for the materials of your current structure.
- [Settings](#)^[23]
Edit general settings as font size, text editor, parallelization, statistics and job system options.
- [Expert Settings](#)^[35]
Edit expert settings to access additional but experimental features usually after consulting our support.
- [Select Constituent Materials](#)^[37]

The Settings menu:

For the current structure set the constituent materials.

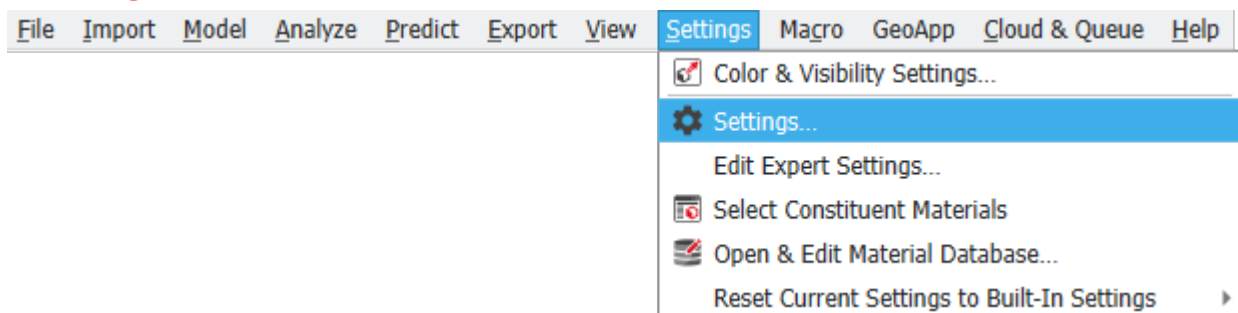
- [Open and Edit Material Data Base](#)^[38]
Edit materials in the database or add new ones.
- [Reset Current Settings to Built-In Settings](#)^[39]
Load the built-in settings of the different GeoDict editions.

Color & Visibility Settings



The **Settings** → **Color & Visibility Settings** from the menu bar opens the [Color & Visibility Settings tab](#)^[94] from the GUI Sidebar where you can define the color and visibility of the materials. Find detailed explanations in that topic.

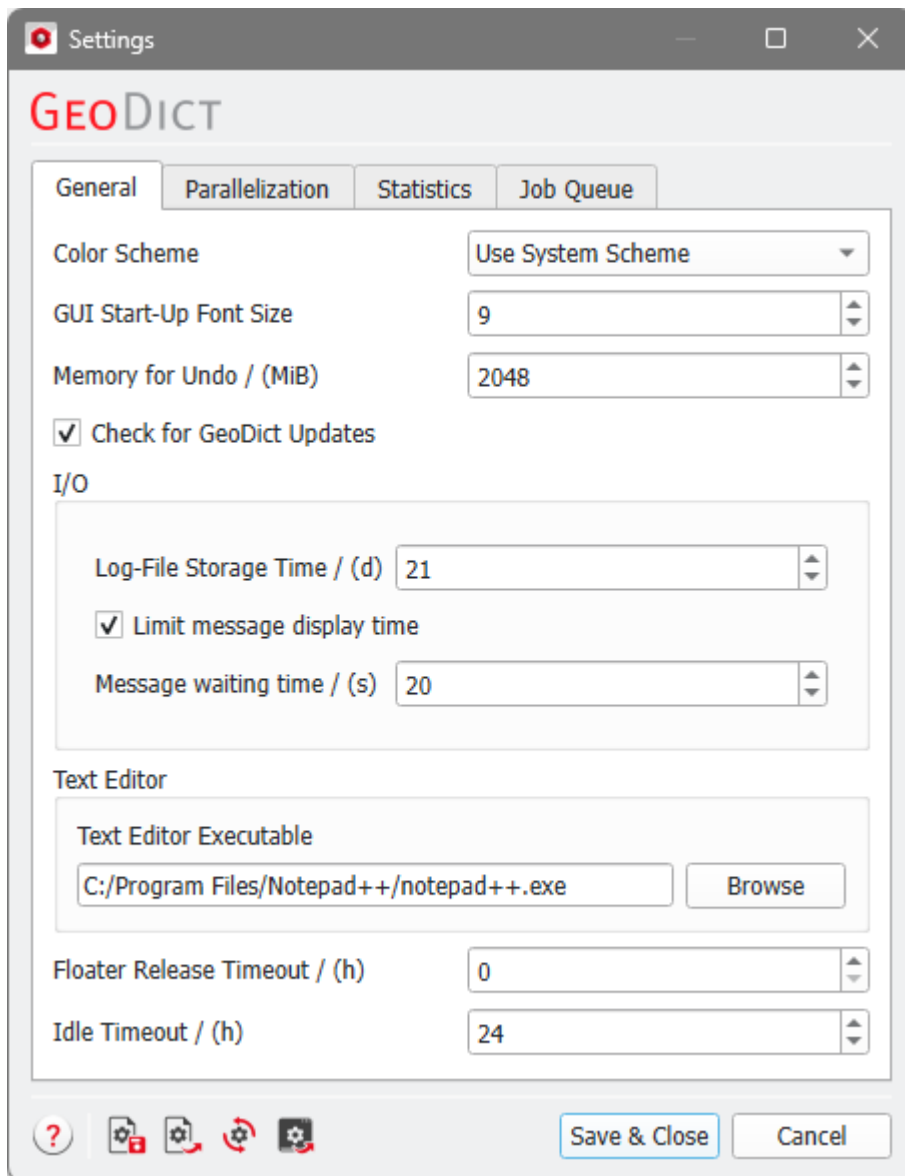
Settings



Selecting **Settings...** from the **Settings** menu opens the **Settings** dialog to modify the general preferences or properties when working with GeoDict. The dialog contains the **General**, **Parallelization**, **Statistics**, and **Job Queue** tabs. They contain a collection of overall settings that are applied to any GeoDict session.

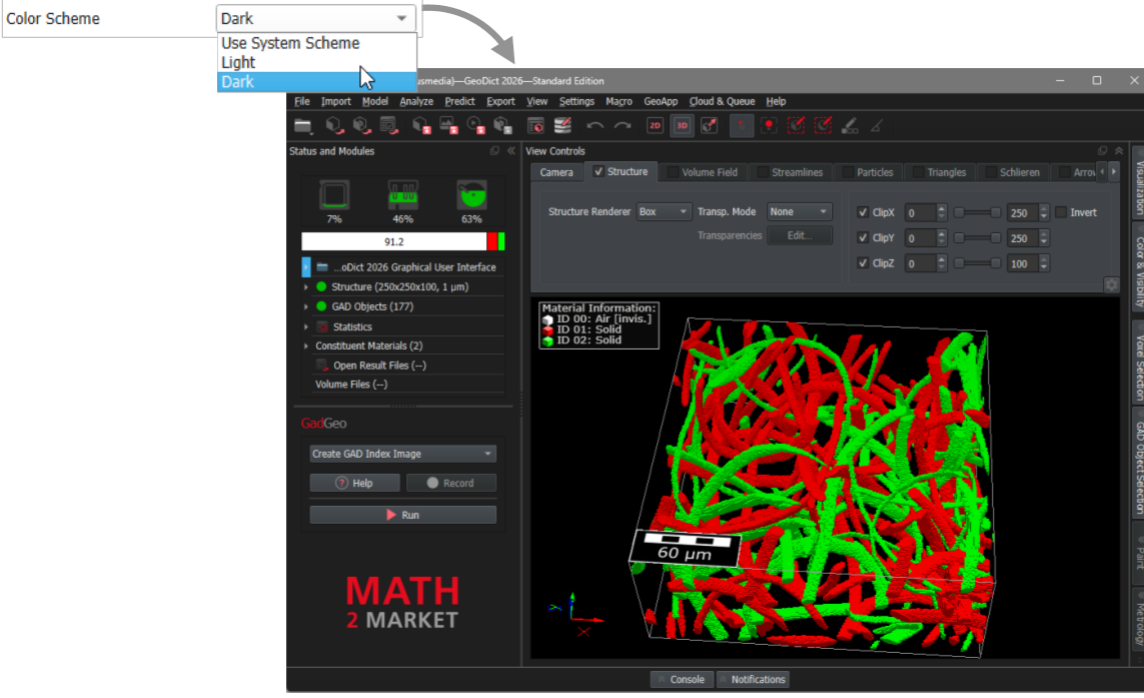
Clicking **Save & Close** at the bottom of the dialog results in carrying out the modifications and closing the dialog. Select **Cancel** to discard the modifications entered in the dialog.

General tab



✓ Color Scheme

The first option under the **General** tab allows to define the **Color Scheme** of GeoDict. You can explicitly set it to **Light** or **Dark** mode, or use the **System Scheme**, which you can select in the system settings.



! Important! The changes take effect after restarting GeoDict.

✓ GUI Start-Up Font Size

Control the size of the fonts used in the GUI when opening GeoDict (**GUI Start-Up Font Size**).

GUI Start-Up Font Size

For example, increasing the **GUI Start-Up Font Size** results in the display of a larger font overall in the GUI.

! Important! The changes take effect after restarting GeoDict.

✓ Memory for Undo

GeoDict automatically stores a copy of the previous structure, before applying any changes to it, until the **Memory for Undo** is filled up.

Memory for Undo / (MiB)

This allows to quickly undo any changes using the undo function in the [toolbar](#)⁴³



The disadvantage of keeping a copy of the last structure is that some runtime and hard disk space is required for saving the structures. Thus, it can be disabled by setting the **Memory for Undo** to 0 MiB.

✓ Check for GeoDict Updates

If **Check for GeoDict Updates** is checked, GeoDict will automatically search if updates are available (requires internet connection) and print a message if an update is found.

☒ Check for GeoDict Updates

GeoDict will not automatically download or install those updates.



Know how! Use the **Download Current GeoDict & GeoDict Tools** link in the [Help](#) to access our website.

✓ I/O (input/output) options

In the **I/O** (input/output) options panel, define how many days the log files should be kept. In the log files the events happening while running GeoDict are recorded, as well as debug outputs.



Note! The log files are important for support cases, e.g., if GeoDict crashes, since they contain important information. Send the log files together with a description what happened to support@math2market.de so we are able to find out the cause of the crash.

I/O

Log-File Storage Time / (d) 21

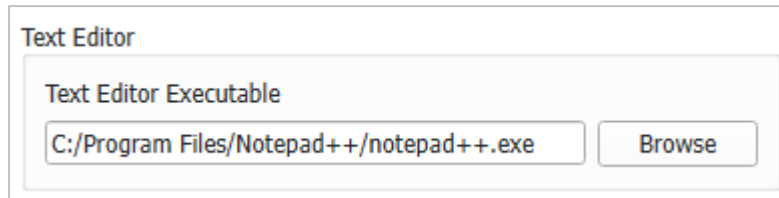
☒ Limit message display time

Message waiting time / (s) 20

Also, define whether the time a warning message is displayed should be limited, and the time of the limitation in seconds. After the entered time has passed, the message is closed automatically. If 0 is selected, pop-up messages are not shown at all. However, pop-up messages are collected in the [Notifications panel](#) at the bottom, except for messages that ask for the confirmation of your choice (e.g., when [Quitting](#) GeoDict).

✓ Text Editor

In the Text Editor panel, set which text editor will be opened automatically when editing macros and other editable files. Click **Browse** to search and set the path to the location where the executable for the favorite text editor is located.



Text Editor

Text Editor Executable

C:/Program Files/Notepad++/notepad++.exe

Browse

For a list of text editor recommendations refer to the [GeoPy Scripting](#) chapter.

✓ Timeout options

The last two options set the timeout options for floating license users only. Define after how many hours the **Floater Release Timeout** will be triggered. Then, all non-required floaters are freed and are available for other users. This is especially useful if many long-running computations are performed. The same behavior occurs when pressing the **Release Floaters** button in the progress bar during a simulation run.



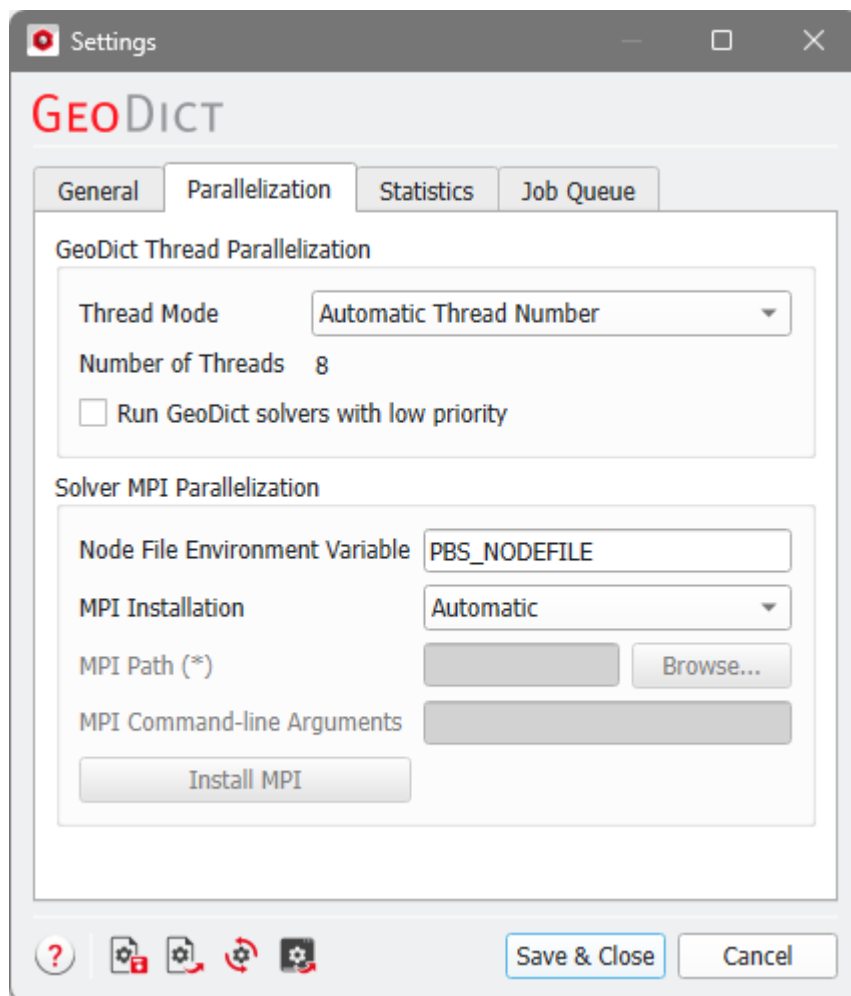
Floater Release Timeout / (h) 0

Idle Timeout / (h) 24

The **Idle Timeout** triggers if after the defined hours no computation or user interaction was made. Then, all floaters, including the GeoDict-Base floater, are freed and available for other users. It is possible to re-acquire the freed floaters when returning to the GeoDict application in the then opening dialog.

For both options, if 0 is entered as value, the corresponding option is disabled.

Parallelization tab



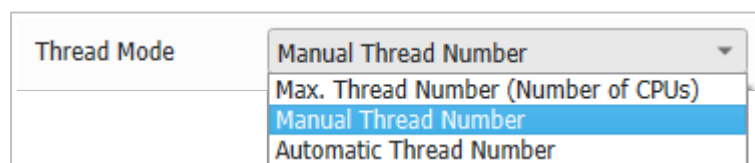
✓ GeoDict Thread Parallelization

In the **GeoDict Thread Parallelization** panel set the number of parallel processes (threads) GeoDict should use, e.g., for the visualization, for the image processing, and for the structure generation.



Important! This option does not influence the number of solver processes, which can be set for all GeoDict solvers in the corresponding modules independently.

It is possible to set the Thread Mode to **Max. Thread Number** which equals the **Number of CPUs** the machine has. When not all available CPUs of the computer should be used, for example to allow other users to work simultaneously on the same machine or to improve the performance of other programs, the number of used parallel processes can be limited by setting a **Manual Thread Number**.



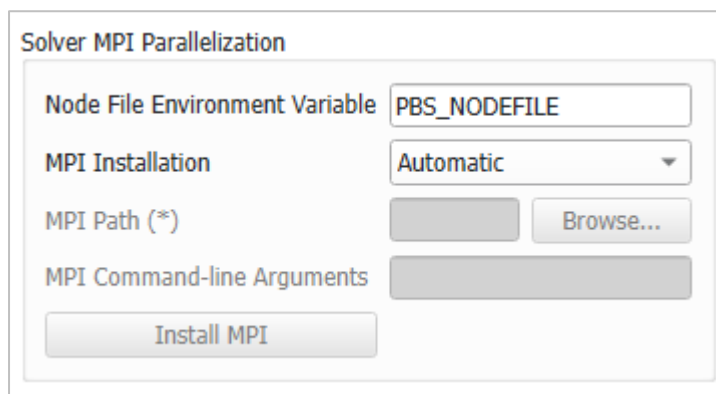
Choosing **Automatic Thread Number** uses the maximum number of cores, if up to eight cores are available. If more than eight cores are available, the maximum of eight and the number of available cores divided by two is used. For example, if the machine has 12 cores available, automatic thread number takes the maximum of 8 and $12/2=6$ which is 8.

Check **Run GeoDict solvers with low priority** to make the system more responsive when working interactively while a GeoDict solver (e.g., LIR or SimpleFFT) is running.

✓ Solver MPI Parallelization

For cluster computations, set the environment variable that holds the location of the node file, i.e., the file that contains the list of assigned compute nodes.

For MPI parallel computations, set the path to the **MPI Installation** that should be used for the parallelization. Select **Automatic** to look automatically for MPI installations.

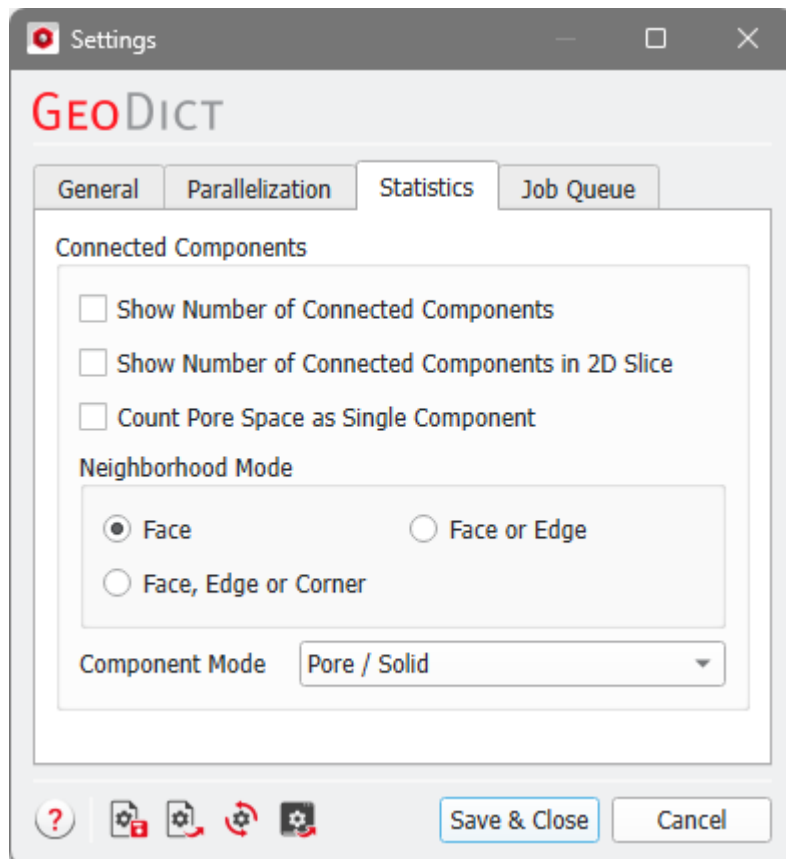


The screenshot shows a dialog box titled "Solver MPI Parallelization". It contains the following fields and controls:

- Node File Environment Variable:** A text box containing "PBS_NODEFILE".
- MPI Installation:** A dropdown menu with "Automatic" selected.
- MPI Path (*):** A text box followed by a "Browse..." button.
- MPI Command-line Arguments:** A text box.
- Install MPI:** A button at the bottom left.

For more information, refer to the [High Performance Computing](#) chapter.

Statistics tab



✓ Connected Components

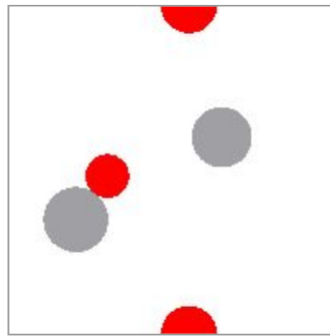
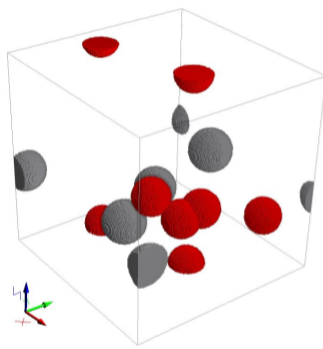
A connected component is defined as a complete set of connected voxels with respect to the chosen neighborhood mode and component mode.

Checking **Show Number of Connected Components** or **Show Number of Connected Components in 2D Slice**, and clicking **OK**, adds the number of **Components** to the [Statistics](#)⁵³ section in the [Status](#)⁴⁵ section.

If the pore space is divided by the structure into several parts, it can be counted as one connected component with **Count Pore Space as Single Component** checked. The pore space does not count as an object and does not add to the number of **Objects**.

As an example, a simple periodic structure model containing 10 spheres is shown. At the corners, it is the same gray sphere that disappears and reappears on the other side. Two red spheres are also cut in half. They disappear and reappear in Z-direction. Three of the red spheres overlap and one of the red spheres touches a gray sphere.

The number of **GAD Objects** in 3D is 10, but the number of **GAD Objects** in the shown 2D slice (Slice 126 in X-direction) is only 4 (2 gray and 2 red spheres. The pore space is not counted as object.



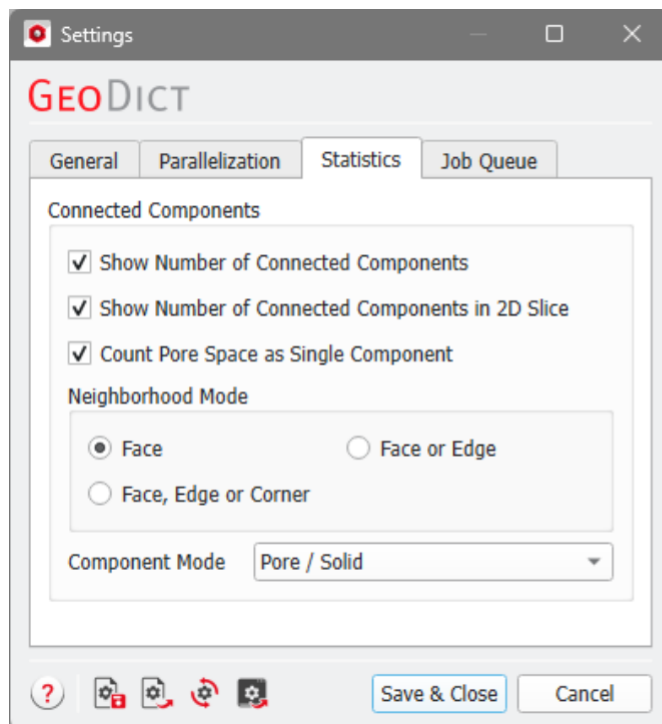
Statistics
2D
GAD Objects : 4
Material IDs
Materials
3D
GAD Objects : 10
Material IDs
Materials

Now, see how the connected components in 3D and 2D are counted when checking **Show number of Connected Components** and **Show Number of Connected Components in 2D Slice**.

Neighborhood Mode and **Component Mode** define criteria for the connectivity of the components and are explained below. For this example, we choose **Face** as Neighborhood Mode, which means that two voxels are connected if they share a voxel face. As Component Mode we choose **Pore / Solid**, so that solid voxels can form a component independent of their Material ID.

The number of Objects 3D and 2D are the same as before. Connected components in the 2D slice shown above are 4 (1 gray sphere + 1 red sphere + 1 [1 red sphere+1 gray sphere] component + 1 pore space).

Connected components in 3D are 8 (3 gray spheres + 3 red spheres + 1 [3 red spheres+1 gray sphere] component + pore space).



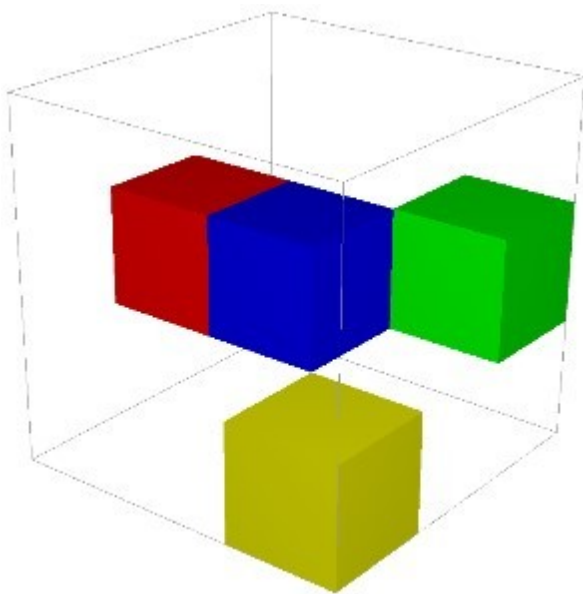
Statistics
2D
GAD Objects : 4
Components : 4
Material IDs
Materials
3D
GAD Objects : 10
Components : 8
Material IDs
Materials

The example structure shown is periodic, thus, objects that end on one side of the domain and reappear on the opposite side are counted as being the same connected component. Periodicity of the domain is saved in the structure file and can be edited through **GadGeo** → **Edit Domain** (see the [GadGeo](#) chapter for more information). This might change the number of components, e.g., if GAD objects lie outside of the domain that is non-periodic. When changing to a periodic domain the objects are then placed inside the domain and counted for the number of components.

✓ Neighborhood Mode

The **Neighborhood Mode** defines if two voxels are connected (and belong, depending on the component mode, to the same connected component) or not.

The different **Neighborhood Modes** are explained using this example.



Two voxels can be connected through faces, edges, and vertices (corners). Voxels that share a face, do also share edges and corners, as you can observe for the **red** and the **blue** voxel. The **blue** and the **green** voxel share an edge and the corner points of this edge. Finally, the **blue** and the **yellow** voxel share only one vertex (corner point).

Thus, checking **Face** is more restrictive than choosing **Face or Edge**, and this is more limiting than selecting **Face, Edge, or Vertex**.

When choosing the Neighborhood Mode **Face** only the **red** and the **blue** voxel are connected.

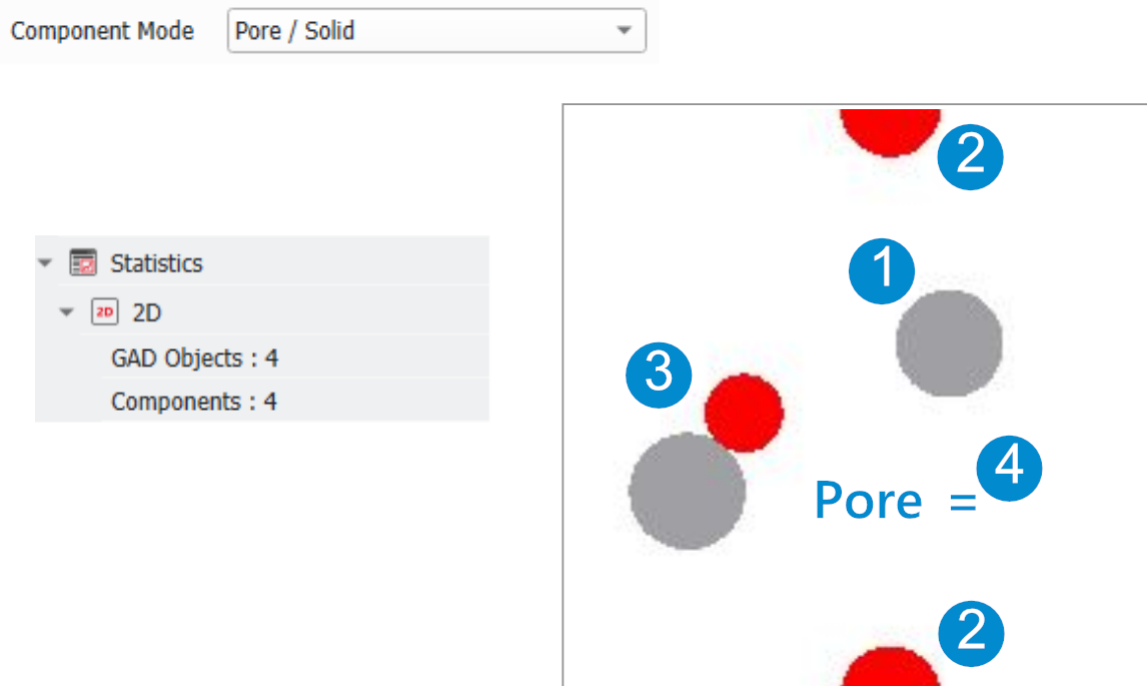
When choosing **Face or Edge** the **red** and the **blue** voxel and the **blue** and the **green** voxel are connected.

Finally, if **Face, Edge, or Vertex** is chosen, the **red** and the **blue** voxel, the **blue** and the **green** voxel and the **blue** and the **yellow** voxel are connected.

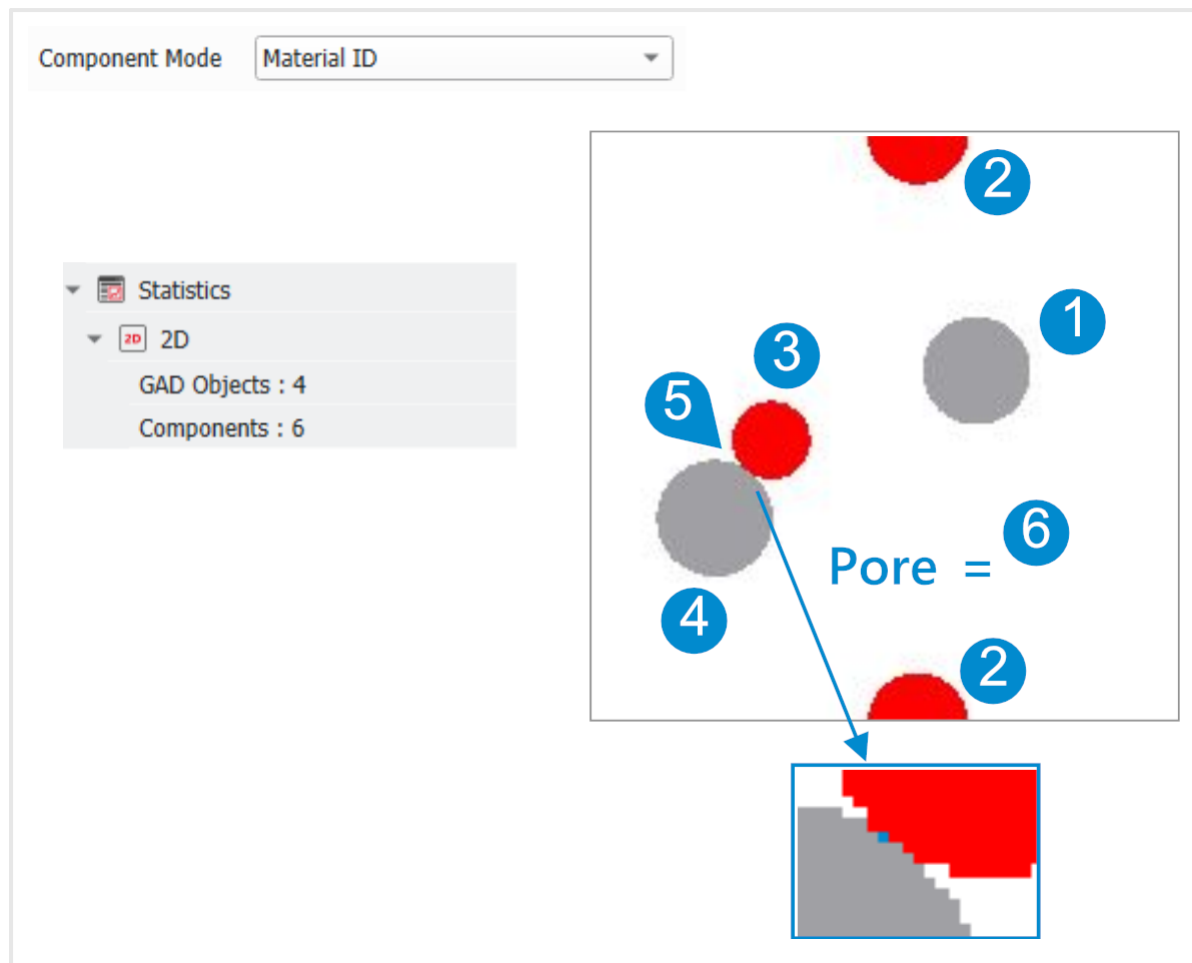
✓ Component Mode

For structures with more than one material, selecting **Pore / Solid** from the **Component Mode** pull-down menu determines whether the components are considered connected or not, based on being (empty) pore voxels (background) or solid voxels (structure), regardless of their Material ID. When selecting **Material ID**, it is the Material ID of the voxels that determines whether the components are considered connected or unconnected. In the following examples, the neighborhood mode is set to face.

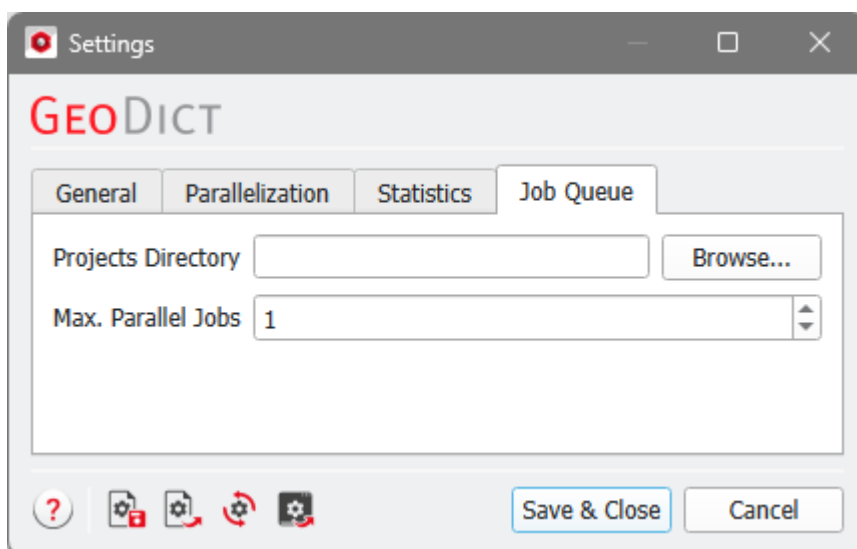
- Setting the component mode to **Pore / Solid** in this example results in 4 connected components in 2D, as there are #1 (sphere), #2 (half red sphere top + half red sphere bottom), #3 (2 spheres touching), and #4 pore.



- Setting the component mode to **Material ID** leads to 6 connected components 2D, as there are #1 (gray sphere), #2 (half red sphere top + half red sphere bottom), #3 (red sphere), #4 (gray sphere), #5 (1 blue overlapping voxel), and #6 pore.



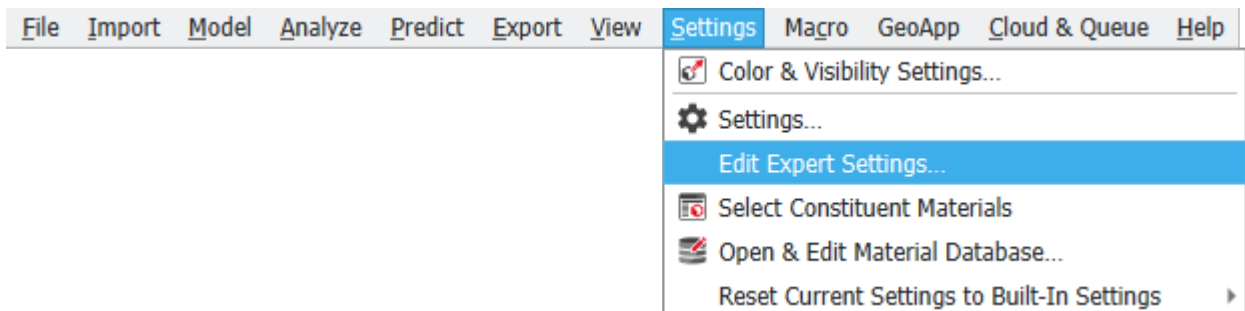
Job Queue tab



Browse for a **Projects Directory** to save the results of Job system runs and set the number of **Max. Parallel Jobs**.

Find out more about the Job Queue settings here in the Job Queue chapter.

Expert Settings

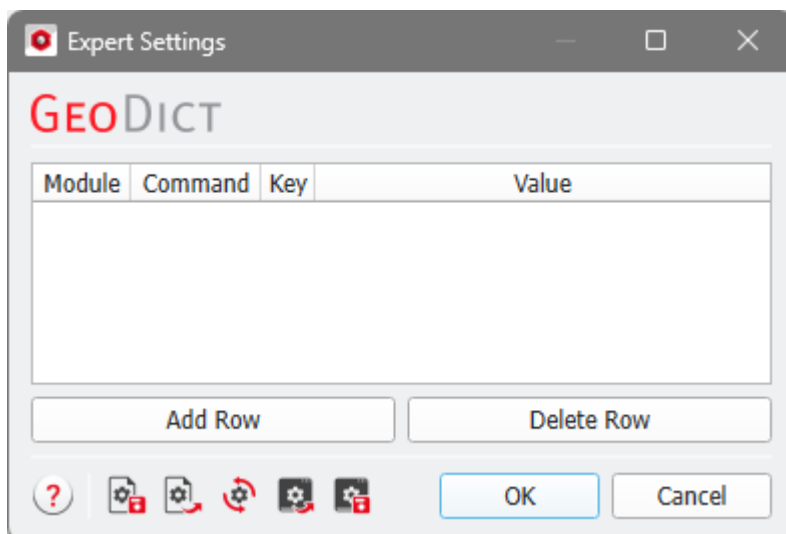


For many commands available in the GeoDict modules, additional parameters exist that are not available through the dialogs that open in the corresponding modules. These parameters are also not stored in the parameter lists of those commands inside the python macros. By default, no expert settings are set, and well-chosen default values are used.

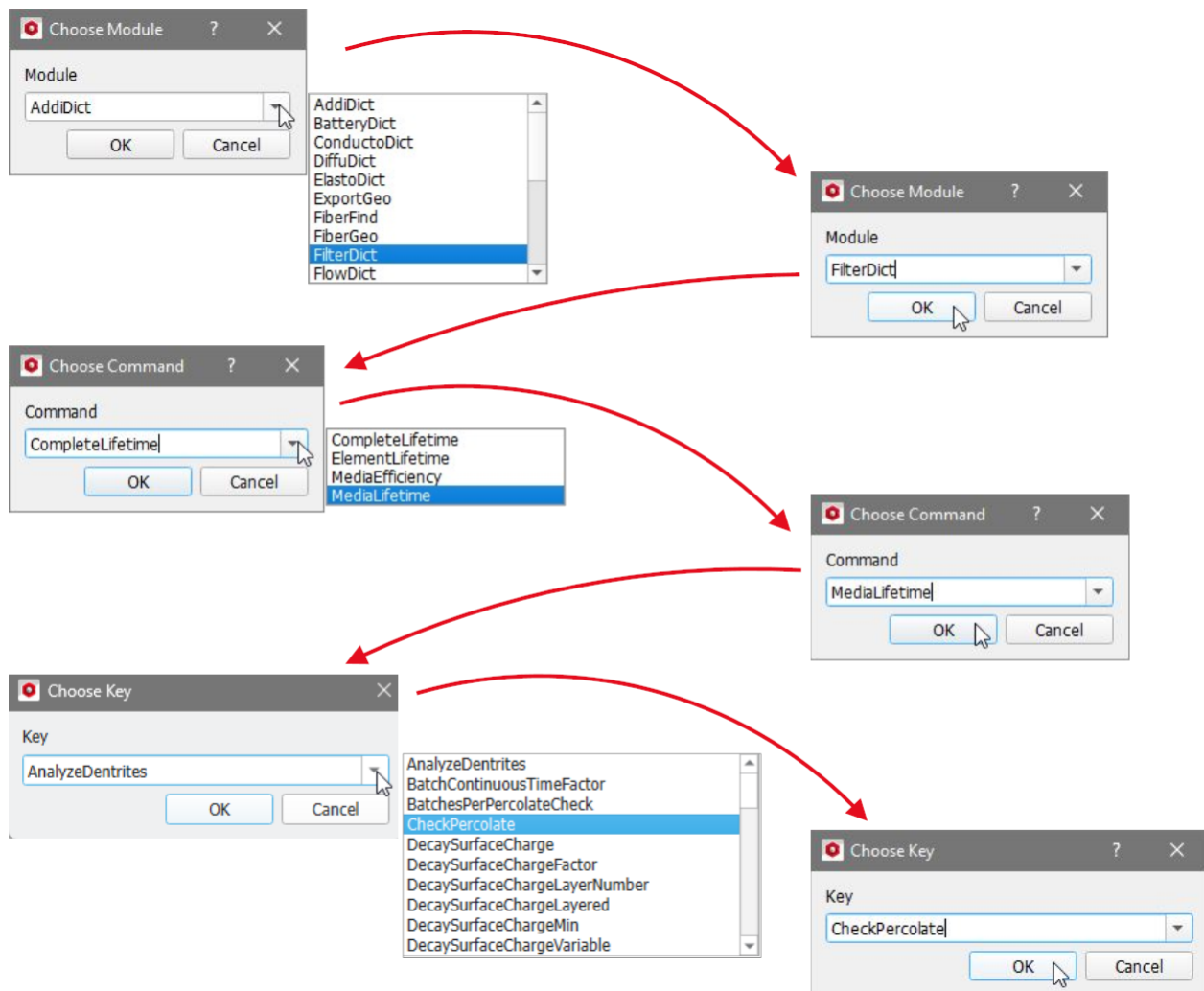
Some expert settings allow to access experimental or unstable features. Others allow to access solver variants that are only useful in very special circumstances.



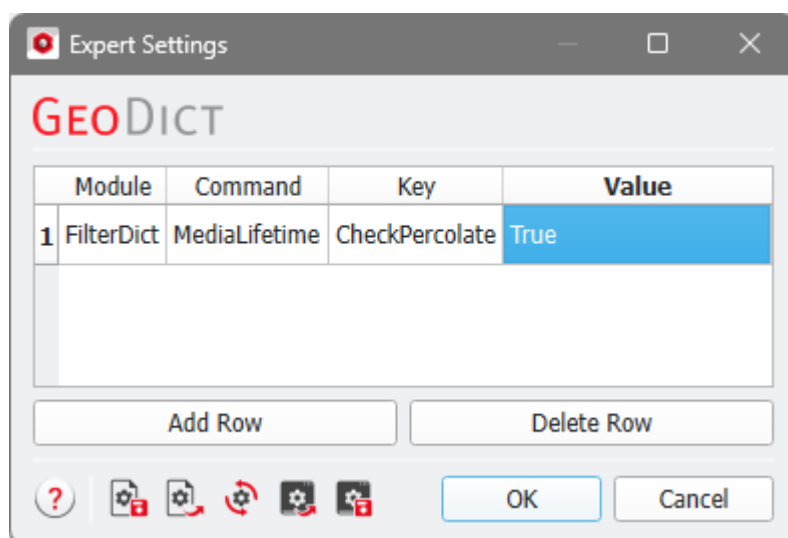
Important! In general, you should consult the Math2Market support team (support@math2market.de) before making any changes to the expert settings.



To activate an expert setting, click **Add Row** to sequentially select the **Module**, the **Command**, and the **Key** that define the expert setting that should be edited. Afterwards, enter a **Value** for the chosen key, often **True** or **False**, but it can also be a number.



The choices of module, command, and key are entered as columns into the first row. Click the cell under **Value** and manually enter the value for the chosen key.

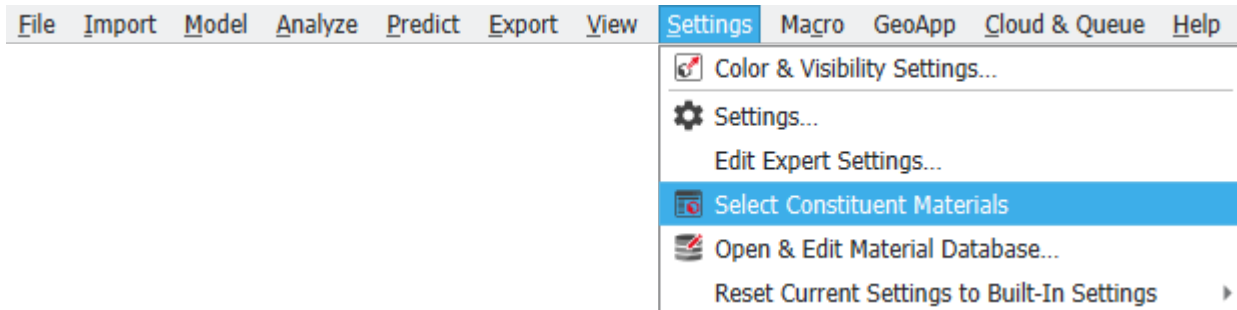


Select any cell of a row and click **Delete Row** to delete the whole entry from the list.

Clicking **OK** at the bottom of the dialog results in carrying out the modifications and closing the dialog.

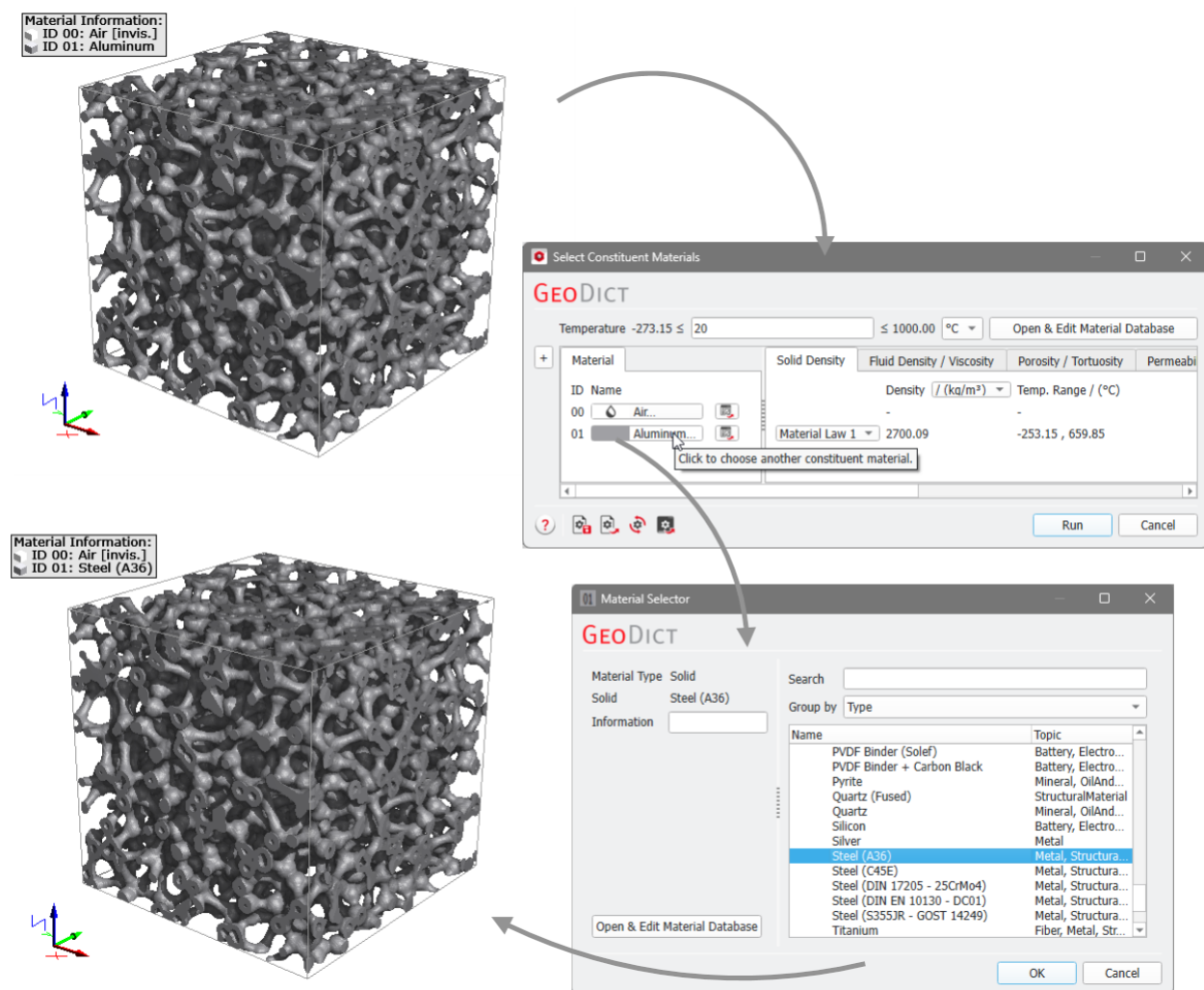
Select **Cancel** to discard the modifications entered in the dialog.

Select Constituent Materials



The materials assigned to the Material IDs in a structure model are called **Constituent Materials**. Materials are defined in the **Material Database**, where the name and different physical properties of the materials are saved.

With a structure model in memory, showing in the Visualization area, select **Settings** → **Select Constituent Materials** to change the raw material of a Material ID or assign a material to a Material ID with undefined material in a structure model. For example, in the foam structure shown below, the Material ID 01, initially defined as Aluminum, is changed to be made of Steel as follows:

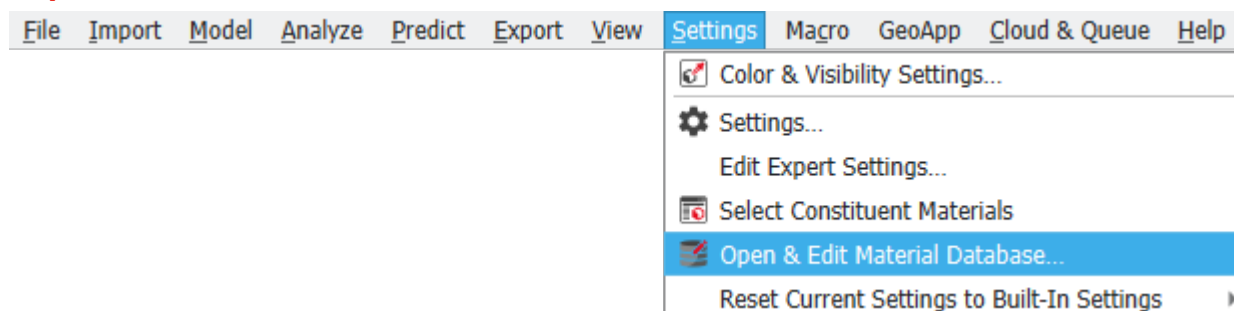


After the new material is selected, close the **Material Selector** dialog by clicking **OK** and click **Run** in the **Select Constituent Materials** dialog.

Observe in the Material legend how the constituent material of Material ID 01 has changed from Aluminum to Steel.

For more information on GeoDict materials refer to the [Material Database](#) chapter.

Open and Edit Material Data Base

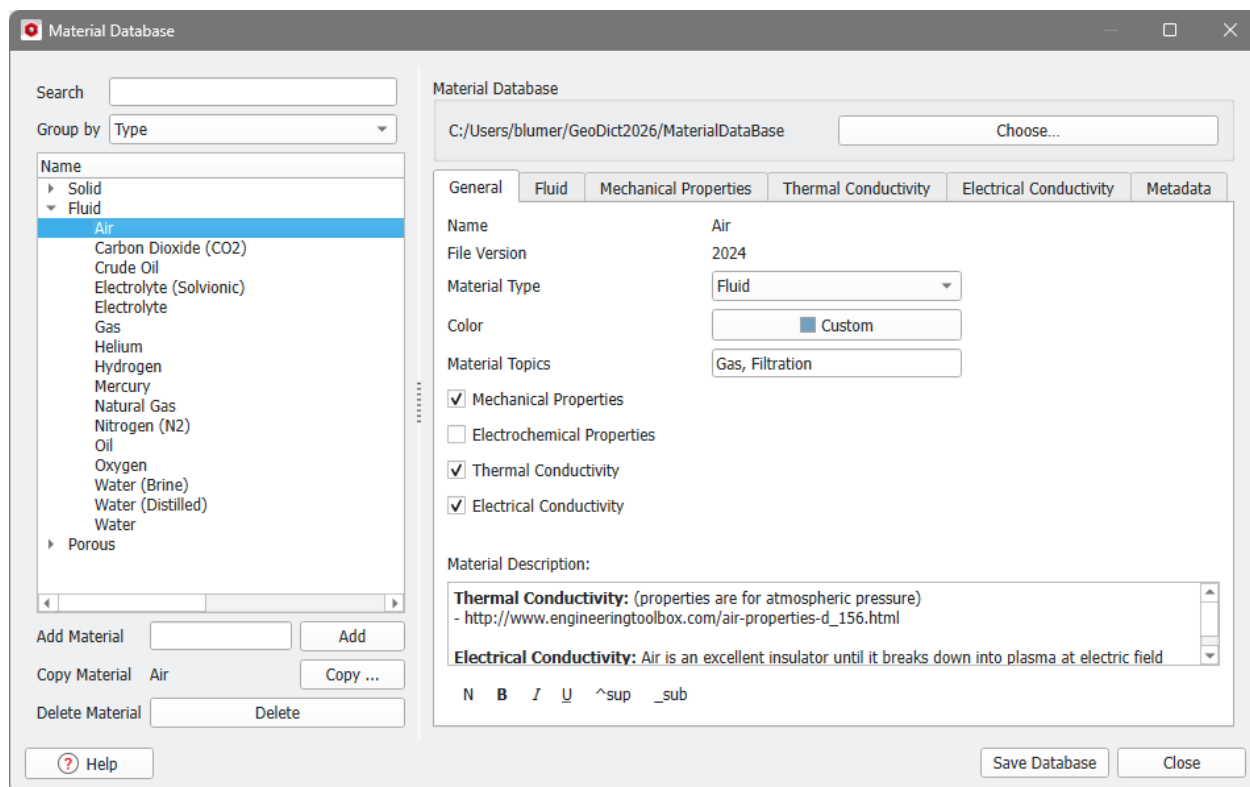


In GeoDict, constituent materials (and their physical properties) are **globally assigned to a structure** and not just to a property predictor simulation.

The **GeoDict Material Database** is a catalog of the constituent materials that can be assigned to correctly identify digital materials in the structure models with properties of real materials.

You can access and edit the GeoDict Material Database from many modules or select **Settings** → **Open & Edit Material Database...** to directly access the database from the menu bar.

User-defined materials can be added to expand the GeoDict Material Database, or further properties can be listed for a material already included in the database. This is described in detail in the [Material Database](#) chapter.

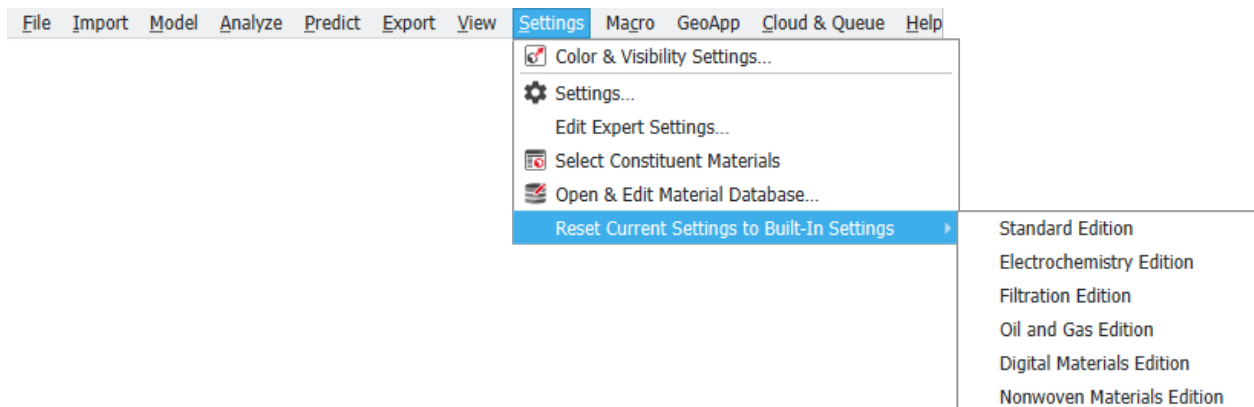


Each material in the database, together with its properties and description, is saved as a text-file with the name of the material. You can edit these files in any text editor.

The default GeoDict Material Database is located at: `c:\Program Files\Math2Market GmbH\GeoDict 2026\MaterialDataBase`.

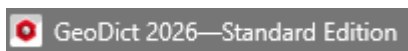
Reset Current Settings to Built-In Settings

With **Reset Current Settings to Built-In Settings** the built-in settings for a specific GeoDict Edition can be reloaded.



This is similar to the  button in the options tabs but changing it here affects the settings in all GeoDict commands.

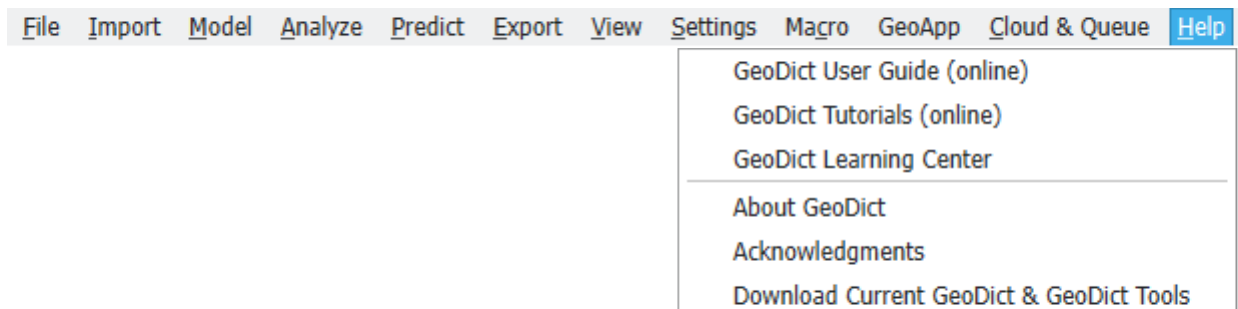
Furthermore, the built-in settings from another edition than the currently activated edition can be loaded. The current edition, with which the license is connected, can be found in the window title of the title bar.



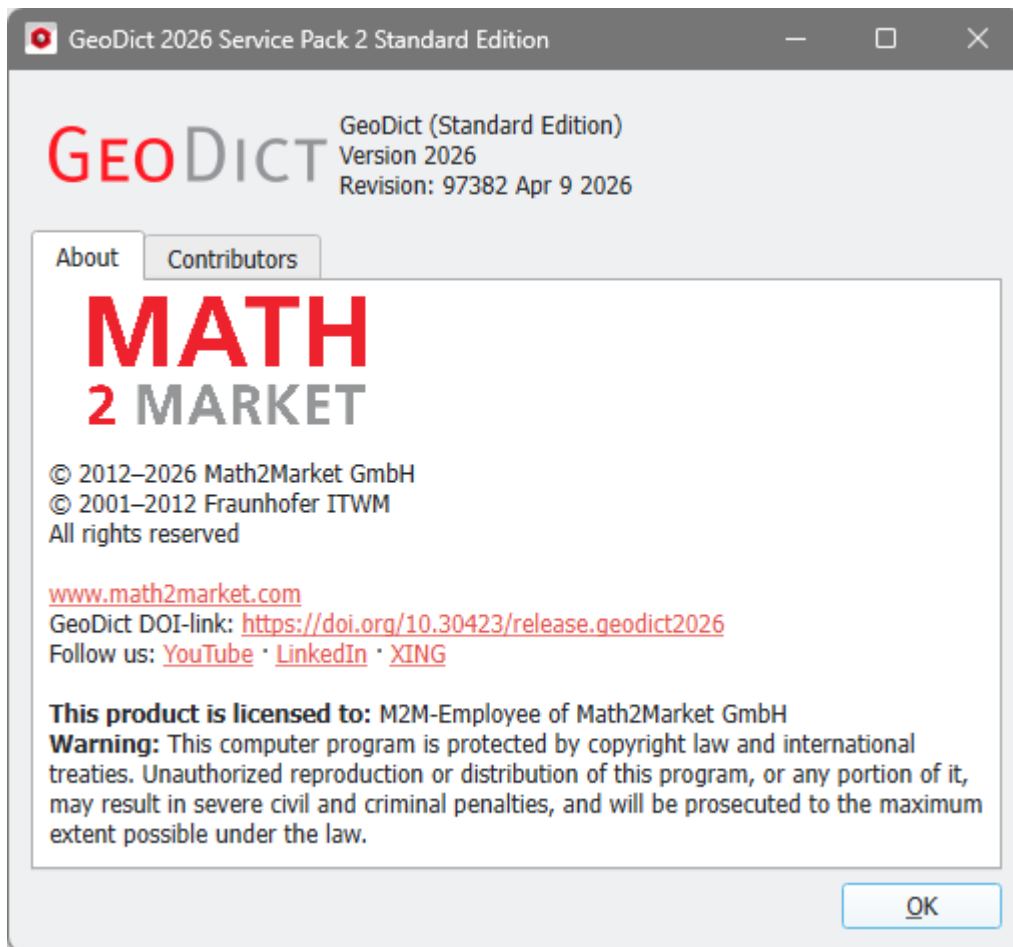
1.1.4 Help

In the Help menu, you can access the GeoDict User Guide and information about the current GeoDict version.

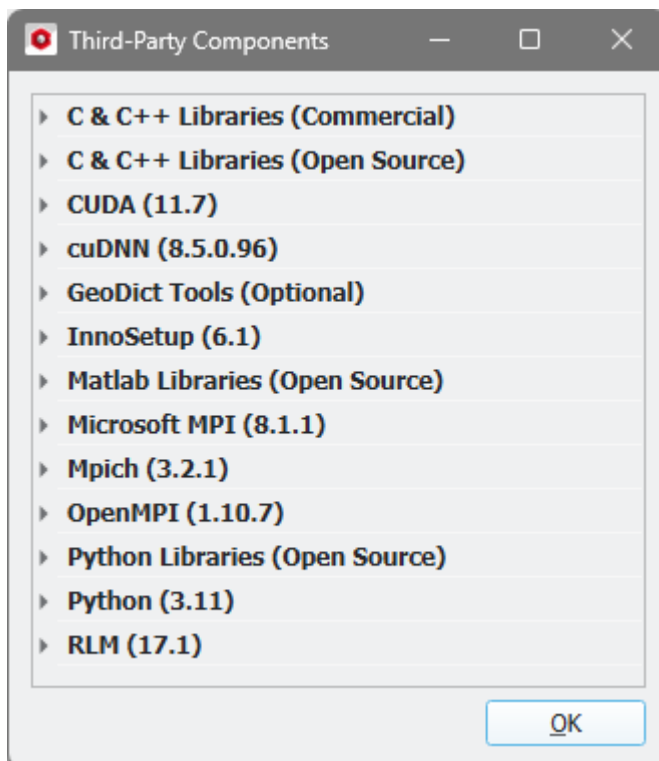
The first three entries in the Help menu link directly to the User Guide, the Tutorials, and the [GeoDict Learning Center](#) on the GeoDict web page.



Clicking **About GeoDict** opens a window giving information on the GeoDict version, revision number, and licensing.



We also **acknowledge** the third-party components used in GeoDict.



You can also **Download Current GeoDict & GeoDict Tools**, e.g., the latest service pack, from our [website](#).

1.2 Toolbar

The Toolbar displays shortcuts for selected functions, mostly included in the Menu bar, which are frequently used in GeoDict. Resting the mouse pointer over a tool for a moment prompts a tool tip explaining the function.

	Choose Project Folder  13
	Open Structure (*.gdt, *.gad)...  7
	Load Volume File...  9
	Open Results (*.gdr)...  7
	Save Structure as...  14
	Save Image as...
	Save Video as...
	Save Volume File as...  17
	Select Constituent Materials  37
	Open & Edit Material Database  38
	Undo changes to the geometry (Ctrl+Z)
	Redo changes to the geometry (Ctrl+Shift+Z)
	2D Cross Section
	3D Rendering
	Color & Visibility Settings

	Use mouse for navigation
	Left mouse button: rotate
	Middle mouse button: pan
	Right mouse button: zoom
	Use left mouse button to change light position.

[Select voxels](#)^[101]

-  Left mouse click: select single voxel
- Shift + left mouse click: add voxel to selection
- CTRL + left mouse click: toggle voxel selection

[Select GAD objects](#)^[109]

-  Left mouse click: select single object
- Shift + left mouse click: add object to selection
- CTRL + left mouse click: toggle object selection

-  Use left mouse button to [paint](#)^[113] into the current structure.

[Measure](#)^[124] distances and angles.

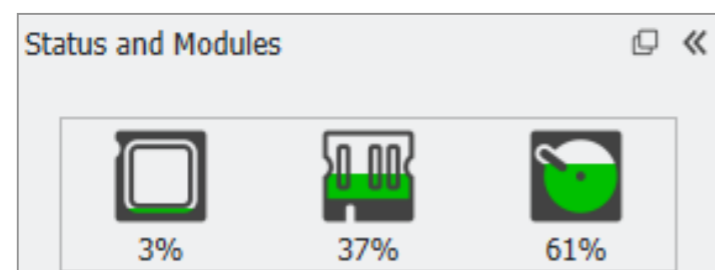
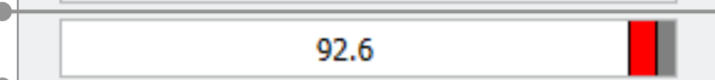
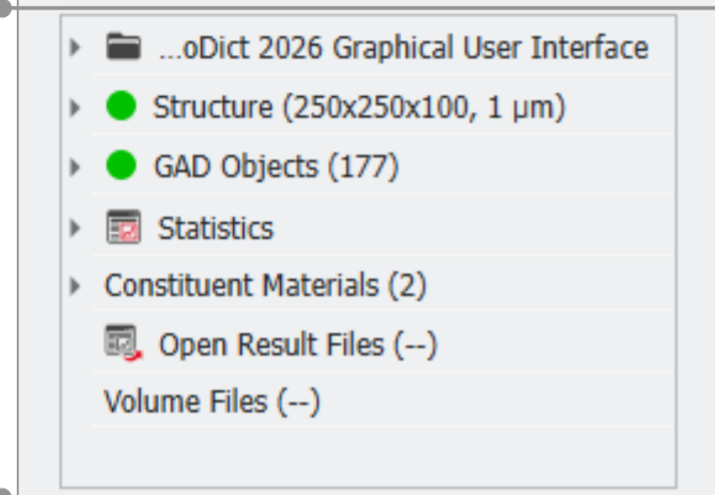
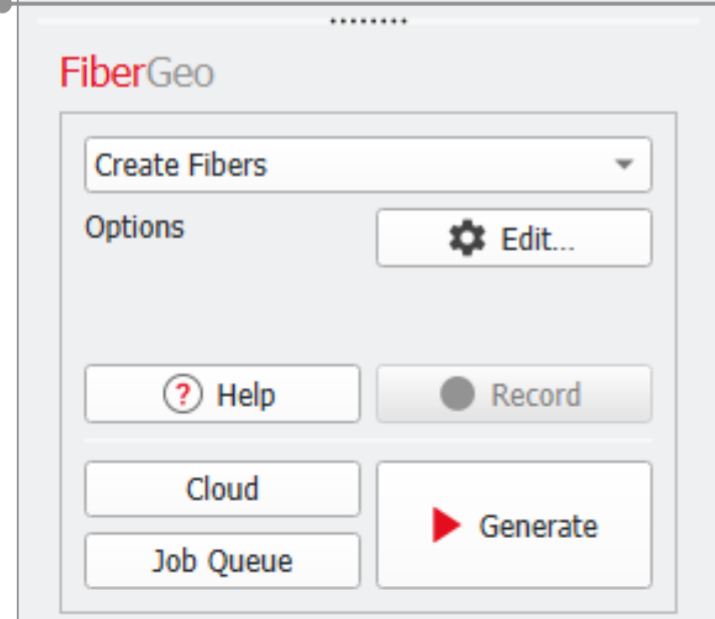
-  Left mouse click: place start and end points for measurements
- Right mouse click: abort placement of new measurement

The selecting and editing functionality of Voxel Selection, GAD Object Selection, Paint and Metrology are part of the [GUI Sidebar](#)^[90].

1.3 Status Section

Hardware status, project status, and module section

The **Status and Modules** section is divided into the **hardware status** section, the **statistics** section, the **project status** section, and the **module** section. It can be collapsed by clicking on the  icon or expanded in a new window by clicking on the  icon.

	Hardware status section
	Statistics section
	Project status section
	Module section

The Status Section:

- [Hardware Status Section](#)^[47]
Observe the current hardware status of your computer.
- [Statistics Section](#)^[47]
Get an impression of the distribution of Material IDs in your structure.
- [Project Status Section](#)^[48]

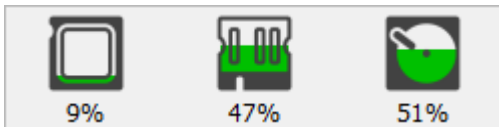
The Status Section:

Find many helpful information, shortcuts, and additional options.

- [Module Section](#)
Edit parameters and start GeoDict computations.

1.3.1 Hardware Status Section

At the top of the status and modules section, the hardware status is shown. The icons are described in order of their appearance from left to right.



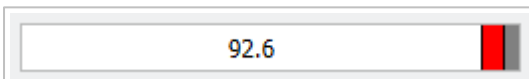
First, the current **CPU** load is displayed.

The second icon shows the currently used **RAM**. Both refer to all processes running on the computer, not only to GeoDict.

Finally, the percentage of **Disk Space** occupied on the hard drive, where the project folder is located, is given.

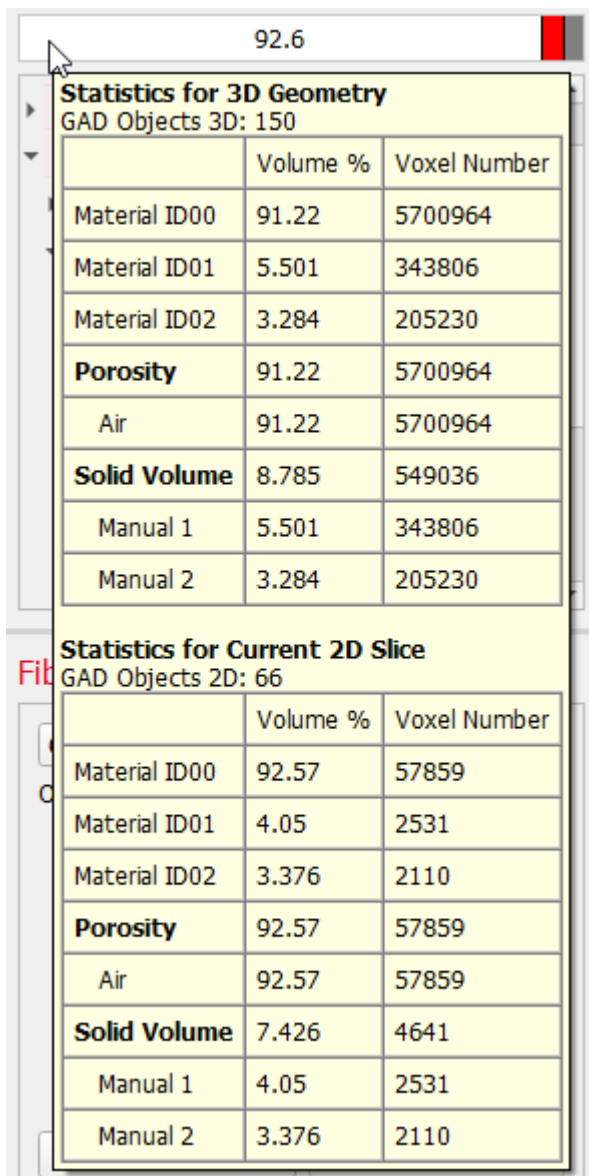
1.3.2 Statistics Section

The **Status Section** provides a quick overview of the distribution of Material IDs in the structure.



In the **3D Rendering** mode (View → 3D Rendering) the statistic for the whole structure is shown, whereas in **2D Cross Section** mode (View → 2D Cross Section) the statistic for the currently shown slice is displayed.

When hovering above the section, the tooltip shows a more detailed statistic, in 2D view mode for the 3D Geometry and the current 2D slice, in 3D view mode only statistics for the 3D Geometry are shown.

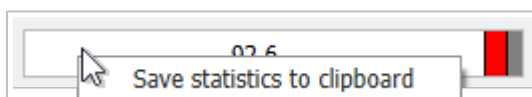


Statistics for 3D Geometry		
GAD Objects 3D: 150		
	Volume %	Voxel Number
Material ID00	91.22	5700964
Material ID01	5.501	343806
Material ID02	3.284	205230
Porosity	91.22	5700964
Air	91.22	5700964
Solid Volume	8.785	549036
Manual 1	5.501	343806
Manual 2	3.284	205230

Statistics for Current 2D Slice		
GAD Objects 2D: 66		
	Volume %	Voxel Number
Material ID00	92.57	57859
Material ID01	4.05	2531
Material ID02	3.376	2110
Porosity	92.57	57859
Air	92.57	57859
Solid Volume	7.426	4641
Manual 1	4.05	2531
Manual 2	3.376	2110

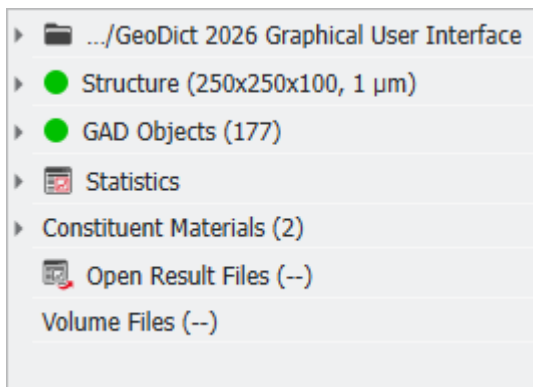
The same statistics are also displayed in the [Statistics section](#)^[53] of the Project Status Section.

With a right-click on the Statistics Section, you can **Save statistics to clipboard**, which will be done as tab separated list (in HTML format before GeoDict 2026 Service Pack 3).



1.3.3 Project Status Section

In the **Project Status** section, several information about the current project and the loaded files is shown. Sections can be expanded by clicking on the small triangle on the left or double clicking on it. Most of the sections offer an additional menu when performing a right-click on it. Often, these are shortcuts to commands that are available in the [menu bar](#)^[5] or are part of the GeoDict Base module.

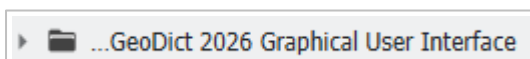


The Project Status Section:

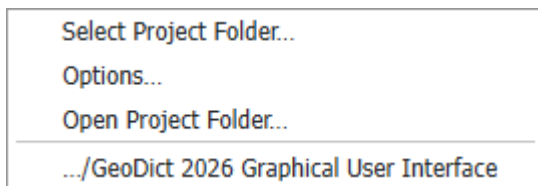
- [Current Project Folder](#)⁴⁹
Define the current project folder.
- [Structure](#)⁵⁰
View structure information and edit the current structure.
- [GAD Objects](#)⁵¹
View the GAD Objects information and edit GAD objects.
- [Statistics](#)⁵³
Observe the statistics of your current structure.
- [Surface Triangulation](#)⁵⁴
View the surface triangulation information.
- [Constituent Materials](#)⁵⁵
View and edit the constituent materials.
- [Open Result Files](#)⁶⁰
View the open result files.
- [Volume Files](#)⁶¹
Observe and edit the loaded volume files.
- [Particles](#)⁸¹
Observe and edit the loaded particles.

Current Project Folder

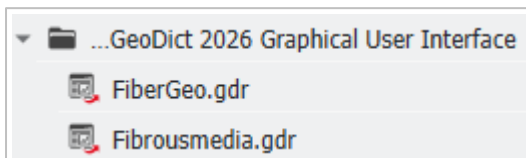
In the first section of the **Project Status Section** you can observe and change the **Current Project Folder**.



A right-click on the **Current Project Folder** row opens a menu used as shortcut for [Choose Project Folder](#)¹³.



Expanding the section lists all GeoDict Result files (*.gdr) which are stored in the project folder. Double clicking on a file name opens it directly in the Result Viewer.

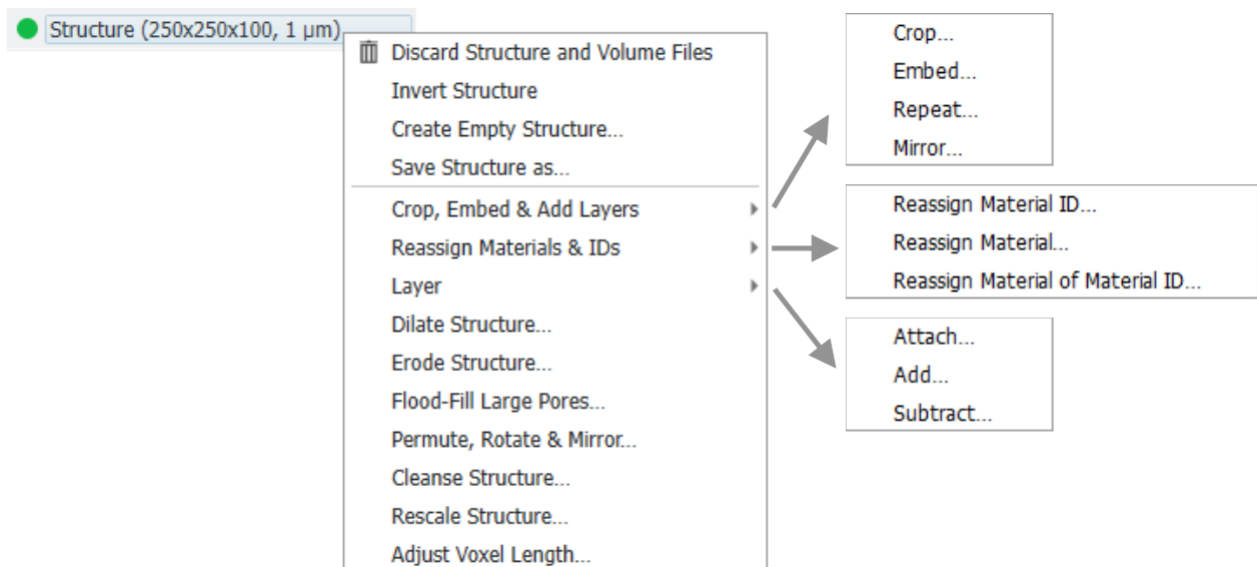


Structure

In the **Structure Section** you can view structure information and edit the current structure.

The color dot in front of **Structure** shows whether any voxelized structure is loaded into GeoDict (green dot), or not (red dot).

Right-clicking on the **Structure** row opens a menu used as a shortcut to apply modifications to the microstructure.

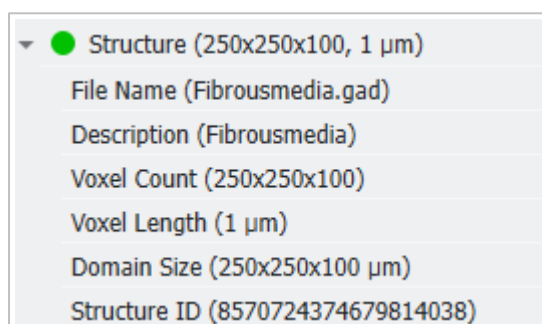


The commands in this menu are shortcuts to several functions included under the **File** menu in the menu bar, in the ProcessGeo module (**Model** → **ProcessGeo**), or in the LayerGeo module (**Model** → **LayerGeo**):

- [Discard Structure and Volume Files](#)^[17]
- Invert Structure
- Create Empty Structure
- [Save Structure as](#)^[14]
- Crop, Embed, Repeat, Mirror

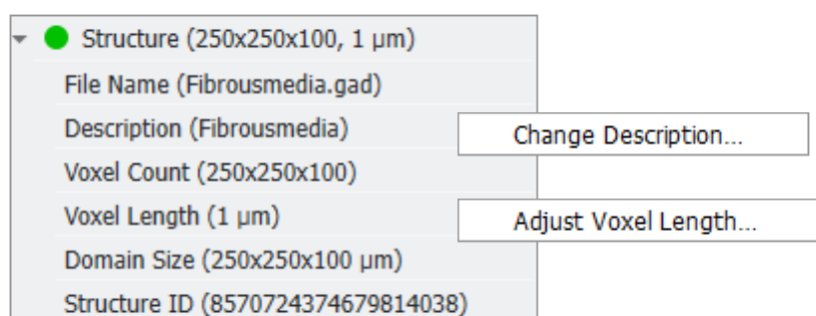
- Reassign Material ID, Reassign Material, Reassign Material of Material ID
- Attach, Add, Subtract
- Dilate Structure
- Erode Structure
- Flood-Fill Large Pores
- Permute, Rotate & Mirror
- Cleanse Structure
- Rescale Structure
- Adjust Voxel Length

Unfolding the status section shows information on the loaded structure model, such as **File Name**, **Description**, **Voxel Count**, **Voxel Length**, **Domain Size**, and the internally hashed **Structure ID** number. A structure generated in GeoDict (e.g., with FiberGeo) with the same parameters and the same random seed always has the same **Structure ID** number. Thus, structures are identified by the Structure ID. The Structure ID changes as soon as the structure is modified in any way.



By right-clicking on **Description** you can **Change the Description** of the structure.

The **Adjust Voxel Length** command can be accessed by right-clicking on **Voxel Length**, where the current voxel length is shown in the selected units (m, mm, µm, nm, Inch).



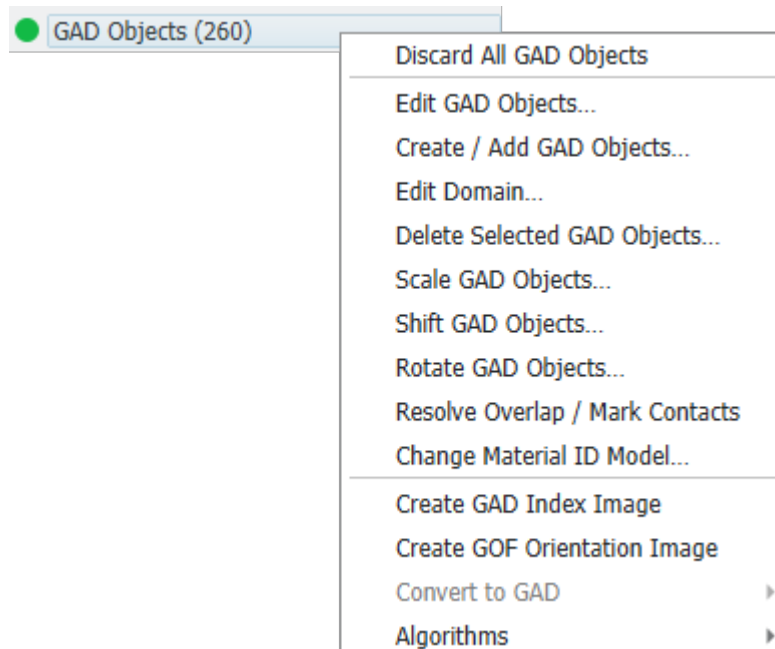
GAD Objects

In the GAD Objects Section you can view the GAD Object number and edit GAD objects.

The color dot in front of **GAD Objects** shows whether analytical information about the objects inside of the current structure is available (green dot), or not (red dot). The dot is yellow when

GAD information is available, but this information does not describe the current voxelized structure completely. This may happen, e.g., when the structure has been modified after the generation (e.g., with ProcessGeo or LayerGeo).

Unfolding the section shows the number of GAD objects (such as fibers, grains, etc.) in the structure (**GAD Object Number**).



Right-clicking on **GAD Objects** opens a list of possible modifications, like editing the GAD objects or the domain, creating, adding, deleting, scaling, shifting, and rotating GAD objects, resolve overlap and mark contacts, change the Material ID model, or to create a GAD index image or an orientation image. By choosing **Algorithms**, all manipulations of analytic objects, available in the section **Algorithms** of **GadGeo** can be accessed.

All of these modifications can be accessed also from the module GadGeo and are explained in the GadGeo chapter:

- **Discard All GAD Objects** is only available here and will discard only the GAD information. The voxel information is not deleted.
- Edit GAD Objects
- Create / Add GAD Objects
- Edit Domain
- Delete Selected GAD Objects
- Scale GAD Objects
- Shift GAD Objects
- Rotate GAD Objects
- Resolve Overlap / Mark Contacts
- Change Material ID Model

- Create GAD Index Image
- Create GOF Orientation Image
- Convert to GAD
- Algorithms

Statistics

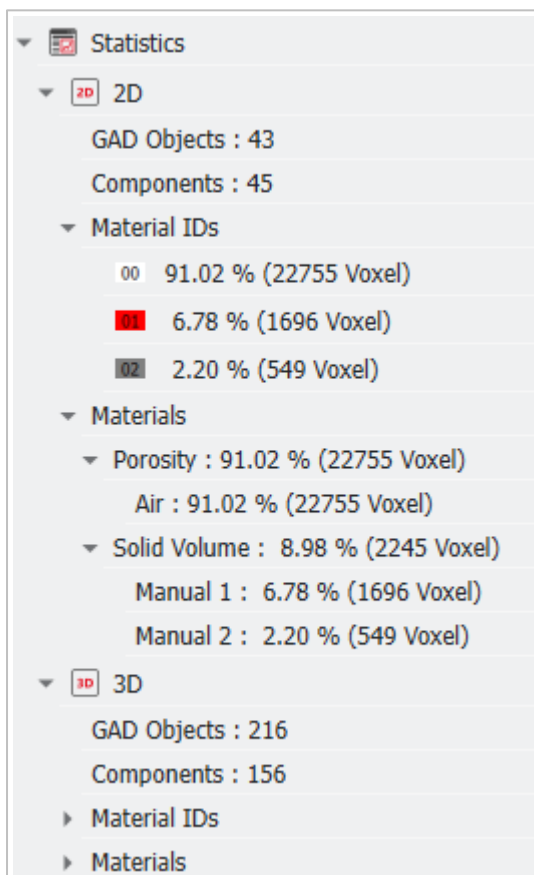
In the **Statistics Section** of the Project Status Section, the detailed statistics from the [Statistics Section](#)⁴⁷ above is shown.

The **2D** statistics are only shown if the 2D Cross Section view is activated. Then, the statistic for the currently selected 2D slice is shown. The values vary when viewing another 2D cutting plane, e.g., by varying the **Direction** and/or moving the **Slice** slider.

First, the number of **GAD Objects** in the current slice is given. If the option **Show Number of Connected Components in 2D Slice** has previously been activated in the [Statistics](#)²⁹ tab of the **Settings** → **Settings...** dialog from the menu bar, **Components** shows the number of connected components contained in the currently shown 2D slice.

Next, unfold to see the volume percentage and the number of voxels of all **Material IDs** present in the structure.

Unfolding **Materials** shows the volume fraction and the number of voxels of each material in the structure. The materials are classified as Pore and Solid.



The **3D** statistics are shown in both the 2D cross section view and 3D rendering. The information shown is the same as for the 2D statistics, but the values refer to the entire 3D image.

The number of **Components** is the number of connected components contained in the entire image. This value is only shown if the option **Show Number of Connected Components** has previously been activated in the [Statistics](#) ²⁹ tab of the **Settings** → **Settings...** dialog from the menu bar.

With a right click in the **Statistics** row, you can toggle between **Show Volume Percentage Only** and **Show Volume Percentage and Voxel Number**.

Show Volume Percentage Only	Show Volume Percentage and Voxel Number
▼ Material IDs 00 ID 00: 91.02 % 01 ID 01: 6.78 % 02 ID 02: 2.20 %	▼ Material IDs 00 91.02 % (22755 Voxel) 01 6.78 % (1696 Voxel) 02 2.20 % (549 Voxel)

Surface Triangulation

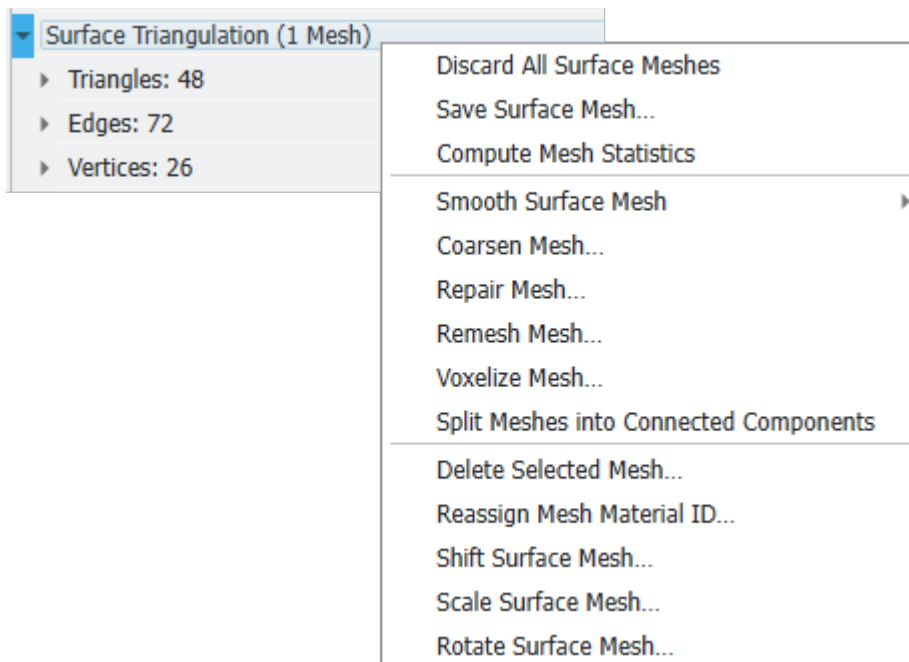
If a triangulation is loaded into GeoDict, the **Surface Triangulation** section is displayed and shows information on the mesh. Multiple meshes can be loaded at the same time, then the information is combined for all meshes.

Unfolding **Surface Triangulation** shows the number of triangles, edges, and vertices.

▼ Surface Triangulation (1 Mesh)
▼ Triangles: 48
Average Size: 143.235 μm^2
Minimum Size: 79.5495 μm^2
Maximum Size: 175.078 μm^2
► Edges: 72
► Vertices: 26

For the triangles and edges, the average, minimum, and maximum values are given when the corresponding section is expanded. For the vertices, the minimal and maximal coordinate in all directions can be observed after unfolding it.

A right-click on **Surface Triangulation** opens a context menu which gives access to many functions from the MeshGeo module.



The commands are all described in the MeshGeo chapter:

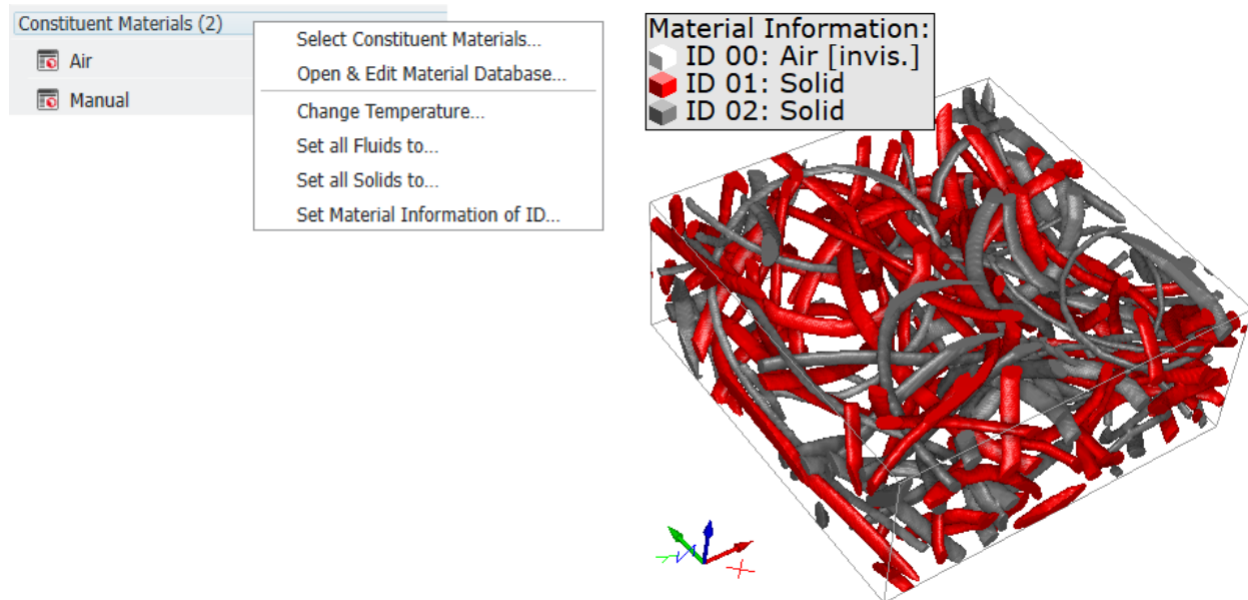
- Discard All Surface Meshes
- Save Surface Mesh
- Compute Mesh Statistics
- Smooth Surface Mesh
- Coarsen Mesh
- Repair Mesh
- Remesh Mesh
- Voxelize Mesh
- Split Meshes into Connected Components
- Delete Selected Mesh
- Reassign Mesh Material ID
- Shift Surface Mesh
- Scale Surface Mesh
- Rotate Surface Mesh

Constituent Materials

The **Constituent Materials** section lists (when unfolding) the materials that are present in the structure and are shown in the **Material Information** legend next to the structure in the Visualization area.

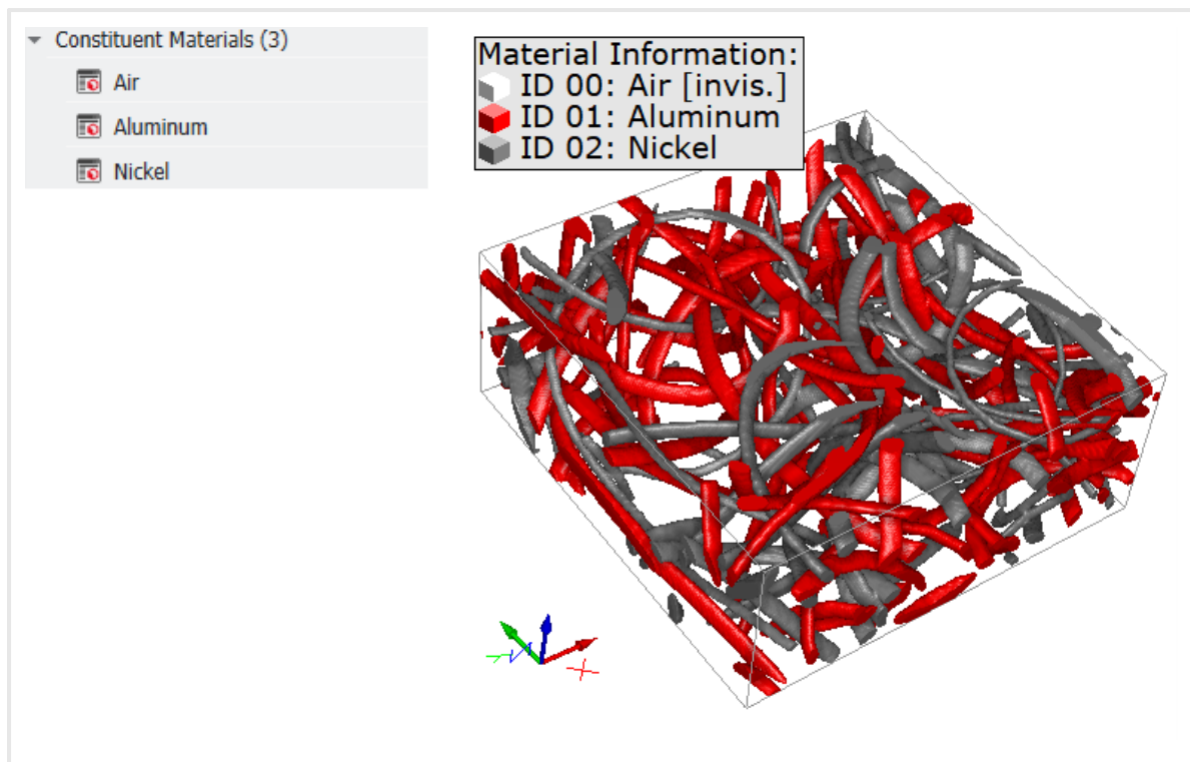
Options for all Materials

Right-clicking on **Constituent Materials** gives access to several short cuts to edit the constituent materials.



✓ Select Constituent Materials

Select Constituent Materials is a shortcut to selecting **Settings** → [Select Constituent Materials](#) ³⁷ in the menu bar. In the example shown above, two **Constituent Materials** are listed in the **Project Status** section (Air and Manual), corresponding to Air and Solid in the **Material Information** legend. The fibers with Material ID 01 and Material ID 02 are set to be made of the same constituent material. After selecting the constituent material and changing the material of Material ID 01 to Aluminum and Material ID 02 to Nickel, the number of **Constituent Materials** in the **Project Status** section changes from (2) to (3).

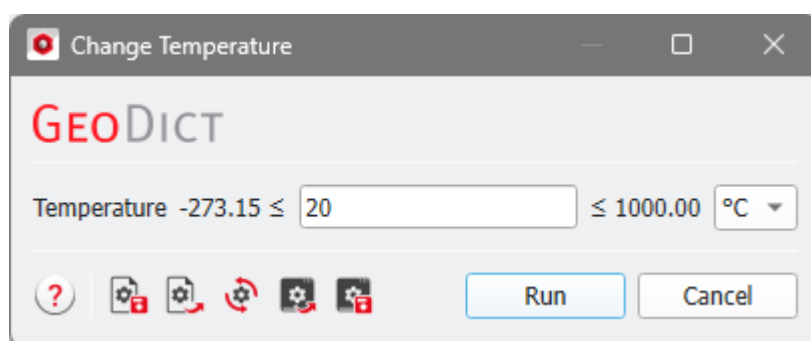


✓ Open & Edit Material Database

[Open & Edit Material Database](#)³⁸ is a shortcut to **Settings** → **Open & Edit Material Database**.

✓ Change Temperature

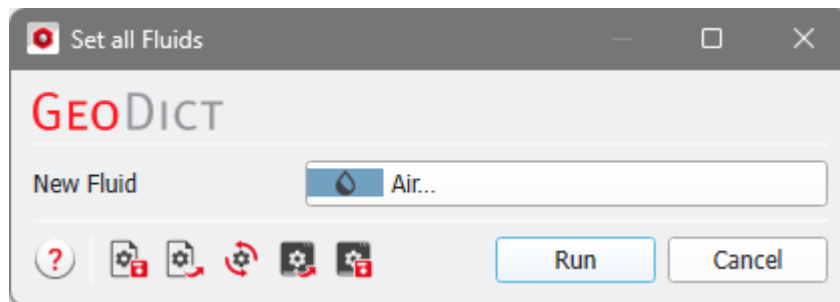
The current temperature can be edited in the constituent materials dialog and also by clicking on **Change Temperature...**, which opens a separate dialog.



Choose the temperature unit from the drop-down menu on the right. Available are **Kelvin**, **°Celsius**, and **°Fahrenheit**. Then enter the value, which must be in the temperature range given by the numbers on the left and the right.

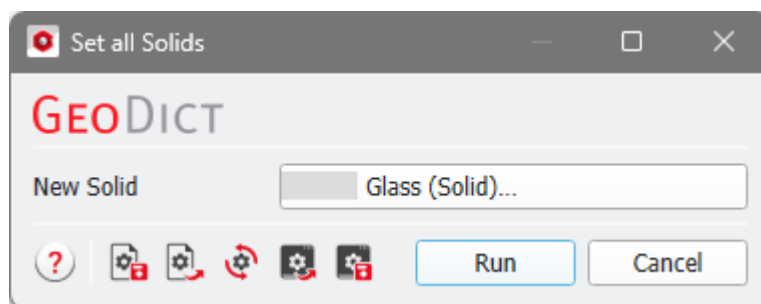
✓ Set all Fluids to

It is also possible to **Set all Fluids to...** one chosen material. This option changes the material of all materials of type fluid or pore.



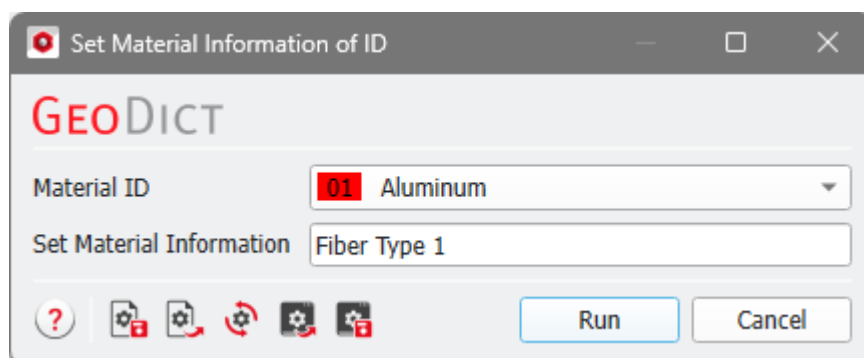
✓ Set all Solids to

With **Set all Solids to...** all solid materials can be set to one chosen material.

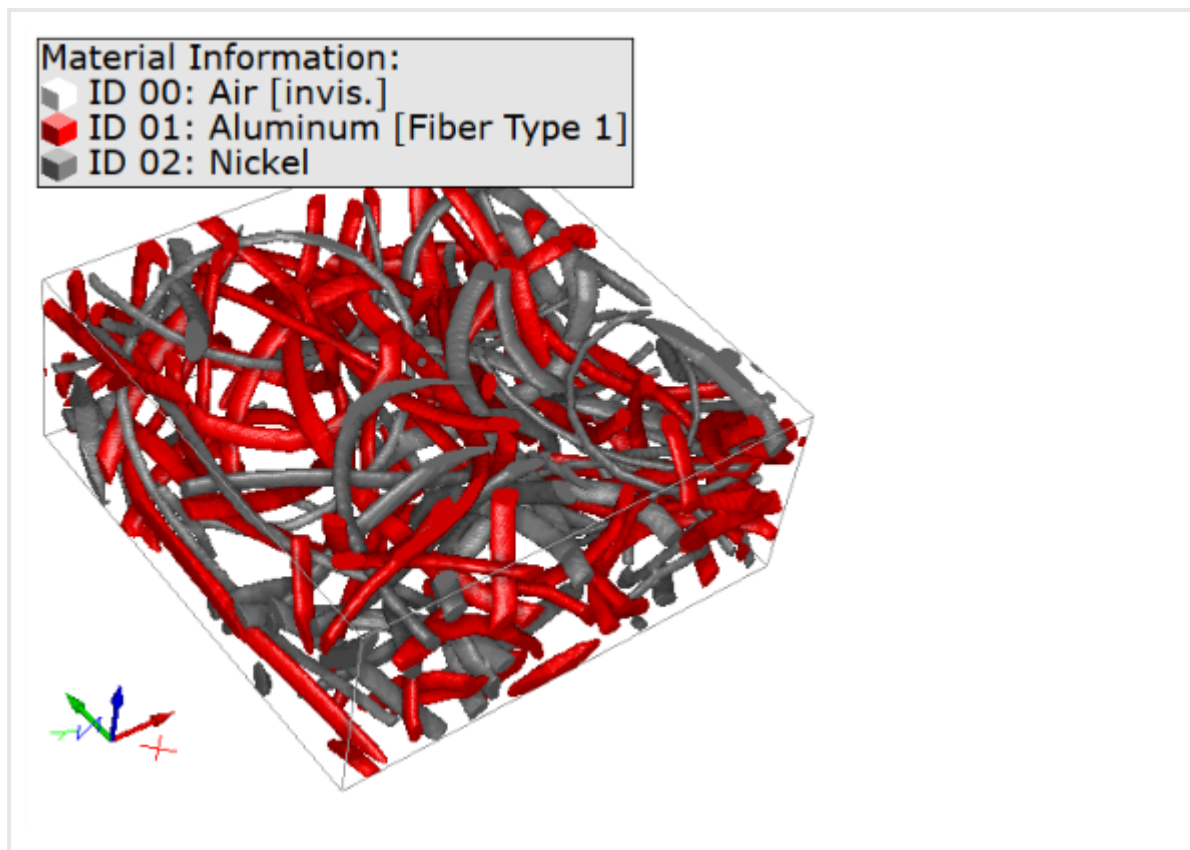


✓ Set Material Information of ID

You can also **Set Material Information** for any Material ID. Type the information in text form in the **Set Material Information** box and click **Run**. The information is then displayed in squared brackets in the material legend in the visualization area.

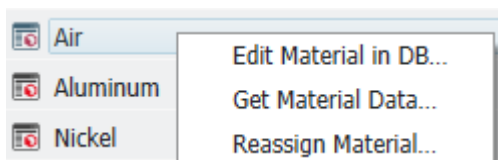


In the example above, the **Material Information** of **Aluminum** is set to **Fiber Type 1**.



Options for single Materials

A right-click on a single material offers additional options.

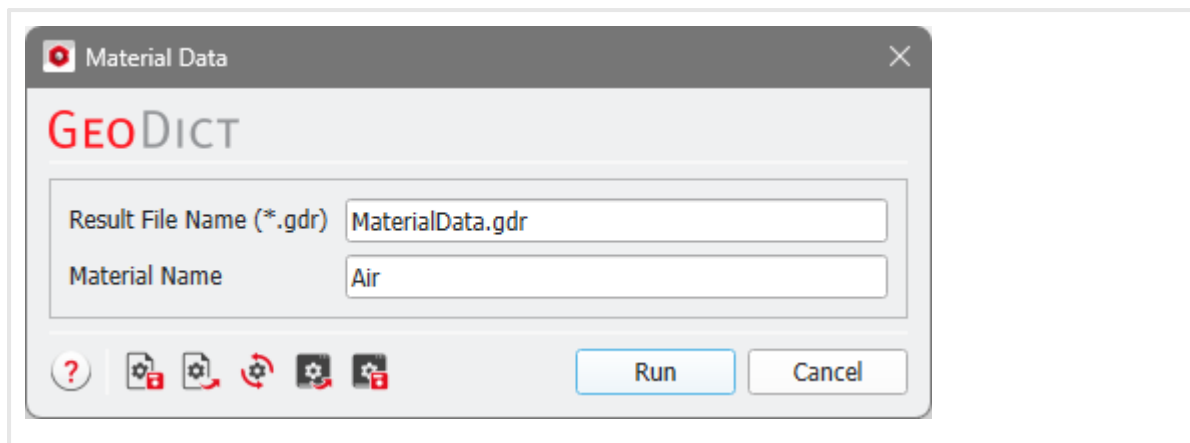


✓ Edit Material in DB

With **Edit Material in DB...** the entry in the material database of the corresponding material is opened. The [Material Database](#) chapter explains how a material can be edited.

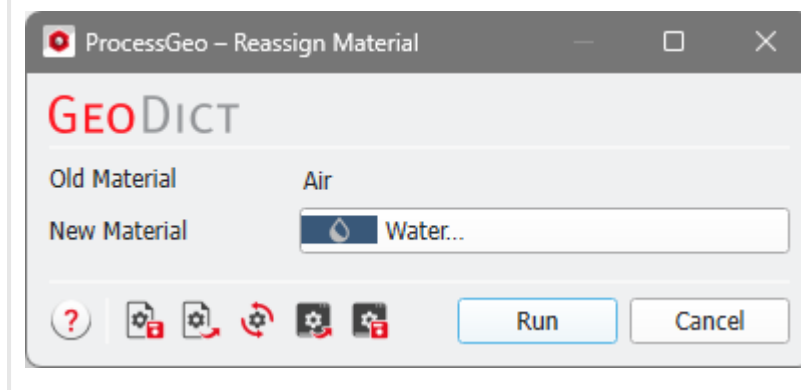
✓ Get Material Data

By clicking on **Get Material Data...**, a dialog is opened where a **Result File Name** and a **Material Name** can be entered. Clicking on **Run** produces a GeoDict result file which contains all information from the material database of the chosen material as key-value map.



✓ Reassign Material

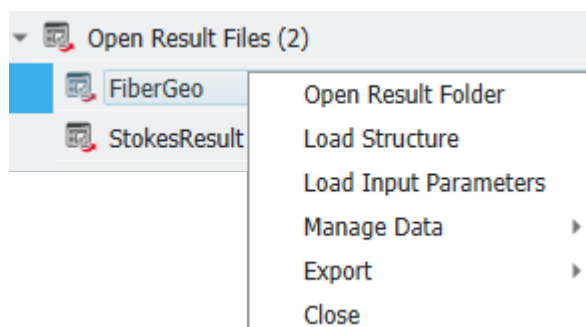
With **Reassign Material...** the chosen material can be reassigned to another material. See the [ProcessGeo](#) chapter for more information.



Open Result Files

Open Result Files shows the number of result files that are currently opened in the **Result Viewer**. With a right-click on **Open Result Files** the option to **Close all GDR-Files** appears.

Click on the black triangle to expand the section such that the names of the opened result file names are shown. Double-clicking on the file name raises the result viewer showing the selected file.



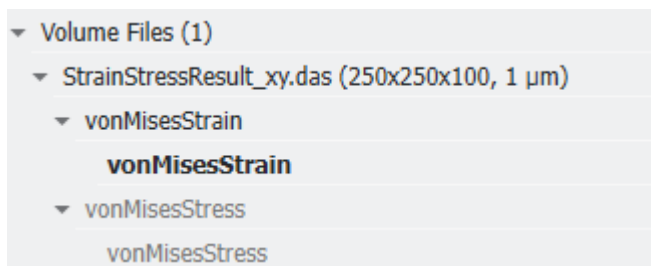
A right-click on a gdr file name opens a context menu, which offers shortcuts to functionalities that are also available with a right-click in the **Header Section** of the Result Viewer:

- Open Result Folder
- Load Structure
- Load Input Parameters
- Manage Data
- Export
- **Close** will only close the currently selected result file.

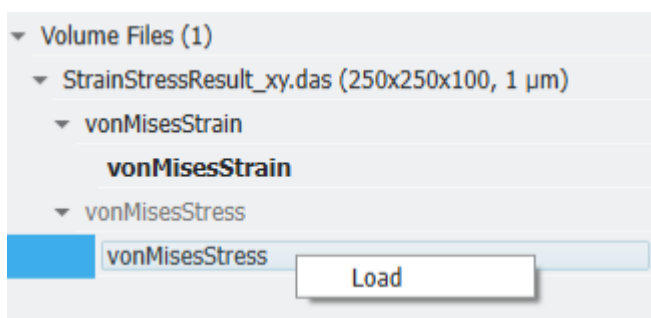
Volume Files

The **Volume Files** section offers an overview of the loaded volume files and their fields and shortcuts to modify them. After loading a volume file (e.g., after an effective stiffness simulation with ElastoDict-FeelMath-VOX), the number of the loaded **Volume Files** appears in the **Project Status** section.

Each of the volume files consists of volume images and they contain volume fields. In the example shown here, the volume file *StrainStressResult_xy.das* is loaded. It has the volume images *vonMisesStrain* and *vonMisesStress*, and they contain a volume field with the same name, respectively. The volume field *vonMisesStress* is grayed out, because it was not selected in the [loading volume file dialog](#).

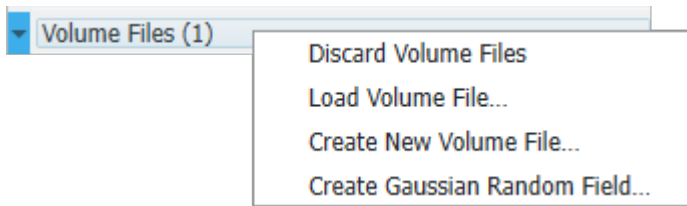


With a right click on the name of the volume field, the **Load** option is available. Alternatively, double clicking on a volume field loads it into GeoDict and it can be seen in the Visualization area.



Volume Files right-click menu

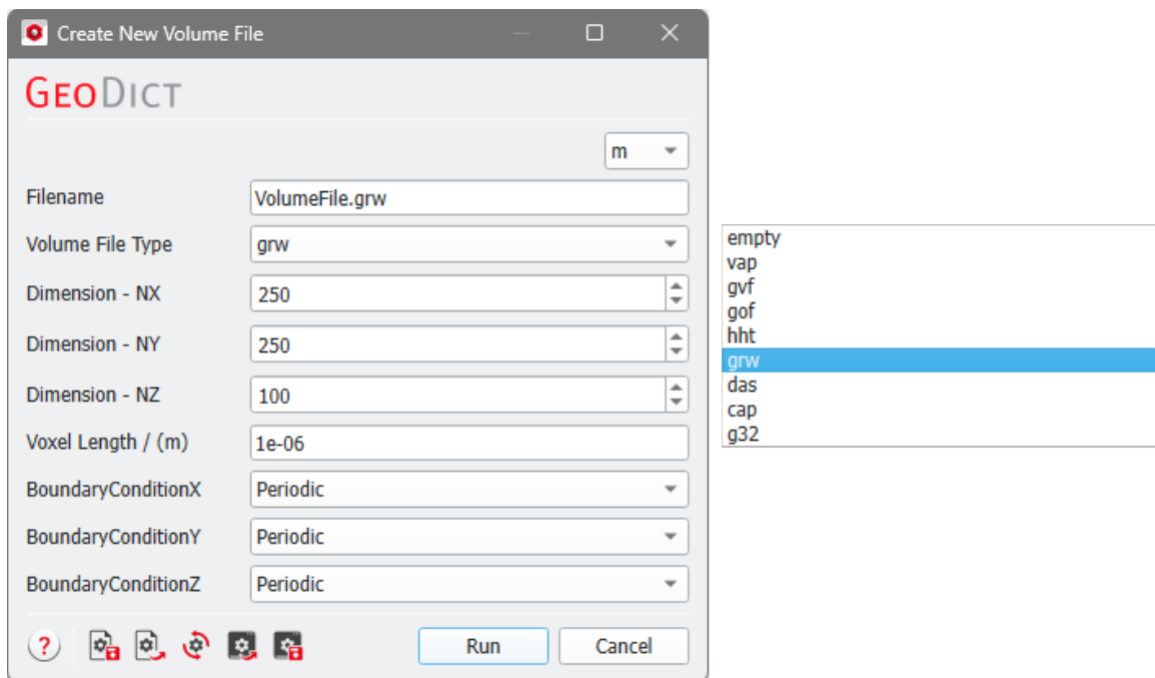
Right-clicking on **Volume Files** opens a list of options.



[Discard Volume Files](#)^[17] and [Load Volume File](#)^[9] are the same as those from the **File** menu in the menu bar. You can also **Create a Gaussian Random Field**, which is described in the GrainGeo chapter.

✓ Create New Volume File

In the **Create New Volume File** dialog, enter a **Filename** and define the **Volume File Type**.



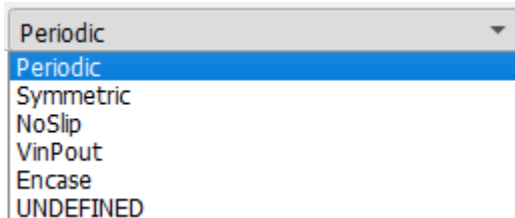
You can choose a preset of GeoDict volume file structures or choose **empty**. In the latter case, the created volume file does not contain any image or field. Instead, you can fill the file with [Create New Image](#)^[64] and [New Field](#)^[66], which are described below.

If a predefined volume file was chosen, the volume file contains the standard images and fields of this volume file type. For example, the preset **vap** produces a volume file that contains a **Velocity image** with the fields **VelocityX**, **VelocityY**, **VelocityZ**, and **Velocity** and a **Pressure image** with the **Pressure** field. All the fields contain zero values and can be filled afterwards using, e.g., the [Math Operations](#)^[76] or via Python scripting with GeoPy.

Set the **Dimension NX**, **NY**, and **NZ** of the new volume file in number of voxels. The size will be inherited by the images and fields.

Additionally, you must set a **Voxel Length** that is larger than zero. You can choose the length unit from the pull-down menu in the upper right corner of the dialog.

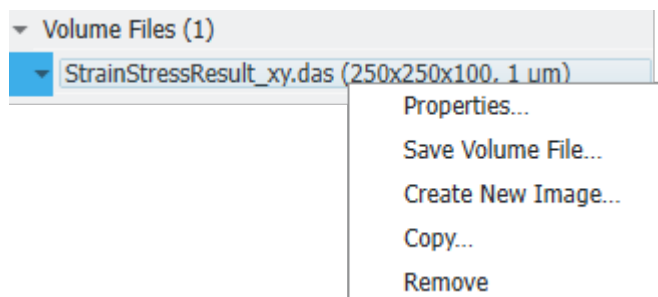
Finally, you can choose the **Boundary Condition** in each direction.



The new volume file is only stored in GeoDict. To save it to the hard disk, click on [Save Volume File](#) .

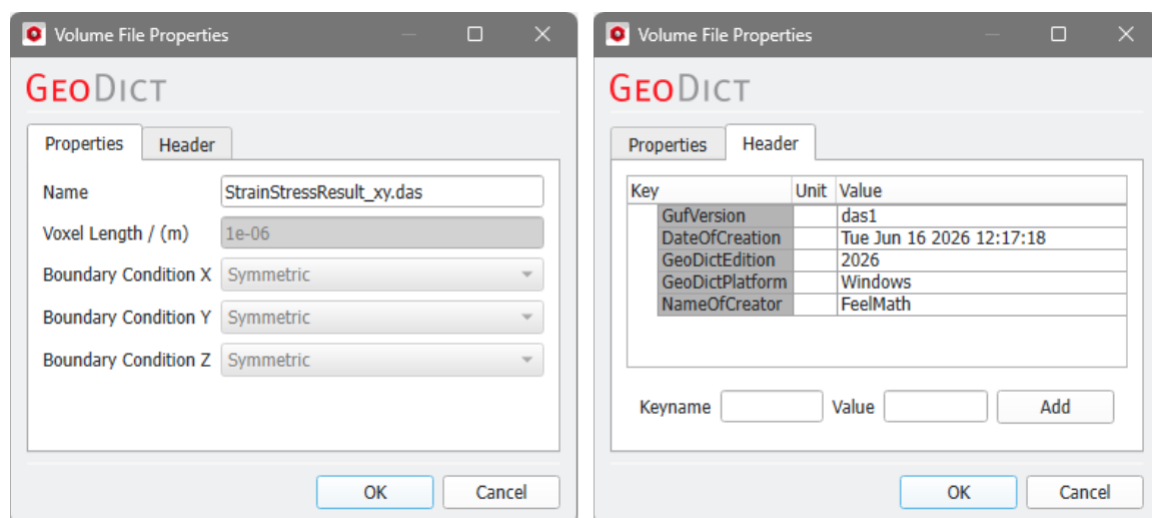
Volume File name right-click menu

A right click on a loaded volume file name provides further options.



✓ Properties

Choose **Properties** to get information on the volume file loaded. In the **Properties** tab, the **Name** of the volume file can be changed. The **Voxel Length** and the **Boundary Conditions** cannot be changed.

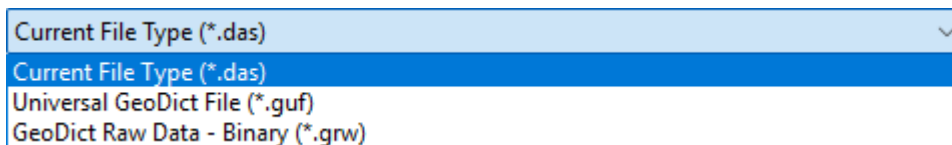


In the **Header** tab, you can observe the header of the volume file, which are Key-Unit-Value pairs. They contain useful information about the creation of the volume file. You can add your own Key-Value pairs below the table.

The changes are only stored in GeoDict, to save them to the hard disk, click on [Save Volume File](#) .

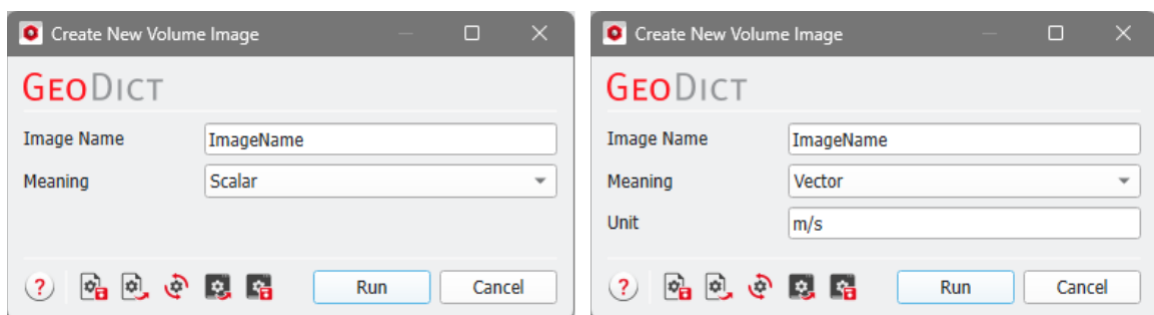
✓ Save Volume File

Save the volume file to the hard disk as **Current File Type, Universal GeoDict File (*.guf)**, or as **GeoDict Raw Data - Binary (*.grw)**.



✓ Create New Image

With **Create New Image** two types of images can be created.

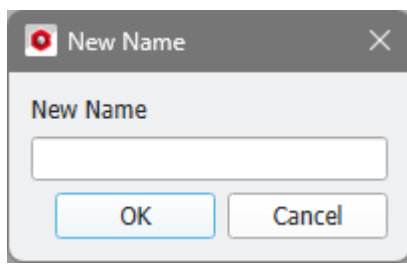


If **Scalar** is chosen, an empty volume image is created and a [New Field](#)  can be created.

If **Vector** is chosen, the unit for the vector field must be entered (e.g., m/s for a velocity field). Then, a volume image with 4 volume fields (containing only zeros) is generated. The created volume fields are the component fields for the X-, Y-, and Z-direction and the supplemental field containing the automatically computed norm.

✓ Copy

With **Copy...** the entire volume file including all images, fields, and values is copied, after entering a name for the new volume file.



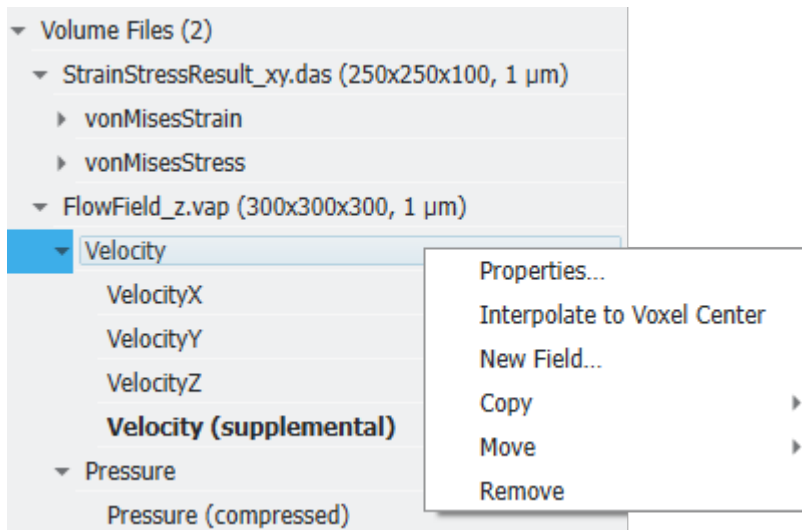
The new file is only stored in GeoDict. To save it to the hard disk, click on [Save Volume File](#) ⁶⁴.

✓ Remove

Click on **Remove** to delete the volume file including all its images and fields from the GeoDict memory.

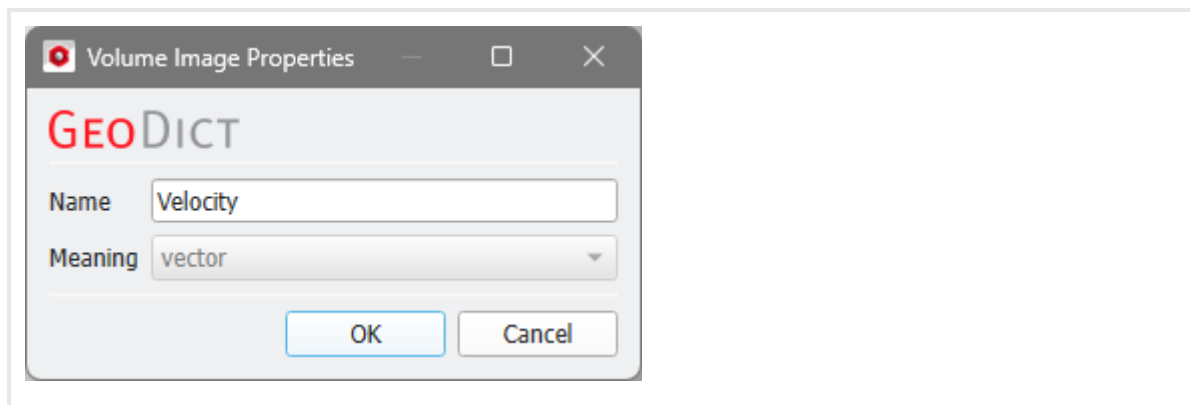
Volume Image right-click menu

Right-clicking on a volume image opens further options. As some options are only available when 2 or more volume files are loaded, the additional volume file FlowField_z.vap was loaded.



✓ Properties

Choose **Properties** to see the name of the volume image and under **Meaning** if it is a scalar or vector volume image (see [Create New Image](#) ⁶⁴). You can change the name of the image. Remember to [save](#) ⁶⁴ the volume file to the hard disk to keep the modifications.

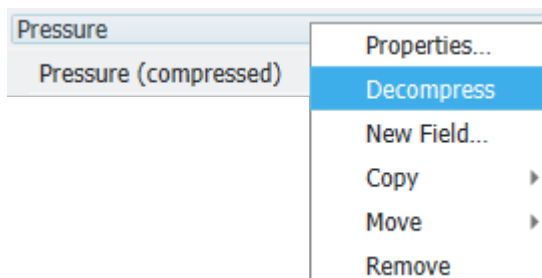


✓ Interpolate to Voxel Center

The function **Interpolate to Voxel Center** interpolates the data in the fields to the voxel centers using the values on edges and faces of the voxels. It is only available for vector images and not for scalar images.

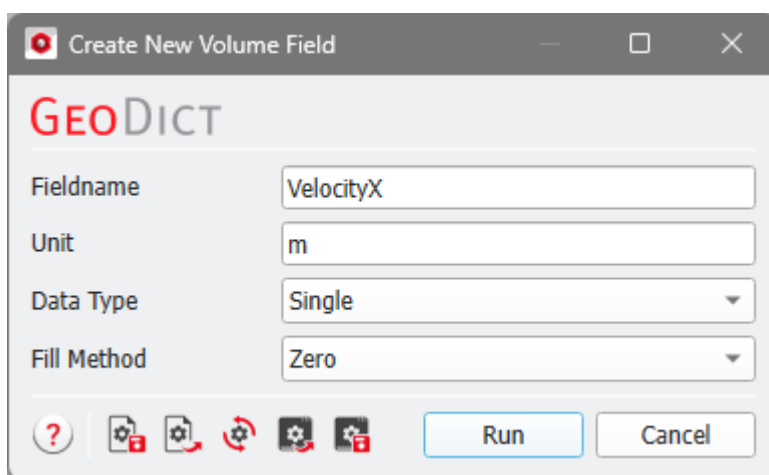
✓ Decompress

The option above is not available if a compressed volume file is loaded without decompressing it during the [import](#) . Instead, the option to **Decompress** the file when it is already in the GeoDict memory is available.

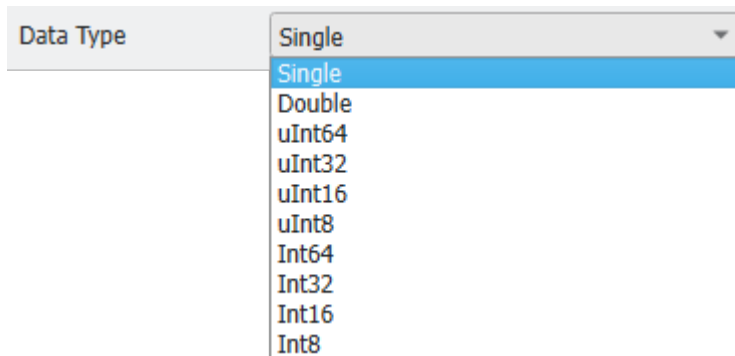


✓ New Field

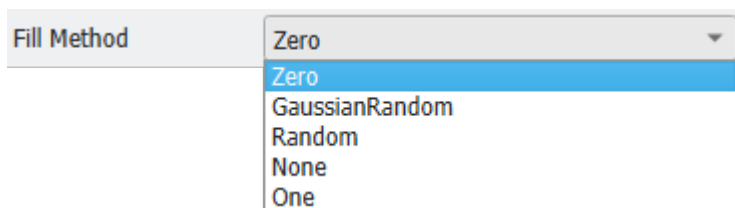
You can also create and add a **New Field** to a volume image.



In the opening dialog, enter a **Fieldname** and the desired **Unit** of the volume field. Select the **Data Type** from the corresponding drop-down menu.

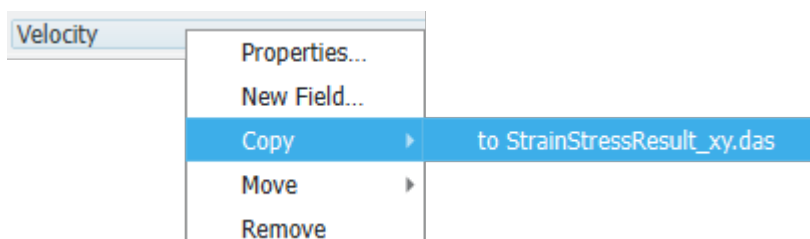


The **Fill Method** determines if the values in the new field are all Zeros, Gaussian randomly distributed around Zero, randomly distributed between 0 and 1, None (which is the same as Zero) or all Ones.



✓ Copy / Move

With **Copy** or **Move** the entire volume image including all fields and values is copied or moved to another loaded volume file.



The modified file is only stored in GeoDict. To save it to the hard disk, click on [Save Volume File](#)^[64].



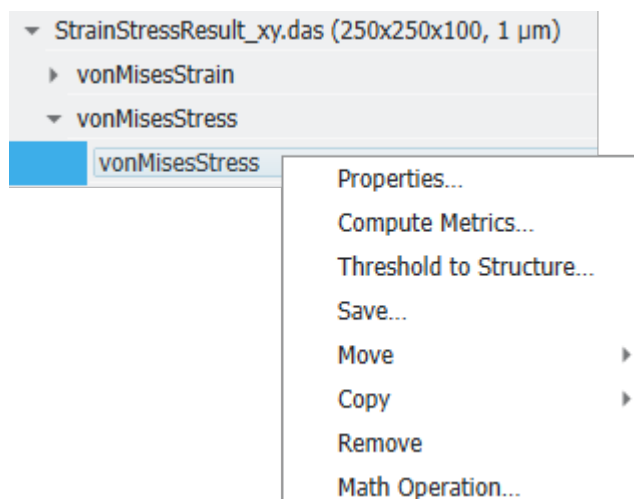
Important! Volume images can only be copied or moved to another volume file if both files have the same dimension in number of voxels.

✓ Remove

With **Remove** a volume image can be deleted from the GeoDict memory. It is not deleted from the volume file on the hard disk, unless you [save the volume file](#)^[64] afterward.

Volume Field right-click menu

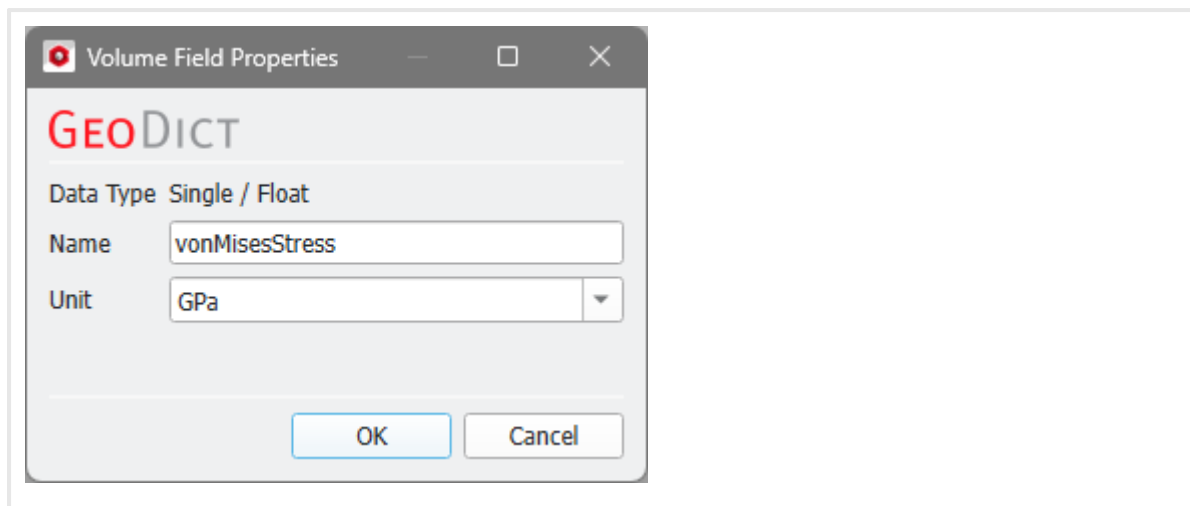
Finally, a right click on a volume field provides other possibilities.



The commands [Compute Metrics](#)^[72], [Threshold to Structure](#)^[74], and [Math Operation](#)^[76] are explained in the corresponding sub-sections.

✓ Properties

Under **Properties** you can change the **Name** and **Unit** of a volume field.

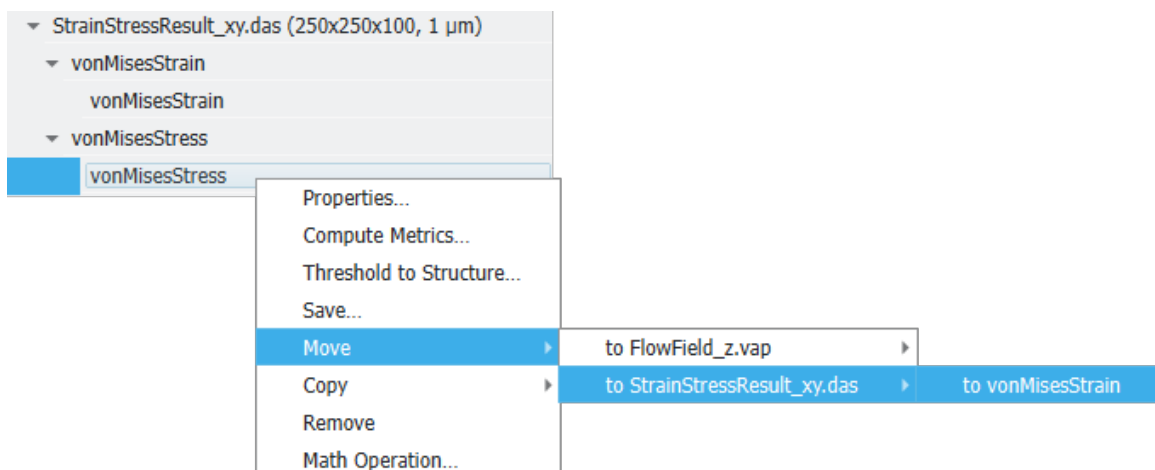


✓ Save

The selected volume field can be **Saved** as *.guf file or in another file format. This is the same as [Save Volume File](#)¹⁷ in the File menu in the menu bar.

✓ Copy / Move

With **Copy** or **Move** the volume field including all values is copied or moved to another loaded volume image.



It can be a volume image of the same volume file or another loaded volume file. The new volume image is only stored in GeoDict. To save it to the hard disk, click on [Save Volume File](#)⁶⁴.



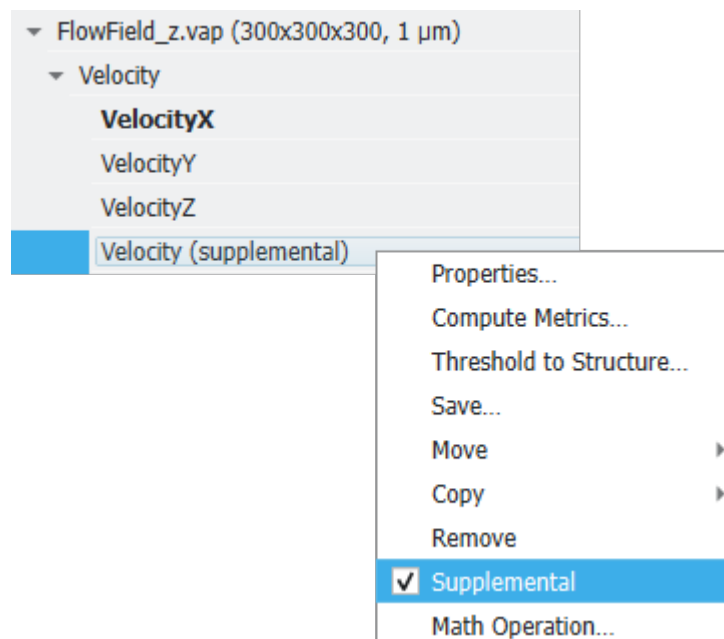
Important! Volume fields can only be copied or moved to another volume image if both fields have the same dimension in number of voxels.

✓ Remove

With **Remove** a volume field can be deleted from the GeoDict memory. It is not deleted from the volume file on the hard disk, unless you [save the volume file](#)⁶⁴ afterward.

✓ Supplemental

For some volume files, e.g., *.vap files, an additional supplemental field like the Velocity field is computed when loading the volume file. To save the supplemental field in the volume file, you can uncheck **Supplemental** and save the volume file afterwards.



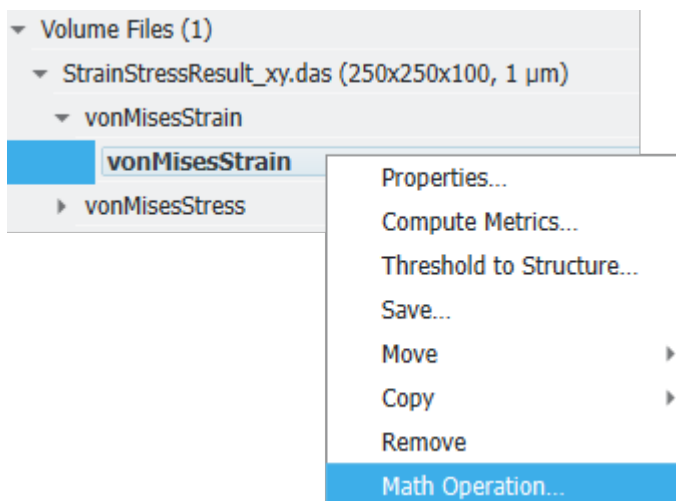
Common errors

✓ I cannot save a volume field as Integer Binary (*.raw) data!

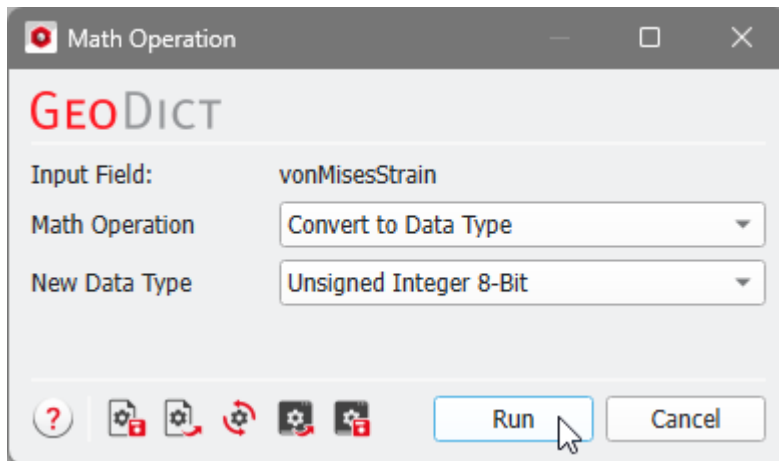
The reason is that the data in the volume file has not the correct data type, e.g., it is a floating single precision value.

Use the math operation **Convert to Data Type** to save a volume field as RAW-file. For example, the field "vonMisesStrain" is saved in the following way:

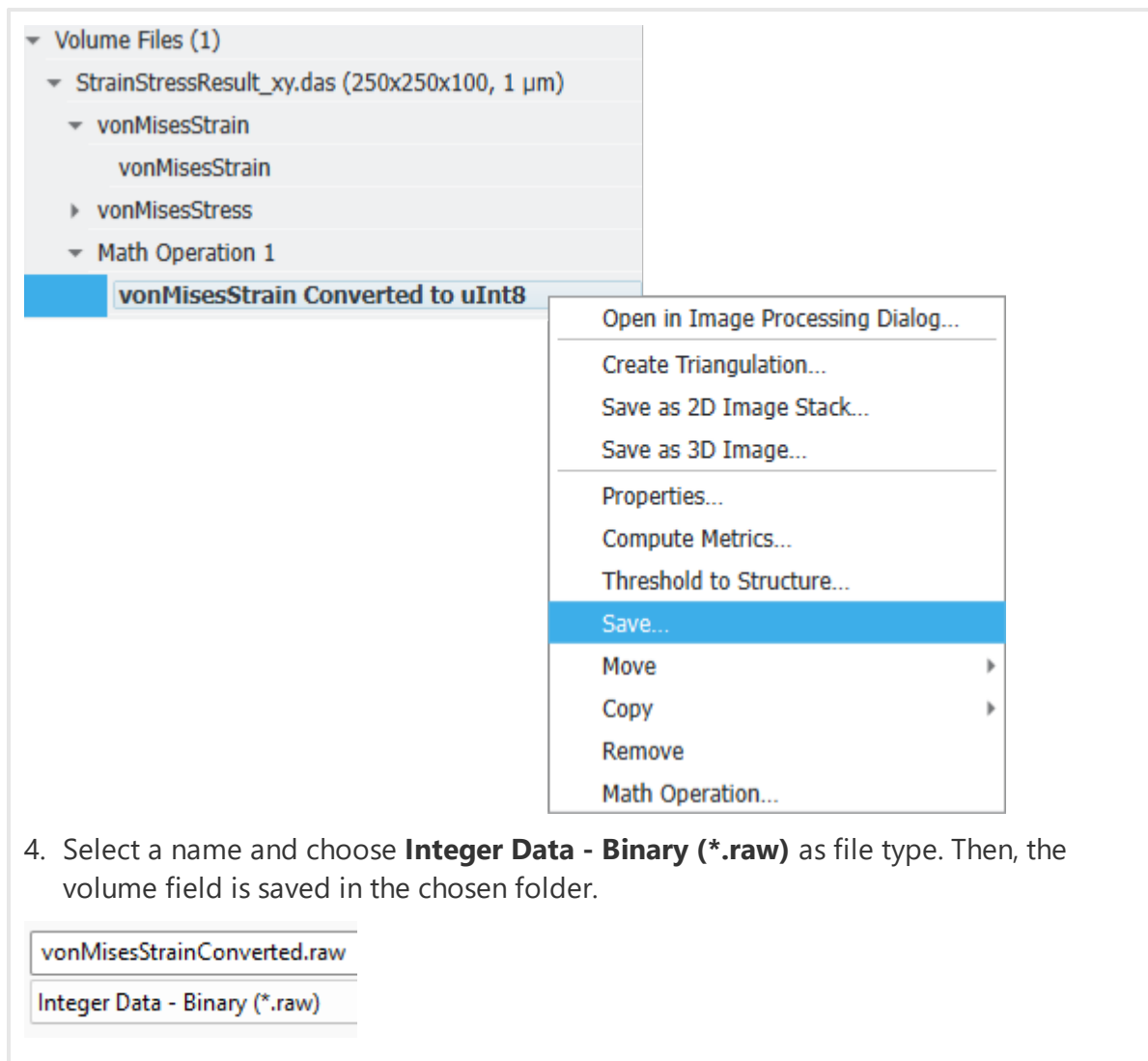
1. First, convert the data in the field to the correct data type (unsigned integer). Right-click on the **vonMisesStrain** field and choose [Math Operation](#)⁷⁶



2. In the dialog select **Convert to Data Type** from the first pull-down menu and **Unsigned Integer 8-Bit** from the second. Then click **Run**.



3. A new Volume Image appears under the currently loaded Volume File: **Math Operation 1**. There, the new Volume Field **vonMisesStrain Converted to uint8** is shown. Right-click on it and choose **Save**.



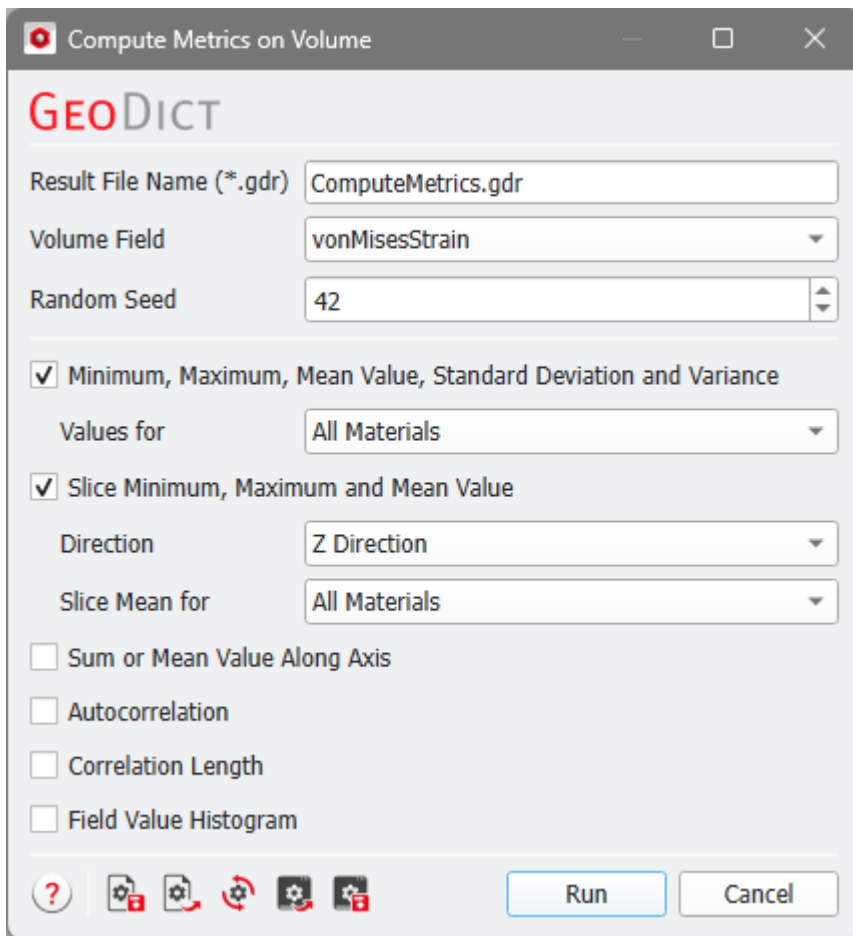
4. Select a name and choose **Integer Data - Binary (*.raw)** as file type. Then, the volume field is saved in the chosen folder.

Compute Metrics

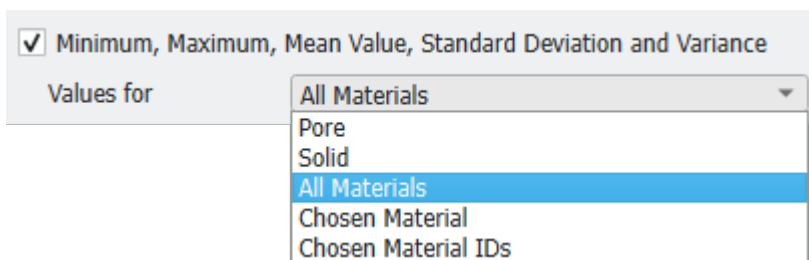
With **Compute Metrics** you can access statistical properties of the volume field.

Enter a **Result File Name (*.gdr)** to under which the results are saved. Then, select on which of the loaded **Volume Fields** the properties should be computed. The **Random Seed** influences the results of **Autocorrelation** and **Correlation Length**.

Below, choose which metrics should be computed.



Minimum, Maximum, Mean Values, Standard Deviation, and Variance can be computed for either Pore, Solid, All Materials, Chosen Materials, or Chosen Material IDs.

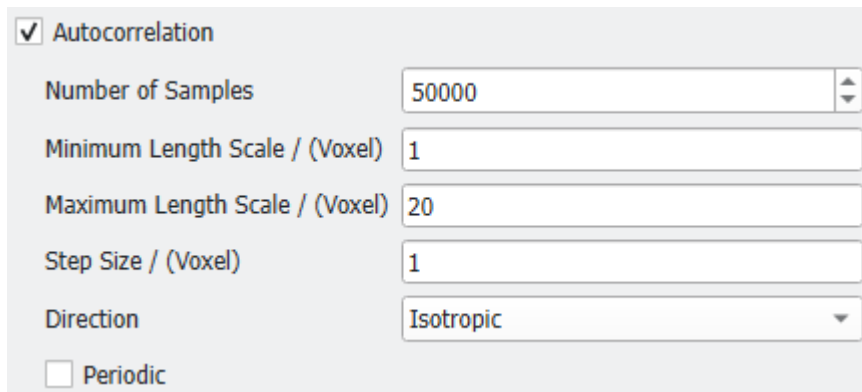


Minimum, Maximum, and Mean Values can also be determined **slice**-wise for a chosen direction and Pore, Solid, All Materials, Chosen Materials, or Chosen Material IDs.

Additionally, you can compute the **Sum or Mean Value Along Axis** for a chosen direction and Pore, Solid, All Materials, Chosen Materials, or Chosen Material IDs.



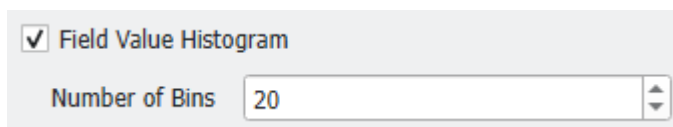
When **Autocorrelation** is selected, the similarity of voxels in a given distance between **Minimum Length Scale** and **Maximum Length Scale** is measured. This is similar to the MatDict command [2-Point Correlation](#).



The screenshot shows a settings panel for Autocorrelation. It includes a checked checkbox for 'Autocorrelation'. Below it are five input fields: 'Number of Samples' (50000), 'Minimum Length Scale / (Voxel)' (1), 'Maximum Length Scale / (Voxel)' (20), 'Step Size / (Voxel)' (1), and 'Direction' (Isotropic). At the bottom is an unchecked checkbox for 'Periodic'.

The **Correlation Length** is a measure on which length scale the values of the volume field change.

With **Field Value Histogram** a histogram of the values in the volume field is computed with respect to the entered **Number of Bins**.

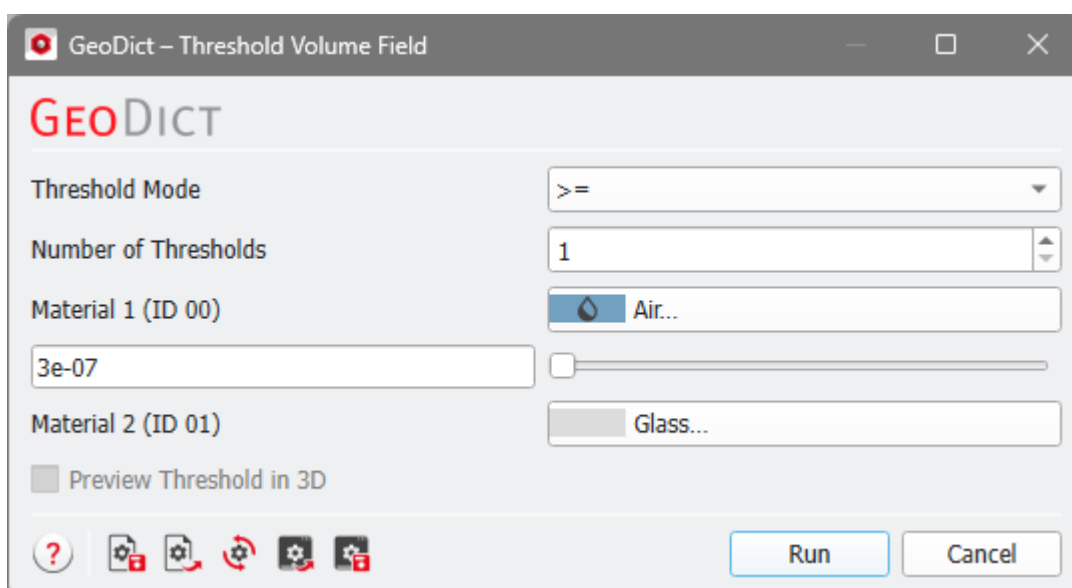


The screenshot shows a settings panel for Field Value Histogram. It includes a checked checkbox for 'Field Value Histogram'. Below it is an input field for 'Number of Bins' (20).

Clicking **Run** computes the chosen metrics. After the run is finished, the result viewer opens and shows the results in the report tab. Additional plots are available in the Plots subtab if **Slice Minimal, Maximal and Mean Value, Sum or Mean Value Along Axis, Autocorrelation**, or **Field Value Histogram** are selected.

Threshold to Structure

Select **Threshold to Structure** to segment the volume field and create a structure using one or two thresholds.



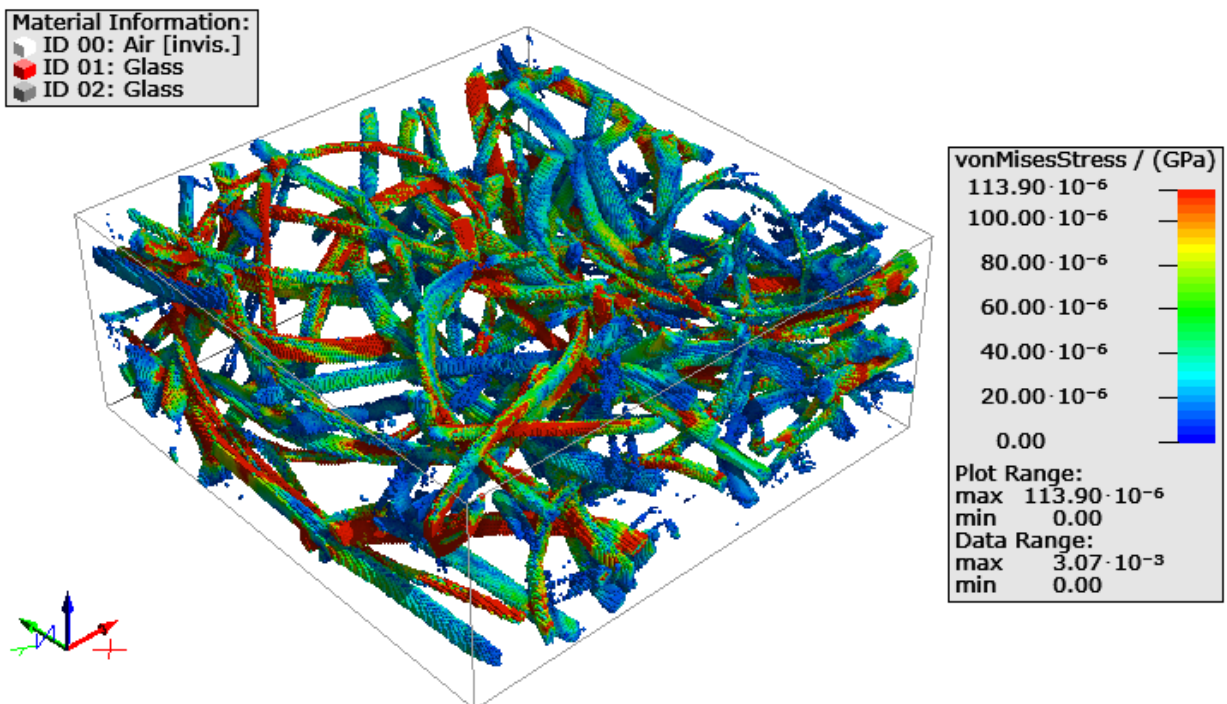
The screenshot shows the 'GeoDict - Threshold Volume Field' dialog box. It features the 'GEO DICT' logo and several settings: 'Threshold Mode' (set to '>='), 'Number of Thresholds' (1), 'Material 1 (ID 00)' (Air...), and 'Material 2 (ID 01)' (Glass...). There is a '3e-07' input field and a 'Preview Threshold in 3D' checkbox. At the bottom are icons for help, save, undo, redo, and delete, along with 'Run' and 'Cancel' buttons.

If the value of the volume field is above the chosen threshold, the voxel gets another Material ID than a voxel where the value is below the chosen threshold.

If the **Threshold Mode** is set to $\geq$, voxel that are smaller than the threshold get a smaller Material ID. With the other mode ($\leq$) the assignment of the Material IDs is turned around.

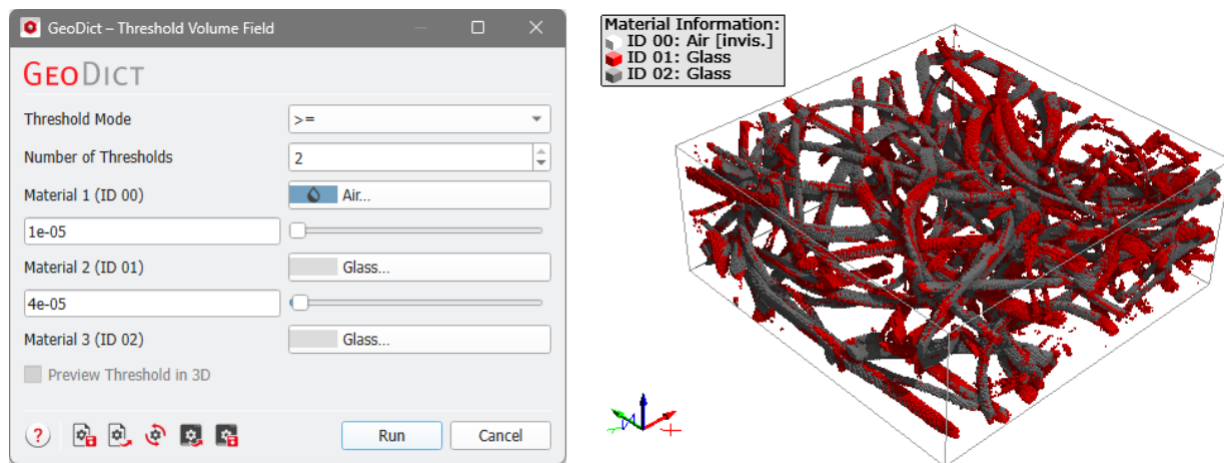
If **Number of Thresholds** is 1 and 3D rendering was chosen before, check **Preview Threshold in 3D** to visualize the created structure before clicking **Run** to start the structure generation.

Example



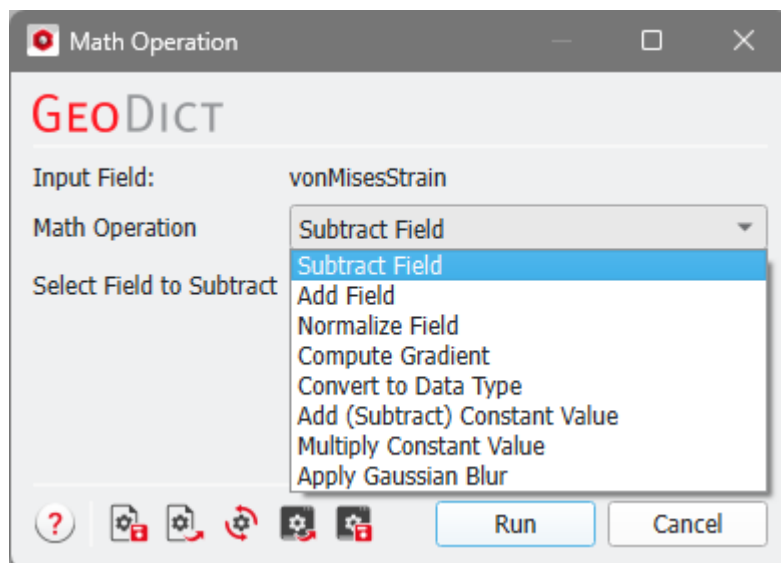
With the shown settings, we define 2 thresholds to create a structure with voxels of

- ID 00, where the von Mises Stress is below $1e-05$,
- ID 01 where the von Mises Stress is above $1e-05$ and below $4e-05$,
- and ID 02 at locations with von Mises Stress above $4e-05$.



Math Operation

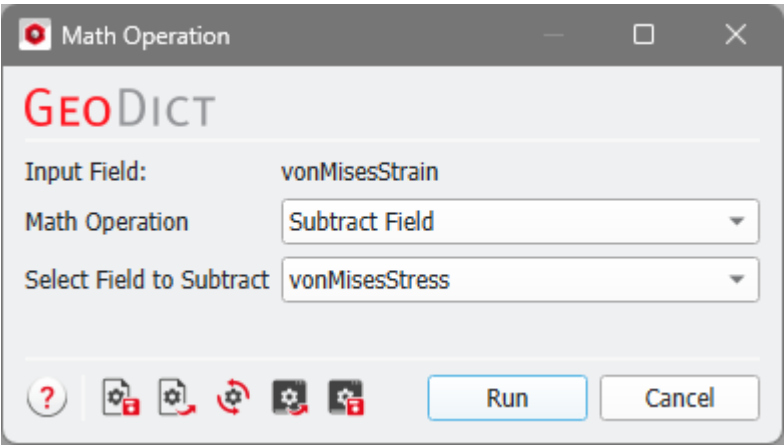
Choose **Math Operation** to open a dialog that allows to manipulate the volume field in different ways. Each math operation generates a new volume image containing the modified volume field. The single volume fields can be saved in *.guf format or the complete modified volume file can be saved, after the unwanted volume images were removed.



Available Math Operations

✓ Subtract Field

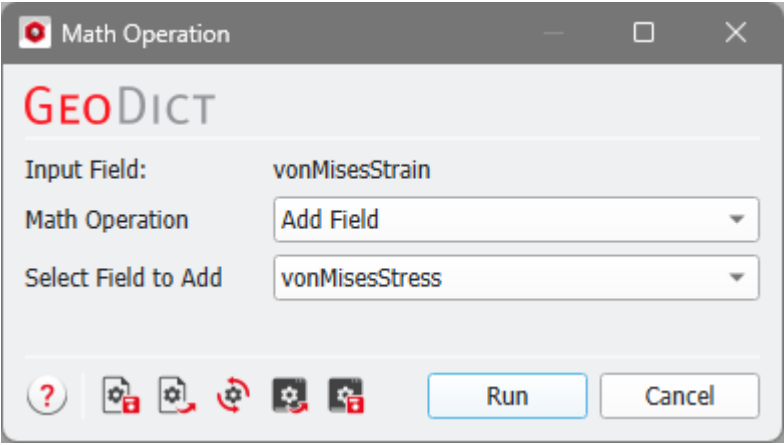
Choose another loaded volume field, that will be subtracted from the current volume field. Make sure that values in the volume fields have the same units, as this will not be checked! If you subtract two fields with different units, only the values will be subtracted and the units are dropped.



Important! The volume fields must be of equal size.

✓ Add Field

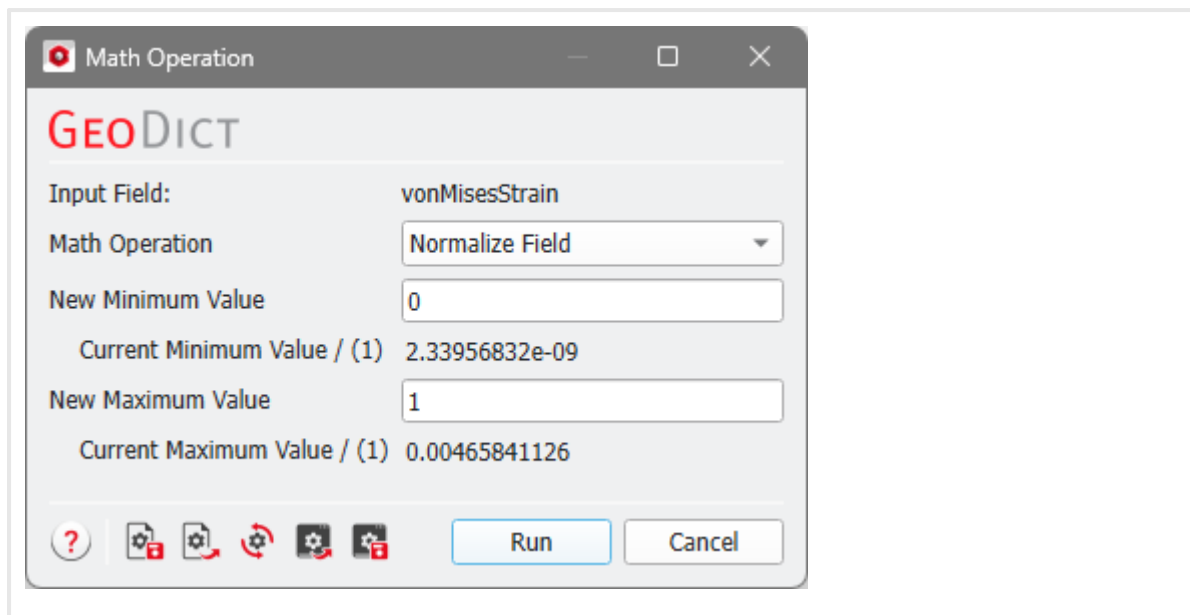
Choose another loaded volume field that will be added to the current one. Make sure that values in the volume fields have the same units, as this will not be checked! If you add two fields with different units, only the values will be added and the units are dropped.



Important! The volume fields must be of equal size.

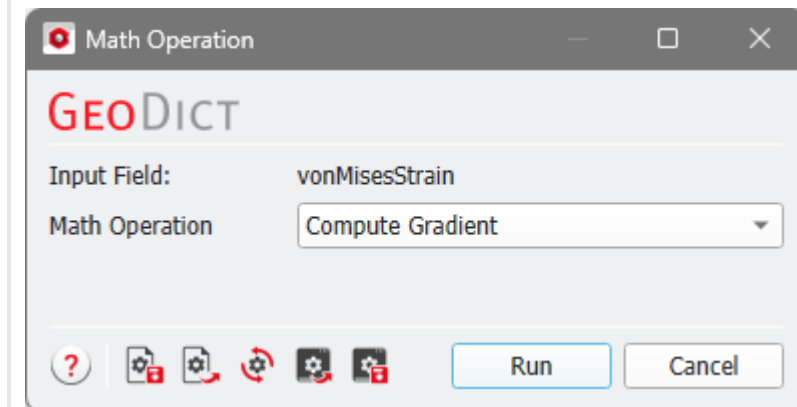
✓ Normalize Field

Define a new minimum and maximum value to normalize the values of the volume field accordingly.



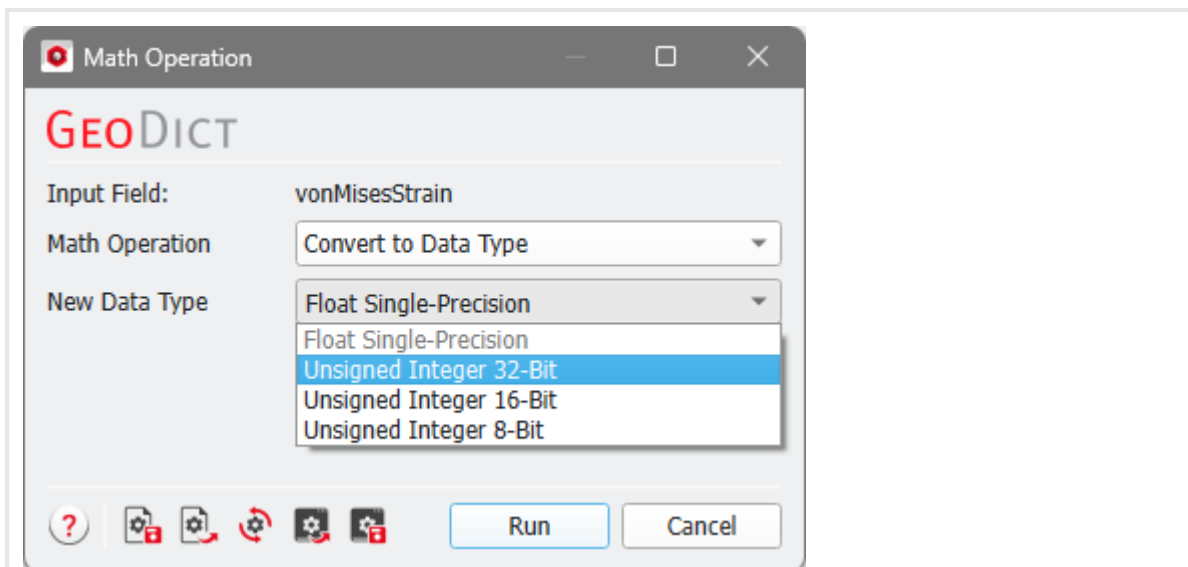
✓ Compute Gradient

No further parameters are needed to compute the gradient for the current volume field. This results in a vector image with the three component vector fields and the supplemental field of the norm.

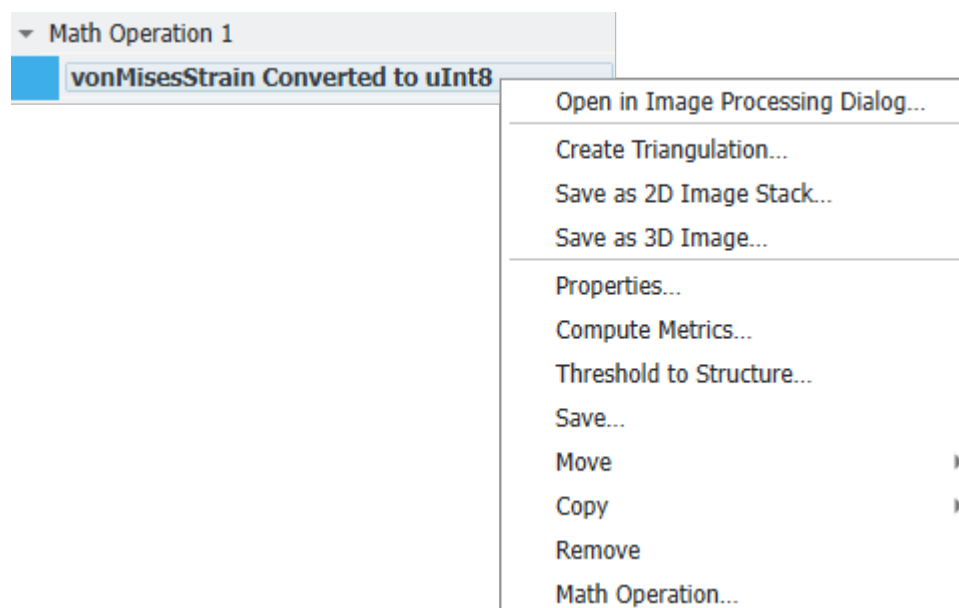


✓ Convert to Data Type

Choose a new data type (single, uint32, uint16, or uint8) and convert all values of the current volume field to this type. The current data type is grayed-out and cannot be selected.



The math operation **Convert to Data Type** with the type uint8 or uint16 chosen offers further possibilities in the right-click context menu for the converted volume field.

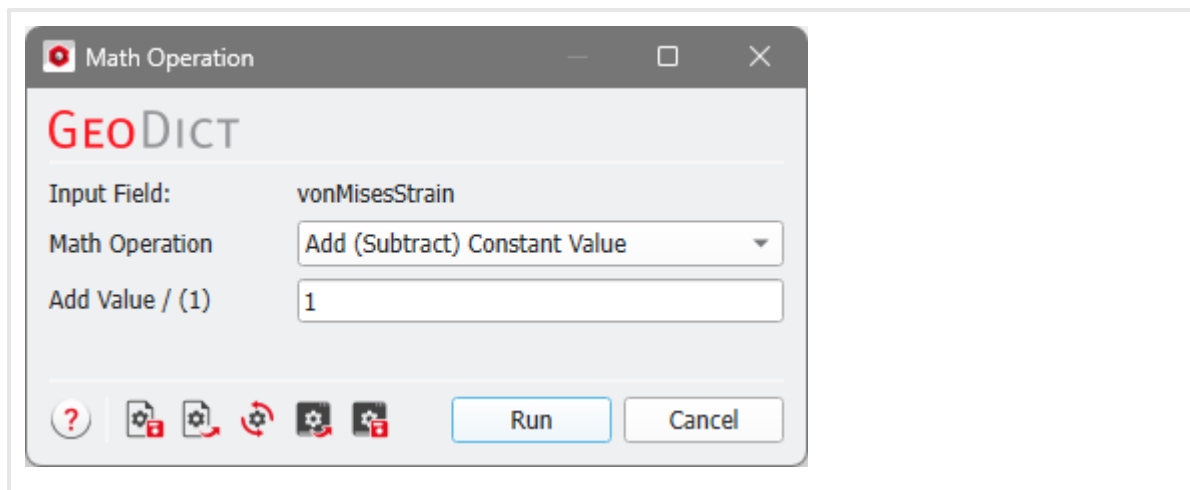


You can then **Open** it in the **Image Processing Dialog** (see the ImportGeo-Vol chapter), Create a Triangulation, Save as 2D Image Stack, or Save as 3D Image.

Use the math operation **Convert to Data Type** to save a volume field as RAW-file, as explained [here](#).

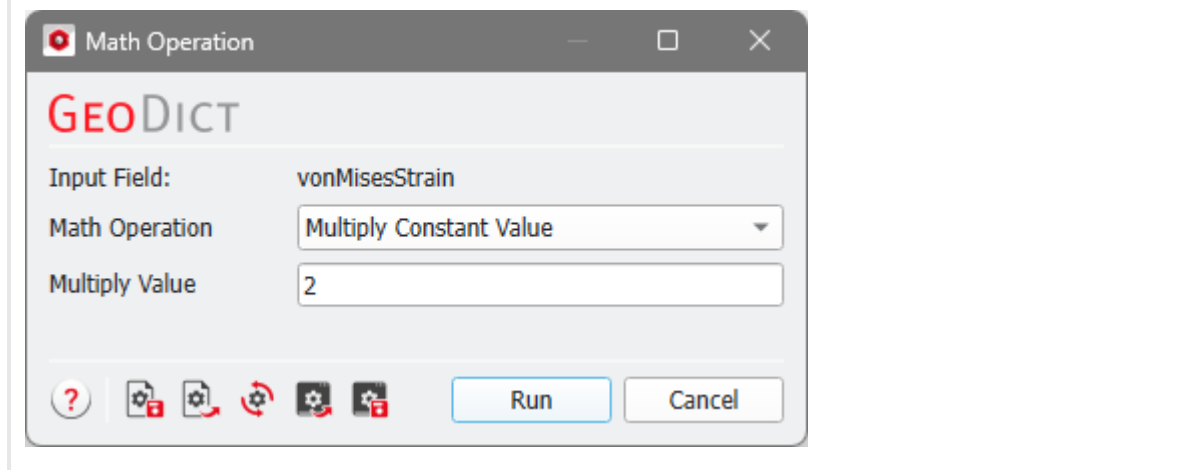
✓ Add / Subtract Constant Value

Add a constant value to the volume field. Enter a negative value to subtract it from the volume field.



✓ Multiply Constant Value

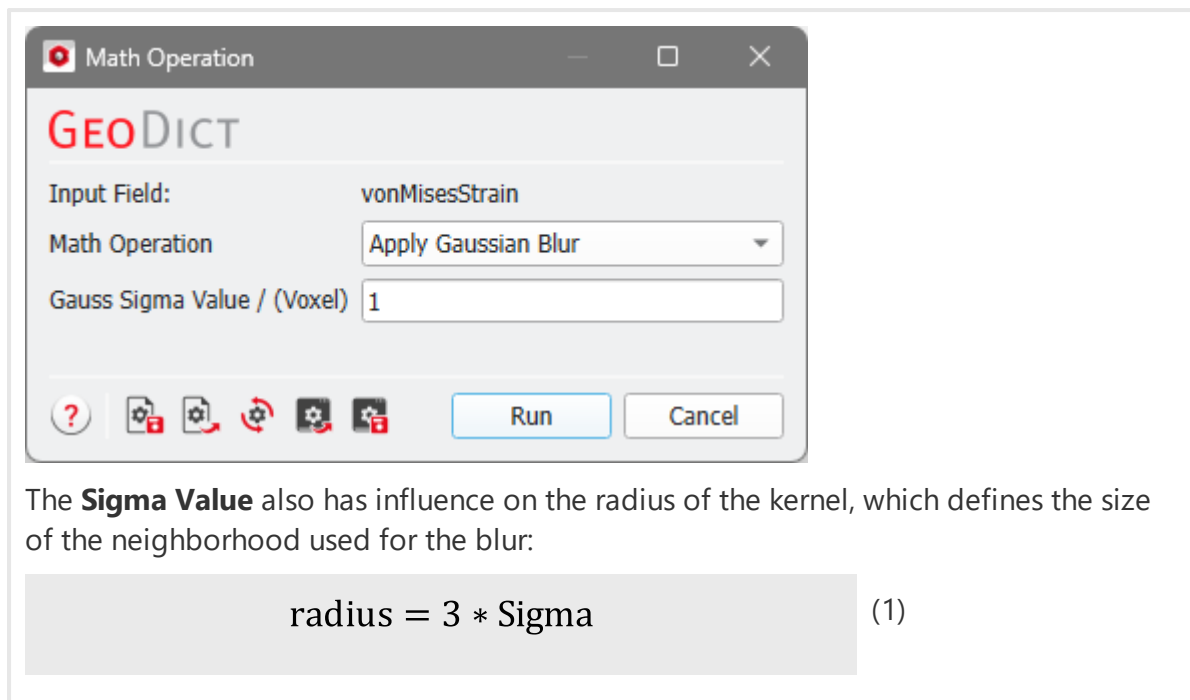
Multiply each entry in the volume field by a constant factor.



✓ Apply Gaussian Blur

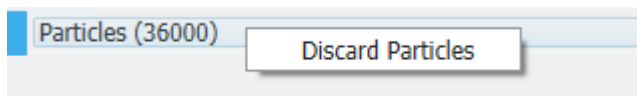
A **Gaussian Blur** can be used to remove noise in a volume field. In this sense it is similar to a local mean filter.

Choose a voxel number larger than 0 to blur the volume field with a Gaussian kernel of the given size. The **Gauss Sigma Value** is the standard deviation of the Gaussian function. The higher the standard deviation, the more blurred the volume field becomes.



Particles

If Particles are loaded into the GeoDict memory, the number of particles is shown in the status section.



With a right-click, the option to **Discard Particles** is available, which is the same as the [Discard Particles](#)¹⁷ option from the File menu.

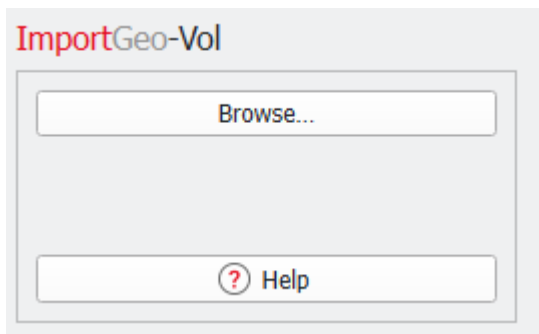
1.3.4 Module Section

In the **Module Section** you can edit parameters and start generations or computations using one of the available GeoDict modules.

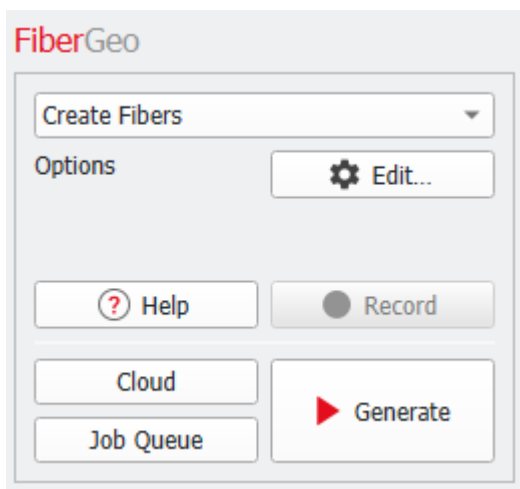
The heading of the **Module Section** changes to the GeoDict module selected from the menu bar. The GeoDict modules are organized into:

- modules to Import and pre-process files and 3D image data,
- generator and structure-modifying modules to Model microstructures,
- modules to Analyze your structure,
- simulation modules to Predict properties,
- and modules to Export files to other formats.

For the Import modules, there is a **Browse...** button for choosing files that you want to import into GeoDict.



For all other modules, the module section contains a pull-down menu, from which you can choose a command to execute.



The **Edit...** button opens the **Options Dialog**, where you can modify the necessary parameters for the GeoDict generators, modifiers, or solvers.



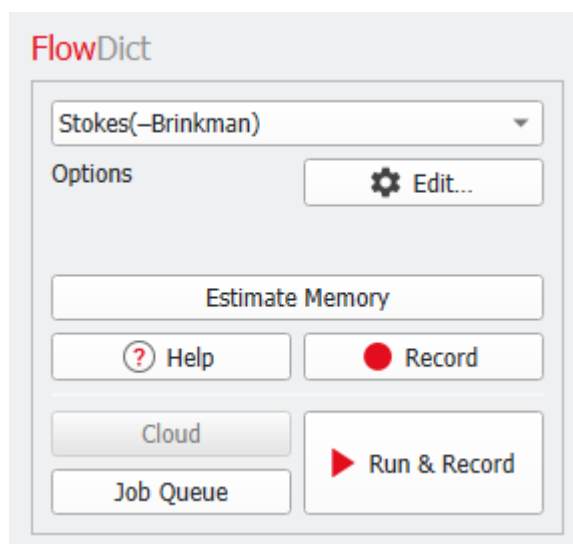
- Opens the corresponding User Guide section.
- Saves the settings to a GeoDict settings file (*.gps).
- Loads the settings from a GeoDict settings file (*.gps) or a GeoDict result file (*.gdr).
- Resets all parameter settings to the built-in default settings.
- Resets all parameter settings to the saved start-up settings.
- Saves the current parameter settings as start-up settings.

Each option is explained by a tooltip which appears when resting the mouse over the icon.

The **Help** button directly links to the chapter of the User Guide where the chosen command is explained. The Help button is also available in the options dialogs that open when clicking on **Edit**.

Depending on the module, the button **Generate** is named differently (e.g., **Run** or **Export**) and specifies the particular modifying process. Clicking the button starts the execution of the chosen command.

The module section includes a **Record** button (except for the Import modules), which is selectable when **Macro** → **Start Macro Recording...** is selected in the menu bar. Clicking **Record** records the settings and actions of the module without obtaining the results (yet), while **Run & Record**, which appears instead of **Run** after starting macro recording, starts the computation and additionally records the action in the macro file.



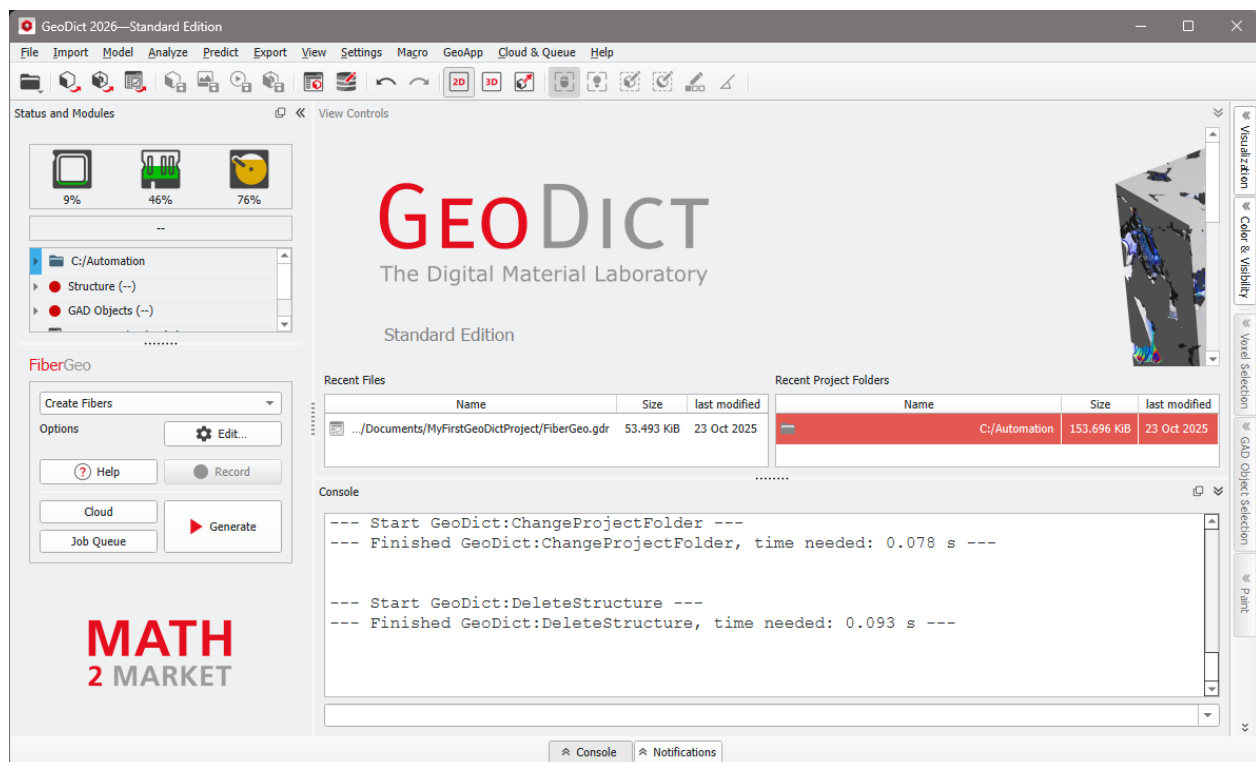
For some modules, the module section includes an **Estimate Memory** or **Estimate Memory & Disk-Space** button, that becomes active for the functionalities that support such an estimation. It allows you to estimate the memory (and disk-space) required for the computation before starting the computation.

The button **Cloud** allows to perform the calculations in the GeoDict Cloud and with **Job Queue** run the calculation on machines connected in your local network. If interested in cloud simulations or job queueing, contact Math2Market to apply for a GeoDict cloud or job queueing license.

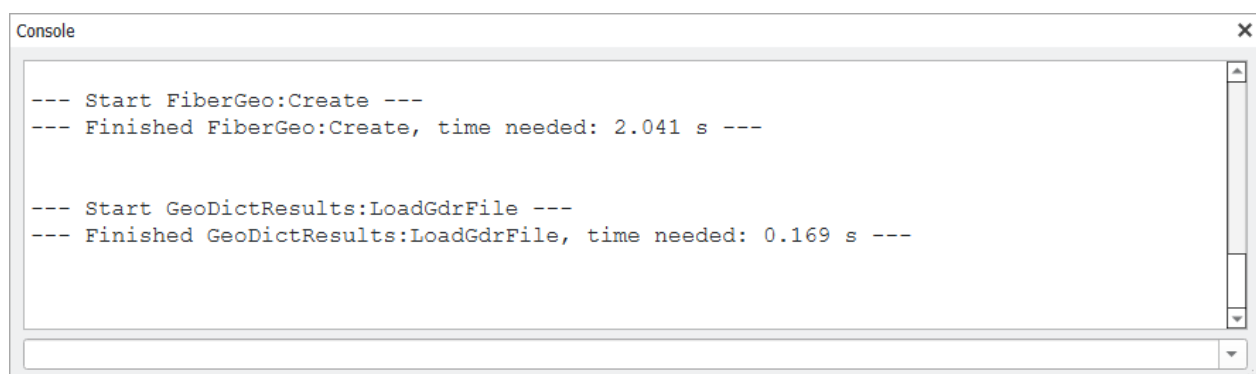
The use of the modules is explained in the sections for each module.

1.4 Console and Notifications

The console and notifications panels are located at the bottom of the GUI, under the visualization area. The **Console** panel is a textual GUI window and log viewer. The console allows you to read the system logs, help find certain ones, monitor them, and filter their contents. Additionally, you can enter and execute python commands directly in the console. For examples, see typing commands in console [below](#)⁸⁷.



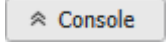
The **Console** and **Notifications** panels can be undocked and turned into a dialog that can move around. Undocking is done by clicking the  icon, located at the top right after expanding. Although still minimized if the GeoDict GUI is minimized, the dialog can be moved independently on the screen.



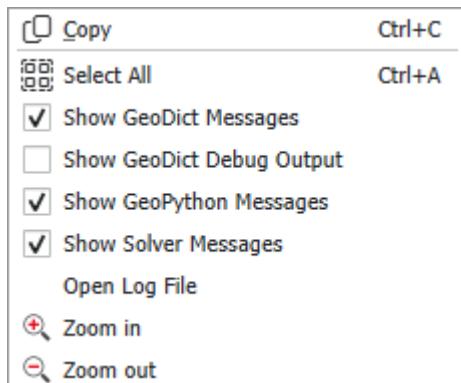
To connect the dialog with the GUI again, drag and drop it to its place at the bottom of the GUI or simply close the dialog, by clicking on .

✓ Console

GeoDict provides an interactive console within the GUI. All commands running from the GUI are displayed in the console.

The console panel can be folded and unfolded by clicking on the  icon in the bottom of GeoDict.

A right click in the console panel provides further options to filter and read the information displayed. Text in the console can be marked with the cursor and exported to another program by using **Copy**. With **Select All** the whole text in the console is marked.

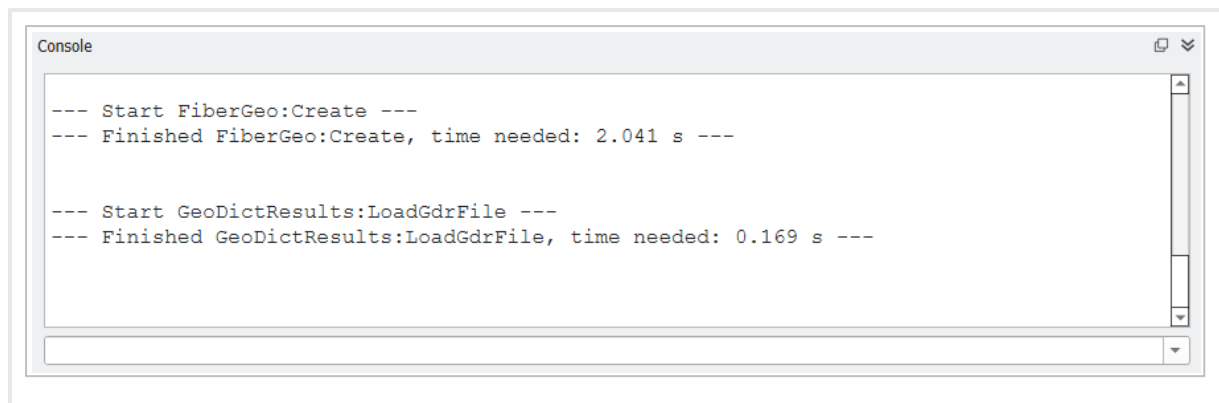


The console content is grouped in four different kinds of messages. Each group has its own color and you can decide which of them to show by checking the corresponding boxes.

- **Show GeoDict Messages:** all direct GeoDict messages. These messages are black for light mode and white for dark mode.
- **Show GeoDict Debug Output:** GeoDict commands may have additional output intended to help localizing bugs and measuring performance. These messages are blue.
- **Show GeoPython Messages:** show output from GeoPy macros and functions. These messages are green.
- **Show Solver Messages:** show messages from GeoDict solvers, e.g., convergence progress. These messages are purple.

During each GeoDict session a log file, that contains all outputs from the console, is written and saved in %username%/GeoDict2026/log (Windows) or %username%/.geodict2026/log (Linux). With **Open Log File** it is opened in the chosen text editor.

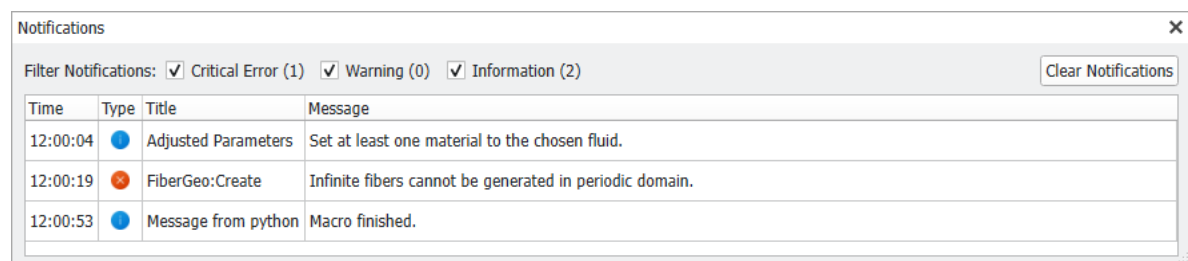
Use **Zoom in** and **Zoom out** to enlarge or reduce the font size of the console.



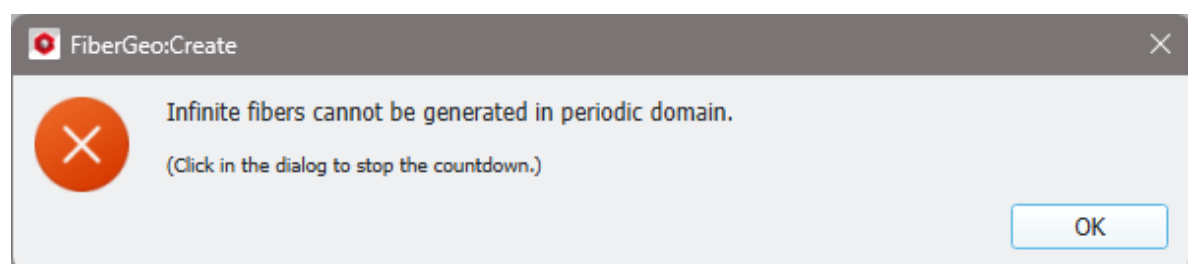
✓ Notifications

The **Notifications** panel can be opened and closed in the same way by clicking on the  **Notifications** icon.

Messages from GeoDict, which are shown in the console, are also shown in the **Notifications** panel.

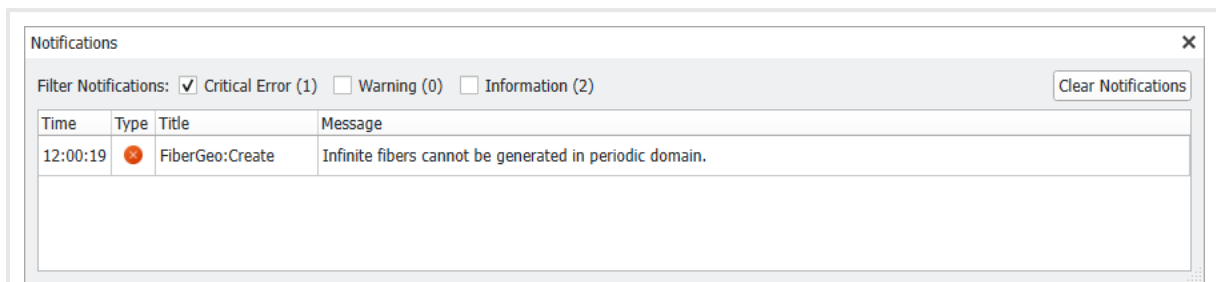


The list shows the **Time**, when a message was raised, the icon shows the **Type** of the message, also the **Title** and the **Message** itself are given. The message is fully displayed in the tooltip, which opens when resting with the cursor over the message. Double-click on a message to open the message dialog again. This is helpful, when a message box was closed, and you want to re-read the message. Another advantage is, that you do not have to scroll through the console, where other output from GeoDict is listed.



With a right click in the corresponding field in the **Notifications** panel the title and the message text can be copied to the clipboard to save them, e.g., in a text editor.

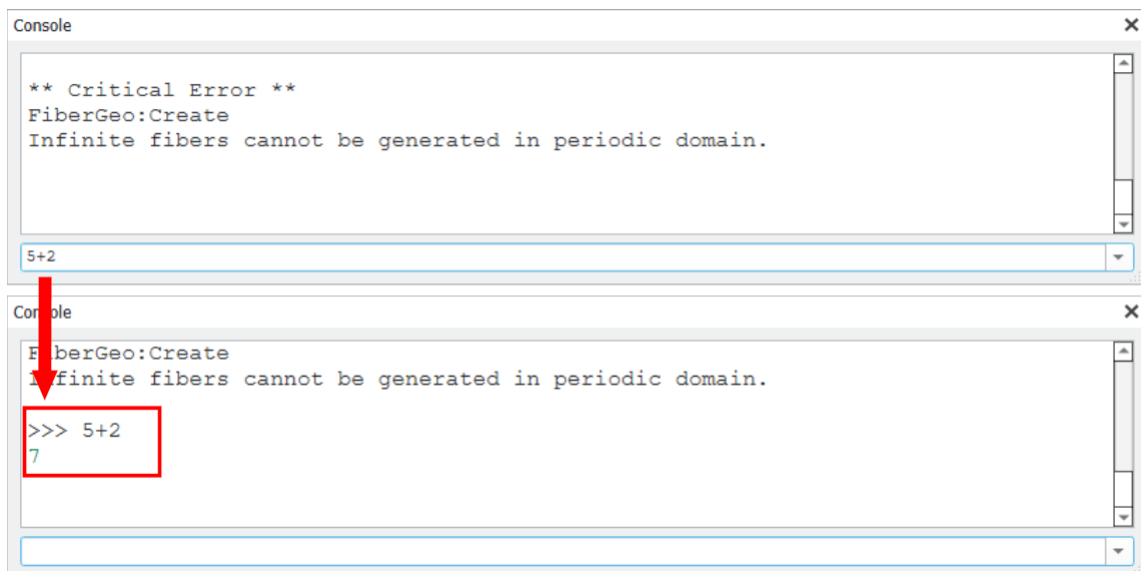
With the filter options it is possible to show only **Critical Errors**, **Warnings** and/or **Information**.



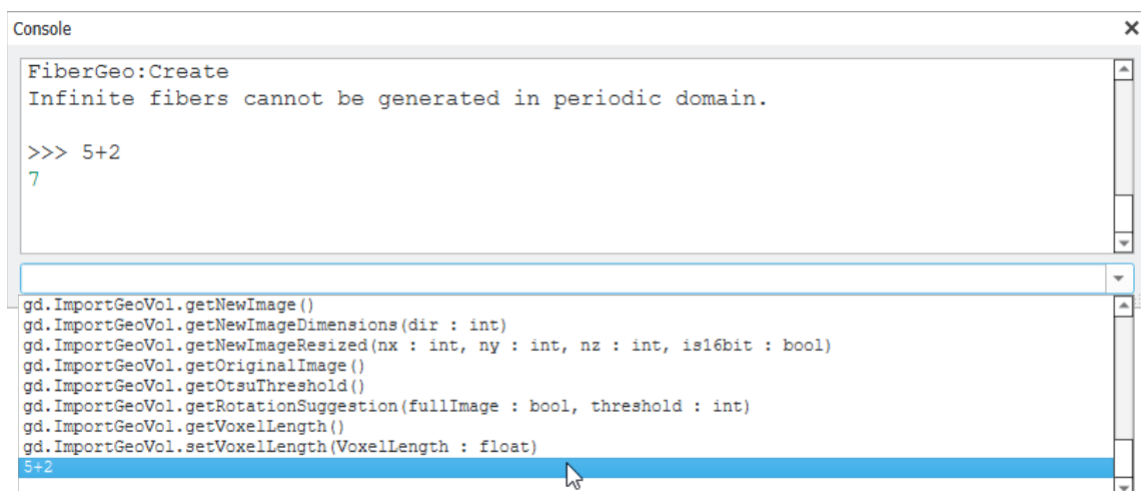
Click on **Clear Notifications** to delete all messages from the list.

✓ Typing Python commands in the console

The box below the console can be used to run Python commands. One command line at a time can be inserted, and it is run by pressing **Enter** on the keyboard.



Unfolding the pull-down menu of the box shows the last used commands and some standard commands from the GeoDict Python [API](#).



Besides, variables can be used. Store information in a variable for later use as, for

example, the Python dictionary of the current FiberGeo parameters:

`FiberGeo_Create = gd.getCurrentSettings('FiberGeo:Create')`

Typing the variable name again displays the value in the console. In the example, the Python dictionary from the FiberGeo **Create Options** dialog is shown.

`FiberGeo_Create`

Console

```
Built-in default settings restored.
>>> FiberGeo_Create = gd.getCurrentSettings('FiberGeo:Create')
>>> FiberGeo_Create
{'ResultFileName': 'FiberGeo.gdr', 'MaterialMode': 'Material', 'MaterialIDMode':
```

The variable value can be changed at any time by assigning a new value to the variable, using the equal sign. Changing only one entry of a dictionary is done by referring to the entry's key in square brackets. The new value is assigned using the equal sign.

Console

```
'StoppingCriterion': 'SolidVolumePercentage', 'SolidVolumePercentage': (10, '%')
FiberGeo_Create['SolidVolumePercentage'] = (50, '%')
```

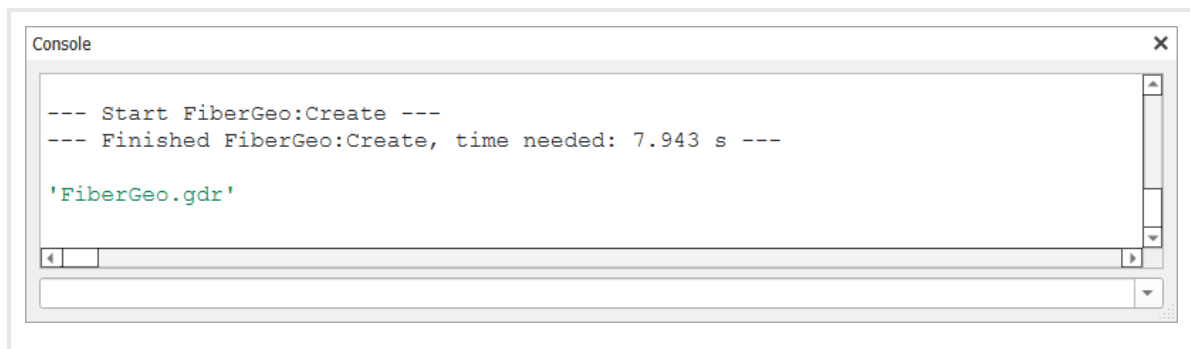
`FiberGeo_Create`

Console

```
'StoppingCriterion': 'SolidVolumePercentage', 'SolidVolumePercentage': (10, '%'),
'StoppingCriterion': 'SolidVolumePercentage', 'SolidVolumePercentage': (50, '%')
```

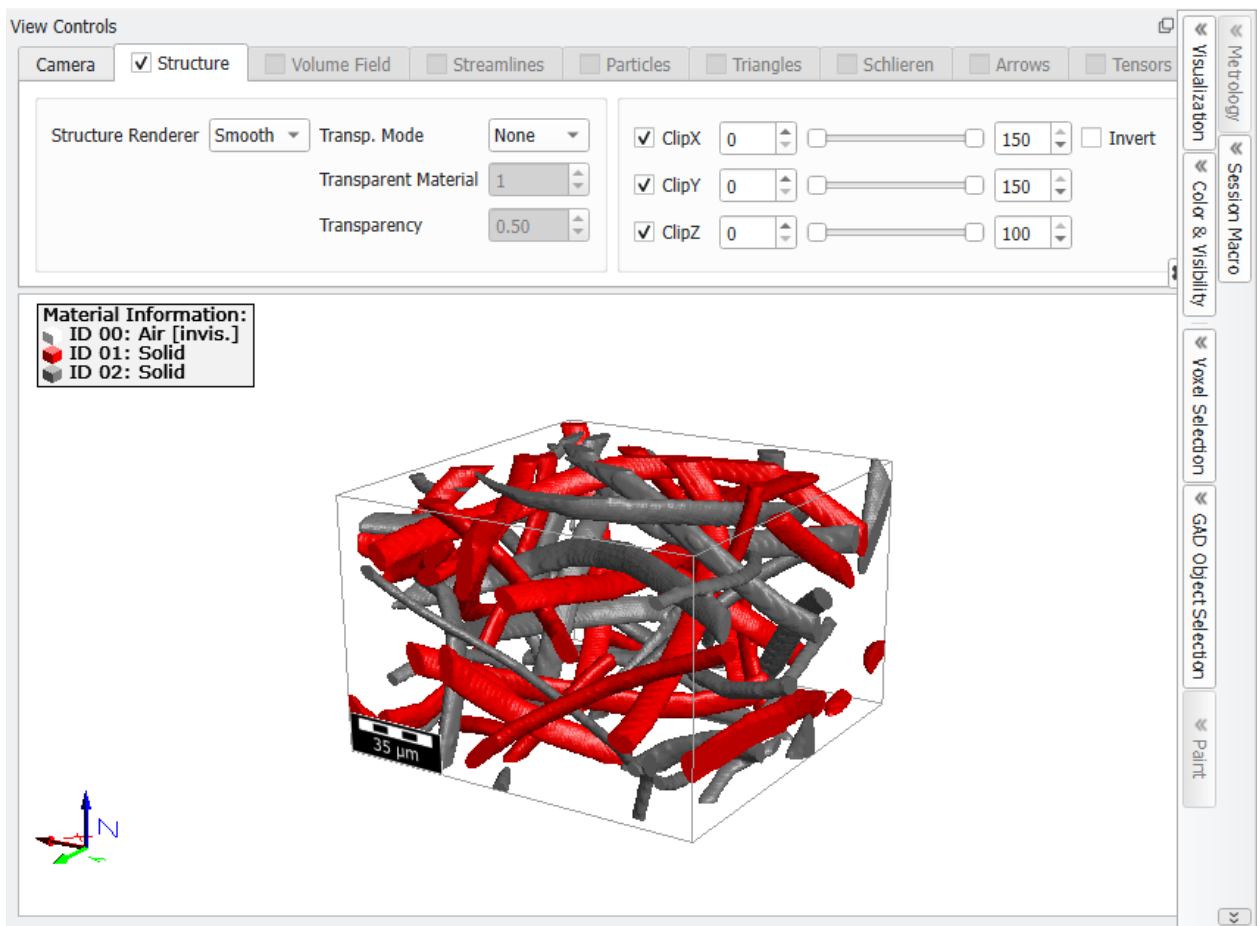
Now FiberGeo can be run with a solid volume percentage of 50 instead of 10, using the Python API command **gd.runCmd()** which is described in the [API for GeoDict commands](#).

`gd.runCmd('FiberGeo:Create', FiberGeo_Create, '2026')`

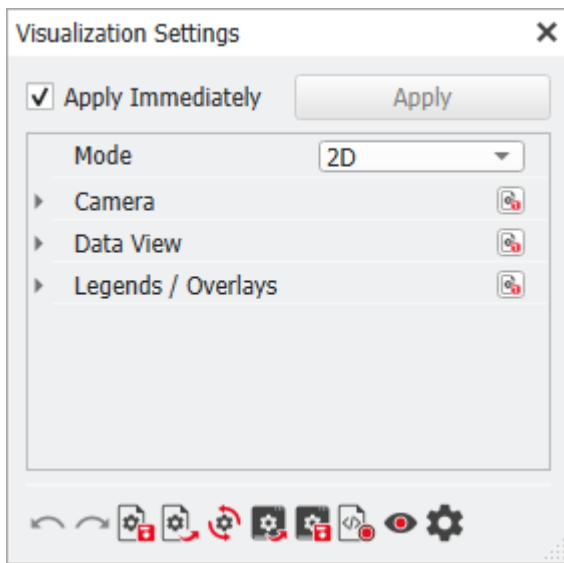


1.5 GUI Sidebar

Many functionalities for **Visualization**, **Color & Visibility**, editing and modifying on the voxel structure (**Voxel Selection**) or the analytic data (**GAD Object Selection**), modifying the Material ID of selected voxels (**Paint**), measuring distances and angles (**Metrology**), and saving the recently executed commands (**Session Macro**) are accessible directly from the GUI sidebar.



Some tabs of the sidebar are hidden if GeoDict is not in full screen mode. Expand and collapse the sidebar by clicking on the  icon at the bottom. Each dialog can also be expanded and collapsed by clicking on the  icon at the top of the tab. When expanded, the sidebar panel can be un-docked by clicking the  icon at the top of the open panel and turned into a dialog that can be moved around.



Tabs in the GUI Sidebar:

- [Visualization](#)^[91]
View your 3D and 2D results and create an impressive visualization.
- [Color & Visibility](#)^[94]
Define the color and visibility for the constituent Material IDs.
- [Voxel Selection](#)^[101]
Select and edit the voxels in your structure.
- [GAD Object Selection](#)^[109]
Select and edit the GAD objects in your structure.
- [Paint](#)^[113]
Paint in your current structure (only in 2D view mode).
- [Metrology](#)^[124]
Measure angles and distances in 2D view mode.
- [Session Macro](#)^[133]
Observe the GeoDict commands used in the current session and record them to macros.

1.5.1 Visualization

The **Visualization Settings** dialog unfolds when clicking the **Visualization** tab in the **Sidebar** of GeoDict and it covers and combines most parameters, commands, and settings that are located in the menu bar and in the **View Controls**, and also some additional parameters.

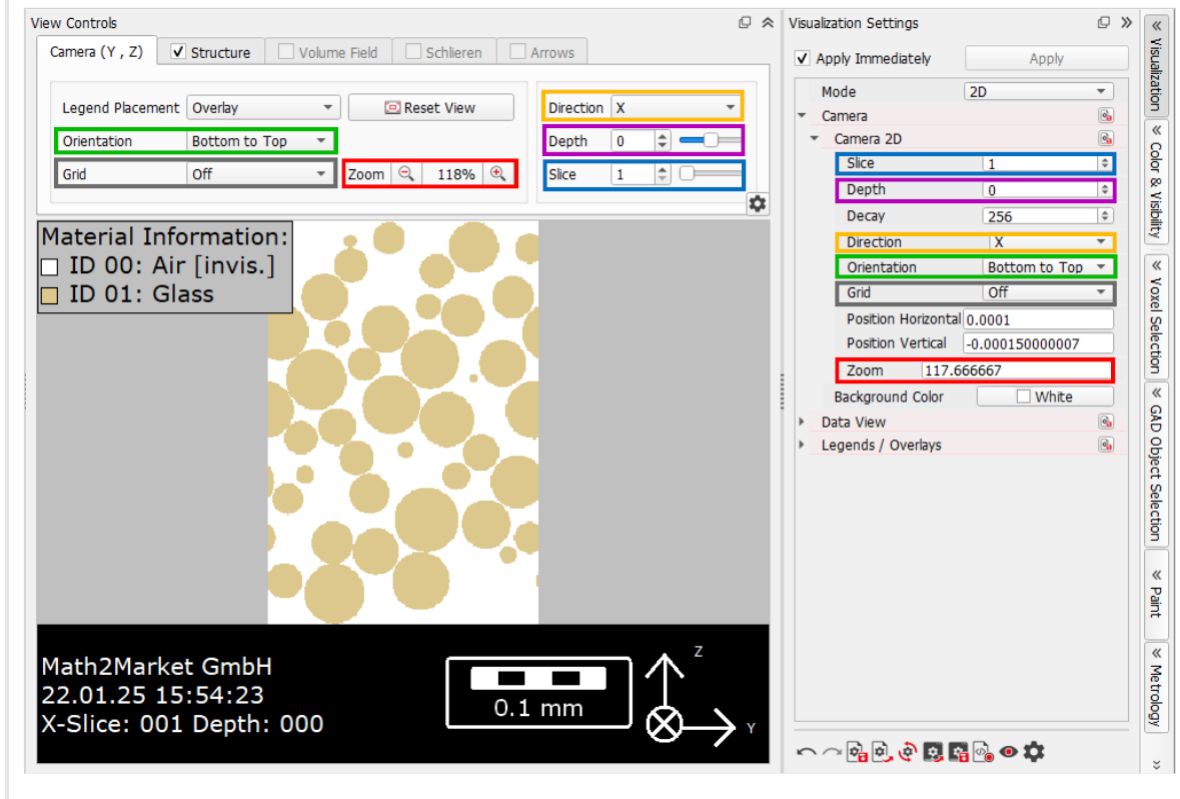
Thus, it allows to set all values for the visualization of structures and results fields obtained with GeoDict. Some of these parameters are redundant and also displayed in the **View menu** in the menu bar and the **View Controls**, but are duplicated in the GUI **Sidebar**. Others are only available in the **Sidebar**.

Collapse the **Visualization Settings** again either by clicking  in the upper right corner or by clicking the **Visualization tab** in the sidebar.

The **Visualization Settings** can be undocked by clicking the corresponding icon  in the upper right corner. Close it by clicking  in the upper right corner.

✓ Doubling of Visualization Options

In the description of the visualization options, many options are shown in both, the **View Controls** panel and the **Visualization** tab of the sidebar. For example:

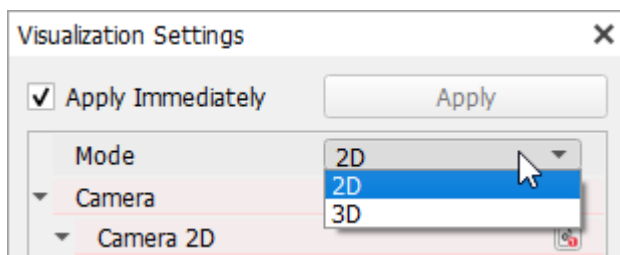


✓ General Options

Initially, only visualization settings related to the current structure are shown in the dialog.

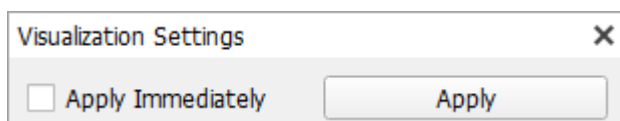
Clicking the gear wheel icon  in the bottom right of the **View Controls** opens the **Visualization Settings** dialog automatically to the corresponding section.

In the example above, the structure is shown in 2D cross section view in the Visualization area and, when opening the **Visualization Settings** dialog, the **Mode** is automatically selected as **2D** and all parameters concerning the display are listed in the panel. This feature simplifies changing the values of these parameters, as it is not necessary to search for them in the menu bar or in the **View Controls**. The selection of the **Mode** to be **2D** or **3D** affects the choices of settings for these two ways of rendering.



Tooltips guide you through the parameters of the **Visualization Settings** dialog, when resting the cursor on the respective parameters.

All settings changed in the **Visualization Settings** dialog are applied directly if **Apply Immediately** is checked. When the checkbox is disabled, the **Apply** button becomes clickable to apply the changes only when the user decides to do it.

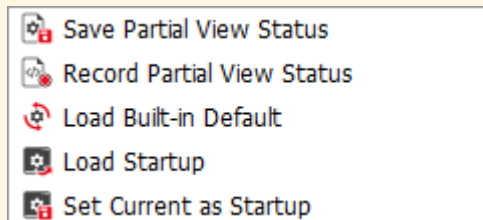


Know how! On the bottom of the **Visualization Settings** dialog, a group of icons controls the following in regard to visualization. Resting the mouse pointer over an icon prompts a tooltip showing the icon function to appear. For example, through them, it is easy to save *all* the current view settings and reload them:

	Undos the last change in the view settings.
	Redos the last undo.
	Saves the current view settings to a GeoPy (*.py) file.
	Loads view settings from a GeoPy (*.py) file.
	Resets all view settings to the built-in default settings.
	Resets all view settings to the saved start-up settings.
	Saves the current view settings as start-up settings.
	Records the current view settings in the session macro. If a macro is recording, the current view settings are also recorded to the macro.
	Synchronize the visualization settings of two GeoDict instances on the same Computer to compare structures and volume fields.
	Shows all visualization settings. If not selected, only the view settings affecting the current visualization are shown.



Know how! Additionally, many view settings can be saved and loaded partially by clicking on the corresponding icon  next to the setting parameter.



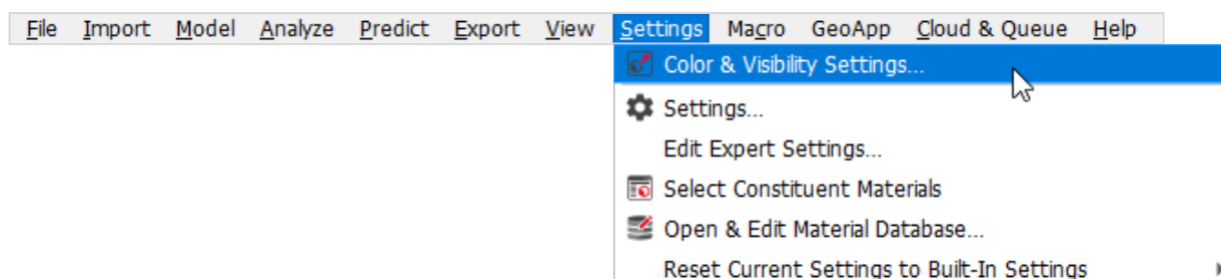
- **Save Partial View Status** saves all settings corresponding to the selected section in a GeoPy macro (*.py) and can be applied whenever needed by selecting Macro Execute Macro / Script from the menu bar. To learn more about how to record, execute and edit macros refer to the GeoPy scripting chapter.
- **Record Partial View Status** records the settings corresponding to the selected section to the macro currently recording. When no macro is recorded, nothing happens when selecting this option.
- **Load Built-in Default** loads the built-in default values only for the selected section.
- **Load Startup** loads previously saved custom start-up settings for the selected section. If no custom start-up settings were saved, the built-in default values are loaded.
- Use **Set Current as Startup** to set the current settings as start-up settings for the selected section.

1.5.2 Color & Visibility

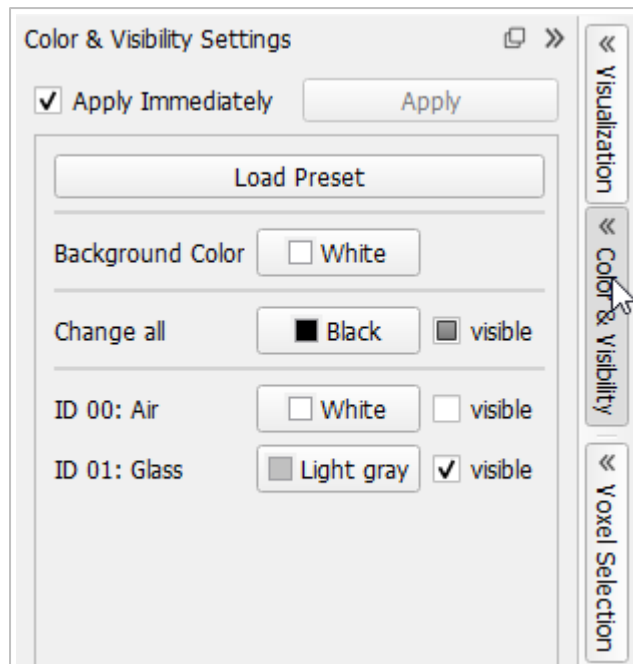
Define the color and visibility of your materials.

The **Color & Visibility Settings** are available from three different places:

- the **Settings** menu in the menu bar.



- the **Color & Visibility tab** in the GUI **Sidebar** on the right side,

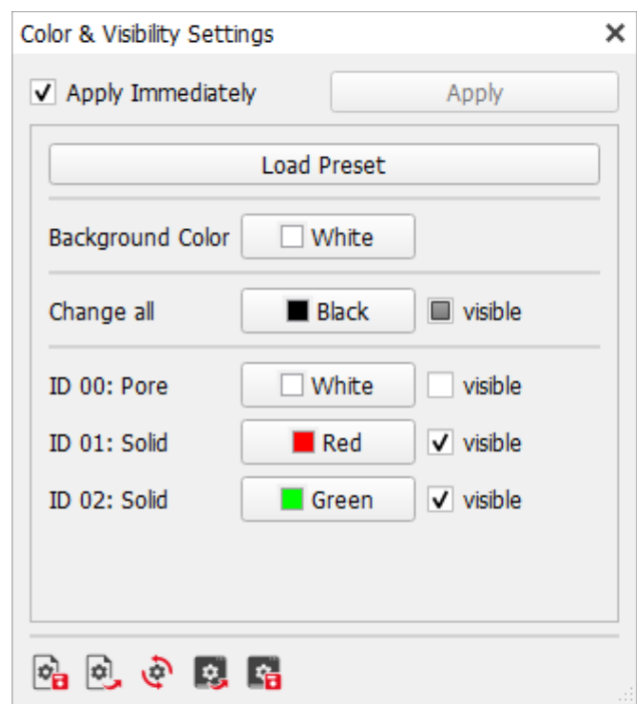
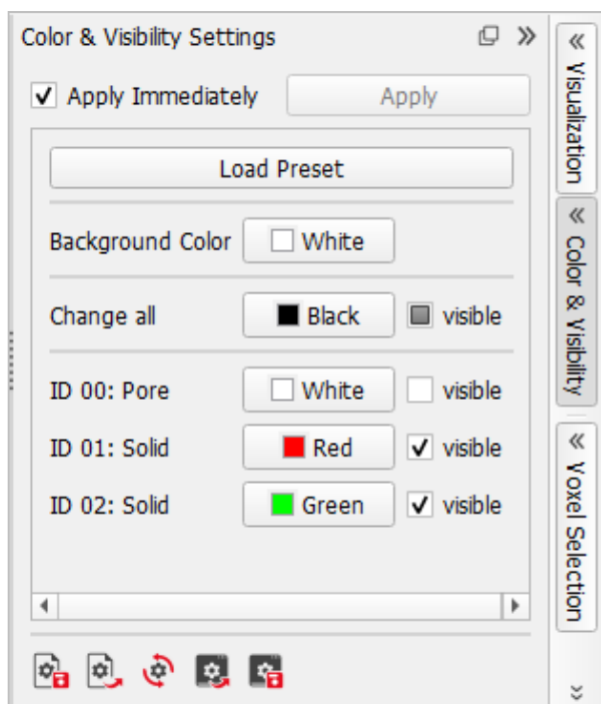


- or clicking the  icon in the toolbar.

In all three cases, the **Color & Visibility Settings** open as a panel that can be also undocked from the GUI by clicking  in the upper right corner.

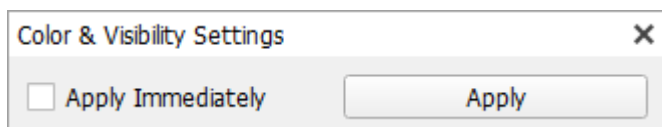
The **Color & Visibility Settings** can be collapsed either by clicking  in the upper right corner or by re-clicking the **Color & Visibility** tab in the GUI **Sidebar**.

The undocked **Color & Visibility** dialog can be closed with  in the upper right corner.



The default color settings, applied to the background and materials during the generation with GeoDict, can be changed through the **Color & Visibility Settings** dialog. While up to 256 material IDs can be present in a structure, only the colors for the IDs contained in the current structure can be edited.

All settings changed in the **Color & Visibility Settings** dialog are applied directly if **Apply Immediately** is checked. When the checkbox is disabled, the **Apply** button next to it is enabled to apply the changes only when desired.



Know how! The icons at the bottom of the dialog can be used to:

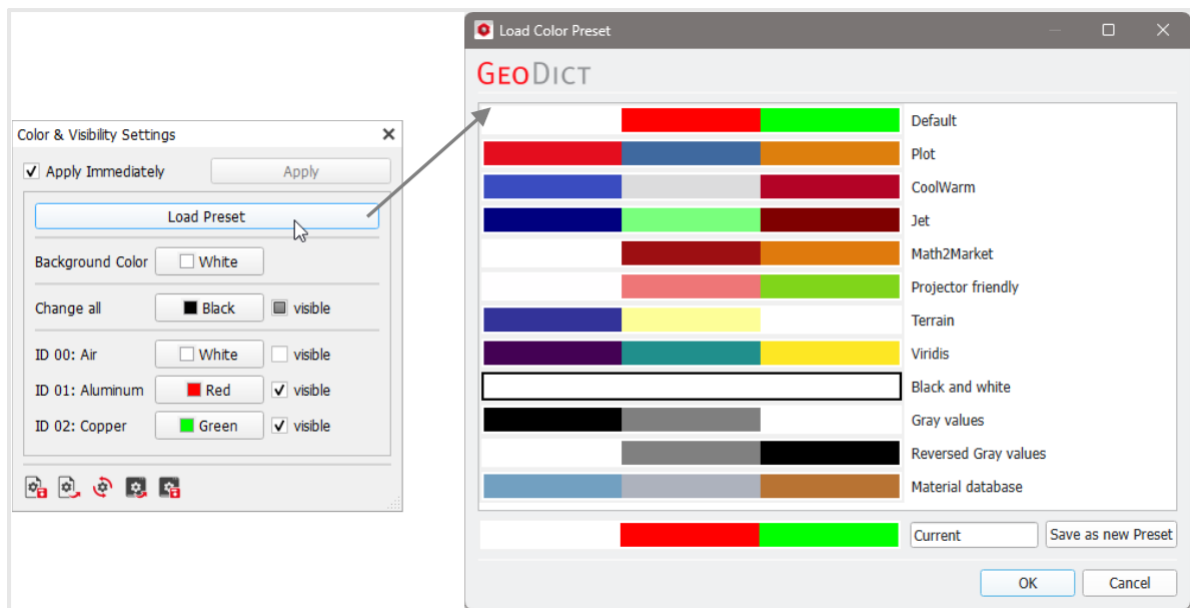
-  Saves the settings to a GeoDict settings file (*.gps).
-  Loads the settings from a GeoDict settings file (*.gps) or a GeoDict result file (*.gdr).
-  Resets all parameter settings to the built-in default settings.
-  Resets all parameter settings to the saved start-up settings.
-  Saves the current parameter settings as start-up settings.

Each option is explained by a tooltip which appears when resting the mouse over the icon.

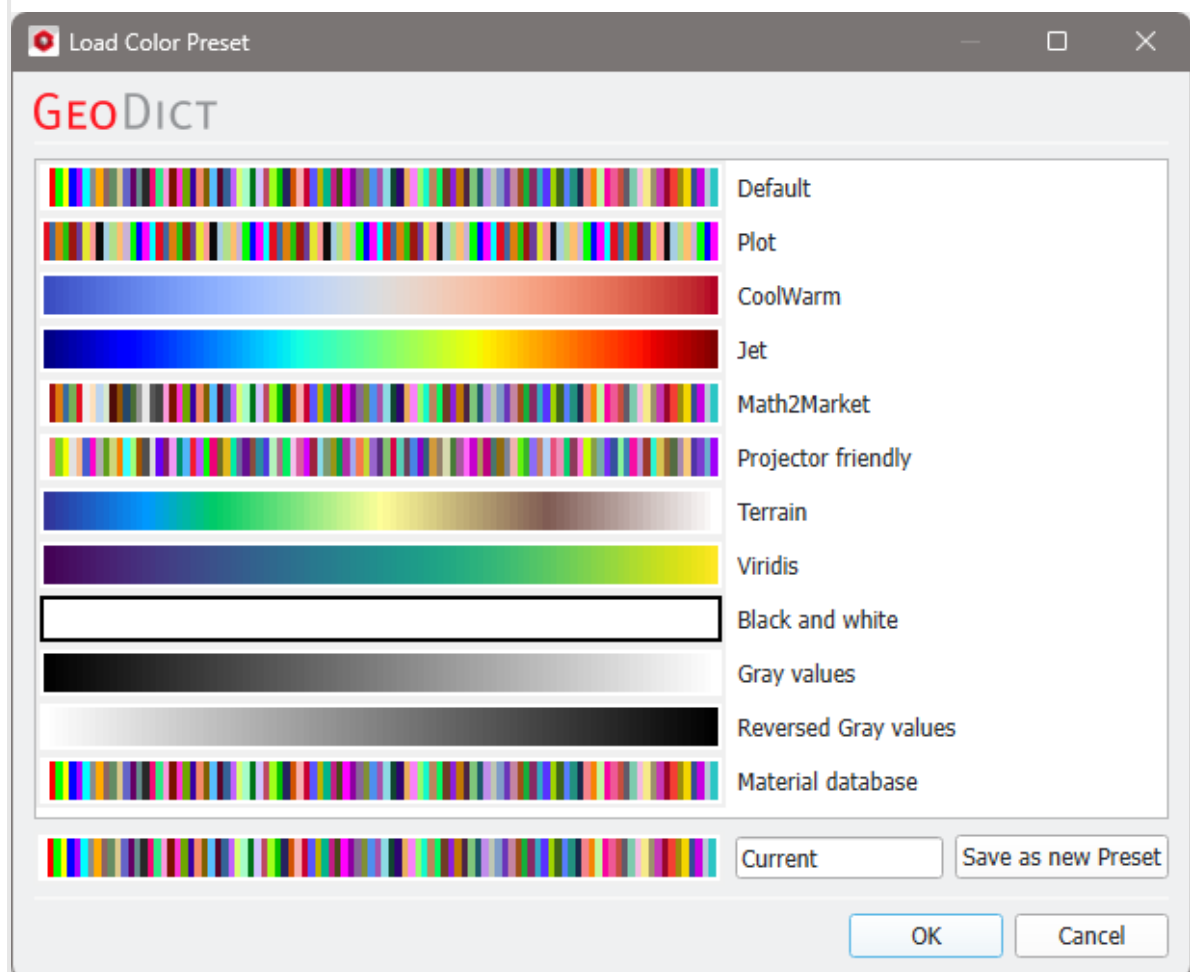
✓ Color Presets

A color preset is a group of colors that are applied together.

Click **Load Preset** and, in the **Load Color Preset** dialog, select whether to display the generated structure's material using one of the presets.

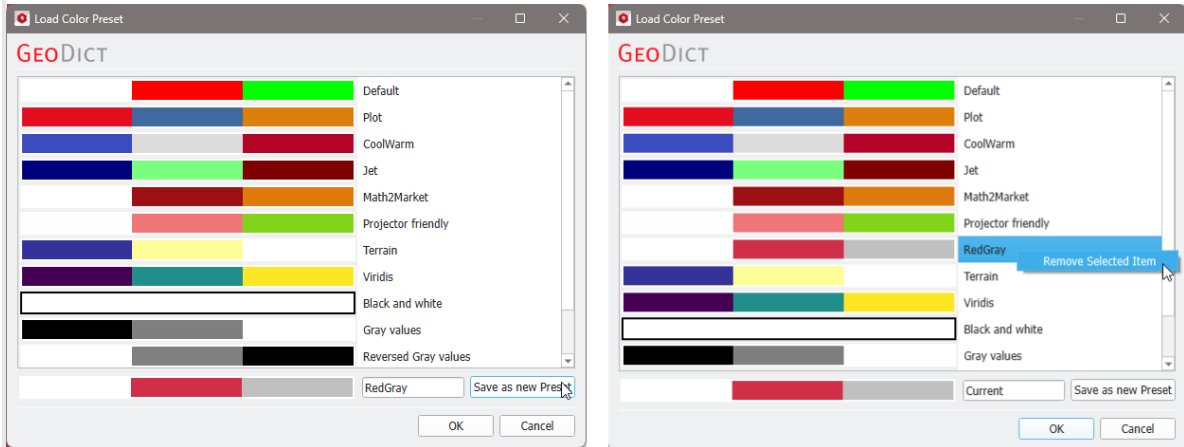


The number of colors shown in the preset previews depends on the number of materials present in the current structure. If for example 100 IDs are present, the dialog looks as follows:

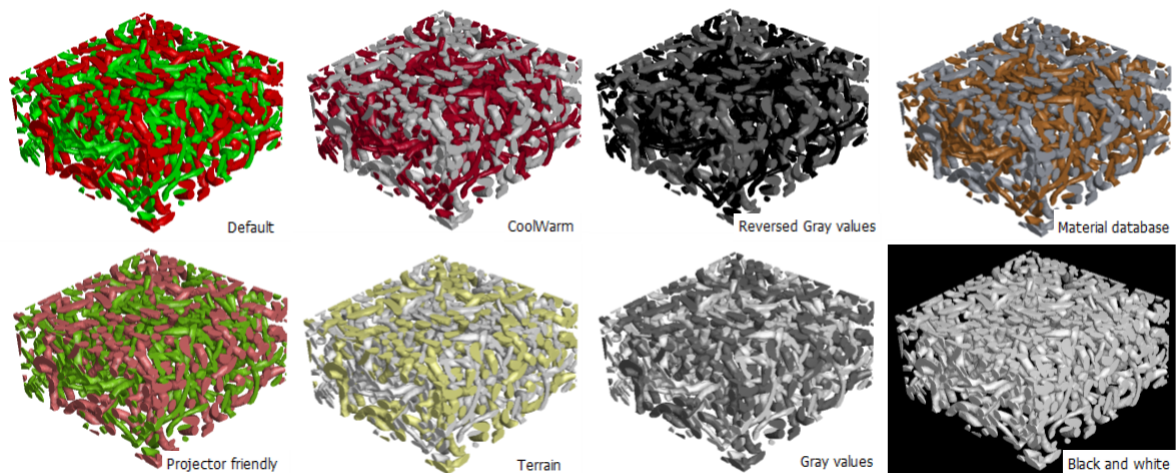


You may select new colors through the buttons in the **Color & Visibility Settings** dialog

and save the current group of colors as a preset (**Save as new Preset**), to have it appear in the list of color presets later. The preset can be removed anytime by right-clicking on it and selecting **Remove Selected Item**.

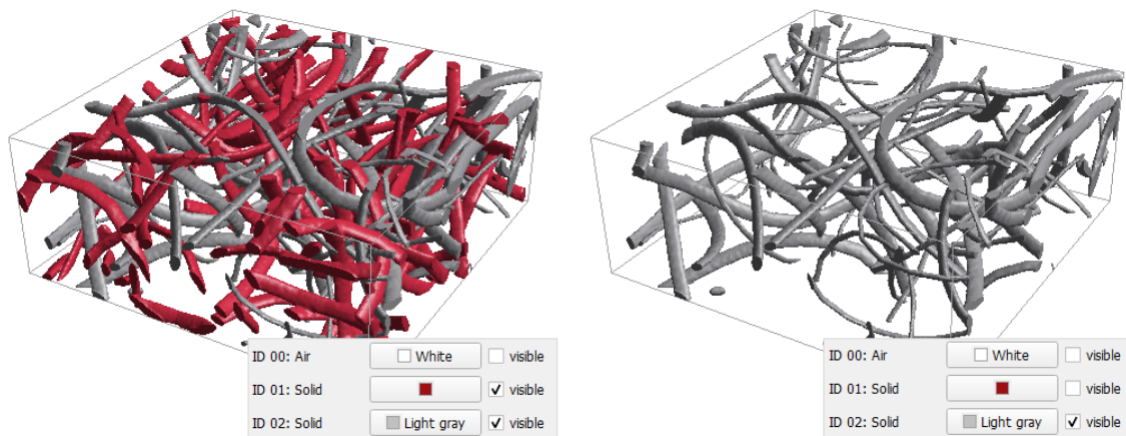


In the following, find some of the color presets applied to our example structure:



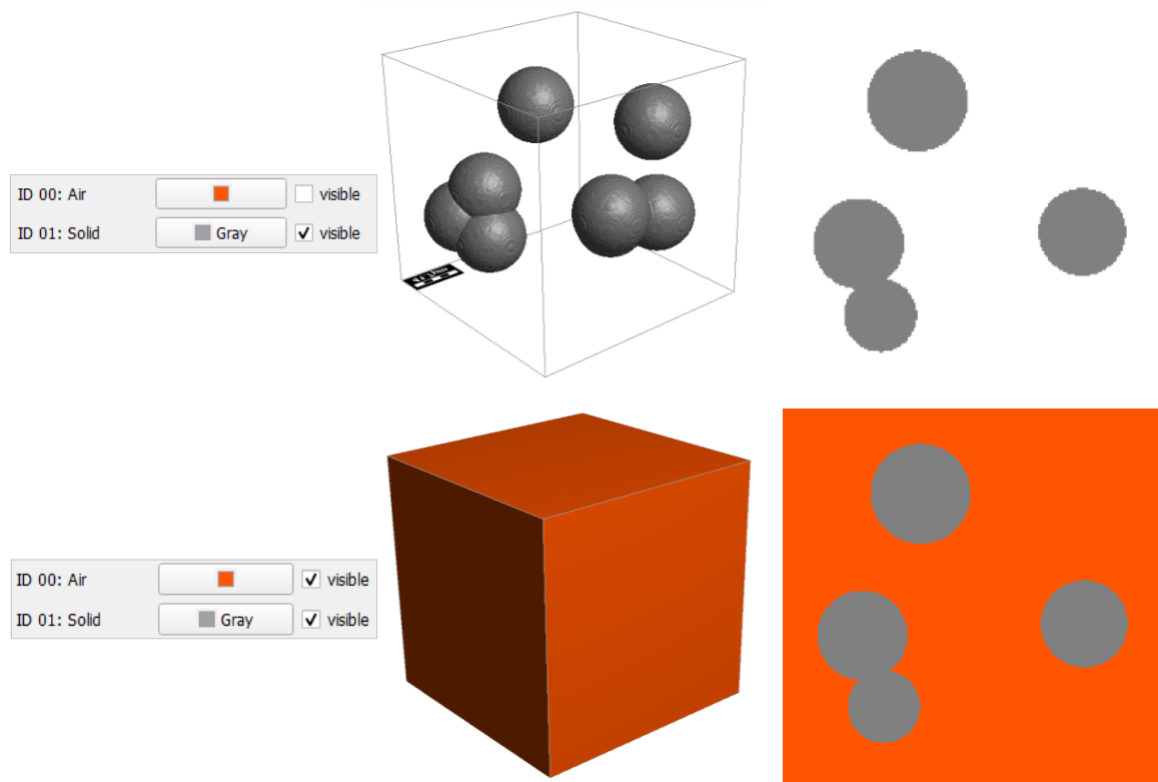
✓ Visibility of Materials

The visibility of the materials in the structure, for example of Material **ID 01**, is controlled by checking or unchecking ☐ **visible**. In the example below, material **ID 01** is still present in the structure, but it is just not visible.



By default, the Material **ID 00** is the background material surrounding the objects, inside the domain indicated by the bounding box. In the default settings, the visibility of Material ID 00 is unchecked, to be able to see the objects in the structure in 3D rendering, and the color is white.

The color and visibility of Material ID 00 can be changed. In this example, this has the effect of showing a block in 3D rendering that corresponds to the domain, in the color selected for Material ID 00 (here, orange).



✓ Change Colors

To change the color selected for a material from the default (e.g., Dark gray) to another color (e.g., yellow), click the button for the color (here: dark gray) and select the yellow color from the table.

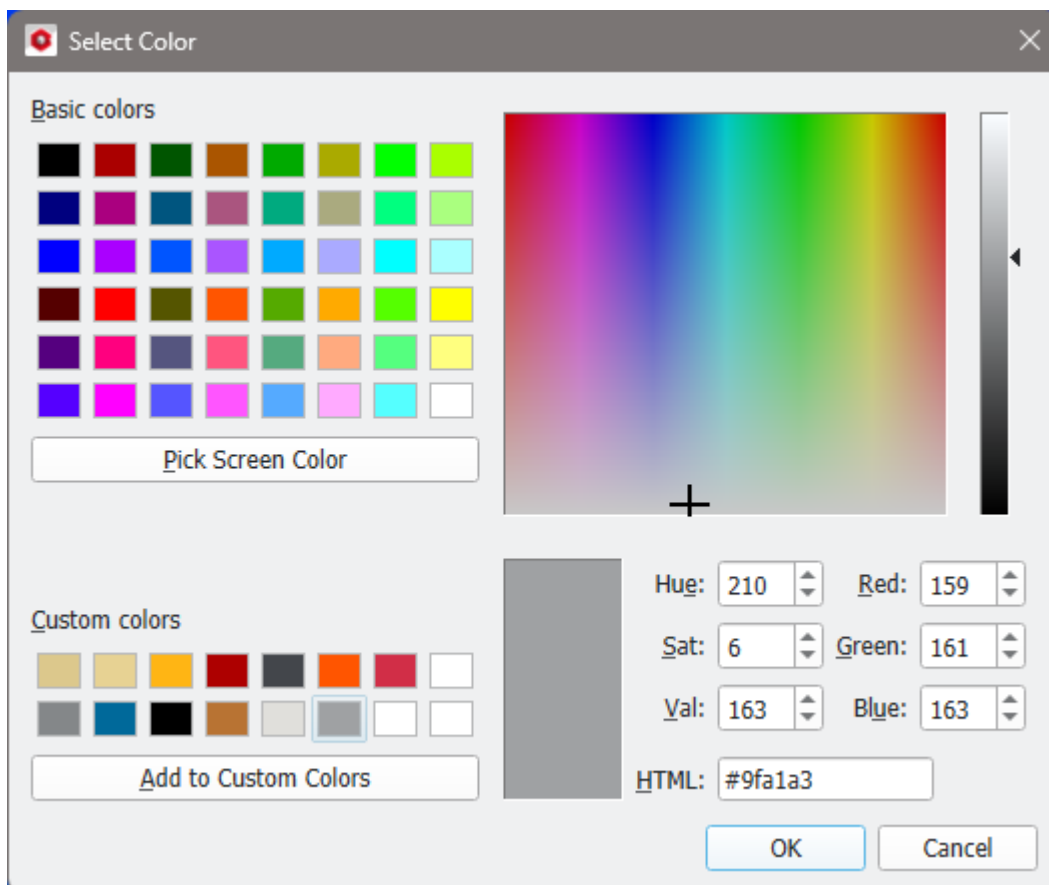


To change the default color to a user-defined color, select the three-dots icon.

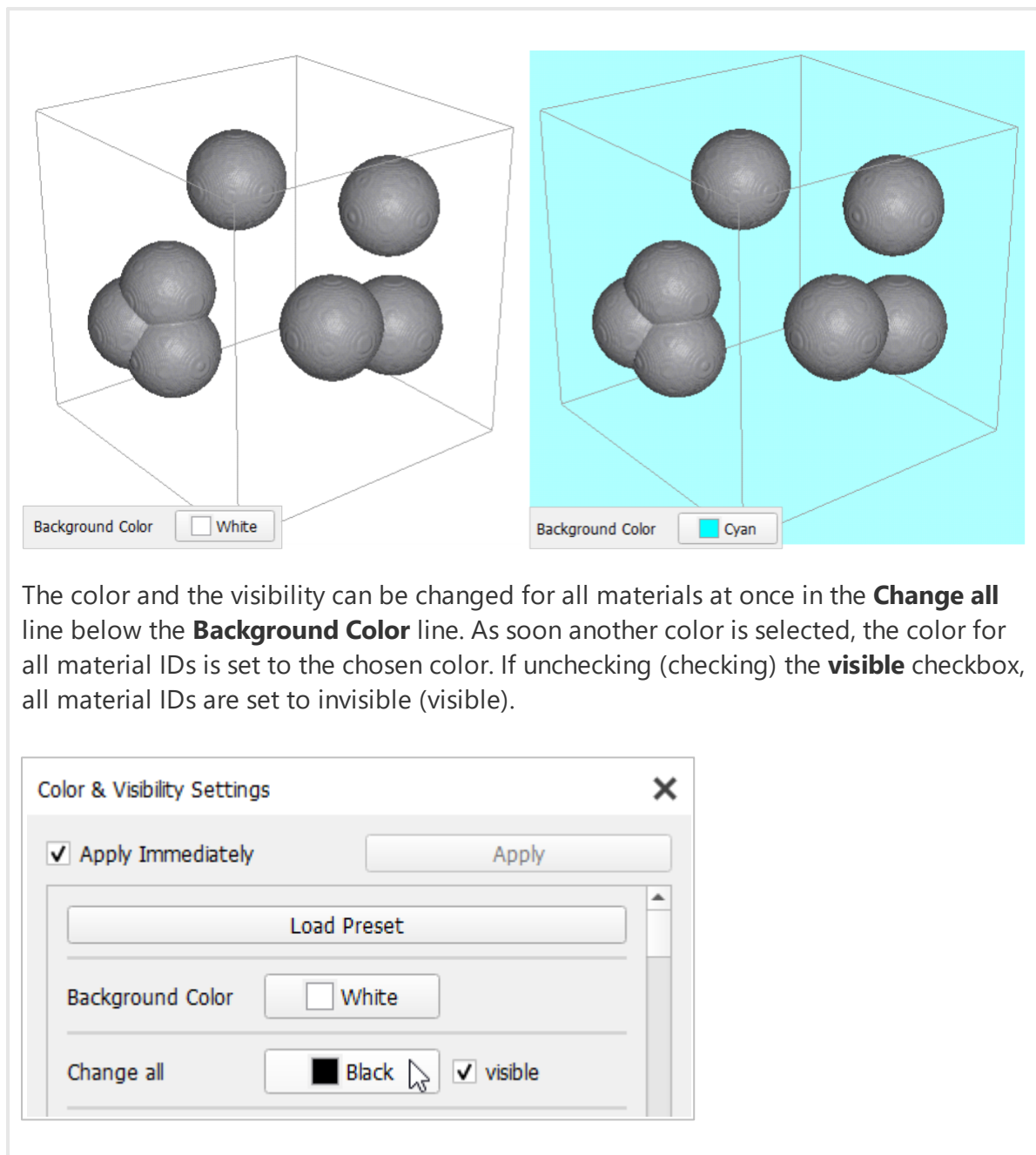


In the opening **Select Color** dialog enter the RGB values that define the color and click **Add to Custom Colors**. Alternatively, the rectangle for the new color can be dragged to occupy the place of the old one in the custom colors.

The new color setting is applied to the material after clicking **OK**.



The **Background Color** of the Visualization area, at the top of the Color & Visibility Settings dialog, can be changed in the same way.



1.5.3 Voxel Selection

Modification of structure models can be done on the voxel geometry or the [analytic description](#)¹⁰⁹ (GAD data) of a structure.

Edit simple or complicated microstructures by manual drawing, e.g., to correct problematic boundary effects, or remove artifacts from 3D structures built from imported 3D-image data (micro-CT, nano-CT, SEM,...).

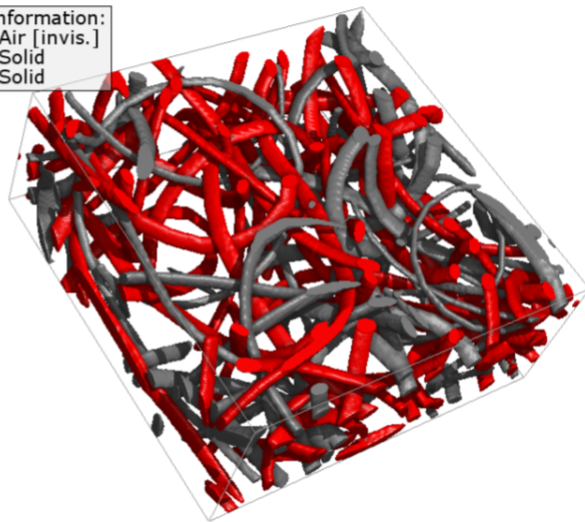
As an example, a voxel structure of a fibrous media model generated with FiberGeo is loaded (indicated by the green dot before Structure). Analytical data fitting to the voxel data is available (indicated by the green dot before GAD Objects).



Note! When editing the voxel structure, the analytic object information will not be modified! Therefore, the analytic object description in the model does not fit anymore to the loaded structure after editing. The initially green dot before **GAD Objects** turns yellow, if one of the operations listed below is applied.

- ▶ ● Structure (250x250x100, 1 μm)
- ▶ ● GAD Objects (177)

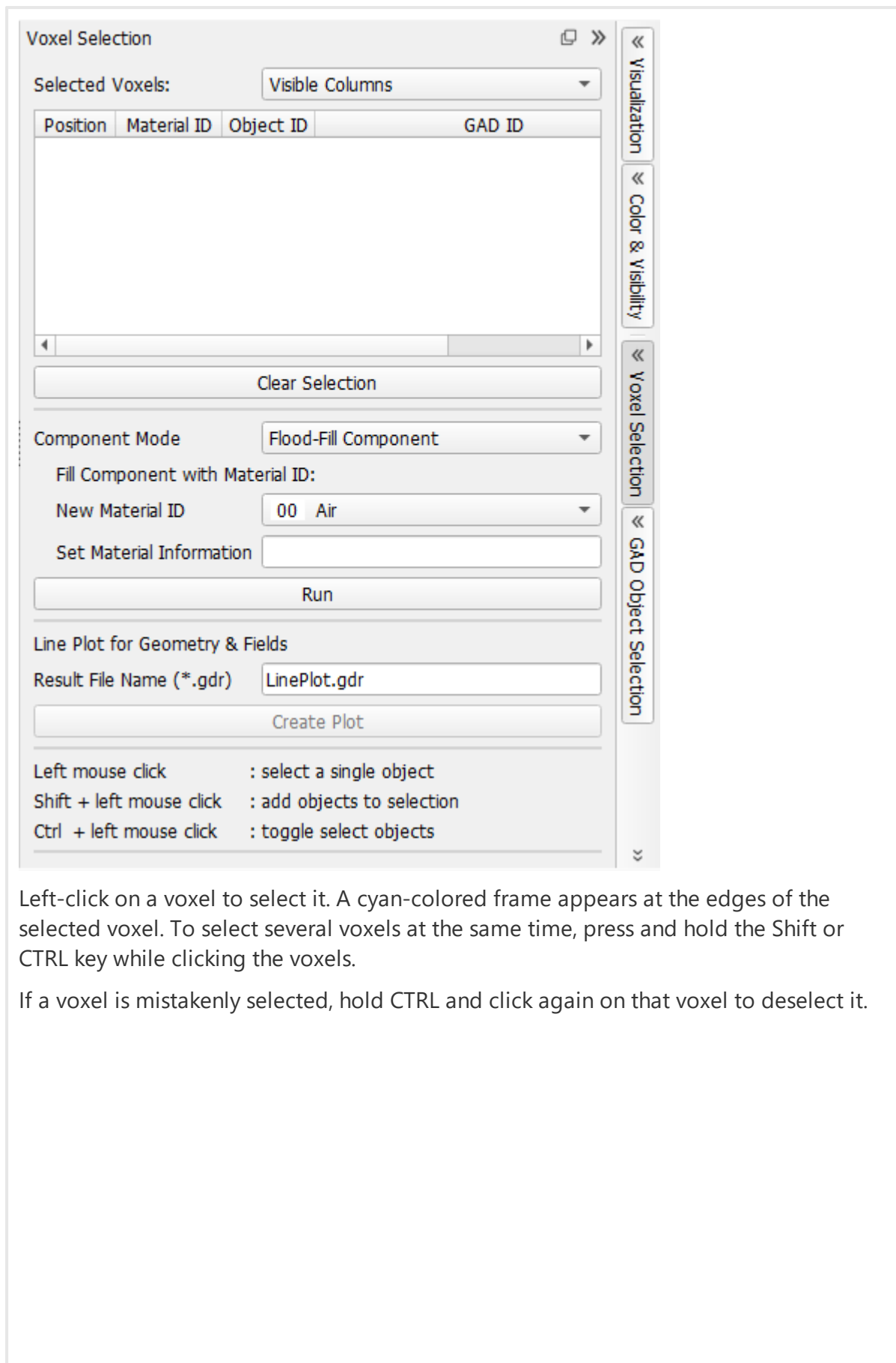
Material Information:
ID 00: Air [invis.]
ID 01: Solid
ID 02: Solid



✓ Select voxels to edit

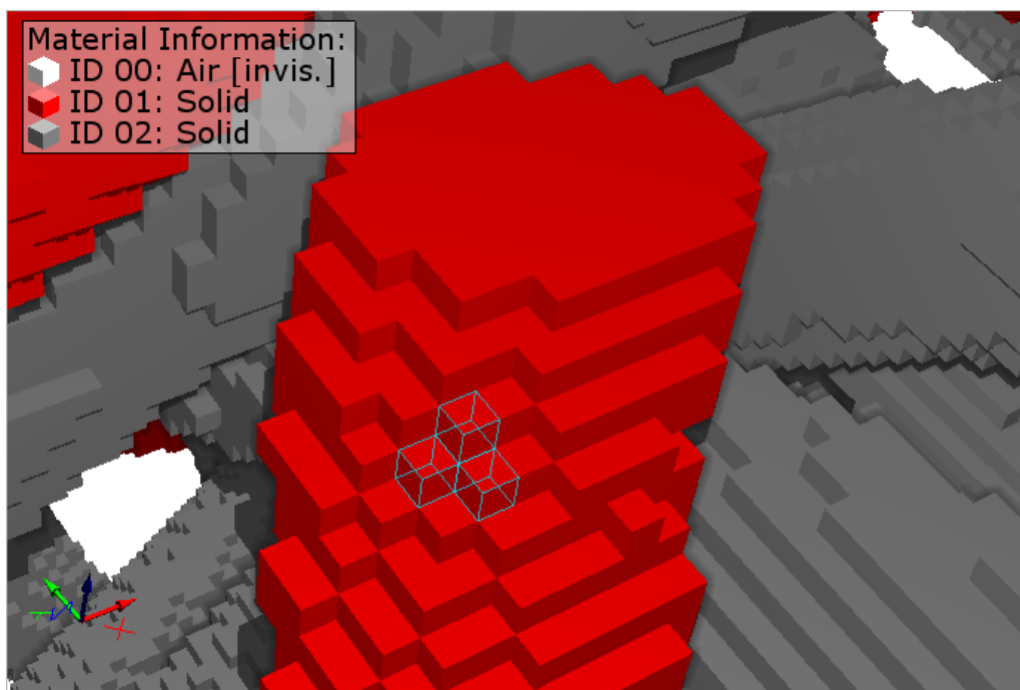
You can edit voxels in 2D Cross Section (SEM) view or in 3D Rendering. First, zoom into the structure to the voxel(s) you want to select.

To enter the **Voxel Selection** mouse mode, click the  icon in the toolbar. This also opens the **Voxel Selection** dialog from the GUI sidebar.

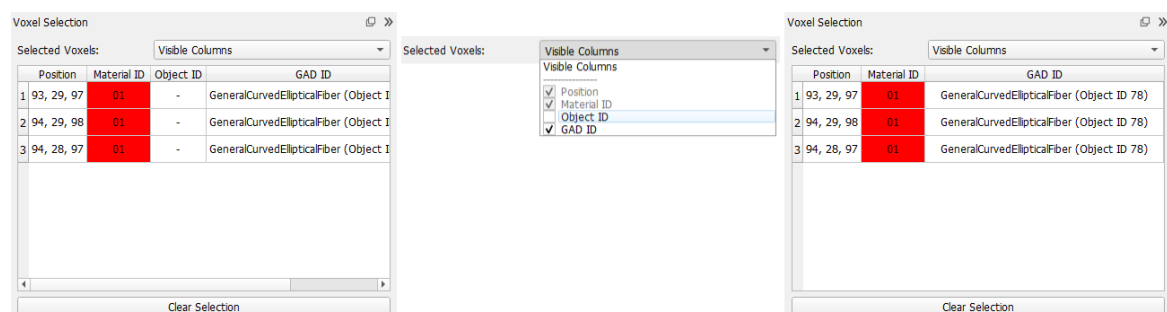


Left-click on a voxel to select it. A cyan-colored frame appears at the edges of the selected voxel. To select several voxels at the same time, press and hold the Shift or CTRL key while clicking the voxels.

If a voxel is mistakenly selected, hold CTRL and click again on that voxel to deselect it.



In the **Voxel Selection** dialog, a table shows information about the selected voxel(s), such as **Position** in X, Y, Z coordinates and **Material ID**. Additional information shown depends on the loaded structure and fields, e.g., if a volume field is loaded, the values of each field at this position are shown. You can also select which columns should be shown from the **Visible Columns** pull-down menu.



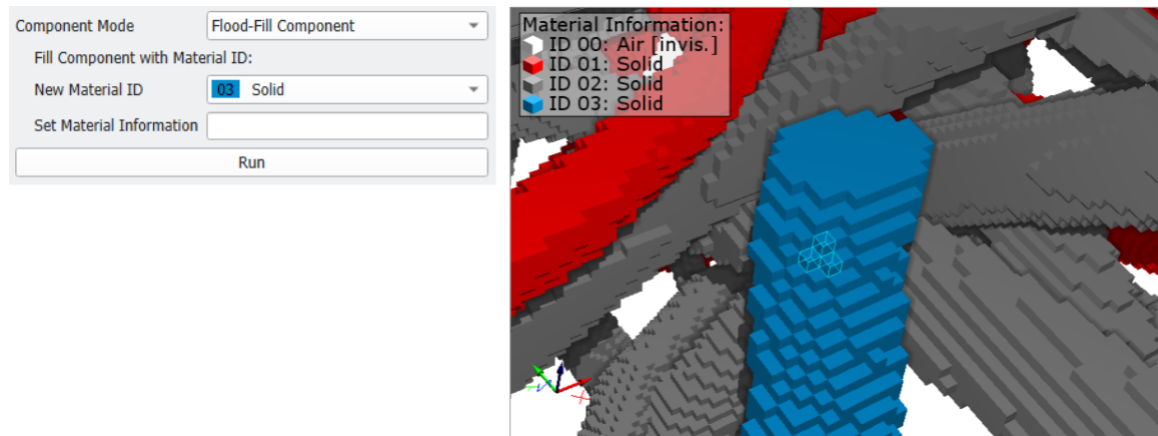
Clicking **Clear Selection** in the **Voxel Selection** dialog removes all voxels from the selection.

Component Modes

After selecting one or more voxels, edit them by selecting one of the **Component Mode** commands, configuring the settings, and clicking **Run**. All these operations can be undone by clicking the  icon in the toolbar or with CTRL+Z.

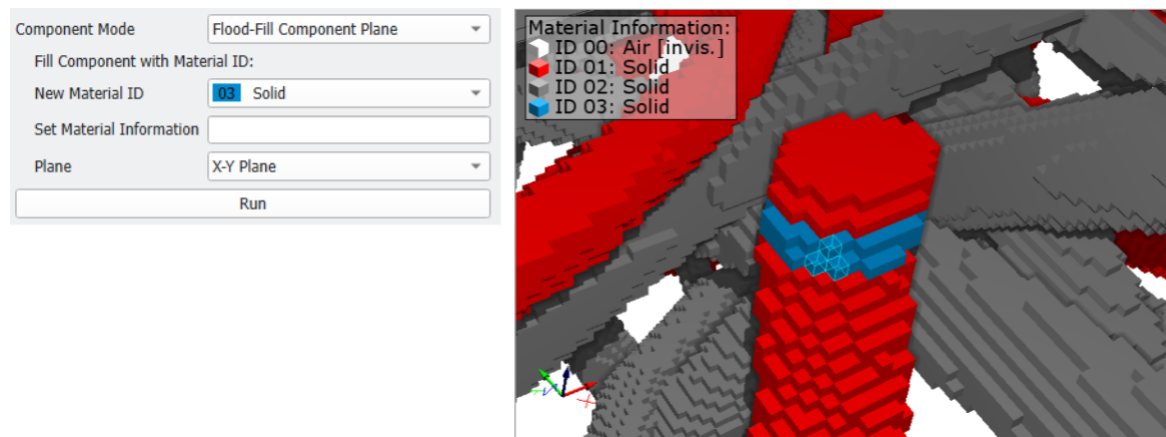
 **Flood-Fill Component**

Fill the selected voxels and the [components connected](#)^[29] to them with a **New Material ID** chosen from the pull-down menu.



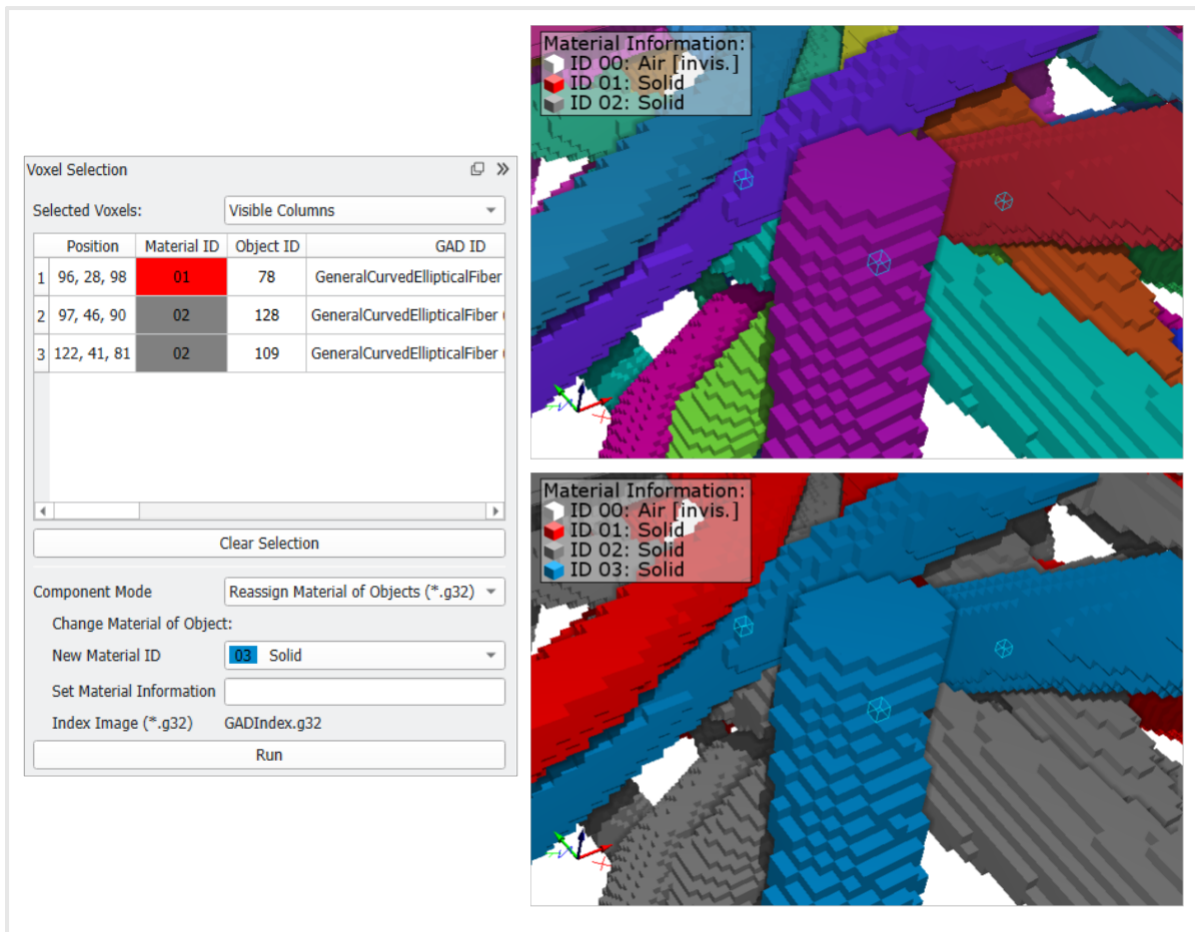
✓ Flood-Fill Component Plane

Fill the selected voxels and the [components connected](#)^[29] to them with a **New Material ID** only in the **Plane** chosen from the pull-down menu (**X-Y Plane**, **X-Z Plane**, or **Y-Z Plane**).



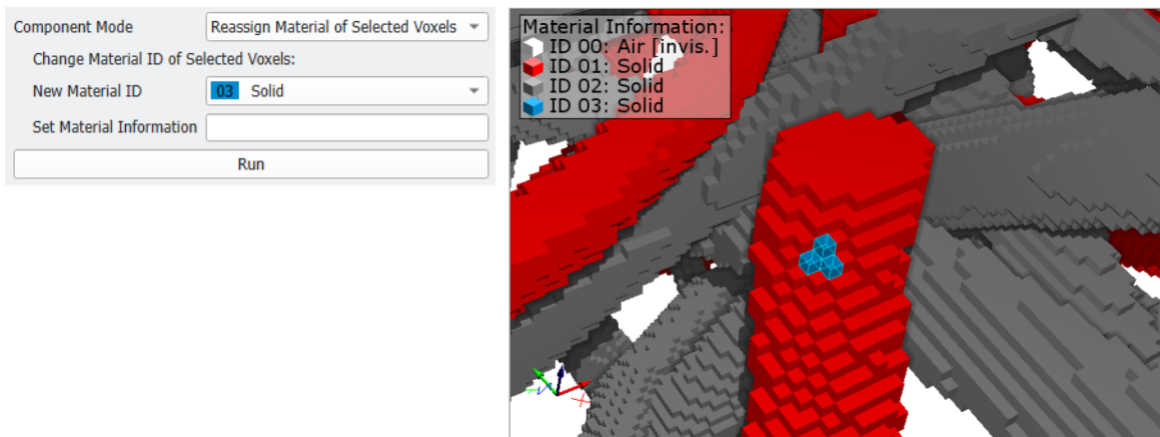
✓ Reassign Material of Objects (*.g32)

If a *.g32 file with object indices is loaded in the GeoDict GUI (e.g., created by right clicking on GAD Objects in the [Project Status Section](#)^[51] and selecting **Create GAD Index Image**), the Object ID is additionally shown for each voxel selected. Select a **New Material ID** and click **Run**, to assign the new material to all voxels that belong to the same Object ID as the voxels selected (here Object IDs 78, 109, and 128).



✓ Reassign Material of Selected Voxels

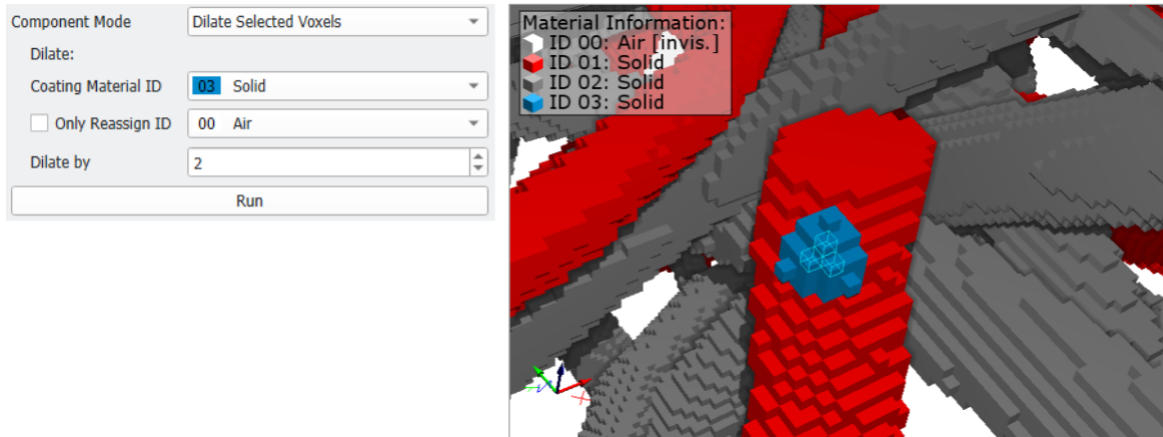
The Material ID of the selected voxels can be changed by selecting a **New Material ID** from the pull-down menu.



✓ Dilate Selected Voxels

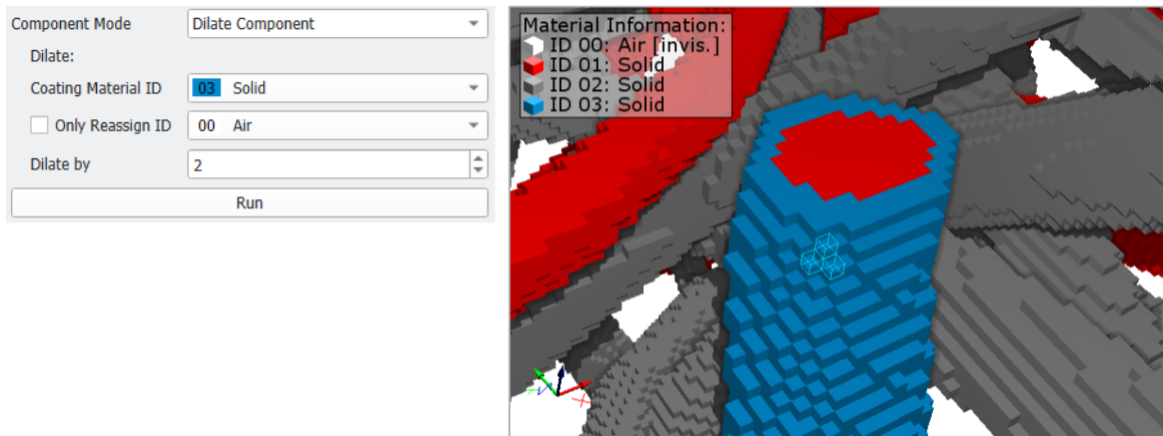
It is possible to dilate the voxels by coating them with another Material ID chosen from the **Coating Material ID** pull-down menu by a certain number of voxels (**Dilate by**). By

checking **Only Reassign ID**, only voxels of the selected Material ID will be changed to the **Coating Material ID**.



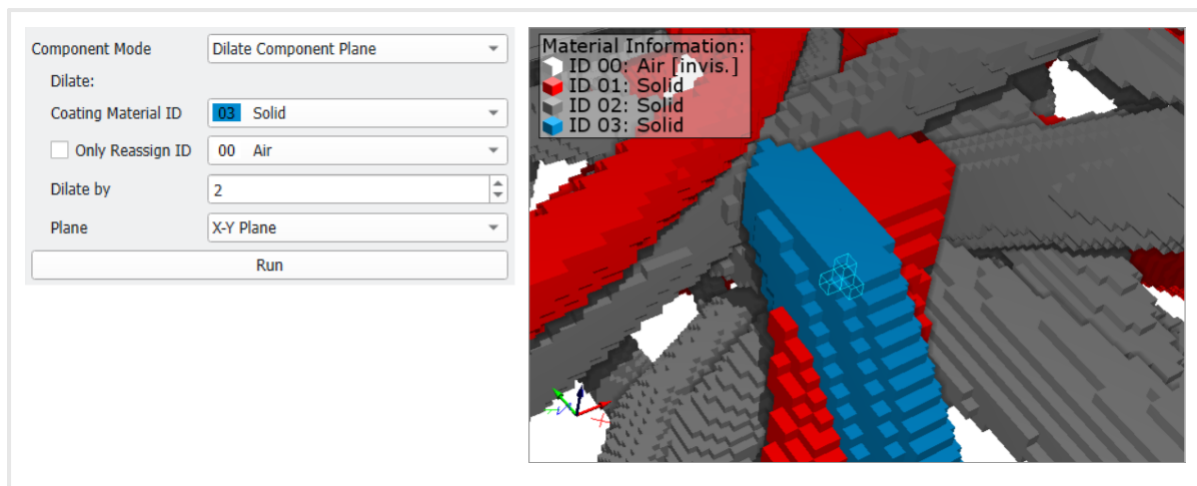
✓ Dilate Component

Also possible is to dilate the selected voxels and the components connected to them with the **Coating Material ID** by a certain number of voxels (**Dilate by**).



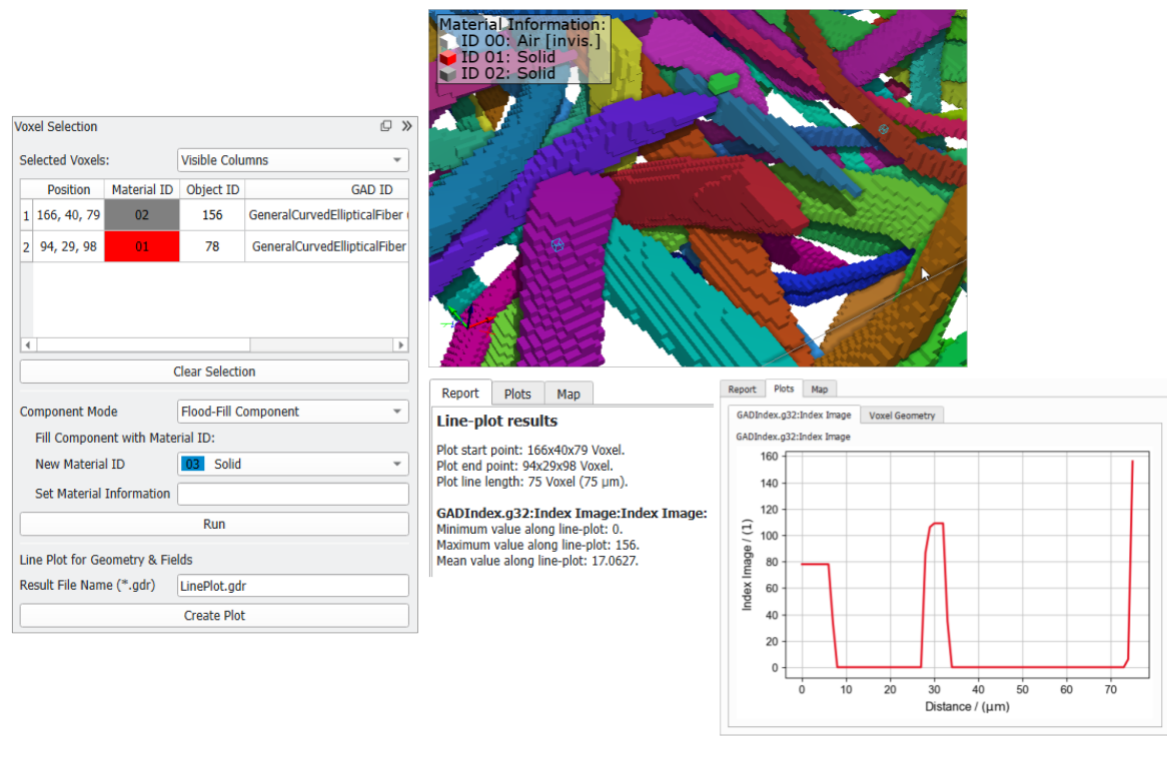
✓ Dilate Component Plane

Dilate the selected voxels and the components connected to them only in the **Plane** chosen from the pull-down menu (**X-Y Plane**, **X-Z Plane**, or **Y-Z Plane**) with the **Coating Material ID** by a certain number of voxels (**Dilate by**).



✓ Line Plot for Geometry & Fields

Select exactly two voxels to create a line plot which will gather information on the structure along the straight line between the two selected points. After entering a **Result File Name**, click on **Create Plot**. Then, the Result Viewer opens and shows in the Report tab the start and end point of the line in X-, Y- and Z-coordinates as well as the length of the line. For each loaded volume field the minimal, maximal and mean value on the line is stated. In the Plots tab, the Material IDs along the line are plotted over the distance from the starting point in the **Voxel Geometry** subtab. Each volume field has its own subtab with a plot of the field values on the line over the distance.



1.5.4 GAD Object Selection

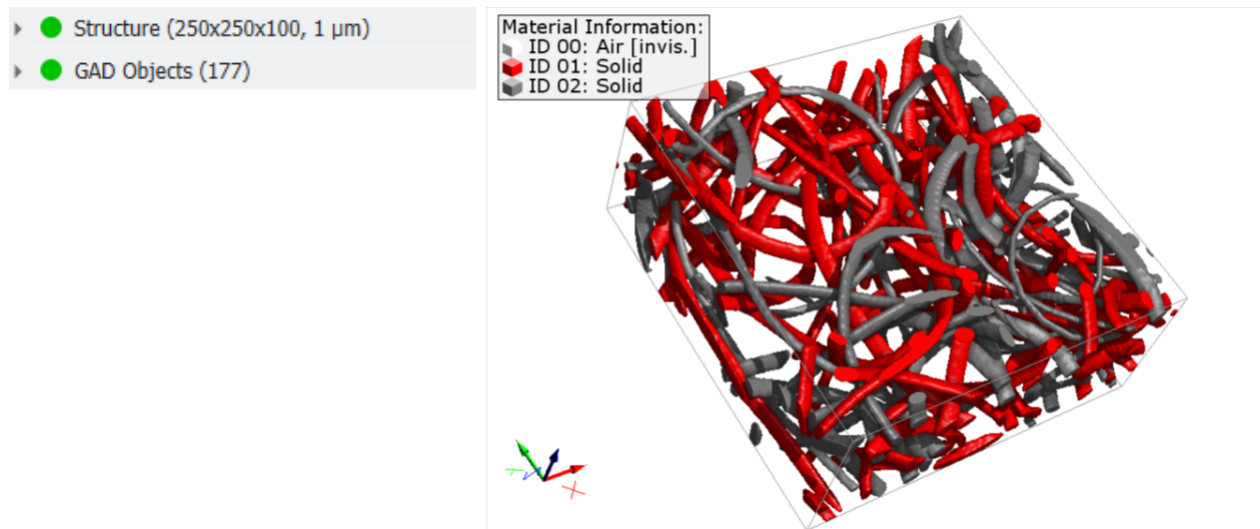
Editing and modification of structure models can be done on the [voxel geometry](#)^[101] or the analytic description (GAD data) of a structure, if it is available. You can check this in the [Project Status Section](#)^[51] (indicated by the green dot before GAD Objects).

If you created a structure with a generator module of GeoDict, then GAD data is available and you can easily modify or eliminate undesired fragments of the structure without having to reset the parameters and generate again.

The example here is the same fibrous media as in the [Voxel Selection section](#)^[101]. However, now the analytic objects are modified.



Note! In contrast to editing the voxel structure, editing the analytic objects preserves the analytic object information in the file.

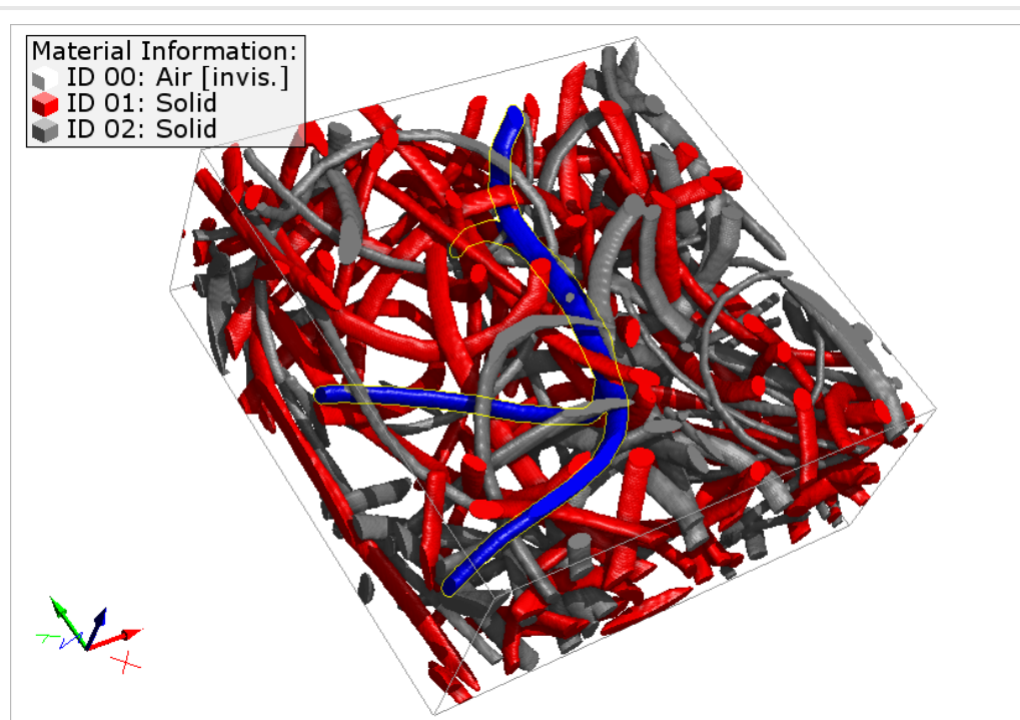


✓ Select analytic objects to edit

You can edit voxels in 2D Cross Section (SEM) view or in 3D Rendering. To enter the **GAD Object Selection** mouse mode, click the  icon in the toolbar. This also opens the **GAD Object Selection** dialog from the GUI sidebar.

Click on a GAD object to select it. For several objects, press and hold the Shift or CTRL key on the keyboard while clicking the objects. The selected objects appear highlighted and have a yellow-colored frame.

If an object is mistakenly selected, press and hold the CTRL key and click on the object again.



The table in the **GAD Object Selection** dialog shows the **ID** number and the **Object Type** of the selected GAD object.

GAD Object Selection

Selected GAD Objects:

	ID	Object Type
1	63	GeneralCurvedEllipticalFiber
2	113	GeneralCurvedEllipticalFiber

Clear Selection

Edit Objects

Delete Objects

New Material ID: 00 Air

Change Material ID

Left mouse click : select a single object
Shift + left mouse click : add objects to selection
Ctrl + left mouse click : toggle select objects

Visualization

Color & Visibility

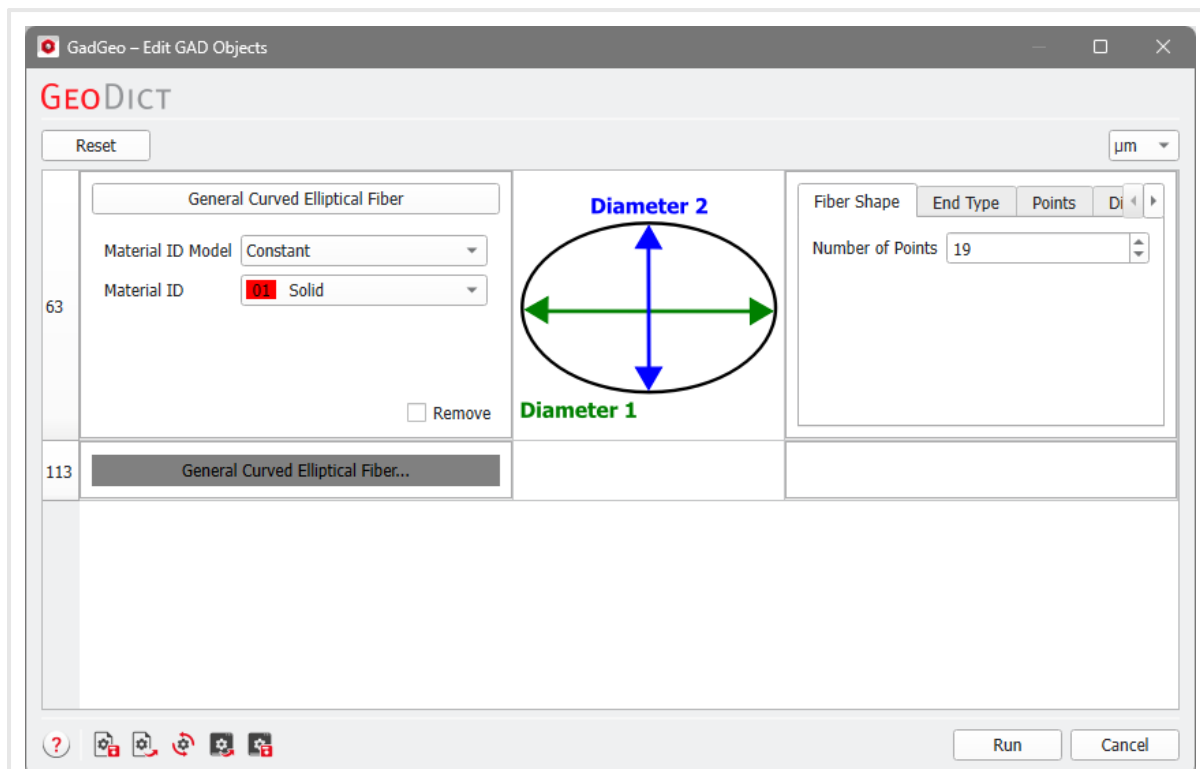
Voxel Selection

GAD Object Selection

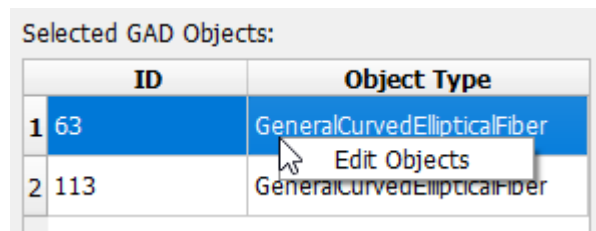
Clicking **Clear Selection** in the **GAD Object Selection** dialog removes all objects from the selection.

✓ Edit Objects

You can **Edit Objects** in a dialog which looks similar to the GadGeo **Edit GAD Objects** dialog, but it contains only the chosen GAD Objects. The **Edit Objects** dialog is described in the GadGeo chapter.

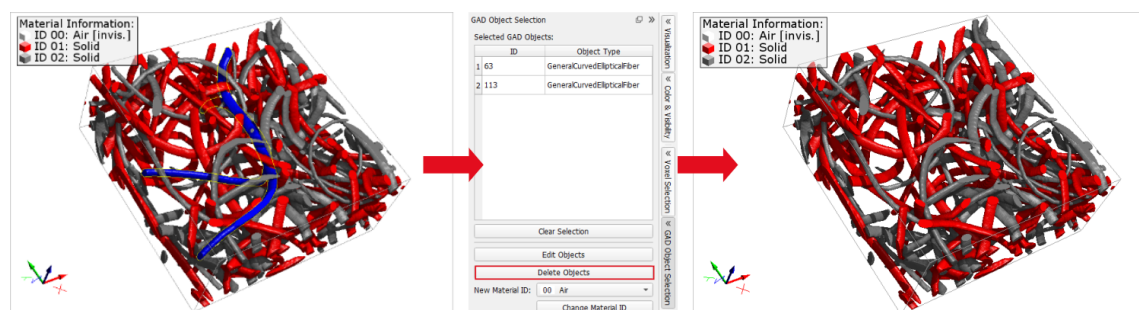


With a double click or right click on one of the selected objects in the table, the **Edit** menu for only this object can be opened.



✓ Delete Objects

When clicking **Delete Objects**, all selected GAD objects, which are listed in the table, are deleted and taken out from the structure model.



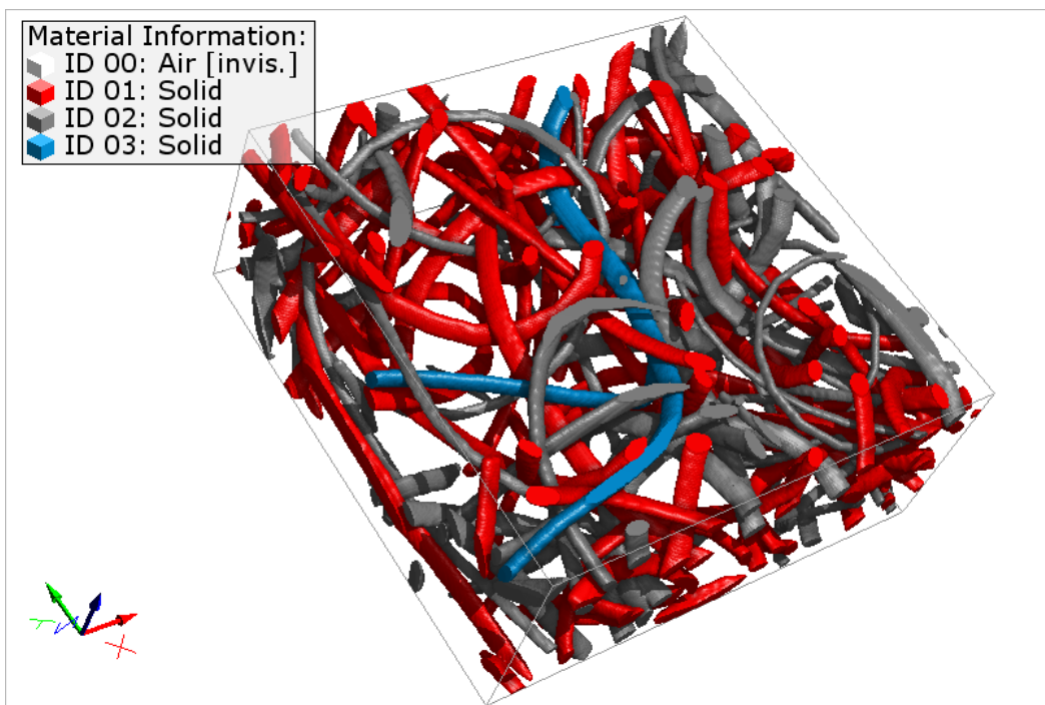
✓ Change Material ID

Change the Material ID of the selected objects by selecting a **New Material ID** from the pull-down menu and clicking **Change Material ID**.

New Material ID: Solid ▼

The selected objects still appear highlighted (and this perhaps makes it difficult to see the change in the Material ID) until you click **Clear Selection**.

Now the fibrous structure model contains fibers of three different materials.



1.5.5 Paint

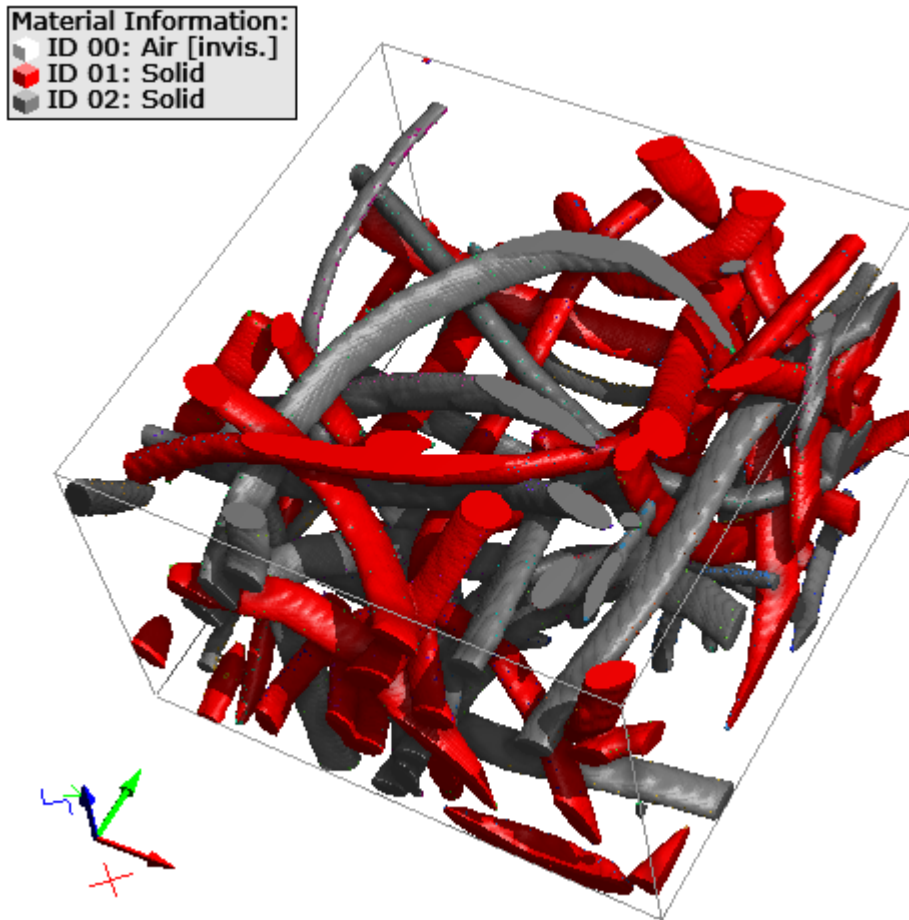
Use the **Paint Mode** to paint in your structure. Editing is always done in 2D (**View** → **2D Cross-Section (SEM)**) and the effects can be seen later in 2D as well as in 3D (**View** → **3D Rendering**).



Important! You have to activate the paint mouse mode with the  icon from the toolbar to start painting! This will also open the **Paint Settings** dialog in the **Paint** tab of the GUI sidebar. The toolbar icon and the **Paint** tab are grayed out and not accessible when the structure is viewed in 3D rendering.

The **Paint Mode** places GAD Objects with the shape chosen in [Brush Mode](#)^[118] into the structure. After painting, these GAD objects can be modified, e.g., as shown in the [GAD Object Selection](#)^[109] topic. Thus, using the paint mode on a structure with analytic object information changes the analytic data. After editing in the paint mode, the changed structure must be saved to store the modifications.

As an example, a fibrous media model is edited with **Paint Mode**.



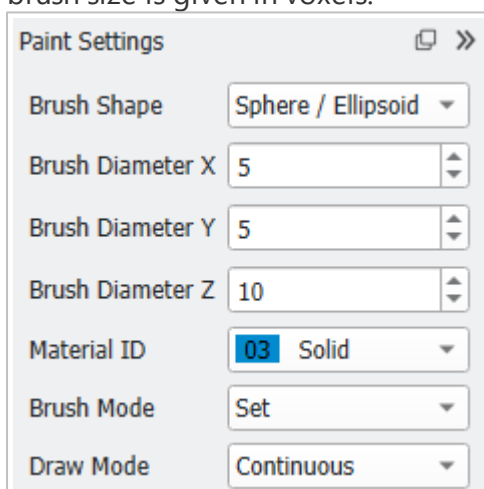
Use the **Paint** mode as follows:

1. Select **View** → **2D Cross-Section (SEM)** in the menu bar or click the  icon in the toolbar. In the **View Controls**, above the visualization area, click the **Camera** tab and use the **Direction** pull-down menu and the **Slice** slider to navigate to the location where the editing

should take place. Here, direction Z and slice 90 is selected.



2. Activate the **Paint mouse mode** with the  icon from the toolbar, which also opens the **Paint** tab on the GUI Sidebar.
3. In the opening **Paint Settings** dialog, editing is done using the cursor as a brush. The shape of the brush is set in the **Brush Shape** pull-down menu and its size in the **Brush Length (Diameter) X**, **Brush Length (Diameter) Y**, and **Brush Length (Diameter) Z** boxes. The brush size is given in voxels.



- a) The brush shape can be a **Box**, with the side lengths entered in **Brush Length X**, **Y**, and **Z**, or a **Sphere / Ellipsoid** with the diameters entered in **Brush Diameter X**, **Y**, and **Z**. The

shape and size of the brush will be the shape and size of the GAD objects that you paint in the structure.

- b) The Material ID of the material to draw with is chosen from the **Material ID** pull-down menu.
 - c) The choice of **Brush Mode**^[118] in the pull-down menu determines the working technique for the brush. With **Set**, the original Material ID of the painted voxels is replaced by the selected Material ID. With **Add** and **Subtract**, the chosen Material ID is bit-wise added to or subtracted from the original Material ID. Use **Replace**, to select a **Replace ID**. Only the Replace ID is changed to the new Material ID.
 - d) The **Draw Mode**^[116] defines whether the brush stroke is applied for **Continuous** drawing, for a **Single Click**, or for drawing a **Straight Line**.
4. The brush strokes, in the selected shape, size, and Material ID (here Sphere (Ellipsoid), diameter 5 x 5 x 10 voxels, Material ID 03), are applied by pressing and moving (for **Continuous Drawing** and **Drawing Straight Lines**) and by clicking (for **Single Click Drawing**) with the left mouse button in the desired position.

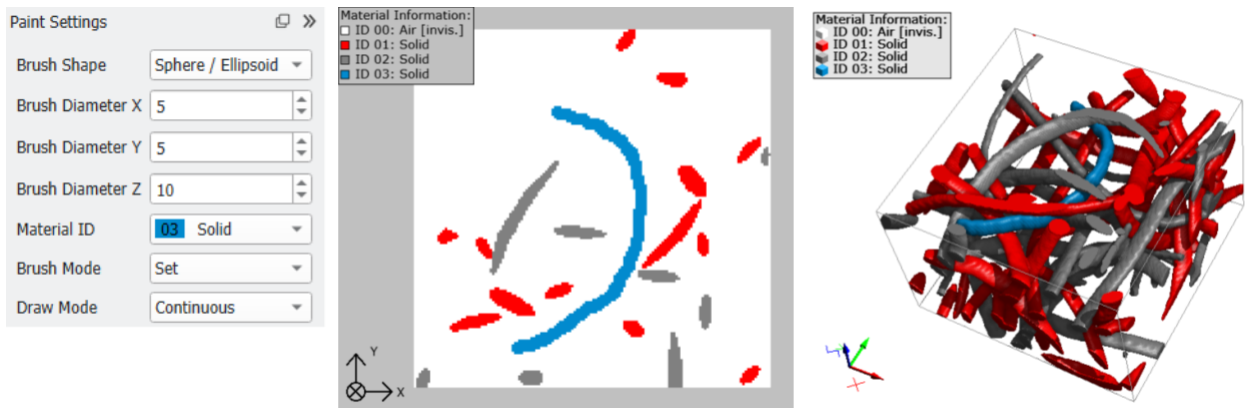


Draw Modes

Choose between different draw modes to paint in your structure. You can also switch to 3D rendering to see and control the changes made.

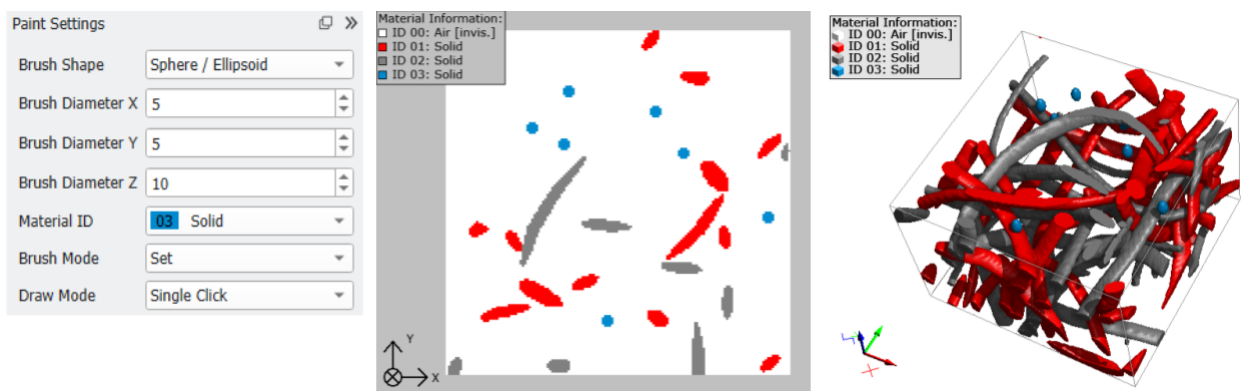
Continuous

For **Draw Mode Continuous**, press the left mouse button while dragging the mouse. As long as the mouse button is pressed you see a preview of the painted object. Release the mouse button to add it to the structure.



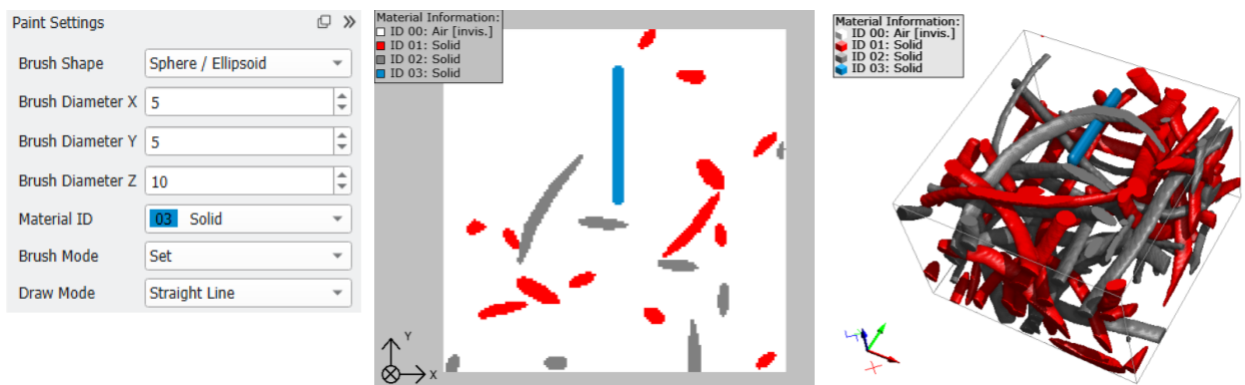
Single Click

Use **Draw Mode Single Click** by clicking the left mouse button in different locations of the 2D view of the structure model. The effects of editing (in 2D view) are observed as soon as the left mouse button is released.



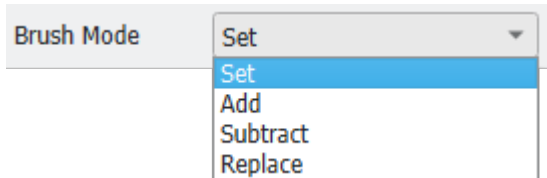
Straight Line

Use **Draw Mode Straight Line** by clicking the left mouse button and drawing the line to the desired end point while holding the mouse button clicked.

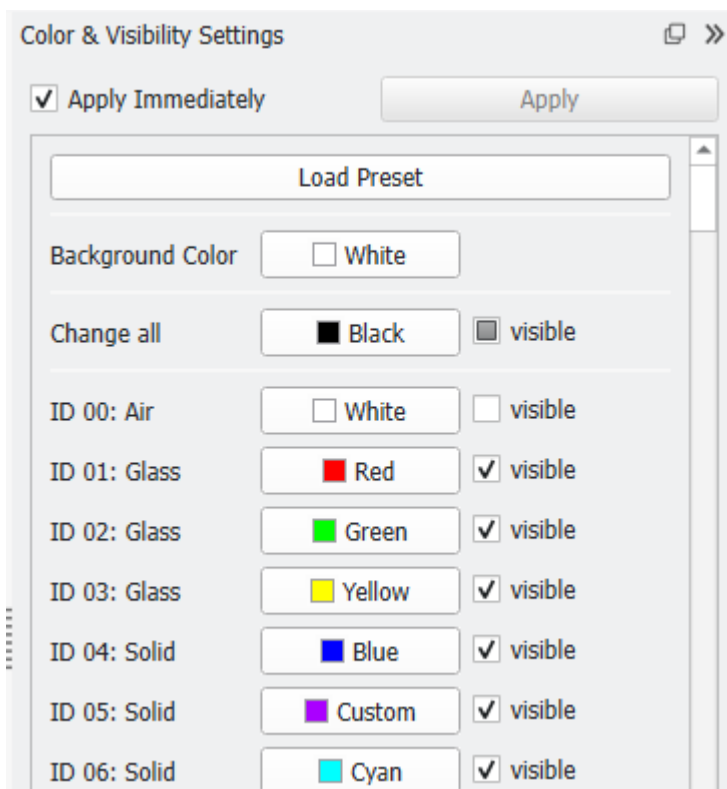


Brush Modes

The Brush Mode defines how the chosen Material ID will interact with the Material IDs existent in the structure.

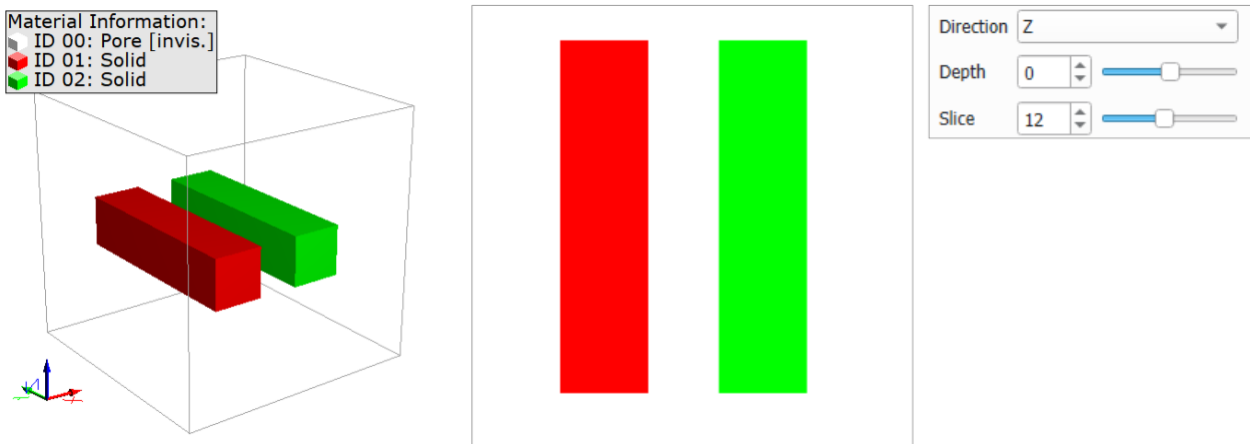


To better observe material intersections, the GeoDict built-in red-green-yellow-blue color scheme is used for the next example.



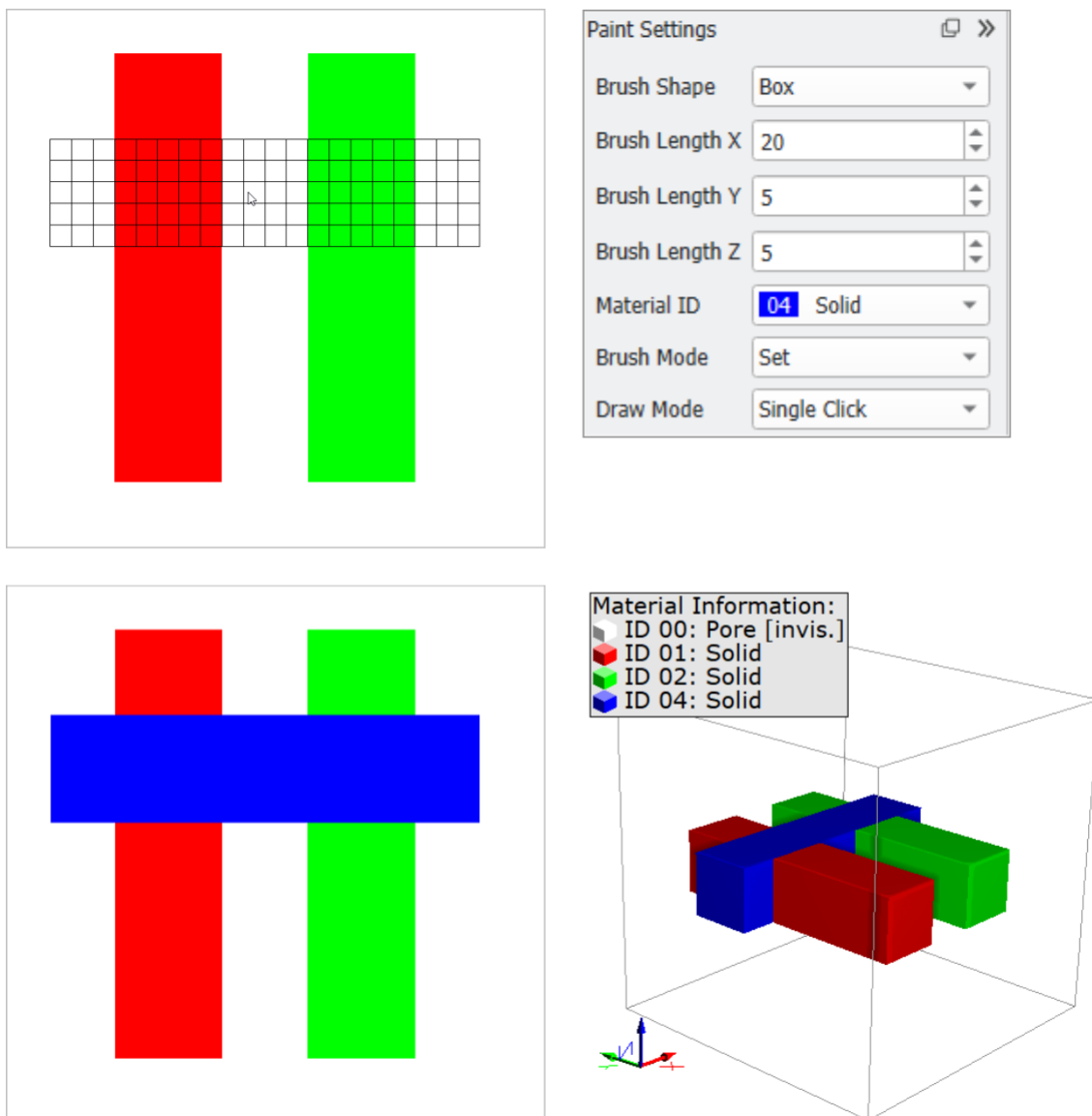
This color scheme is obtained by selecting **Settings** → **Color & Visibility Settings...** and clicking the  icon at the bottom of the dialog (**Load built-in default settings**).

To show the behavior of different brush modes, two slabs were created with 5x20x5 voxels each. The painting is done in the X-Y-plane on slice 12.



✓ Set mode

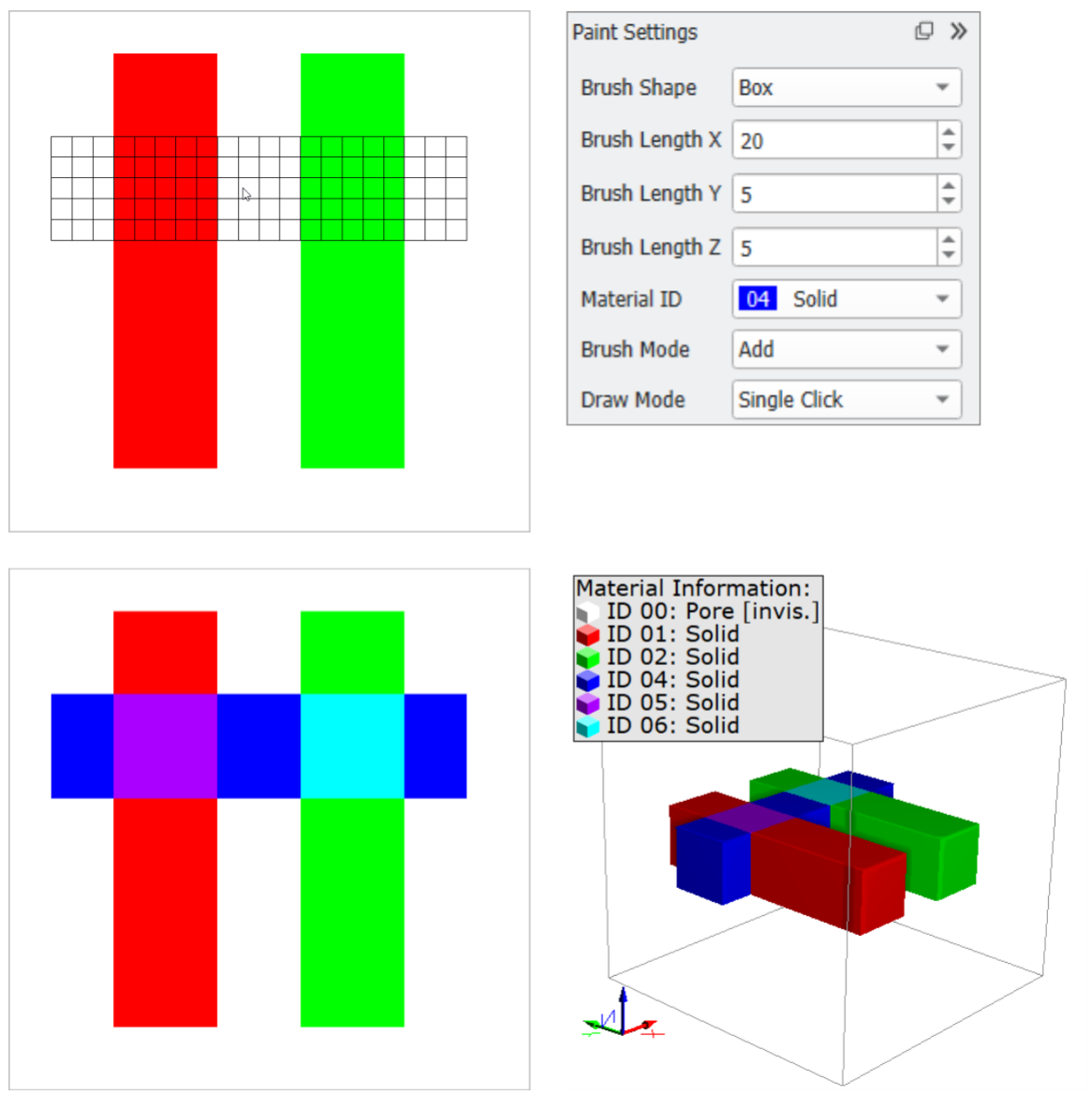
In **Set** mode, all original Material IDs are set to the chosen Material ID. The replacement of material is clearly seen in 3D rendering.



✓ Add mode

In **Add** mode, the selected Material ID does not replace the original Material ID of the painted voxels, but an intersecting material is built. The new Material ID is determined by bitwise adding the paint Material ID to the Material ID of the painted voxels.

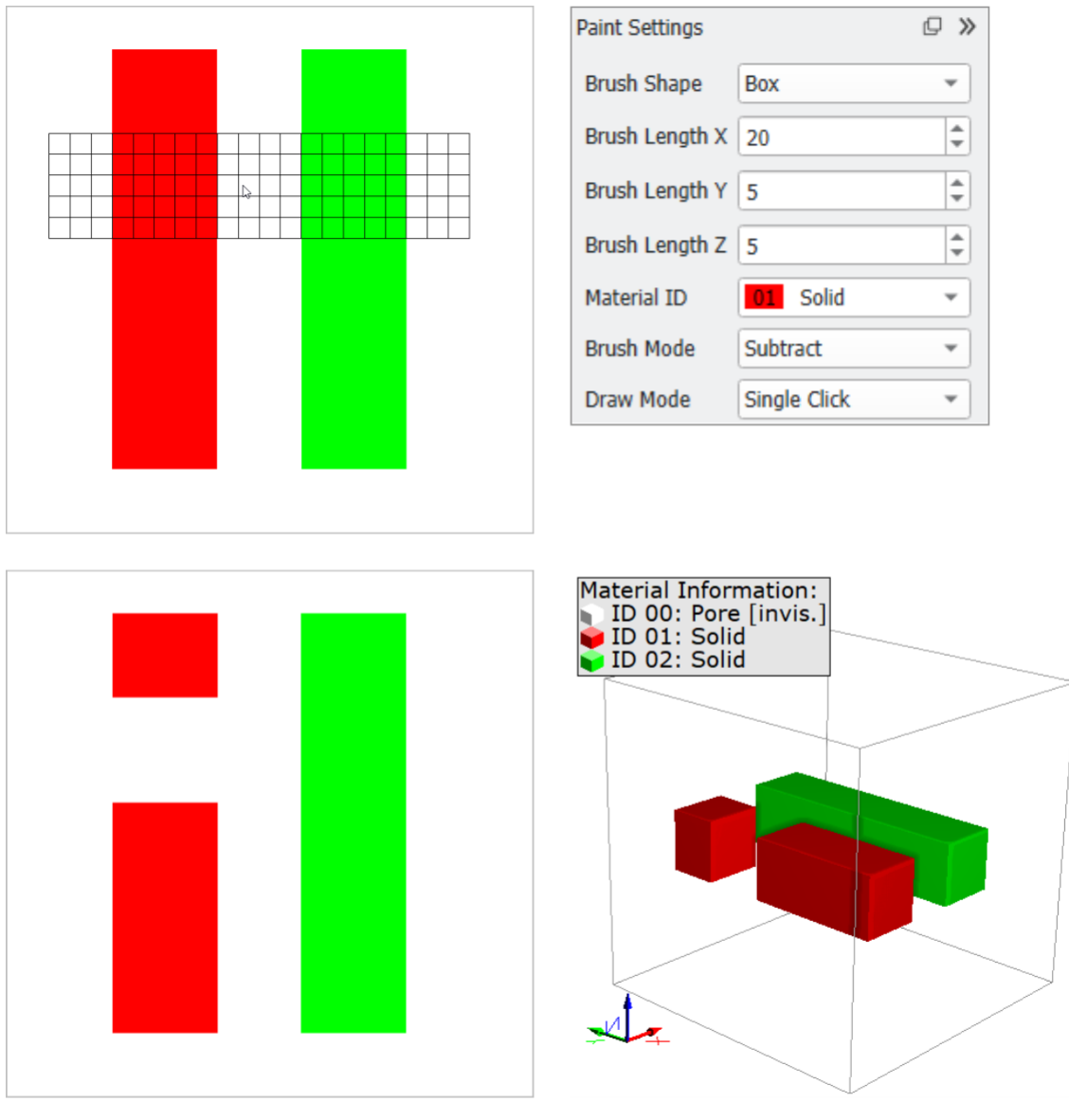
According to GeoDict's rules on defining new Material IDs for [intersecting materials](#)^[122], adding voxels of Material ID 04 (blue) to Material ID 01 (red) results in intersected voxels of Material ID 05 (violet-colored). Material ID 04 added to Material ID 02 (green) results in intersected voxels of Material ID 06 (cyan-colored). And Material ID 04 added to Material ID 00 (porous space) results in Material ID 04. The intersecting materials are also shown below in 3D rendering.



✓ Subtract mode

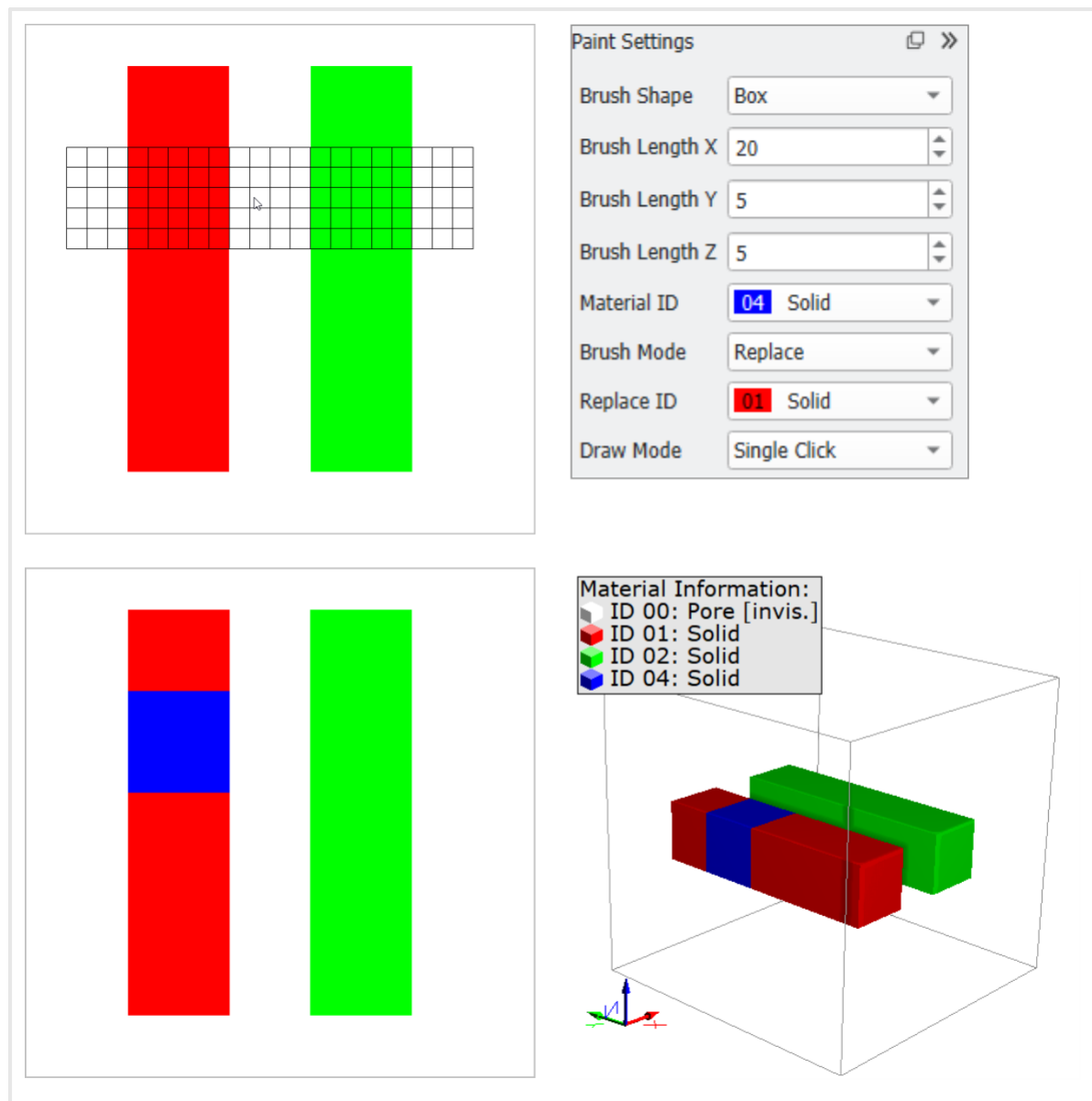
In **Subtract** mode, the selected Material ID is bit-wise subtracted from the existing structure where the brush is applied, again according to GeoDict's rules on defining new Material IDs for [intersecting materials](#)^[122].

Thus, voxel of Material ID 01 subtracted from voxels of Material ID 01 or Material ID 00 results in Material ID 00. For voxels of Material ID 02 subtracting Material ID 01 does not change the Material ID.



✓ Replace mode

In **Replace** mode, the selected Material ID replaces only voxels of the **Replace ID**. Other Material IDs are unaffected by the modification. With the settings shown, only voxel of Material ID 01 replaced by Material ID 04.



Intersecting Material IDs

In GeoDict, 256 Material IDs are available. In **Add** and in **Subtract** edit mode, when two materials are added or subtracted, the Material ID of the addition or the subtraction is given by adding or subtracting the binary codes corresponding to the Material IDs. The used calculation rules are shown below.

Binary addition rules

$$1 + 1 = 1$$

$$1 + 0 = 1$$

Binary addition rules

$$0 + 1 = 1$$

0	+	0	=	0
---	---	---	---	---

Binary subtraction rules

$$1 - 1 = 0$$

1	-	0	=	1
---	---	---	---	---

$$0 - 1 = 0$$

0	-	0	=	0
---	---	---	---	---

The addition of Material IDs is done column-wise, as follows:

0	0	0	1	01
+	+	+	+	+
0	1	0	0	04
=	=	=	=	=
0	1	0	1	05

The subtraction of Material IDs is also done column-wise, as follows:

0	0	1	0	02
-	-	-	-	-
0	0	0	1	01
=	=	=	=	=
0	0	1	0	02

Examples of Material ID and binary codes of intersection materials obtained by **adding**:

First Material ID		Second Material ID		Intersection Material ID	
Material ID	Binary code	Material ID	Binary code	Material ID	Binary code
02	0010	04	0100	06	0010 + 0100 = 0110
03	0011	04	0100	07	0011 + 0100 = 0111
03	0011	05	0101	07	0011 + 0101 = 0111
05	0101	01	0001	05	0101 + 0001 = 0101

Examples of Material ID and binary codes of intersection materials obtained by **subtracting**:

First Material ID		Second Material ID		Intersection Material ID	
Material ID	Binary code	Material ID	Binary code	Material ID	Binary code
01	0001	01	0001	00	0001 – 0001 = 0000
05	0101	02	0010	05	0101 – 0010 = 0101
01	0001	03	0011	00	0001 – 0011 = 0000
04	0100	01	0001	04	0100 – 0001 = 0100

1.5.6 Metrology

With the **Metrology** functionality, you can measure distances and angles in the 2D View of a structure.

Select **View** → **2D Cross Section (SEM)** in the menu bar. In the **Camera** tab of the View Control panel, choose the **Direction** (**X**, **Y**, or **Z**) and the **Slice** of the structure for the measurement.



Important! You have to activate the measurement mouse mode with the  icon from the toolbar to start a measurement! This will also open the **Measure Angles and Distances** dialog in the **Metrology** tab of the GUI sidebar. The toolbar icon and the **Metrology** tab are grayed out and not accessible when the structure is viewed in 3D rendering.

New Measurement Settings:

- ☒ Distance
- ☐ Angle
- ☐ Angle and Distance

✓ New Measurement Settings

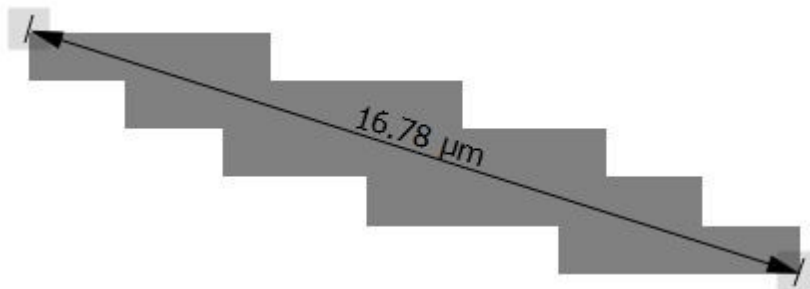
Before starting a new measurement, select from the **New Measurement Settings** if a **Distance**, an **Angle**, or **Angle and Distance** should be measured.

To start measuring, click with the left mouse button at the position where the measurement should start.

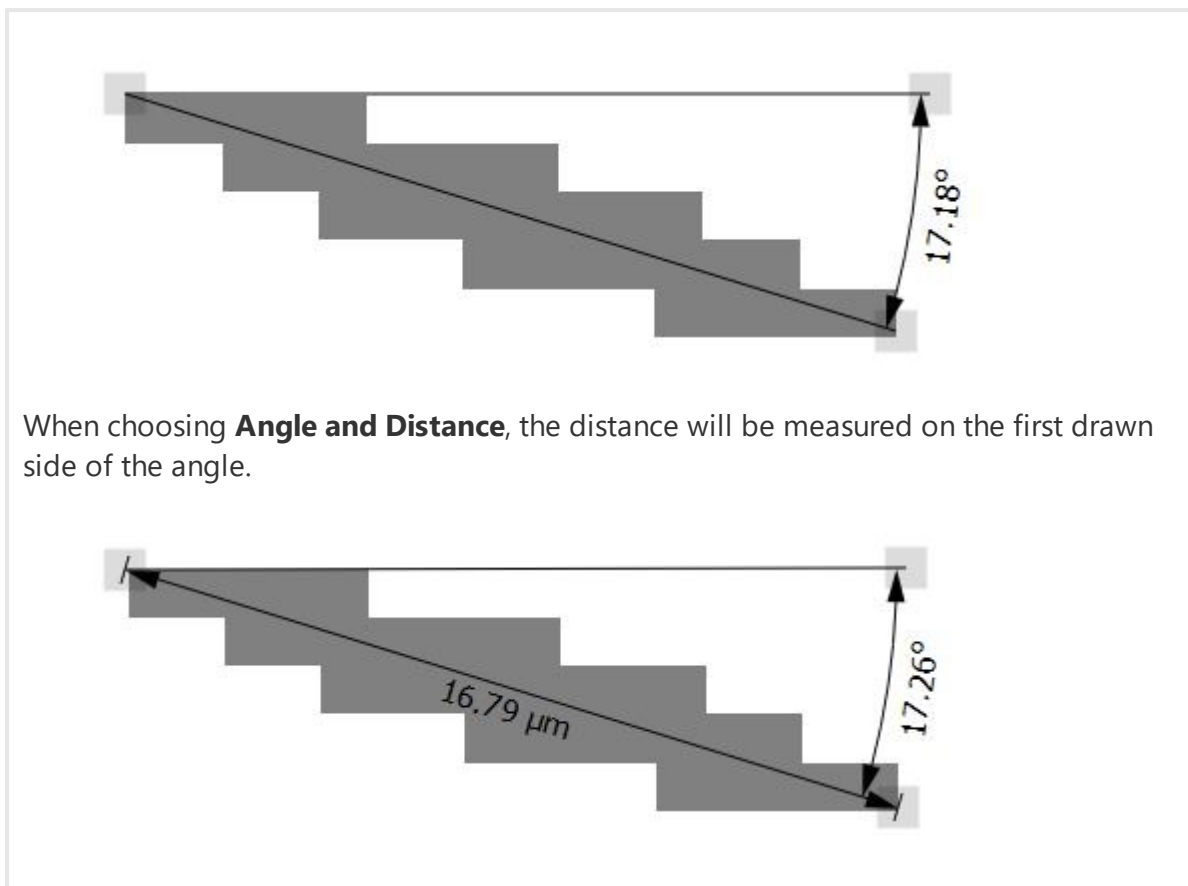


Know how! Cancel the measurement by just clicking the right mouse button.

If **Distance** is chosen, end the measurement by left-clicking again at the desired endpoint.



If an **Angle** is measured, you first draw one side of the angle. After the second mouse click, the second side of the angle is displayed and you can move it around to the desired endpoint, where you click again to finish the measurement. The arrows indicate in which direction the angle is measured.



Editing Settings:

☐ Lock Measurements

Snap to grid:

☒ Free Placement

☐ Snap to Voxel Centers

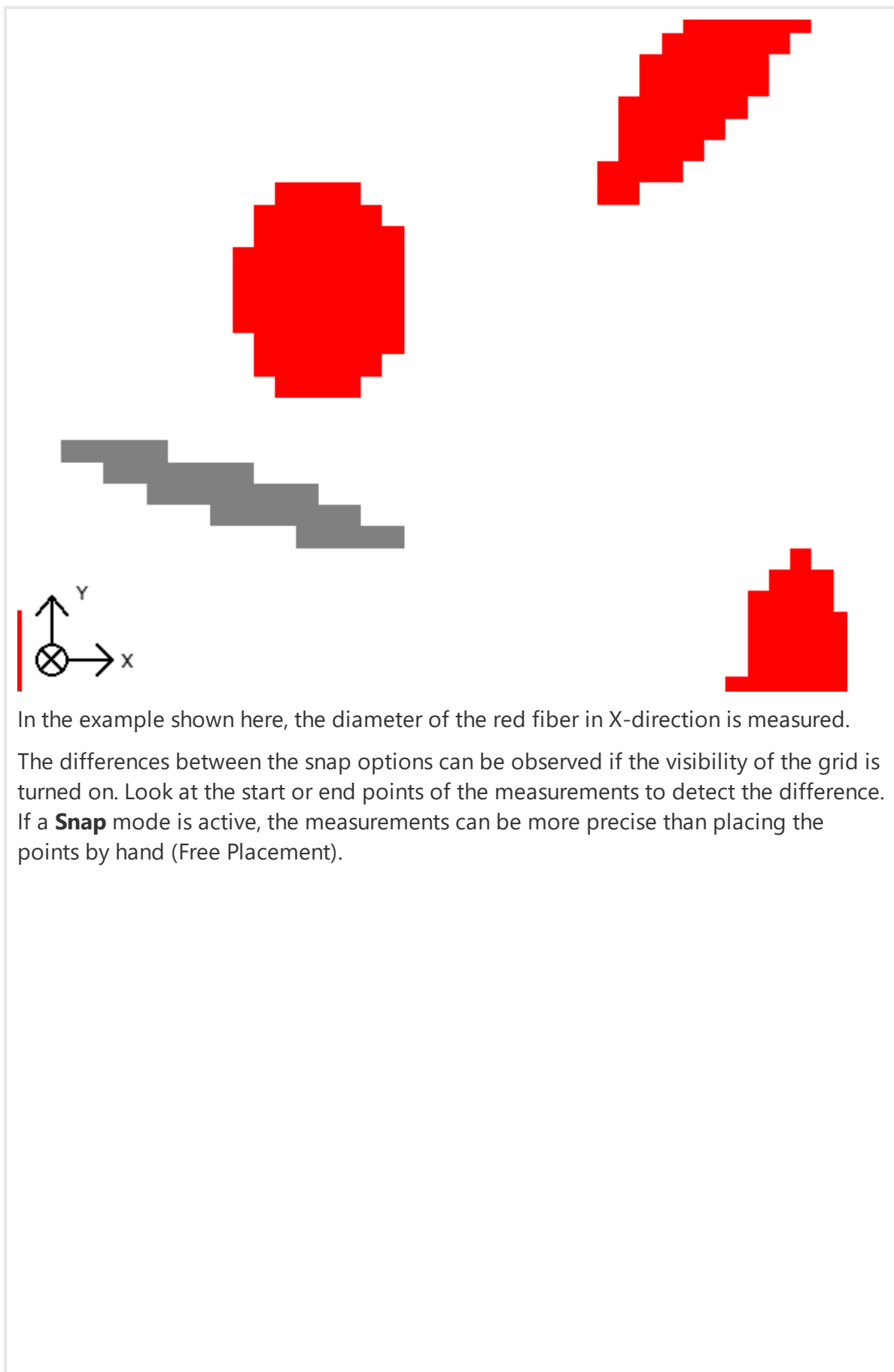
☐ Snap to Voxel Corners

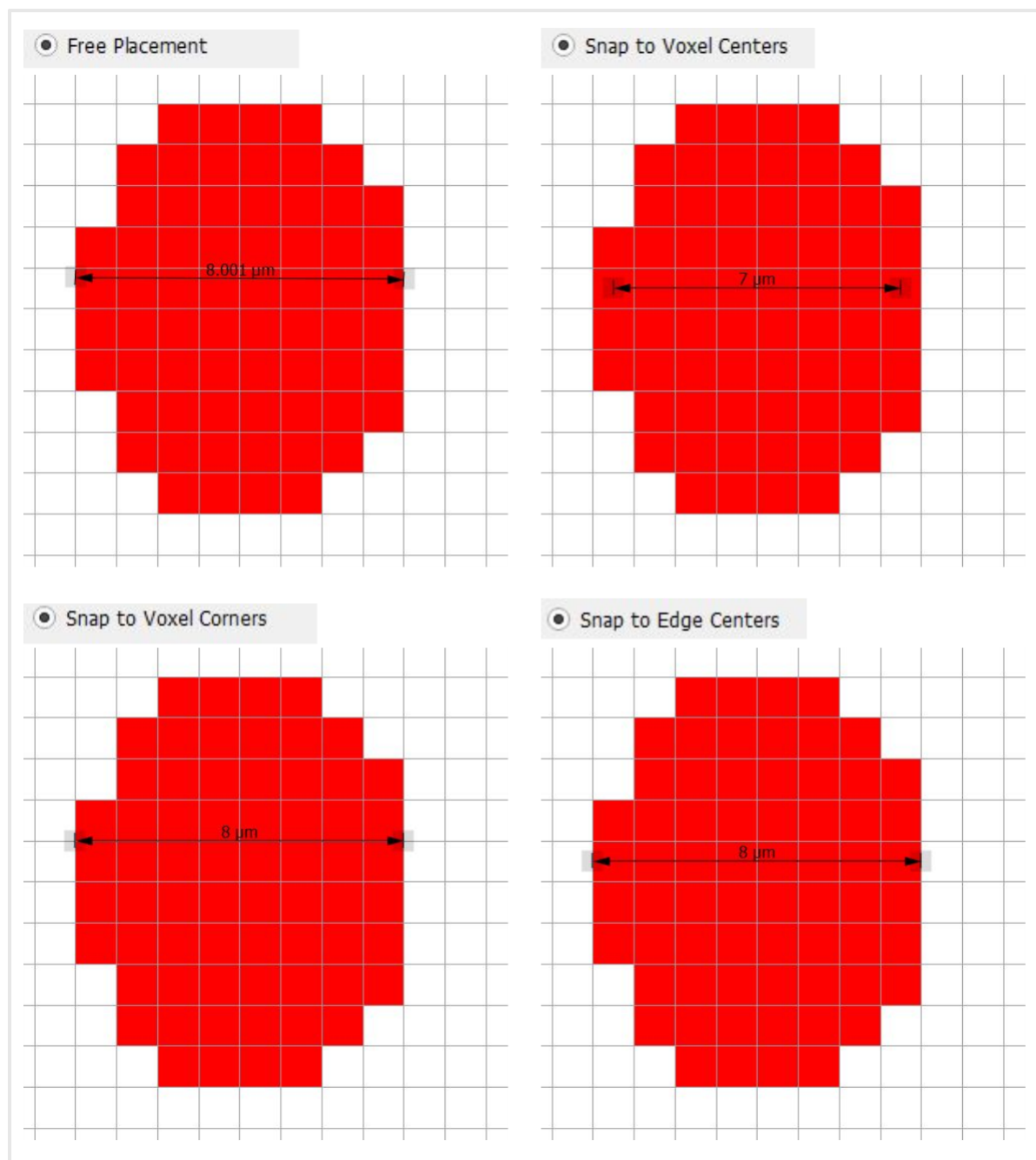
☐ Snap to Edge Centers

☒ Editing Settings and Snap to grid

In the **Editing Settings** part of the panel, choose **Lock Measurements** to move the whole line of a measured distance and/or angle to another location. If **Lock Measurements** is unchecked, the end points of a measurement can be modified.

In **Snap to grid**, define if points should be selected freely in the structure (**Free Placement**), or be snapped to the nearest **Voxel Centers**, **Voxel Corners**, or **Edge Centers**. This means that when you click into the structure the nearest voxel center, voxel corner, or edge center (depending on the selection) is set as starting point (or end point) for the measurement.





Active Measurement:

Measurement 2 ▼

☐ Hide

☒ Counterclockwise Angle

☒ Show Distance

☒ Show Angle

Distance: 16.79 μm
 16.79 Voxel

Angle: 17.2629°

Adjust Voxel Length

Delete Measurement

✓ Active Measurement

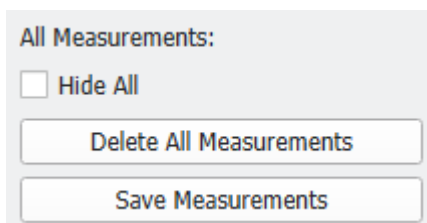
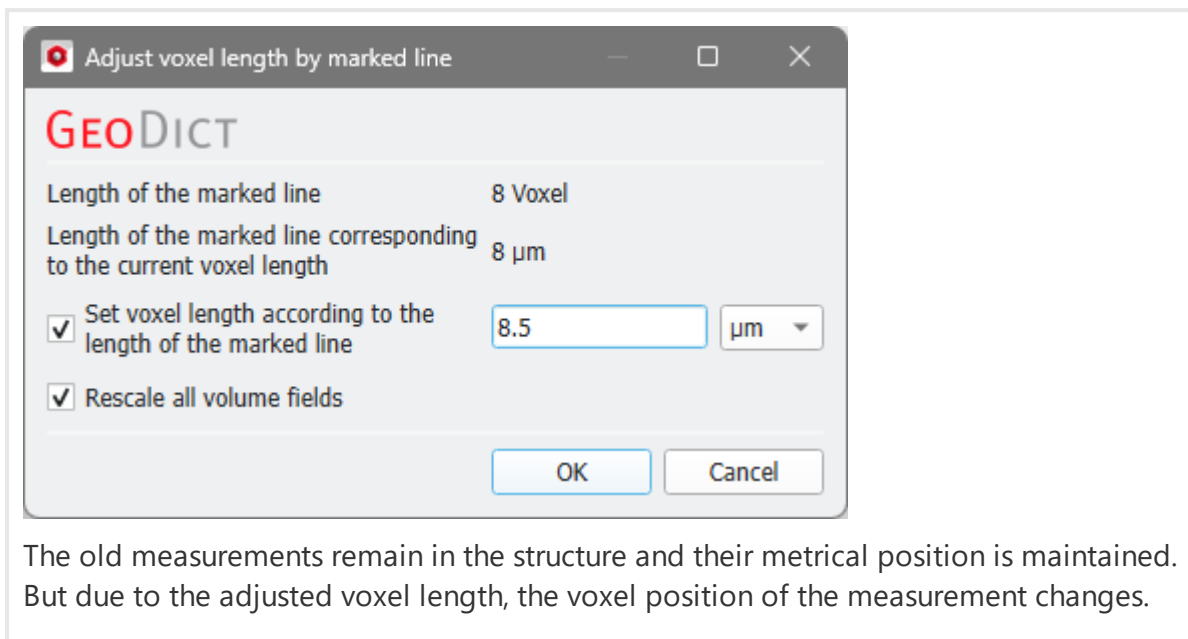
Each measurement gets a number and all of them are listed in the drop-down menu under **Active Measurement**. The last measurement is usually the active one, but you can choose a previous measurement from the list or by clicking on the endpoints of the measurement in the visualization area.

Below, the measured distance and/or measured angle is shown.

Check **Hide** to hide the measurement and the text in the visualization area, uncheck **Show Distance** to hide only the text of distance measurement, or uncheck **Show Angle** to hide the text of the measured angle. The angle is measured and shown counterclockwise, when **Counterclockwise Angle** is checked. Uncheck to switch measuring and visualization to **Clockwise**, there is no need to redo the measurement, see also the example below.

With **Delete Measurement**, the currently active measurement is deleted from the panel.

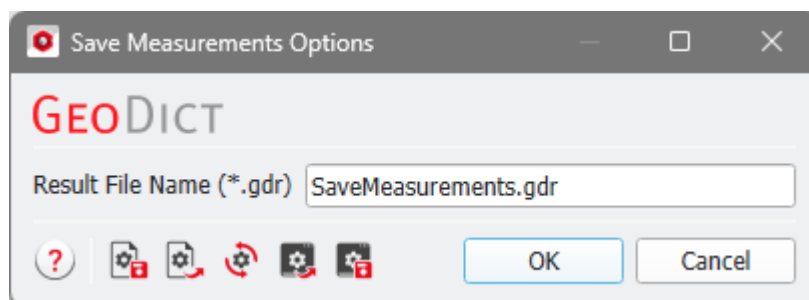
Clicking **Adjust Voxel Length** opens a dialog to change the voxel length of the structure accordingly to the measured distance. Enter the desired length of the measured line (in the example 8.5 μm instead of the 8 μm measured in Measurement 1) and click **OK**. The voxel length of the whole structure is rescaled to match the desired length. Check **Rescale all volume fields**, to rescale also the volume fields to the new voxel length.

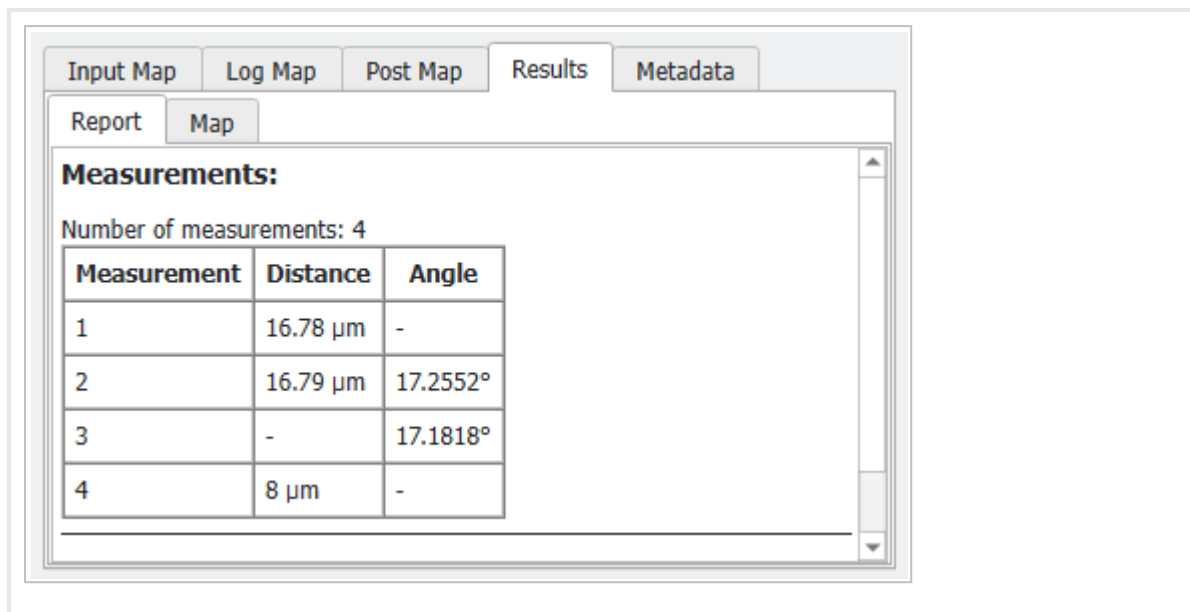


✓ All Measurements

In the **All Measurements** part of the panel, all available measurements can be hidden by checking **Hide All** or deleted with **Delete All Measurements**.

Write the resulting distances and angles into a *.gdr file by clicking **Save Measurements**. A dialog opens, where you enter the desired result file name.





Visualization Settings:

Line Thickness:

Color:

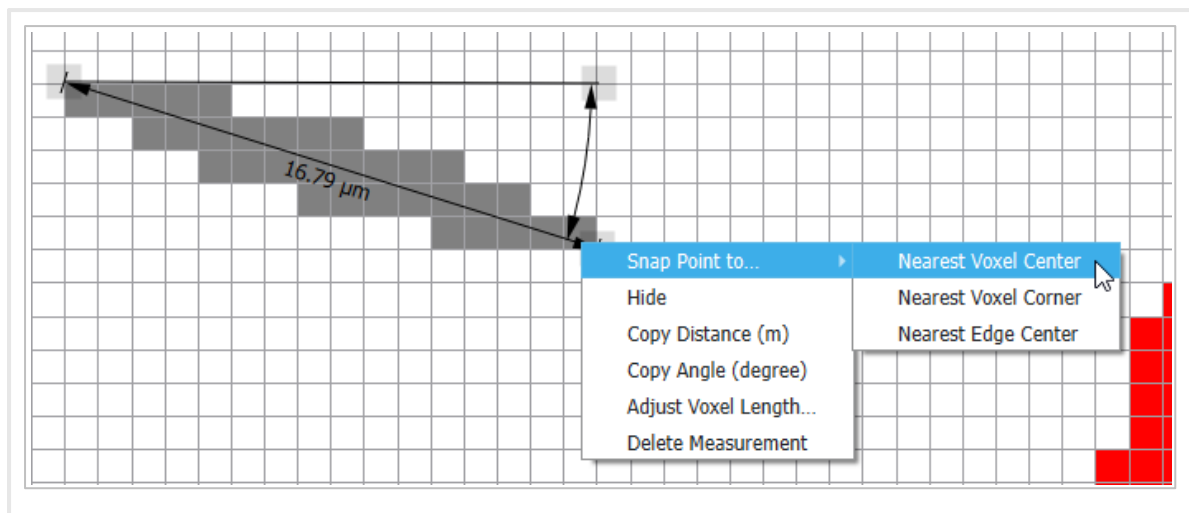
✓ Visualization Settings

In the **Visualization Settings**, choose the **Line Thickness** and **Color** for the visualization of the measurements. This can also be done after the measurements were conducted and it applies to all measurements. The font size of the measurements can be changed in the [visualization settings tab](#)^[91] of the sidebar.

✓ Shortcuts

Edit a selected measurement with a right click on one of the endpoints. The selected point can be snapped to the grid as explained above. The measured distance is adapted accordingly.

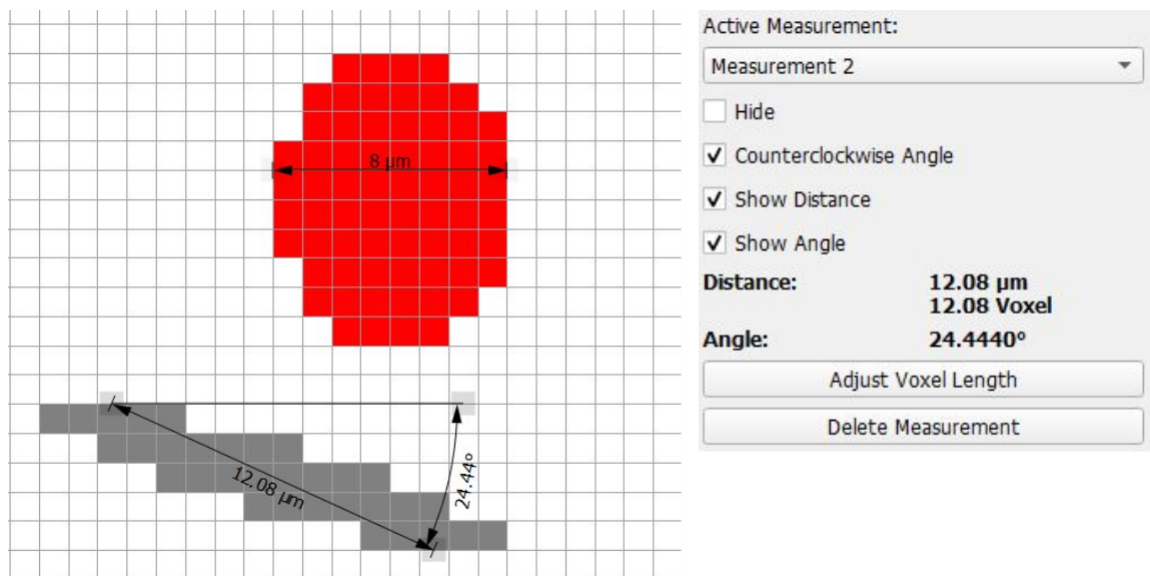
The options **Hide**, **Adjust Voxel Length**, and **Delete Measurement** are the same as explained [above](#)^[129]. If needed, you can **Copy** the **Distance** in meters or **Angle** in degree to the clipboard.



✓ Example

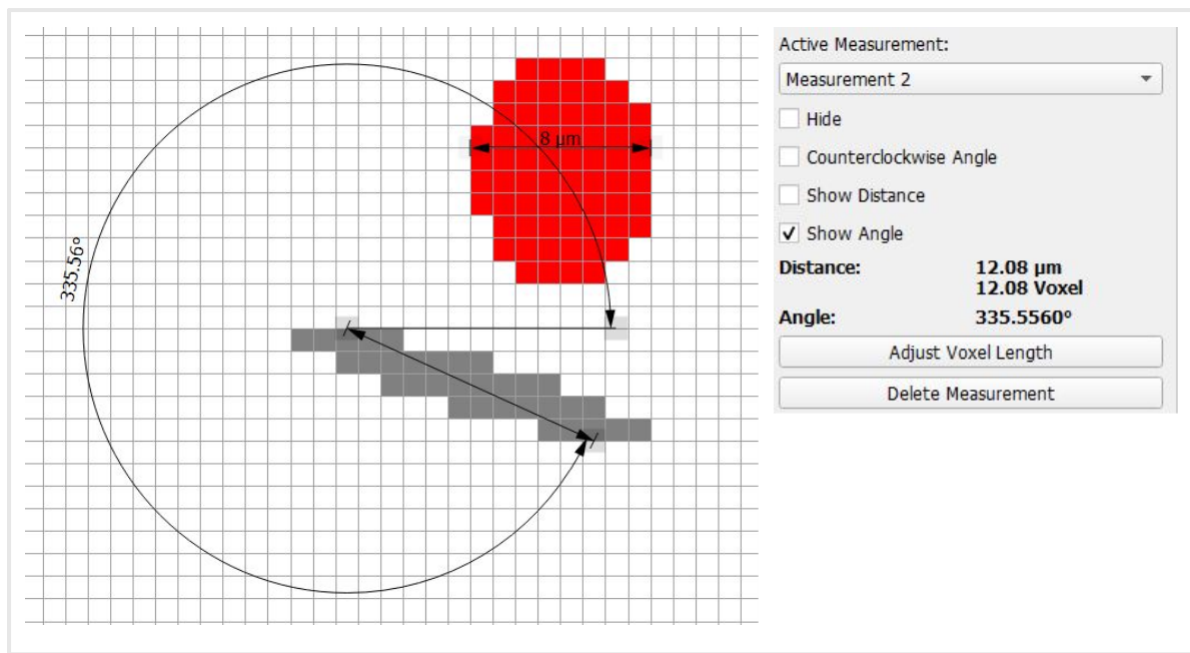
For the example we re-measure the length of the gray fiber segment and its angle to the X-axis. For this, we set the options for this new measurement to **Angle and Distance**. For the snap mode **Snap to Edge Centers** was chosen.

First, the desired distance is measured, then this measure line is taken as first angle leg, and the angle can be measured with a third click.



Unchecking **Counterclockwise Angle** changes the visualization and value of the measured angle as it is measured clockwise.

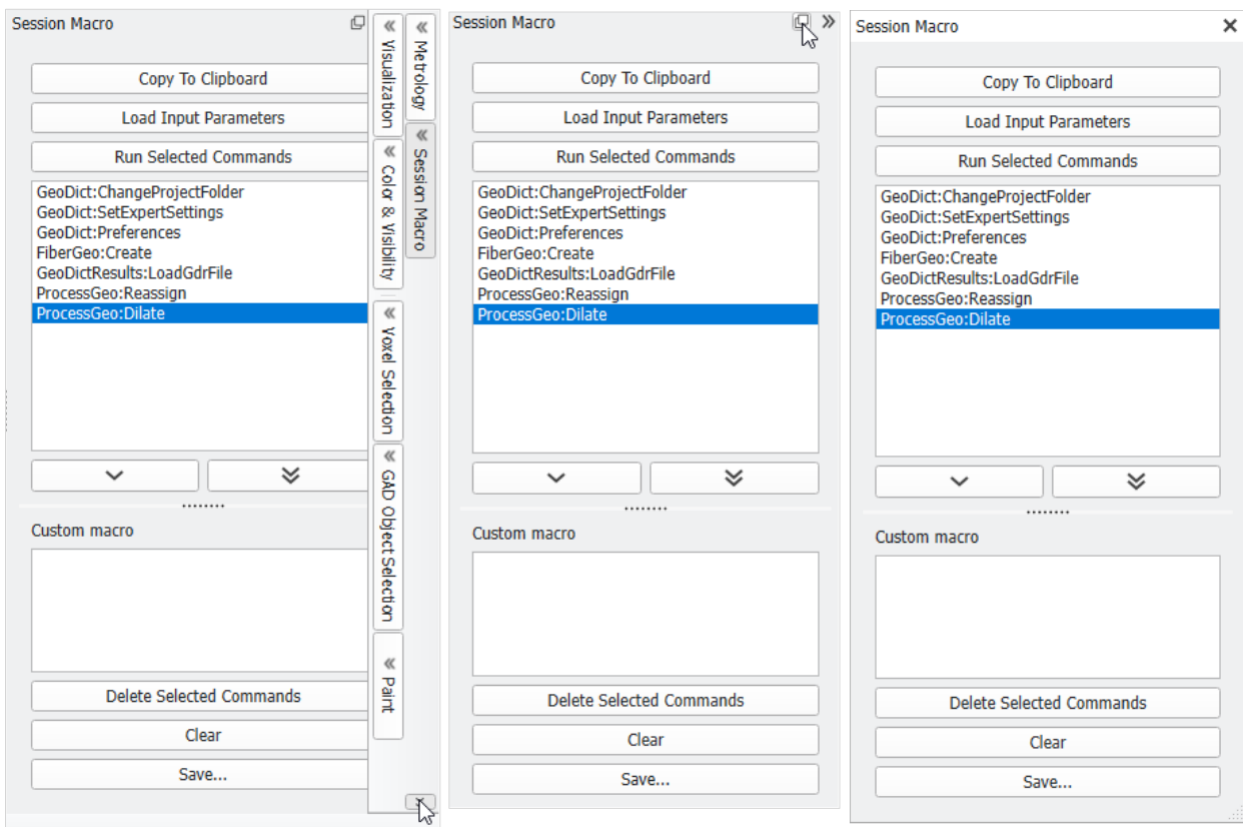
Unchecking **Show Distance** makes the distance disappear from the visualization area. It is still shown in the **Metrology** tab of the sidebar.



1.5.7 Session Macro

From the moment in which you begin a session with GeoDict, all commands used are internally recorded and stored in the **Session Macro**. You may decide to select some of these recorded commands, create a macro that combines them, and save this macro for later use.

After selecting **Macro** → **Session Macro...** in the menu bar, the **Session Macro** side bar opens. It can also be opened by clicking on the side bar tab on the right of GeoDict. If the GeoDict window is not maximized, the Session Macro tab may not be shown. It can be found by clicking  at the bottom of the side bar. You can also undock the **Session Macro** panel and turn it into the **Session Macro** dialog by clicking  in the upper right corner. Although it is still minimized if the GeoDict GUI is minimized, the dialog can be moved independently on the screen.

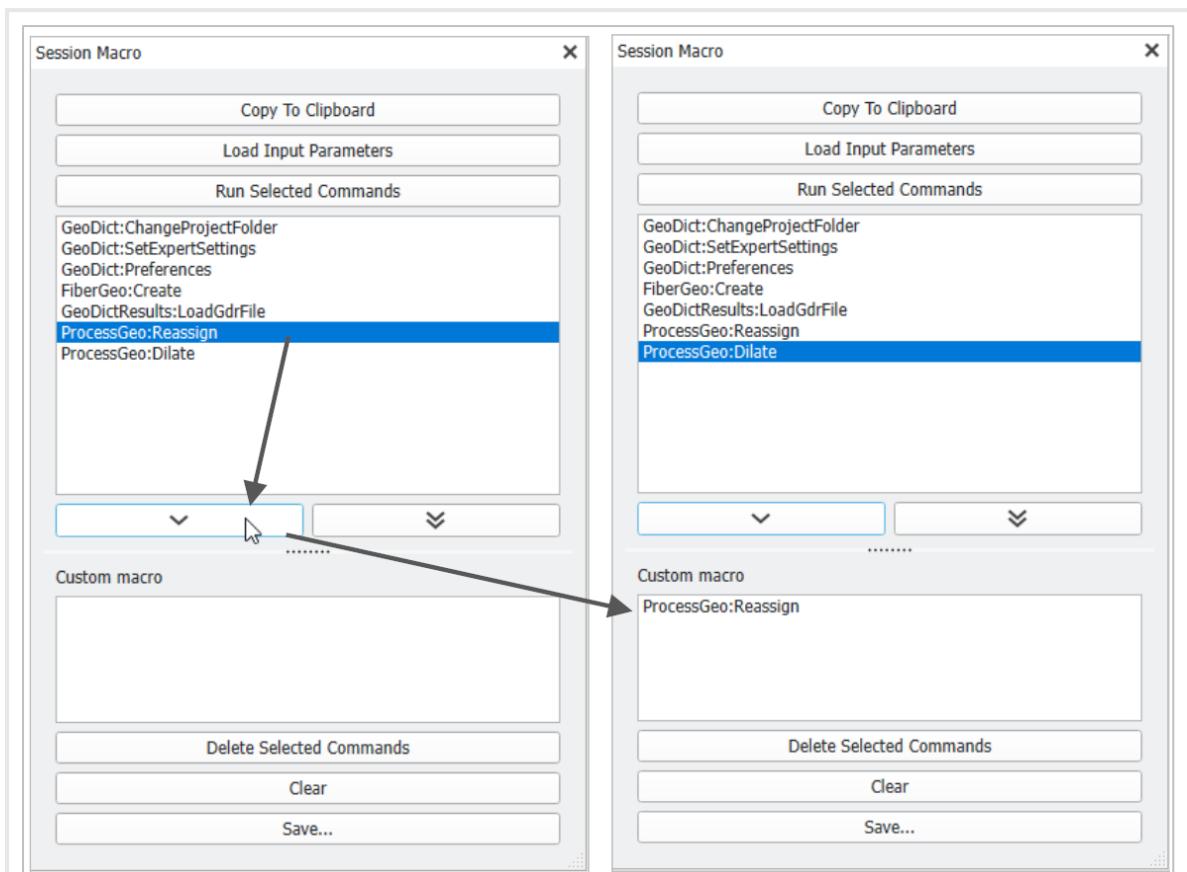


✓ Select the commands to record

The commands used during the session appear in the upper panel of the **Session Macro** dialog and can be selected (highlighted). Click the single arrow

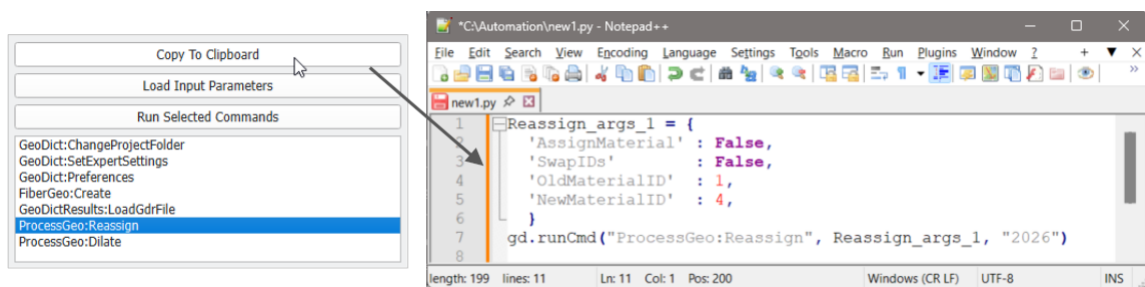


to move the selected commands to the lower panel (**Custom macro**) in the desired order. To move several commands at once, press and hold Ctrl while selecting the desired commands.



To choose and move all commands from the upper panel at once, click the double arrows  instead.

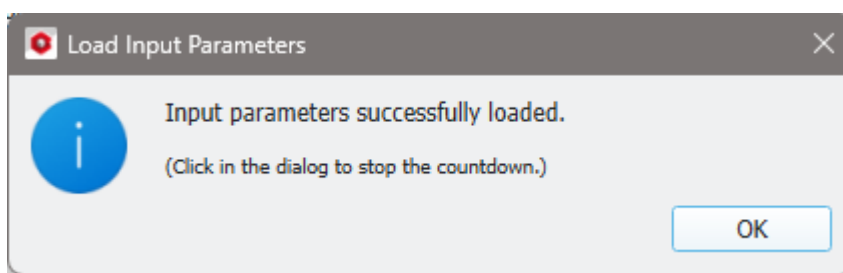
Clicking **Copy To Clipboard** copies the highlighted commands from the upper panel to the clipboard. From there, you can paste them to an editor.



The commands can be removed from the lower panel by highlighting them and clicking **Delete Selected Commands**. To remove all commands at once, click **Clear**.

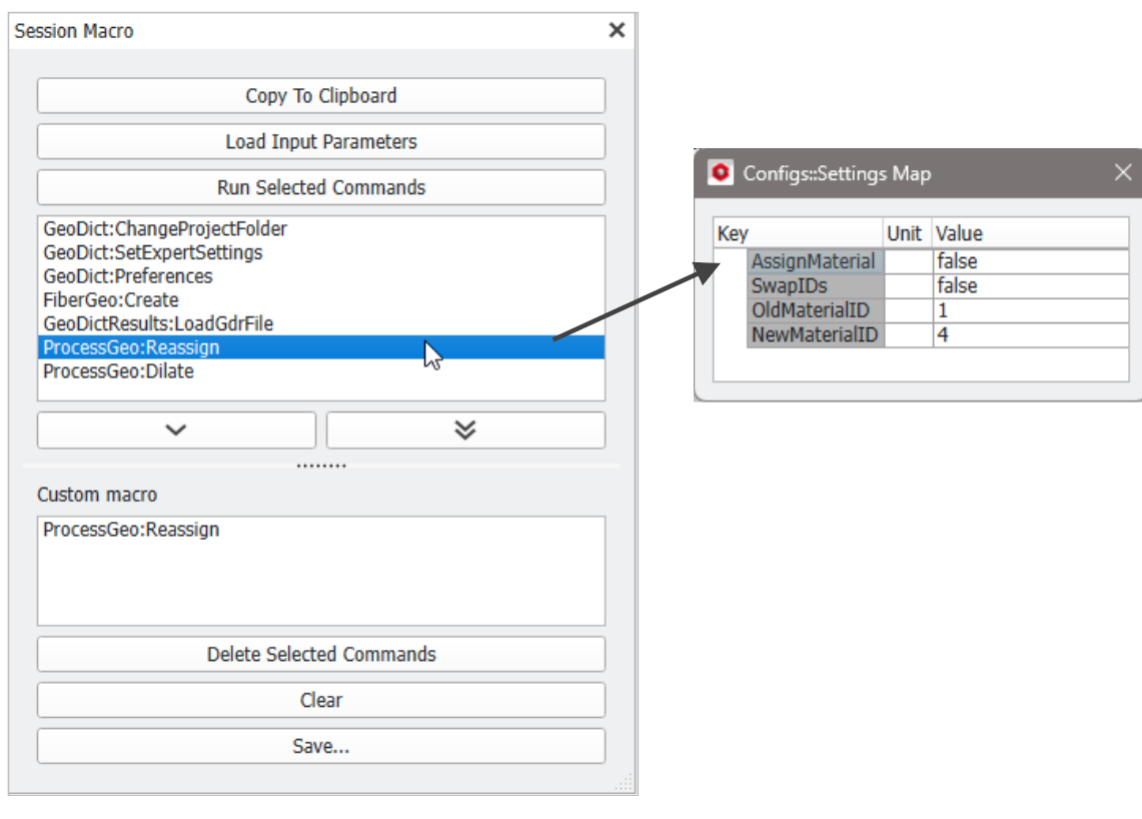
✓ Load input parameters and directly run a command

Click **Load Input Parameters** to only load the parameters of a single highlighted command in the corresponding parameters dialog box in the module section.



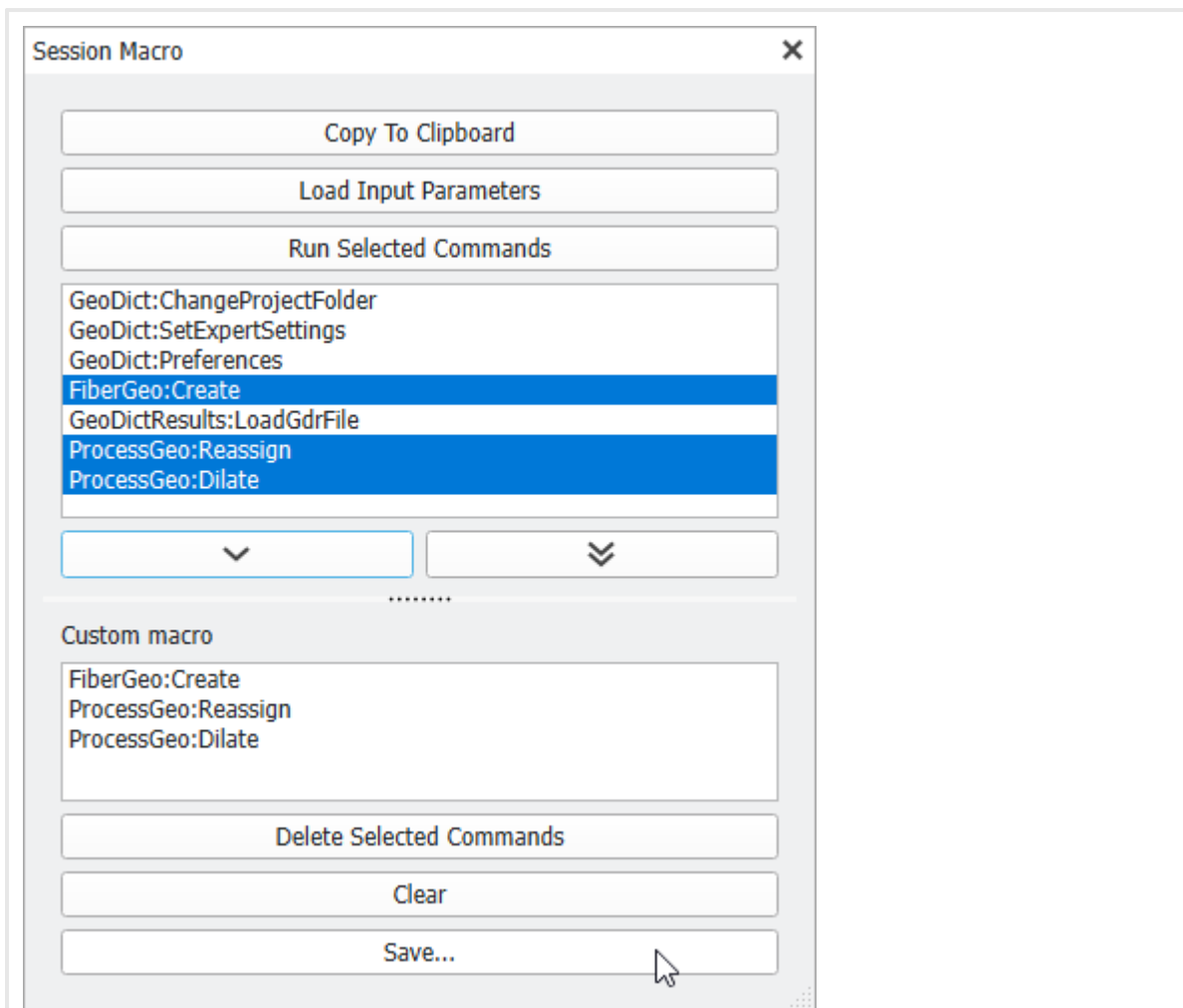
To run commands again without saving them to a macro, highlight the desired commands in the upper panel and click **Run Selected Commands**.

Double clicking on a command, whether in the upper or in the lower panel, shows the corresponding settings map in a new dialog.

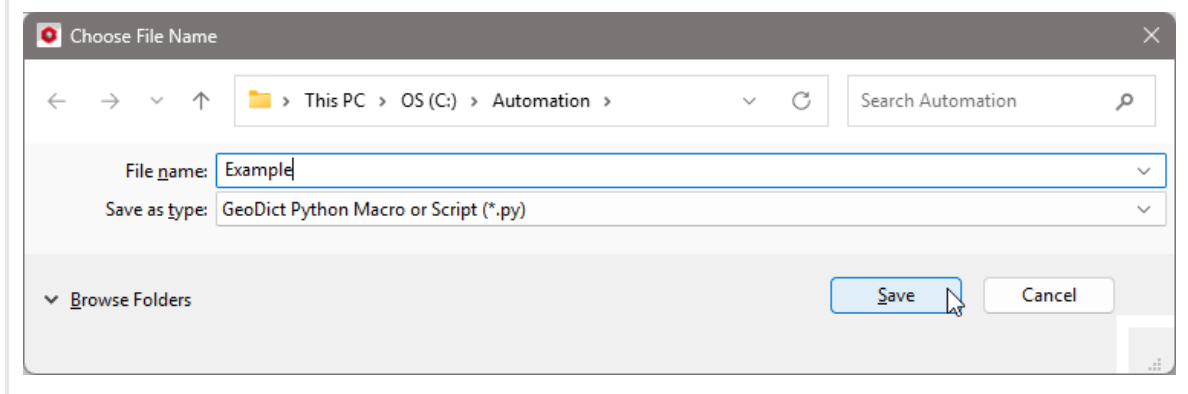


✓ Save your custom macro

After selecting and adding the commands click **Save**.



In the appearing dialog, choose a file name and the desired folder where the macro will be stored.



1.6 Recent Files and Folders

If no structure is in memory and the initial splash screen is shown, the **Recent Files** and **Recent Folders** sections are visible below. There, the **Name**, **Size**, and date when it was **last modified** are shown. Clicking on a file opens it directly in the Visualization area or the Result Viewer. Clicking on a folder changes the current project folder.

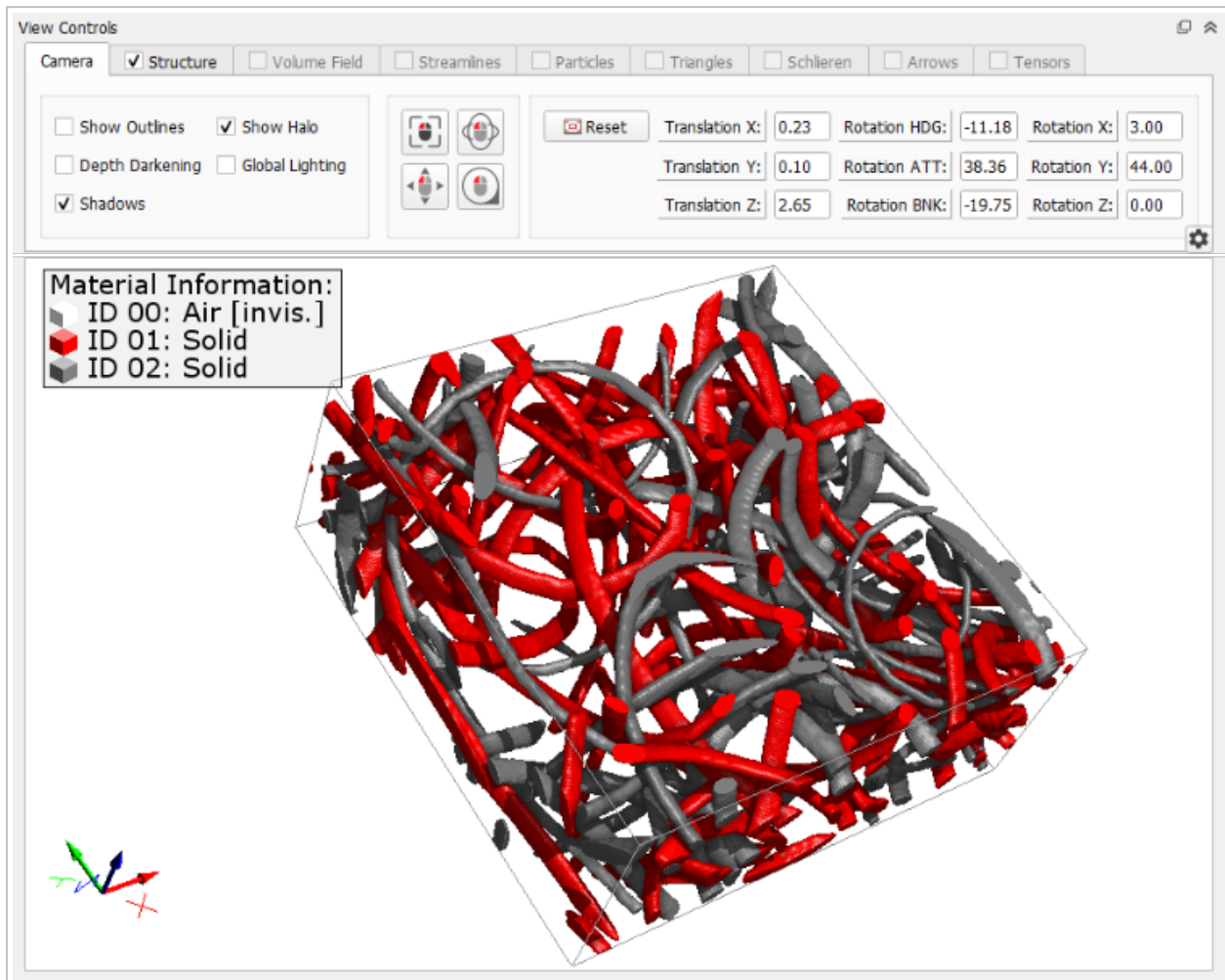
Recent Files			Recent Project Folders		
Name	Size	last modified	Name	Size	last modified
 ...026/FiberGeo/Structure.gdt	1.219 MiB	28 May 2026	 .../GraphicalUserInterface2026	5.077 MiB	12 Jun 2026
 ...Interface2026/FiberGeo.gdr	45.813 KiB	28 May 2026			



Note! Remember that you can [clear the list of recent files and folders](#) from the **File** menu.

1.7 View Controls & Visualization Area

The **View Controls** panel becomes available if a structure is loaded into GeoDict and shown in the **Visualization Area**.



In the **View Controls** panel, the most important settings for the visualization of the structure and additional loaded data (e.g., volume fields) are available. If no data of a certain type is loaded, the corresponding settings tab is grayed-out. The settings are described in detail in the Visualization chapter.

Shortcuts in the right-click menu

Do a right click with the mouse in the visualization area to get access to shortcuts to select voxels and / or GAD objects, apply algorithms to the selection, edit the selected voxels or objects, and control the mouse functionality.



Important! After editing the structure it must be [saved](#) to preserve all modifications.

✓ Select

Part of the selection and editing functionalities are also available from the [GUI sidebar](#)^[90]. You can select the voxel on which the right-click was made. In the right-click menu, the position of the voxel in X-, Y-, and Z-coordinates is given. The selected voxel is added to the table in the [Voxel Selection](#)^[101] sidebar. Right-clicking again on a selected voxel offers to **Deselect** the voxel at this position.



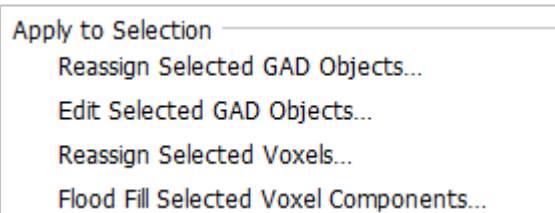
If the voxel belongs to a GAD object, you can also select this GAD object (the ID and the GAD object type are shown) and it will be added to the table in the [GAD Object Selection](#)^[109] sidebar. A previously selected GAD object can be removed from the selection list with **Deselect GAD Object**.



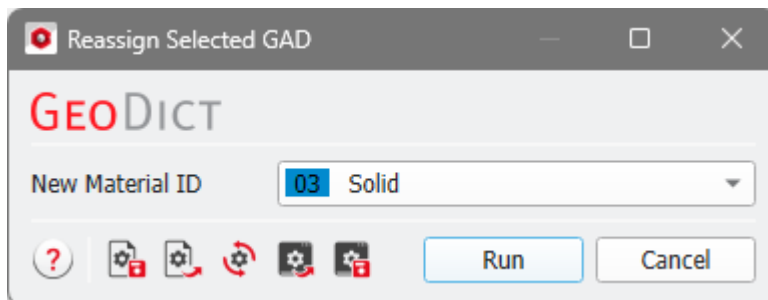
The selections of both dialogs, voxel selection and GAD object selection, can be removed simultaneously with **Clear Selection**.

✓ Apply to Selection

After a selection has been made, different modifications can be applied to the selected GAD objects or voxels. It is not necessary to click again on a selected voxel or GAD object.

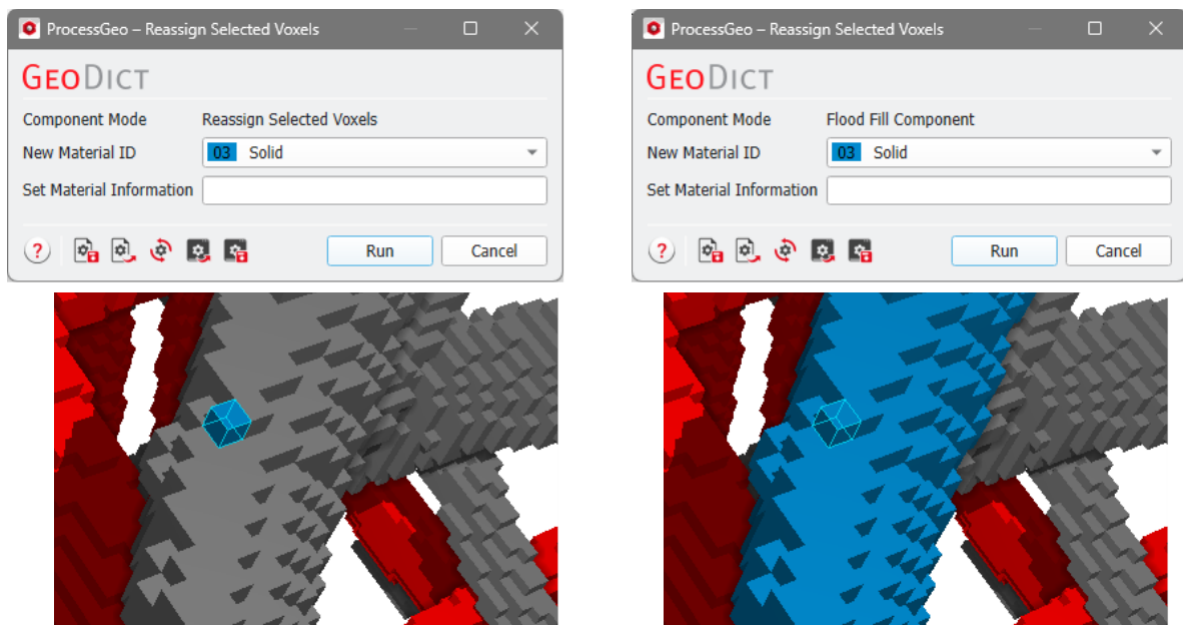


Choose **Reassign Selected GAD Objects** to assign a new Material ID to the selected GAD objects.



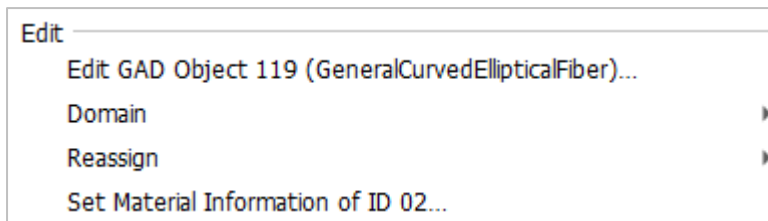
With **Edit Selected GAD Objects**, all selected GAD objects (listed in the **GAD Object Selection** sidebar) can be modified at once. Have a look into the GadGeo chapter for a description of this command.

Voxels listed in the **Voxel Selection** sidebar or the whole components connected to them, can be reassigned to a new Material ID with **Reassign Selected Voxels** or **Flood Fill Selected Voxel Components**. In the opening dialog, choose the new Material ID for the operation. You can also **Set Material Information** which is displayed in the material legend. For example, you can reassign a voxel to a not already present Material ID and set the material information to a specific property of this voxel.



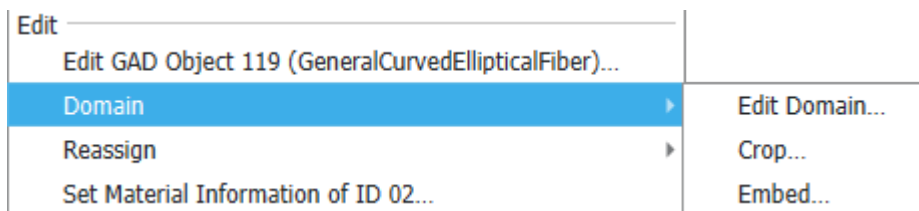
✓ Edit

The options in the **Edit** section apply modifications to the structure without the need to make any selection of voxels or GAD objects.

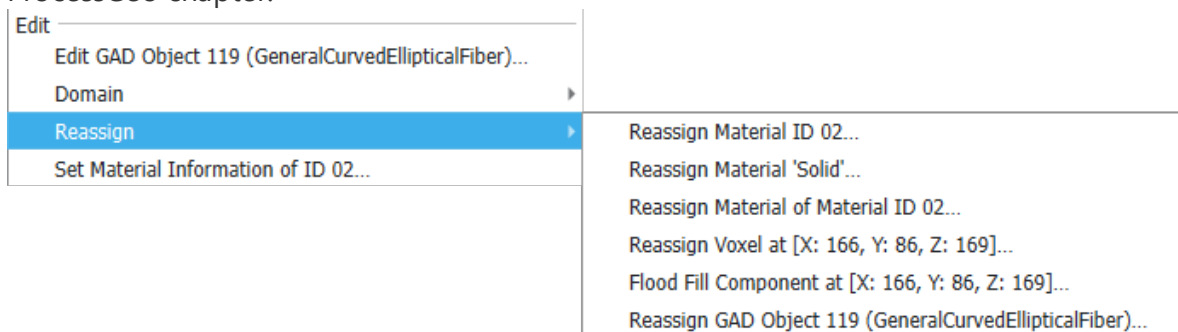


With **Edit GAD Object**, the GAD object on which the right click was made can be modified in the same way as it can be done for [selected GAD objects](#)^[140].

Under **Domain**, the GadGeo command **Edit Domain** (only if GAD data is in memory) and the ProcessGeo commands **Crop** and **Embed** are available as shortcuts.



Under **Reassign**, Material IDs and Materials can be reassigned as it is described in the ProcessGeo chapter.



When choosing **Reassign Material ID**, **Reassign Material**, or **Reassign Material of Material ID**, the Material ID or Material at the voxel where the right click was made is set as old Material ID or Material.

With **Reassign Voxel at** the voxel at this point can be reassigned to another Material ID. This is the same as [Reassign Selected Voxel](#)^[140], but without prior selection of a voxel.

Flood-Fill Component at is the same as [Flood-Fill Selected Voxel Component](#)^[140], but here for the current voxel.

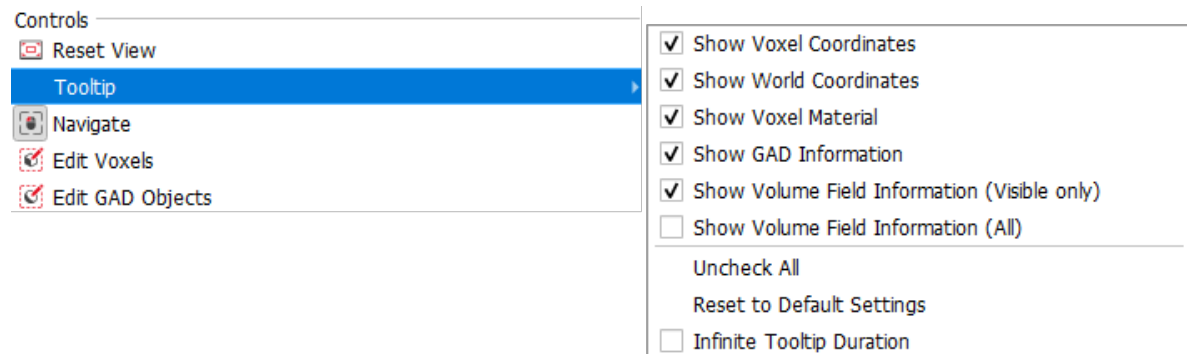
Finally, with **Reassign GAD Object** the GAD Object at this position can be reassigned to a new Material ID, which is the same as [Reassign Selected GAD Objects](#)^[140], but without prior selection of a GAD Object.

For the Material ID of the voxel where the right-click was done, you can **Set Material Information**. This is the same as [Set Material Information of ID](#)^[58] from the Project Status Section.



Select the options available under **Controls**, to reset the current view settings and to change the behavior of the mouse.

Choose **Reset View** to apply the start-up view settings for Rotations and Translations (in 3D View mode) and for Zooming and Panning in 2D view mode. This is a shortcut to the corresponding button in the Camera tab of the view control panel.



Choose which information should be shown as **Tooltip** at the position of the mouse pointer in the structure.

For the position of a voxel, the coordinates can be shown in number of voxels in each direction (**Show Voxel Coordinates**) or as coordinates in length units with respect to the origin of the structure (**Show World Coordinates**).

Check **Show Voxel Material** to add the Material and Material ID information to the tooltip.

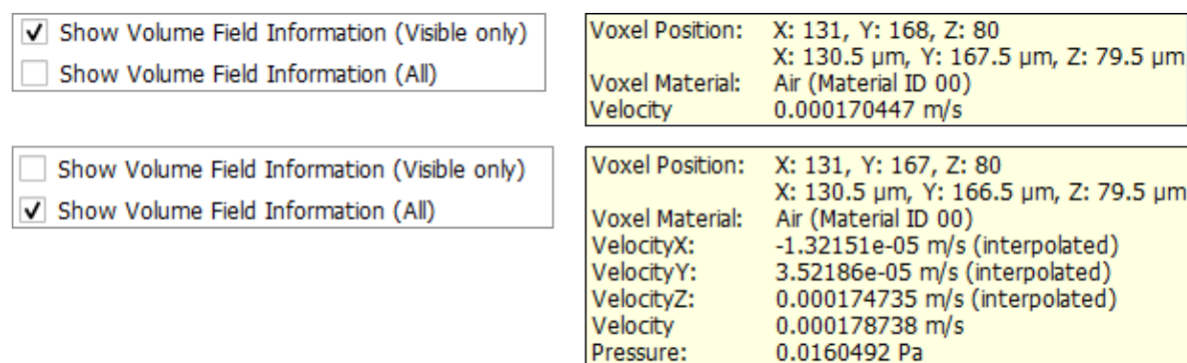
Check **Show GAD Information**, to show the object type and Object ID of the GAD object the voxel belongs to (only shown if analytic object data is available for the structure).

Select **Show Volume Field Information (Visible Only)** to show the value of the currently displayed volume field at the current position (only shown if a volume field is loaded).

Or you can select to **Show Volume Field Information (All)** to show the values of all volume fields available in the GeoDict memory at the current position.



Know how! You can choose to select no volume field information at all (both unchecked), but you cannot check both options at the same time.



Use **Uncheck All** to deselect all boxes of the Tooltip options, or **Reset to Default Settings** to reload the GeoDict default settings for the tooltips. These are shown above.

Check **Infinite Tooltip Duration** to prevent the tooltip from vanishing after a few seconds.

For the functionality of the mouse, you can switch between  **Navigate**,  **Edit Voxels**, and  **Edit GAD Objects**, which are also available as icons in the [Toolbar](#)⁴³.

- F -

files 5

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Math2Market GmbH

Richard-Wagner-Str. 1, 67655 Kaiserslautern / Germany
www.math2market.com