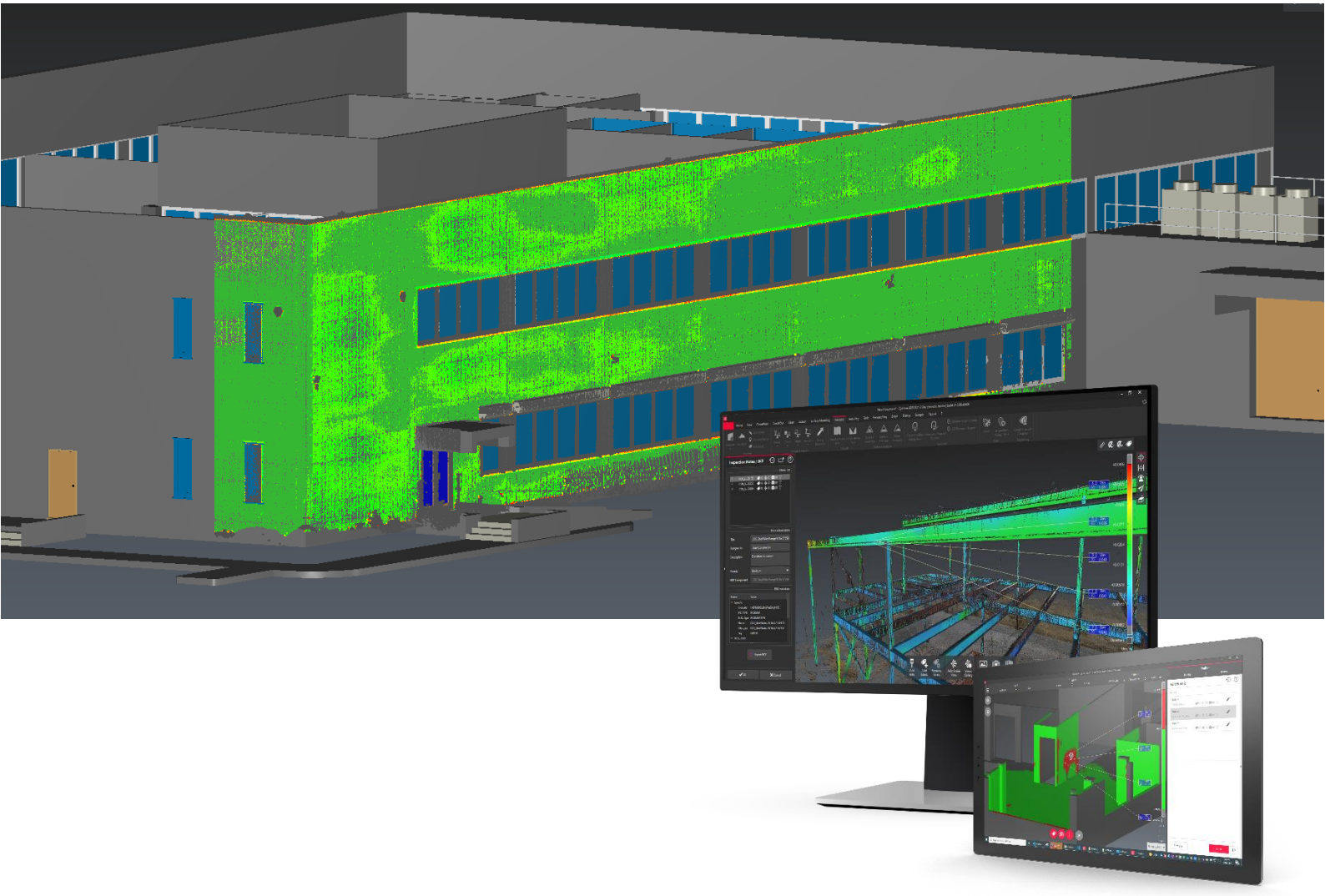
Leica Geosystems
Release Notes

Product: Leica Cyclone 3DR 2023.1.0

Date: 18 April 2023

From: HDS Software Product Management



Contents

What's New

Cyclone 3DR 2023.1.0 is a major release that includes new features and improvements to the product, for both the Desktop and Touch Mode interfaces. In addition to many enhancements, the main new functions are:

- **More simplicity and flexibility for the AEC Industry**
  - Significant updates for Auto-Classification in Indoor and Outdoor environments
  - BIM Alignment
- **Virtual Surveyor**
- **Gridded Inspection** for both Survey and AEC applications
- **New interoperability capacities**
  - Send to Hexagon BricsCAD
  - Support of TRK data
  - Support of classification within LGS format
  - Extension of e57 support
  - Connect to Cyclone FIELD 360 in Desktop Mode
  - Connect to HxDR
- **New UI tools**
  - Free Move new generation
  - First person navigation mode
  - Possibility to display point cloud with transparency
  - Support of multi-screens for the 3D Scene
  - Pole center extraction
- **Report Editor New experience:** Report preview, UI and performance improvements
- **New script engine and functions**
- **New tool to extract lines**

According to the maintenance expiration date policy, users under maintenance on 12 March 2023 may access version 2023.1 with no new license required.

New features

Auto-Classification updates

With Cyclone 3DR 2023.1 release, a new version of point cloud classification engine is embedded. This change allows Cyclone 3DR to offer new models for both indoor and outdoor applications:

- Generic Indoor
- Indoor Construction Site
- Outdoor Heavy Construction

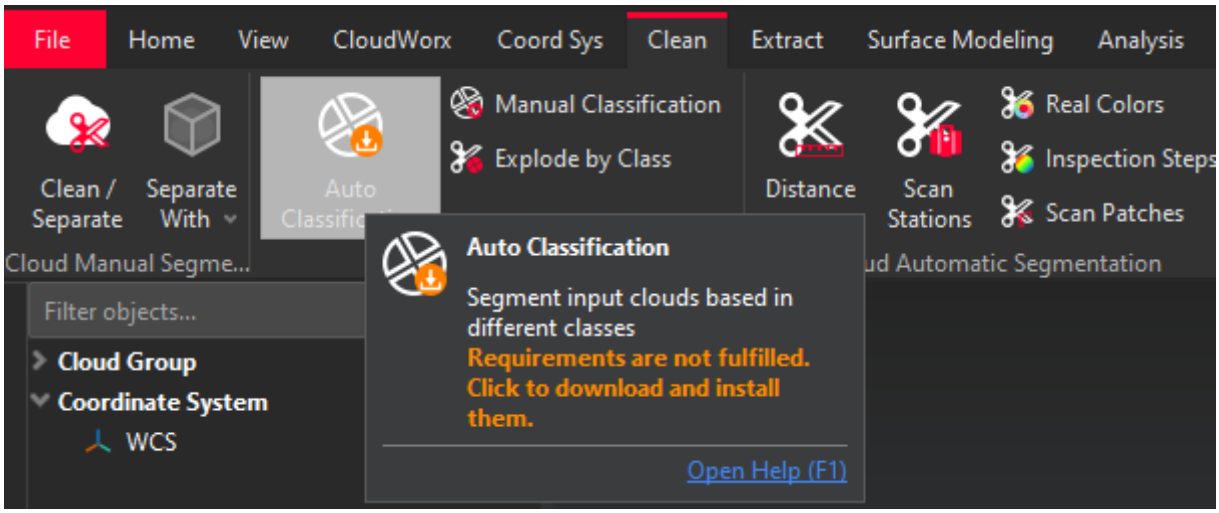
The classification experience is unchanged within the software solution.

This feature is available to users with the SURVEY or AEC or PRO licenses.

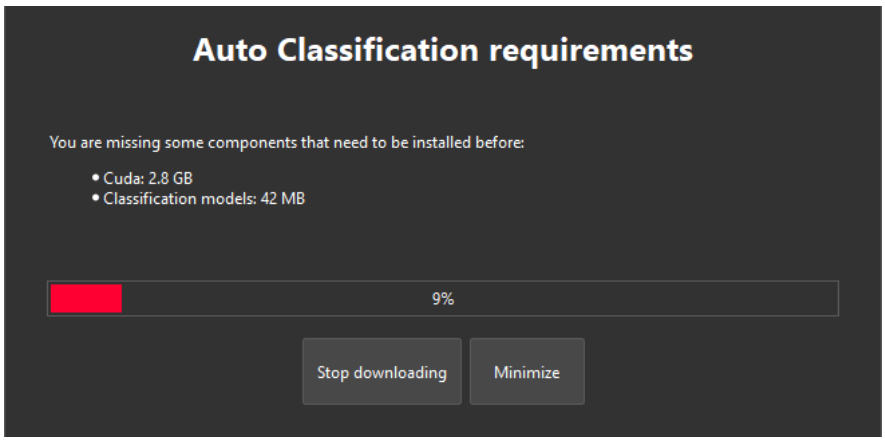
New package installation

The installation process of the pre-requisites is unchanged. Users with a previous version installed must install the new package to take advantage of improvements. The process is defined below. The major change is the **version 11.6 of CUDA Toolkit** that is required to run auto-classification, whereas the version 11.2 was required for the previous engine.

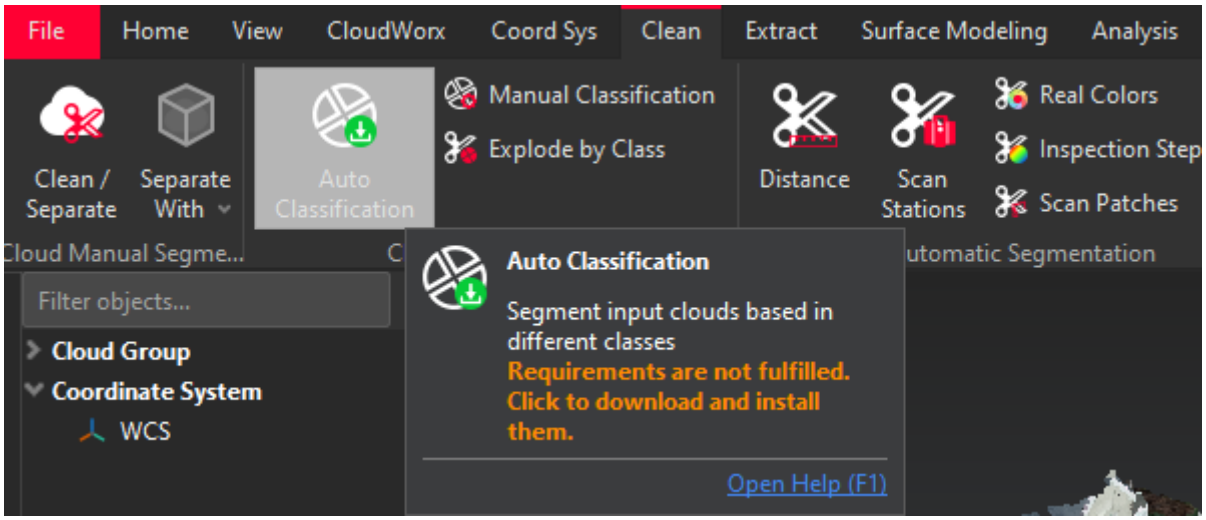
Before launching Auto-Classification for the first time, a notification is displayed in the menu Clean > Cloud classification to alert the user that prerequisites must be fulfilled before running the command.



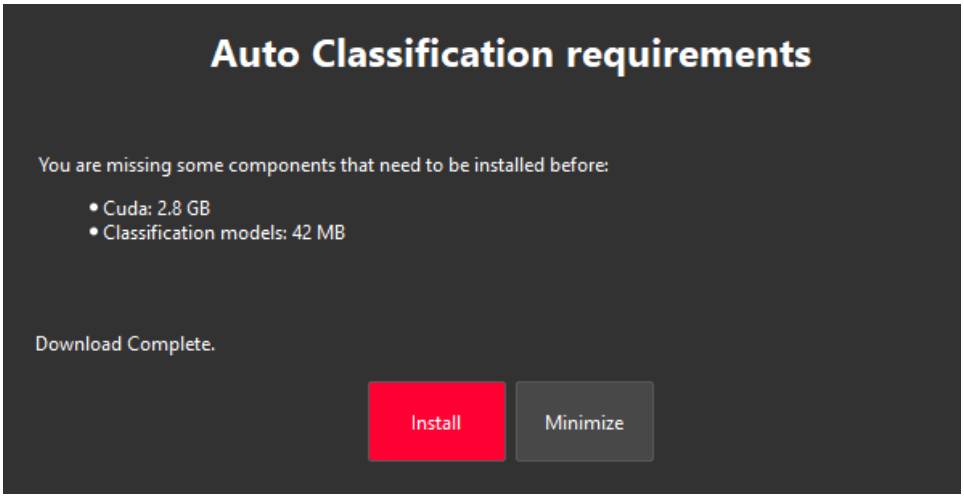
After clicking on the button, the following pop-up is displayed to explain the missing prerequisites, and to guide the download and the installation process.



The same warning will appear when prerequisites are downloaded but not installed yet:



Once the download is complete, the user will be prompted to complete the process by installing the downloads.



The download process of the prerequisites is isolated from the product installer for the following reason:

- It prevents users from unnecessary downloading at each new release (minors and majors).
- Some computers may have already CUDA® 11.6 Toolkit installed.
- Some machines may not have the minimum specifications to run the command.
- Users with Standard Edition do not need to install those elements.
- Some users might not use the feature.

The prerequisites are:

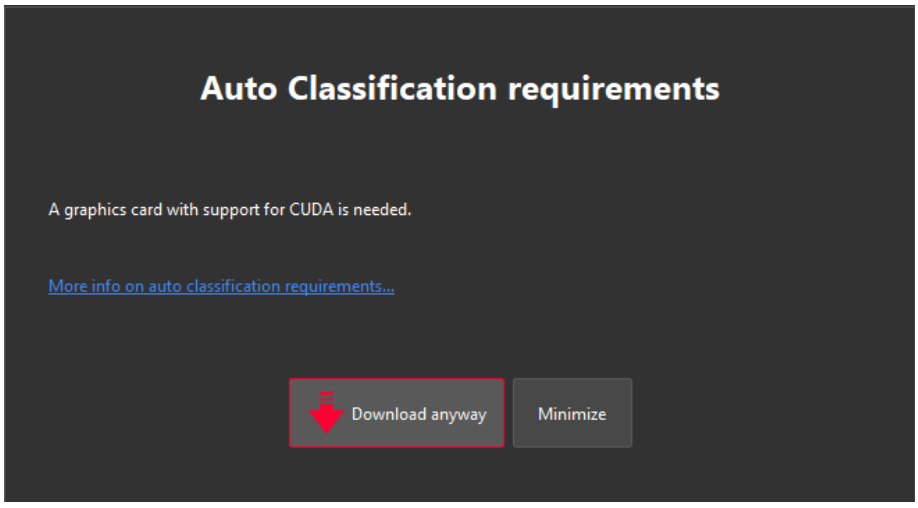
- CUDA® 11.6 Toolkit (from NVidia). **The 11.6 version of CUDA is mandatory for Auto-Classification.**
- Classification plugin
- Classification models

Since this new algorithm is based on machine learning, its capabilities require high-performance elements.

The minimum computer specifications to run auto-classification are:

- RAM: minimum 32 GB
- Graphic Card: NVidia with GPU capabilities
  - Compute capability: 3.7 or higher
  - Minimum GPU memory: 4 GB
- Hard Disk:10 GB free disk space

The Auto-Classification tools require a NVIDIA QUADRO graphics card. If one is not detected, the following pop-up is displayed:



New classification models

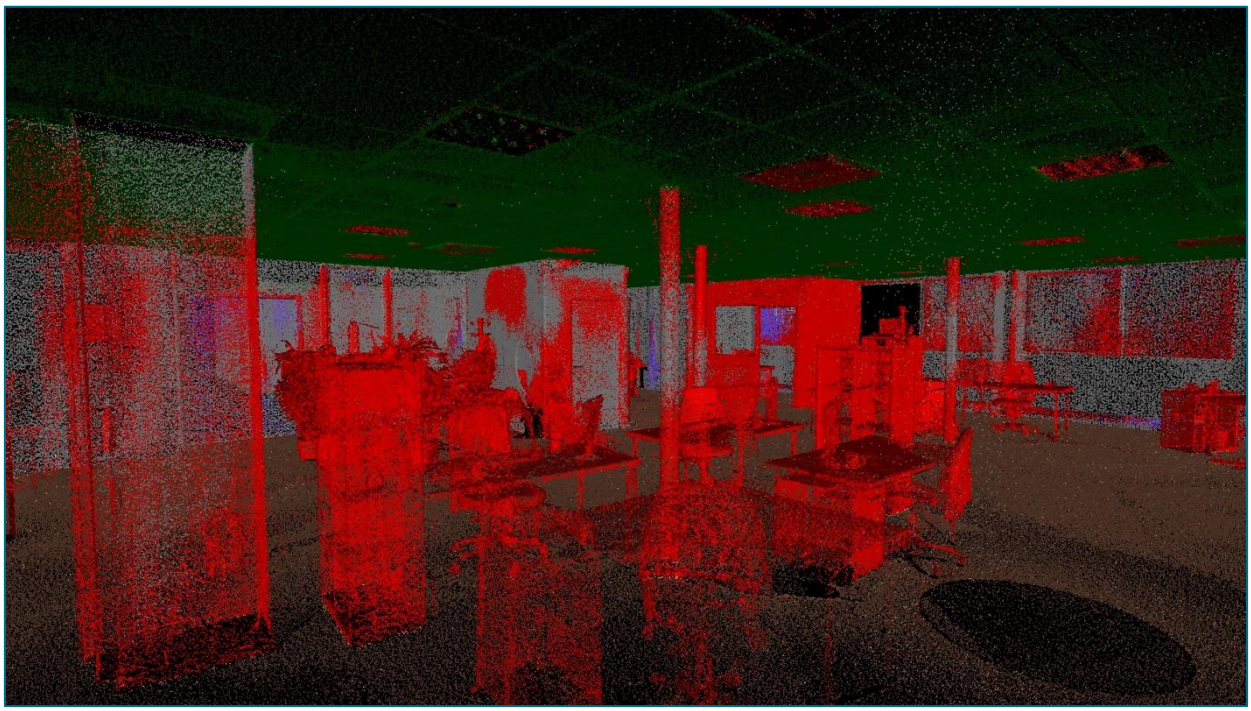
In addition to the existing model for Outdoor application, the Auto-Classification feature exposes three new models. To execute a classification, the workflow is unchanged, and the steps are:

- Select a point cloud (JetStream point cloud must be converted first).
- Go to Clean menu.
- Launch Auto-Classification
- Choose the appropriate model
- Click Preview to run the computation, then OK to validate the results.

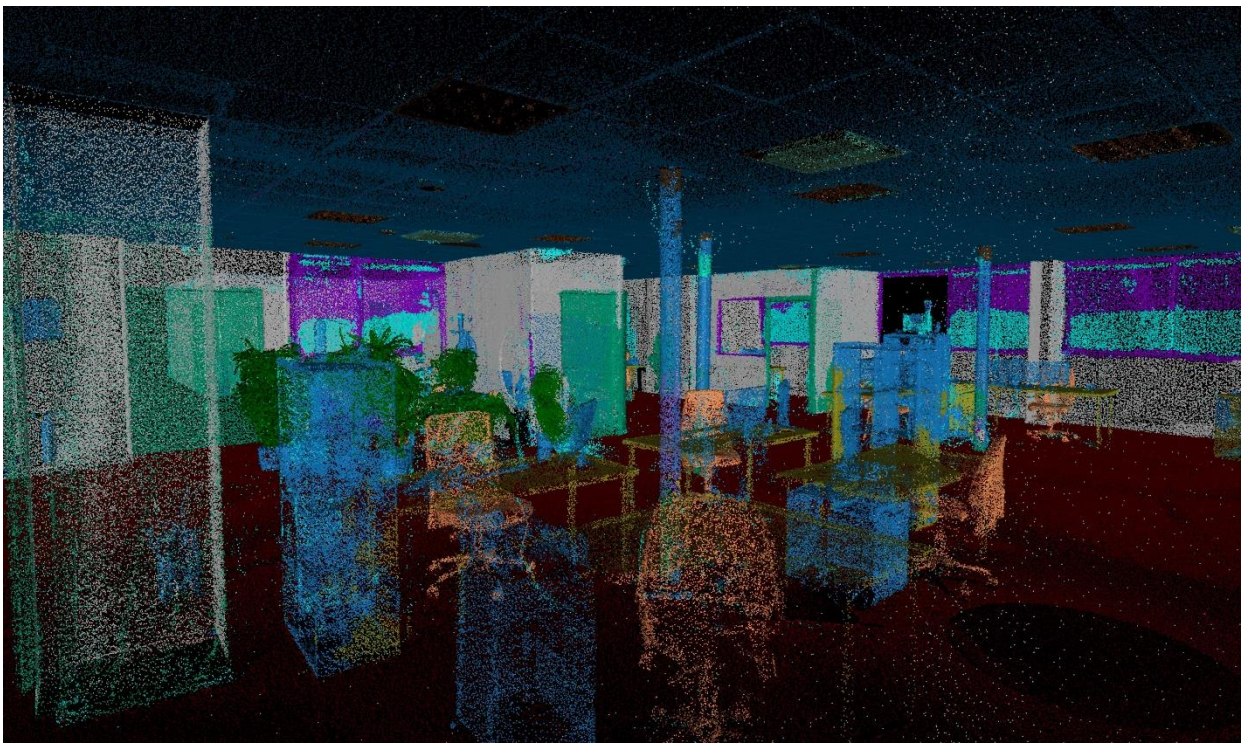
Indoor for Generic Application

This new model is appropriate to classify point cloud data captured in an Indoor environment. Since the model is dedicated to generic applications, it is recommended for use in existing environments for Scan to BIM, renovation and digital twins in environments like offices, residentials and public facilities.

This Generic Indoor model replaces the previous Indoor model. It can be used for point clouds captured with any sensor and it delivers a point cloud that can contain up to 37 classes. They are detailed in the “Settings” within Cyclone 3DR.



Office environment classified with previous Indoor model



Office environment classified with new Generic Indoor Classification
Objects like floor, doors, ceiling, ceiling equipment, walls, chairs, tables, columns are clearly defined

Indoor Construction

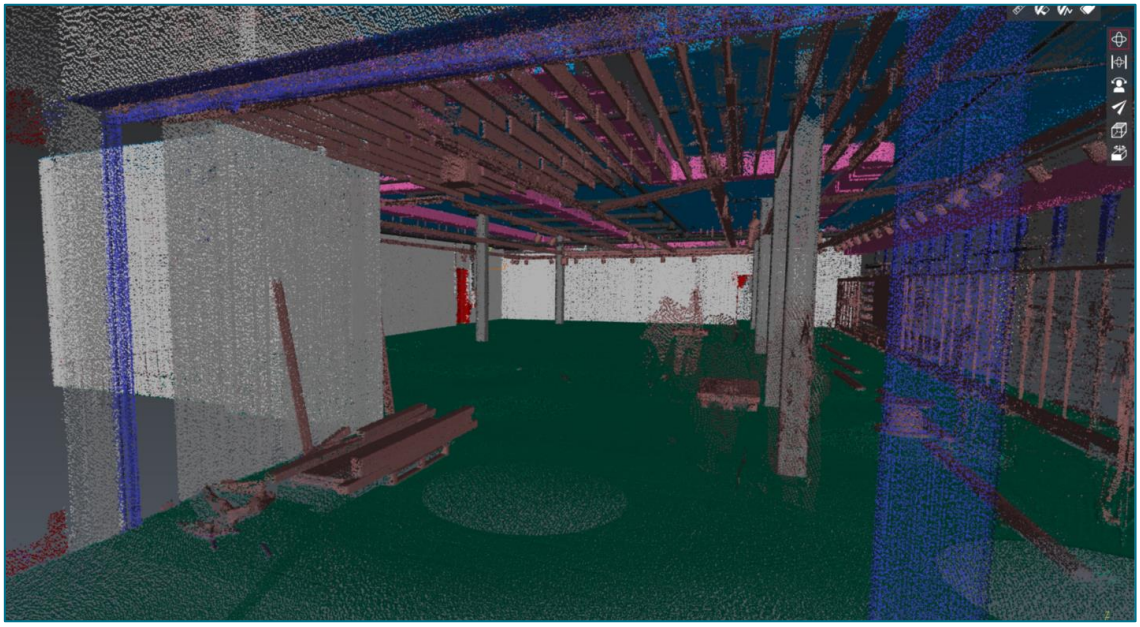
This new model is appropriate to classify indoor point cloud data in active construction zones. The main application for this classification model is preparation and data cleaning to deliver accurate verification and analysis (structure, MEP, distributions, etc.)

- Surface analysis
- Inspection vs design
- Clash Analysis
- Progress Monitoring

The Construction Site model can be also used for data cleaning to deliver cleaned mesh model for visual inspection/verification or to deliver models to 3rd party applications.

The indoor construction classification model will identify not only structural objects such as walls doors, ducts etc. but also construction equipment and debris for easy removal from the scene.

Construction site capture with RTC360 (shopping center)

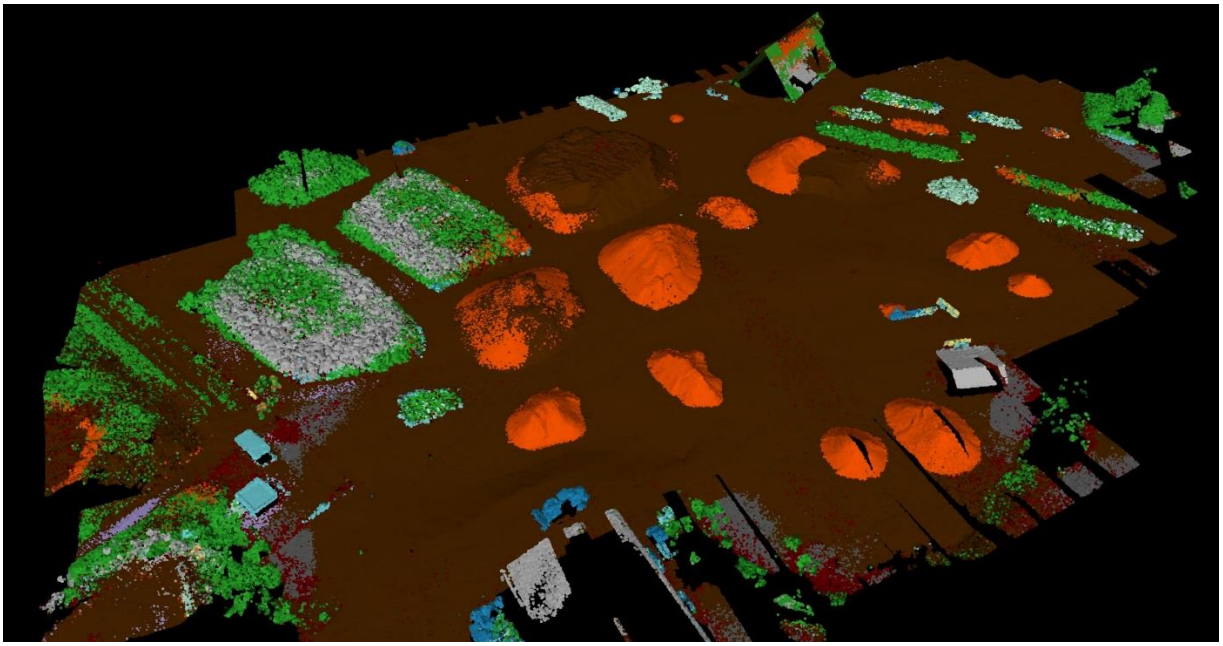


After classification with Indoor model for Construction Site
Objects like floor, doors, ceiling, ducts, pipes, worksite equipment, beams, columns are clearly defined.

Outdoor for Heavy Construction Application

This new model has been trained with UAV sensor datasets but can be used with point clouds from any sensor corresponding to Heavy Construction environments. This new model is relevant to prepare datasets for many workflows in 3DR:

- DTM
- Stockpile
- Cross-Section analysis
- Slope monitoring
- Volume calculation / Cut and Fill calculation



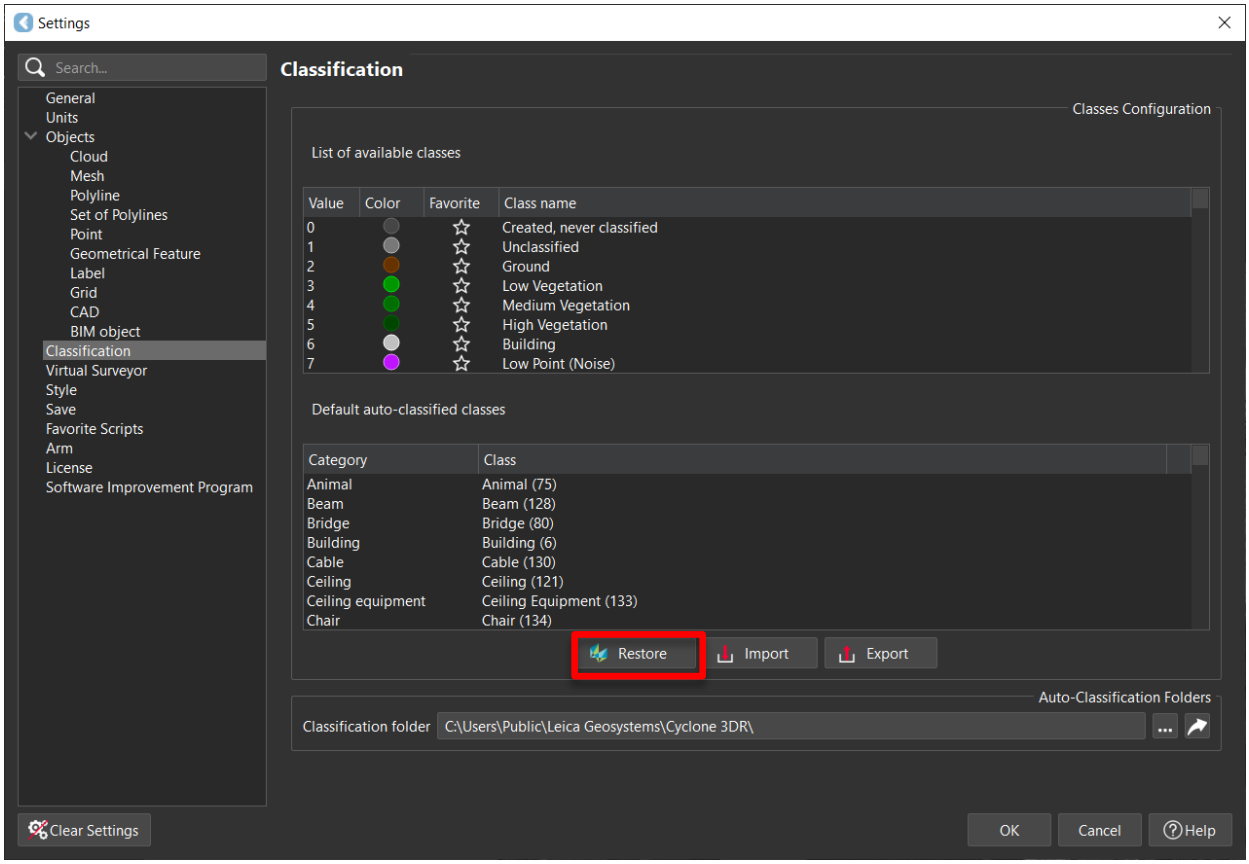
Stockpile site classified in 1-click in Cyclone 3DR with the new Heavy Construction UAV model
Trucks, stockpiles, buildings, grounds, artefacts are automatically classified.

Settings

Classification settings are updated with the 2023.1 release of Cyclone 3DR. The pre-defined parameters have been adjusted to match with the classes related to the embedded classification models within Cyclone 3DR and all Hexagon solutions in general. It means that there is now a unified standard (indexes, names and colors) within Hexagon products.

Since personal settings are saved when a new version of Cyclone 3DR is available, **it is recommended to restore the default settings for classification when installing the 2023.1.0 version.** For this new release, a specific feature has been added to restore the Hexagon standard settings for classification.

It is highly recommended to use the Hexagon standard classification settings for workflows using classified LGS from Cyclone REGISTER 360 PLUS or from Cyclone PEGASUS Office to facilitate the experience between the Hexagon products.

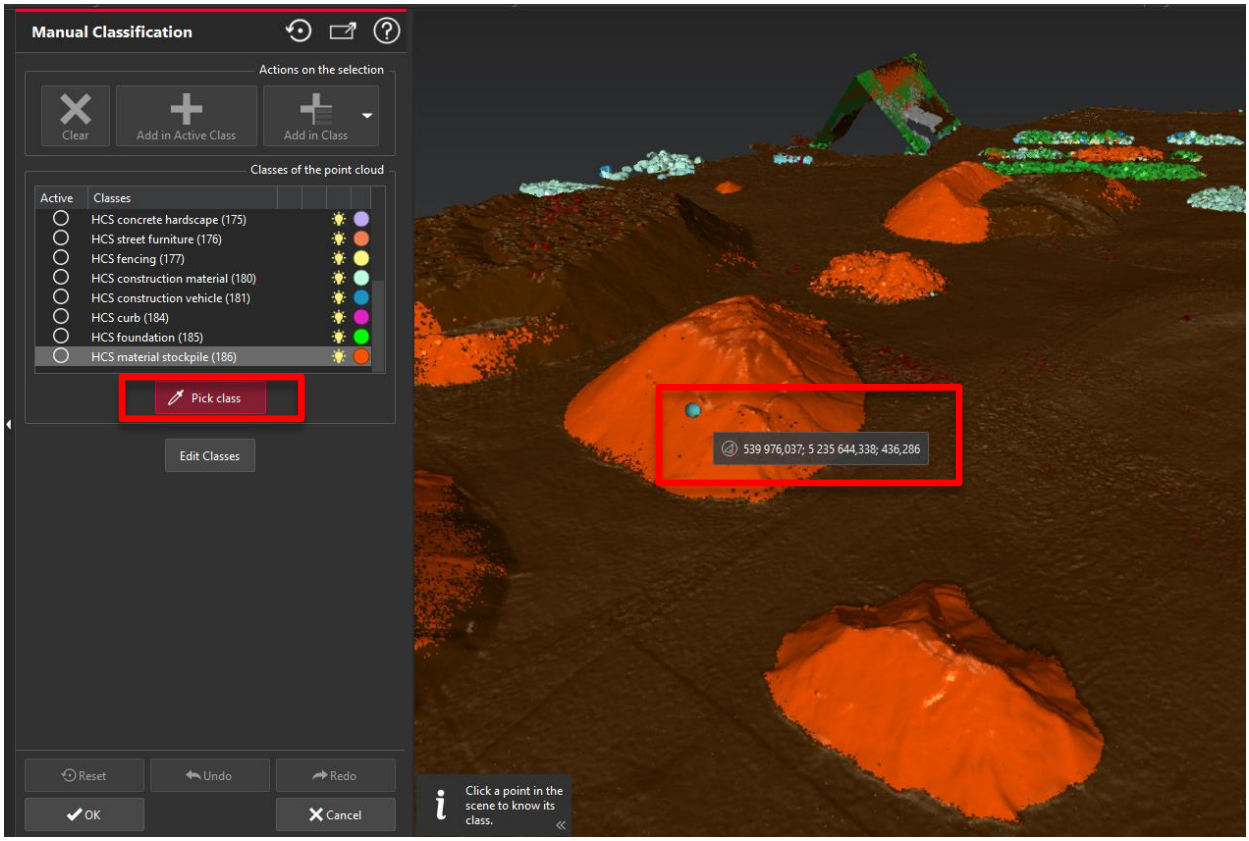


New "HEXAGON standards" restoring feature in Cyclone 3DR classification settings

Manual Classification > Pick class

Users can now query the classification of any point within a project. This new capacity is helpful to understand complex datasets with many classes.

- Select one or multiple classified point cloud(s)
- Run Manual Classification in the Clean menu
- Click on the new button **Pick class** to activate the new mode
- Click on a point in the 3D Scene to get the information
- The corresponding class is highlighted in the list



This feature is available to users with the SURVEY or AEC or PRO licenses.

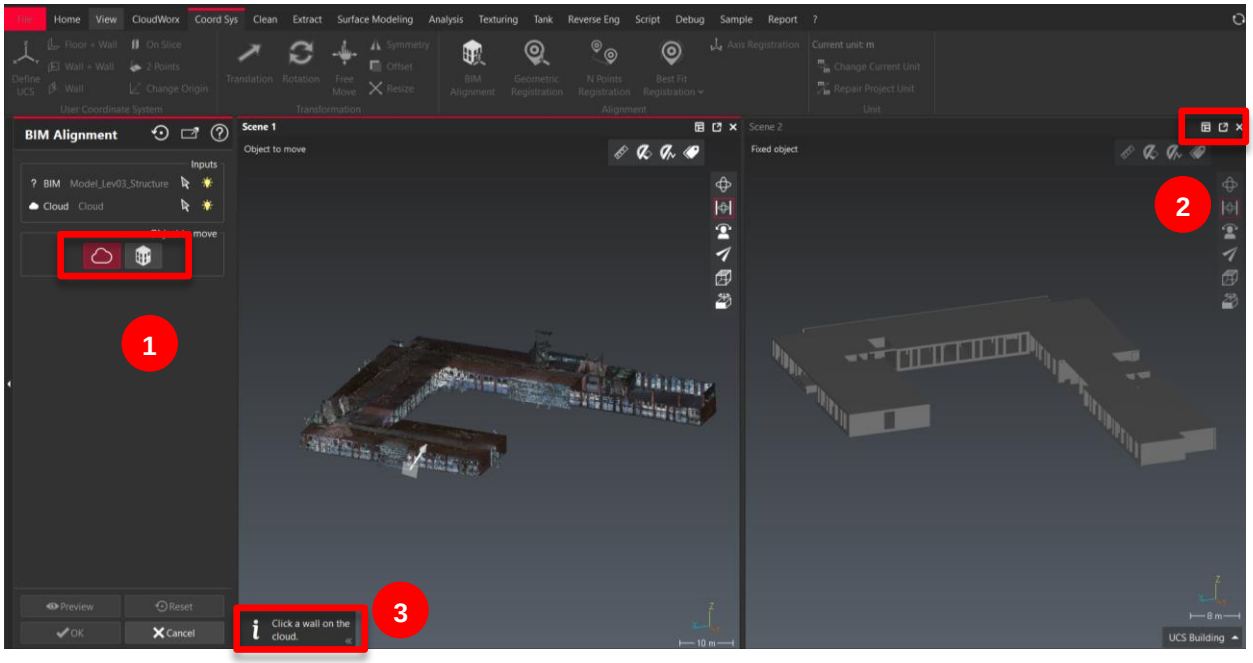
Coord Sys > BIM Alignment

With the 2023.1 release, the new BIM Alignment feature gives a user-friendly way to align a design model with a point cloud data in a few clicks. This feature has been designed for the construction industry and can be applied for diverse design models like Mesh, CAD or BIM models. This new functionality is useful as a start of any analysis workflow involving a design model for AEC applications like a construction verification, a clash analysis or a progress monitoring.

The process is to execute the BIM Alignment is the following:

- Select both inputs: the point cloud and the design model (BIM, Mesh or CAD)
- Go to **Coord Sys** menu and click on **BIM Alignment**.

The feature automatically splits the 3D scene in two parts: one 3D scene for each object of the project.



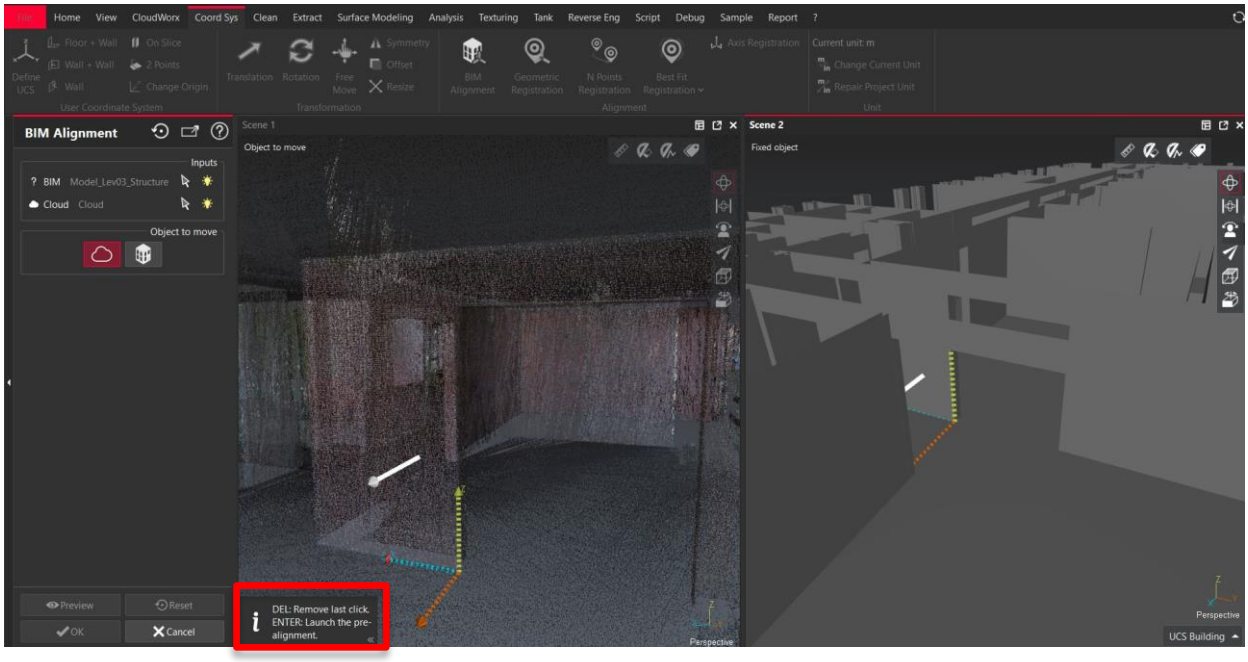
1. Choose which object to move (point cloud of design model). The other one will be fixed.
2. Note that it is possible to benefit from the new Multi-Window capacity of the 2023.1 release of Cyclone 3DR to deploy a 3D scene and to shift it into a second screen for example, to increase the size of the windows and to improve the experience. This new interface capacity is described in the release notes.
3. Apply the instructions:

   On the moved object: one click on a vertical wall + one click on a reference point.
   On the fixed object: one click on the same vertical wall + one click on the same reference point.

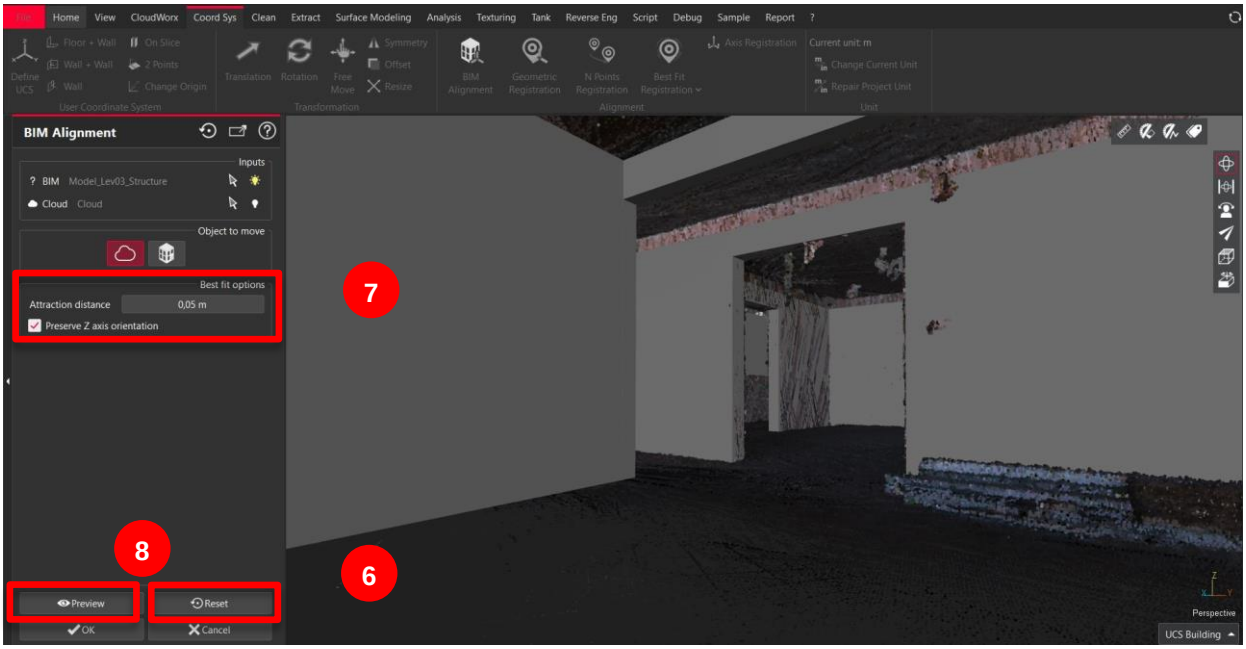
   It is recommended to first adjust the views of the two 3D scenes at the same position and with the same orientation to click on similar objects. Note that the clicks on the vertical wall do not need to be precise because the purpose is to get the normal direction, whereas the click on the reference points must be precise enough so it is recommended to click on a corner that is easy to recognize.

   Tip: prior to launching the BIM Alignment feature, create a limit box or slice around one object (the targeted fixed object for example) and use the shortcut CTRL+SPACE inside the command to edit it and get the best view to navigate through complex BIM models.

4. Temporary UCS are then displayed on each scene as an indication. Click on ENTER as requested in the instructions (screenshot below).



5. The pre-alignment of the moved object to the fixed one is automatic and extremely fast. Next and final step of the workflow is the best-fit operation.



6. In case it is necessary to redo a pre-alignment, click Reset.

7. The exposed options for the best-fit operations are very simple and composed of:

   The attraction distance (default 5 cm): the points that are not closer to that distance are not considered in the best-fit operation. It is a way to remove noisy points from the operation but also to focus on the common areas of the two objects.

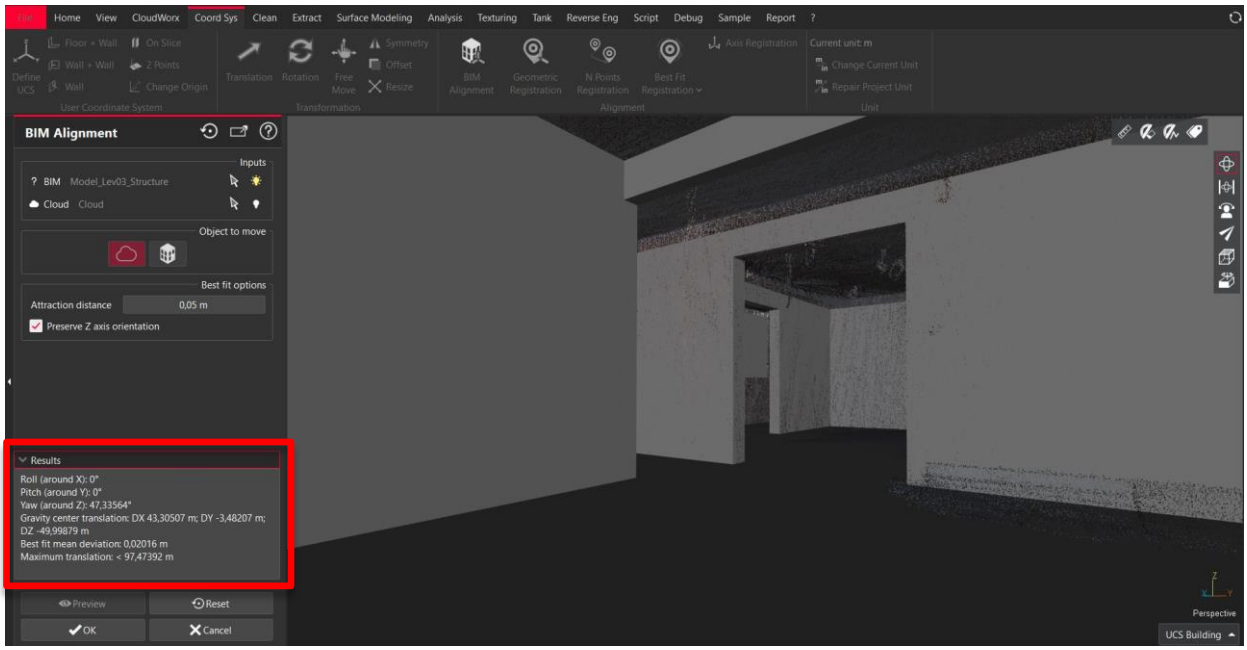
   Checkbox option to preserve the vertical axis: in most cases for building applications, scans are properly leveled, and its Z orientation should be maintained during the best-fit operation.

   Note that the alignment process is similar to the alignment feature of the BIM Inspection

in Cyclone 3DR Touch Mode. The same experience is deployed in the Desktop mode of Cyclone 3DR 2023.1.

8. Click on preview to execute the best-fit operation.

Results of the transformation are summarized in the dialog box.



Click on OK to validate. It is at this point that the two objects are finally aligned and ready to finalize the workflow with a comparison analysis.

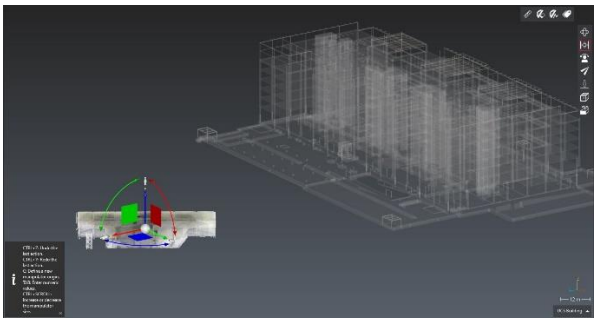
This feature is available to users with the AEC or PRO licenses.

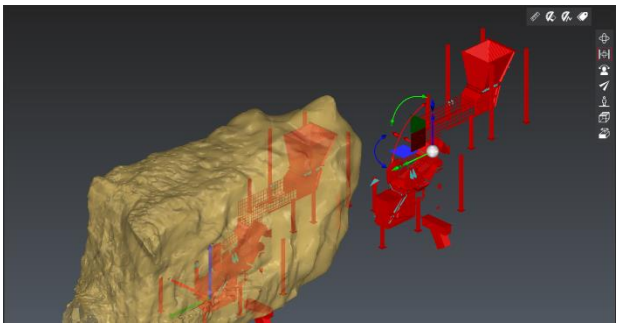
Coord Sys > Free Move new generation

With the release of the Cyclone 3DR 2023.1 the Free Move has been improved with greater usability, responsiveness, support for undo/redo, the possibility to translate objects in a plane and the capacity to enter numerical values for translation and rotation.

The Free Move feature can be used to conduct a pre-alignment of multiple objects:

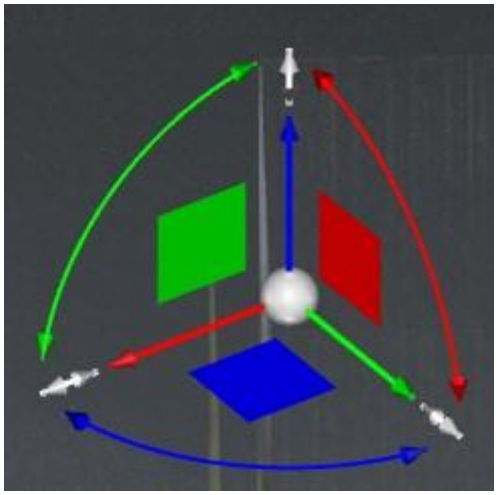
- To do a manual pre-alignment for a BIM application or positioning of an object in a 3D environment.
- To position and orientate a design model of a piece of equipment in a real environment for any kind of application like the construction or the mining industry.





The name of the feature, **Free Move,** is unchanged, and it is just necessary to select the object prior to running the Free Move tool.

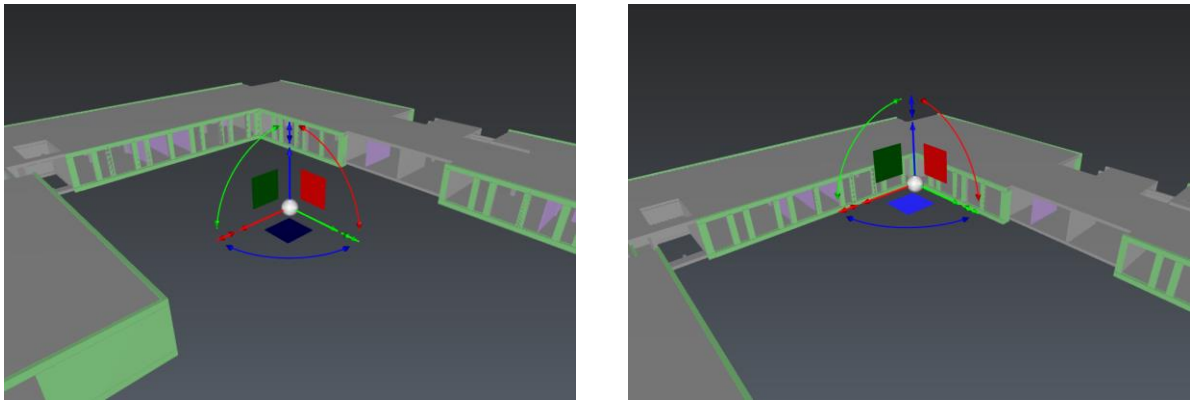
Once started, a 3D widget is displayed at the center of the object.



The features are the following ones:

- **Long arrows along main axis of the active UCS**:
  - Drag and drop on the arrows to proceed a translation along the selected axis. Ability to define a numerical value for translation when pressing keyboard TAB.
  - Single click on the arrows to open the vector toolbar and reposition the axis of the widget.
- **Curved arrows around the main axis of the active UCS**: drag and drop on the arrows to proceed a rotation around the selected axis. Ability to define a numerical value for rotation when pressing keyboard TAB.

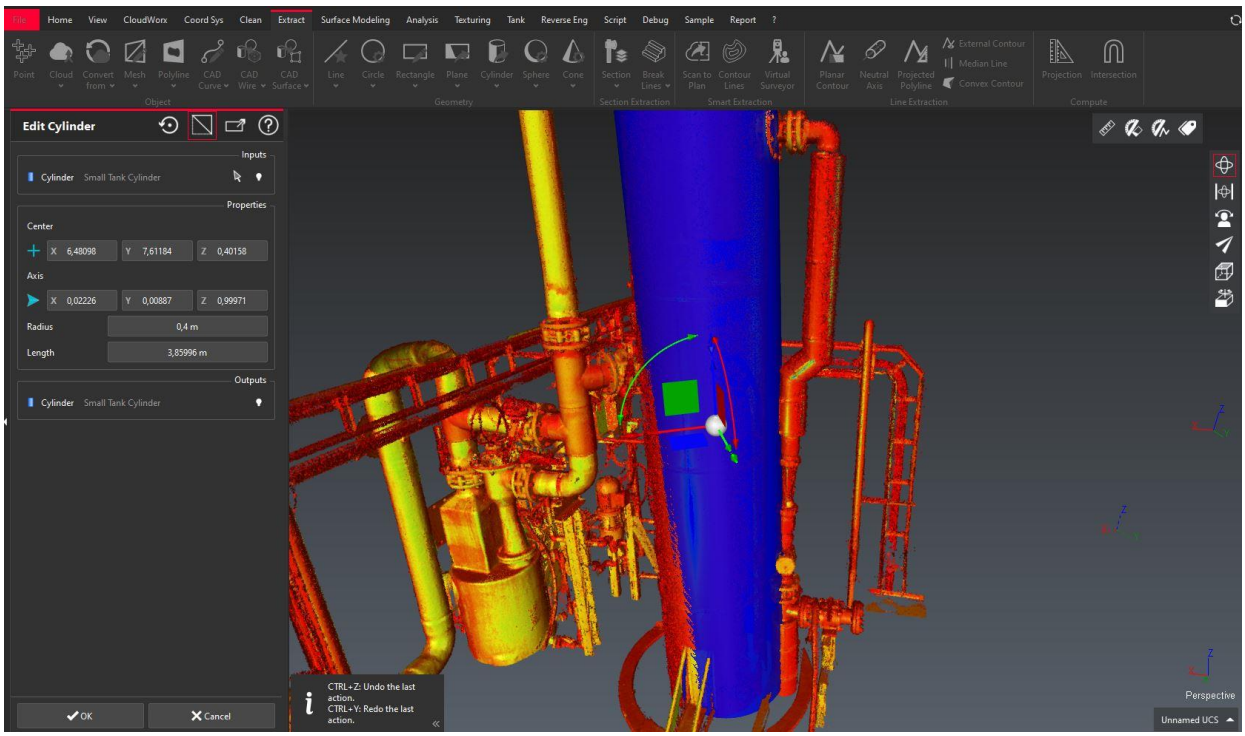
- **Short white double arrows at the extremity of each axis of the axis UCS**: drag and drop on the double arrows to resize the object.
- **Planes aligned on main axis**: drag and drop on the selected plane to translate the object onto the selected planes.
- **Center ball**:
  - Drag and drop the center ball to do a 2D move of the object in the scene (translation in the plane corresponding to the scene view)
  - Single click on the center ball and then click on a specific point on the object to reposition the widget in an area that may be more appropriate to do the free move operation (relevant for large object and to focus on a specific area). Available with keyboard shortcut “C”.



The Free Move widget is repositioned in the corner of the building.

- **CTRL+Z**: to undo the last action
- **CTRL+Y**: to redo the last action
- **ESC**: to quit the command and cancel the changes
- **TAB**: to define a numerical value when doing a translation or a rotation
- **ENTER**: to quit the command and validate the changes

Note: the edition of geometrical features (like cylinders, cones, circles, …) has been adapted to use the same 3D scene widget to facilitate the edition of the objects (dimensions and main axis).



Example of a best cylinder of a small Tank of a Chemical Plant – Edited with new widget

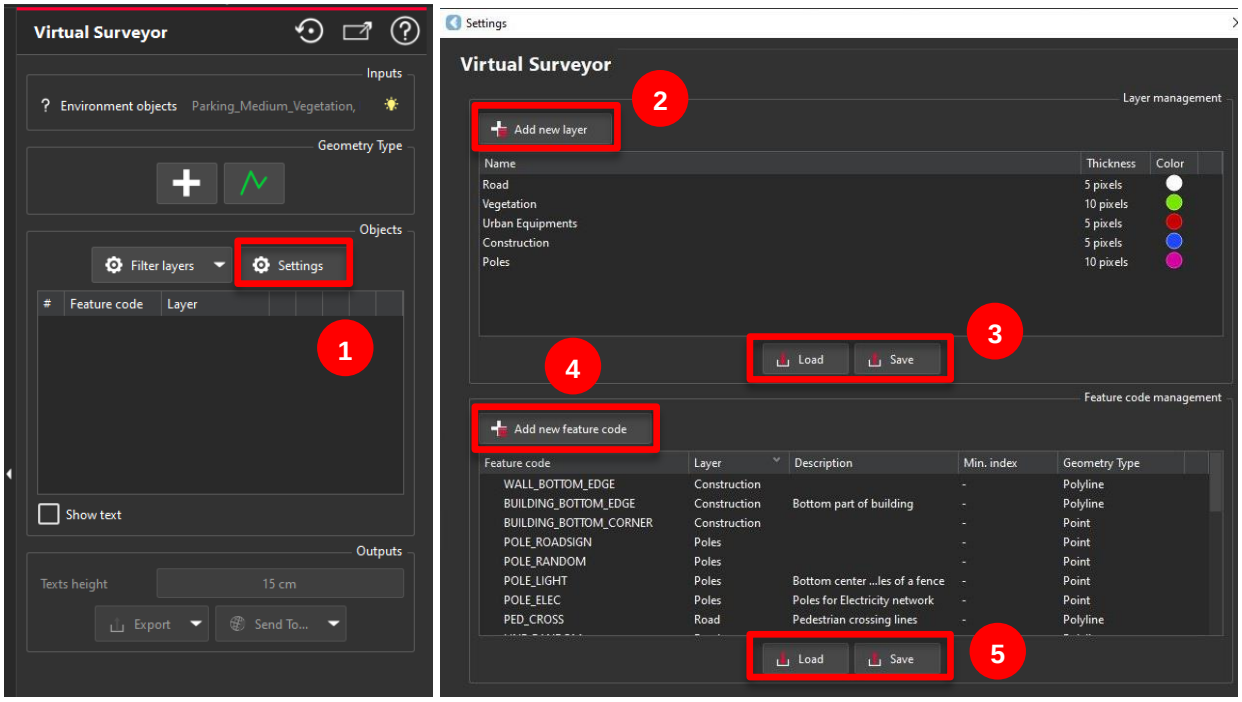
This feature is available to users with the STANDARD license.

Extract > Virtual Surveyor

With the release of Cyclone 3DR 2023.1 a new **Virtual Surveyor** feature allows users to create traditional survey maps in CAD format from any kind of 3D data. This feature adapts the popular tool from Cyclone SURVEY into Cyclone 3DR Survey Edition for users switching to the next generation solution.

Virtual Surveyor offers a very flexible workflow which allows it to be used from multiple objects like point clouds (including LGS, JetStream data or HxDR point cloud), meshes or design models and allows a project to be closed and validated and then revisited later.

Starting Virtual Surveyor for the first time, the following empty dialog is displayed. It is necessary to define the settings of the Virtual Surveyor project from the button illustrated below.



1. Go to Virtual Surveyor settings
2. Layer management – Add new layer

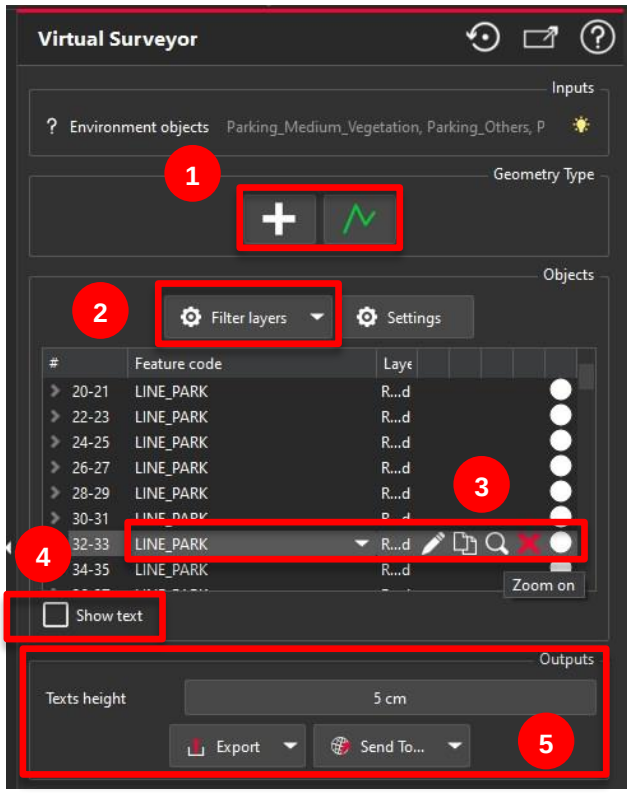
   This section gives the capacity to create different layers and their parameters (colors and pixels).
3. Layer management – Load and Save

   With the capacity to save the layers to a CSV file, users can properly store their predefined settings for specific applications, for different types of customers or for different regional needs. It provides an easy way to share the list of layers with other stakeholders or colleagues.
4. Feature Code management – Add new feature code

   For each layer, users can then define precisely different Feature Codes: Layer, Description, Min Index and type of objects (point or polyline).
5. Feature Code management – Load and Save

   Similar capacities and benefits as the management of layers to save, store, reuse or share predefined settings of Feature Codes.

Once the settings are properly defined, they can be completed later again during the project, and it is possible to build a CAD Survey map in the main command:



1. Create a new object Point or Polyline: when active, this feature enables a drop-down list to make the user choose the appropriate Feature Code.
2. Filter Layers: to show/hide and activate/deactivate layers for new objects
3. Edit object: change Feature Code, Edit, Copy, Zoom on or Delete
4. Option to hide/show texts: to display the feature code naming in the 3D Scene
5. Export options including
    a. Export to DXF or CSV
    b. Direct Send to CAD feature (including now BricsCAD in addition to AutoCAD and MinePlan)
6. Click OK to save the project and go back to the main environment.

CAD Survey map in construction for a parking lot

To restart a project users have two options:

- Select the Virtual Surveyor folder in the treeview and click on Virtual Surveyor in the Extract menu.
- Click on the “Play” icon close to the folder name directly in the treeview.

This capacity to start, close and reopen a Virtual Surveyor gives users more flexibility. It also provides the capacity to show/hide objects of interest, or to change some representations. As an example, in the

illustration above, the trees and random outdoor objects are displayed with their classification representation, whereas the ground area and the buildings are displayed in real colors. That is appropriate to have a better visibility of the areas of interest to create the Feature Codes.

Note: A new “Pole Center” is released with the 2023.1 version of Cyclone 3DR in the point selection toolbar. This functionality is appropriate for Virtual Surveyor and is described in the 3D Scene > New experience chapter of the release notes.

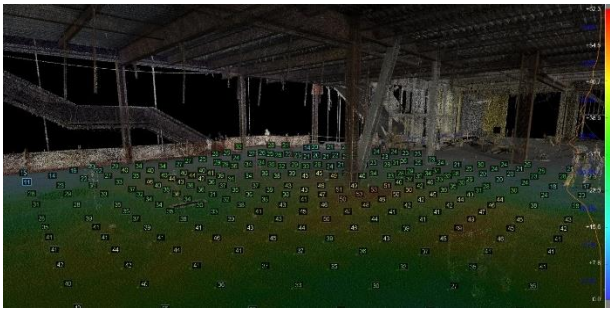
This feature is available to users with the SURVEY or PRO licenses.

Analysis > Gridded Inspection

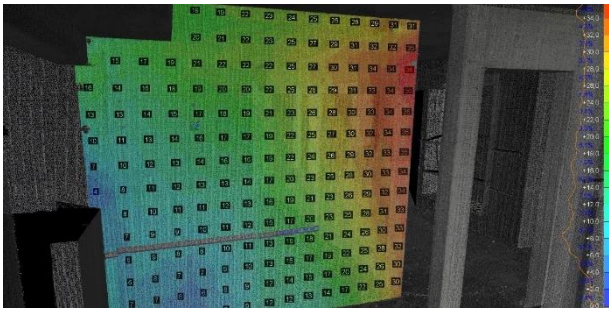
Cyclone 3DR 2023.1 offers a new option within Surface Analysis: **Gridded Inspection**. The new feature offers the capacity to create customized grids that contain inspection values for reporting and decision making.

Gridded Inspection is applicable to the Surface Analysis tools, Surface Levelness, Surface Flatness and Slope Analysis, and brings a significant improvement for the various applications that were already possible with Cyclone 3DR:

- Floor Flatness / Floor Levelness mainly for the AEC Industry
- Wall verticality for AEC or Heavy Construction industry
- Slope reporting both for the Construction Industry (verification of existing floors), Heavy Construction (verification of piles, slopes, worksites, Surveying (landscape monitoring)
- Surface verification for Manufacturing application (agnostic to any kind of fabricated products)



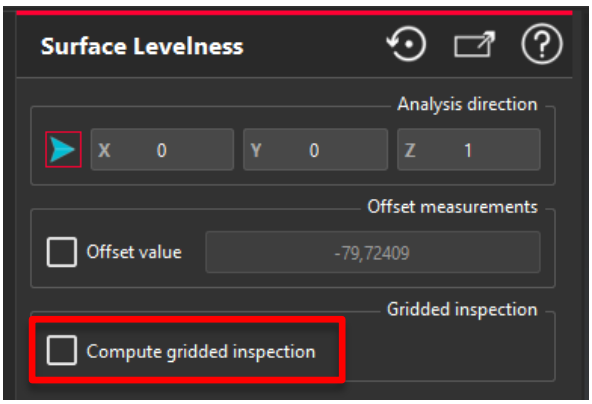
Gridded Floor Levelness inspection



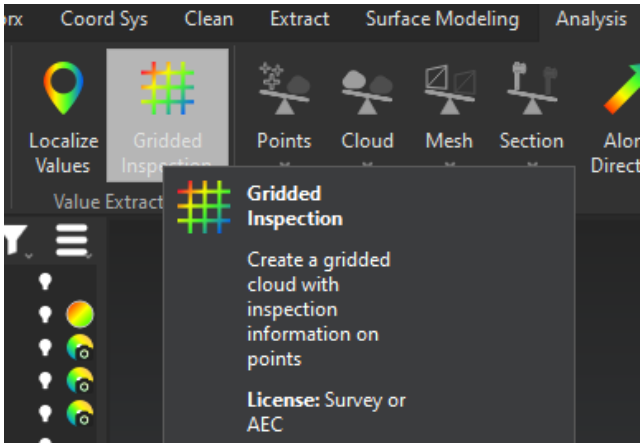
Estimation of thickness for the future plaster layer after the construction of the wall

The Gridded Inspection feature can be executed by two means with the same interface and same options:

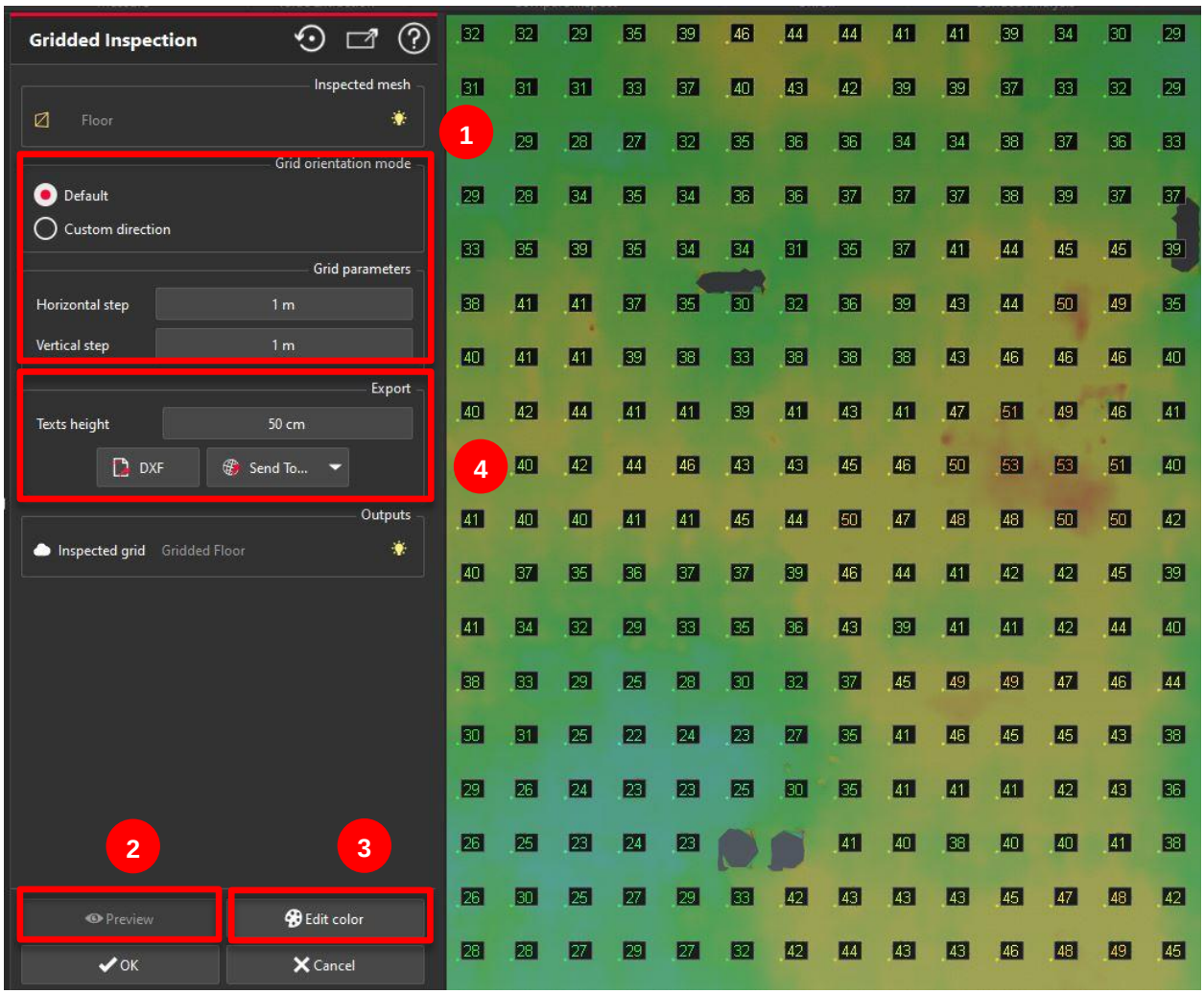
1. Directly from the existing Surface Analysis tools by checking the new option



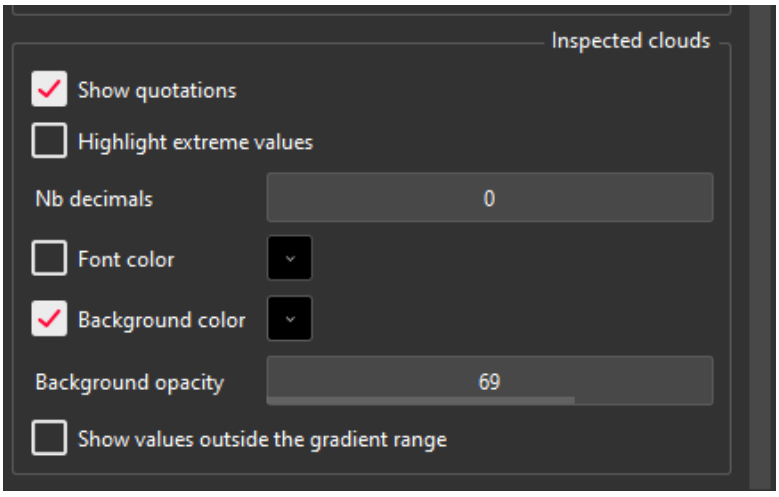
2. Or from an existing analyzed mesh models from the new feature in Analysis menu > Gridded Inspection (after selecting the input analysis)



The workflow is described below:



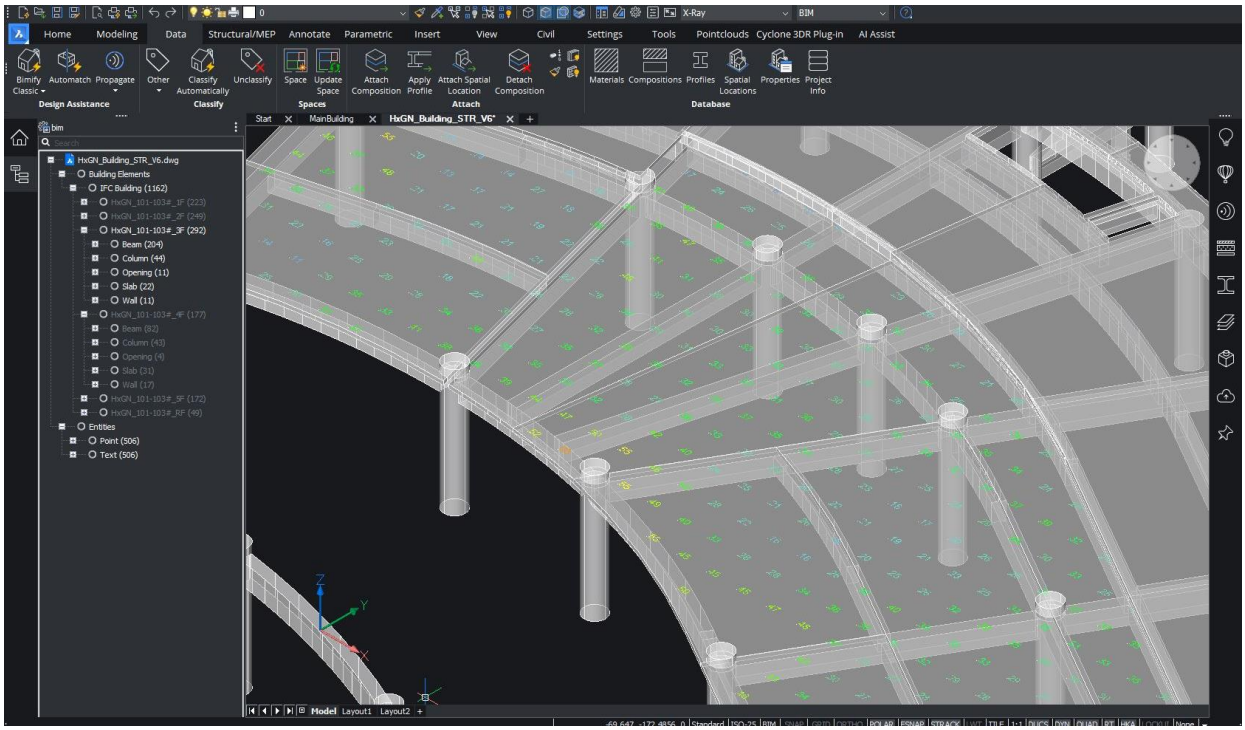
1. Define the parameters of the grid (origin, axis and dimensions).
2. Click Preview to run the computation.
3. Click Edit Colors to adjust the parameters of the grid. New options are proposed for this specific feature for the most appropriate visualization in the 3D scene or in the printed report (depending on the application). Many options are exposed for more flexibility for users.



4. Export to 3rd party CAD application before validating the results:

a. Ability to define the size of the text of the values.

b. Export directly to DXF or to CAD application like AutoCAD or BricsCAD.

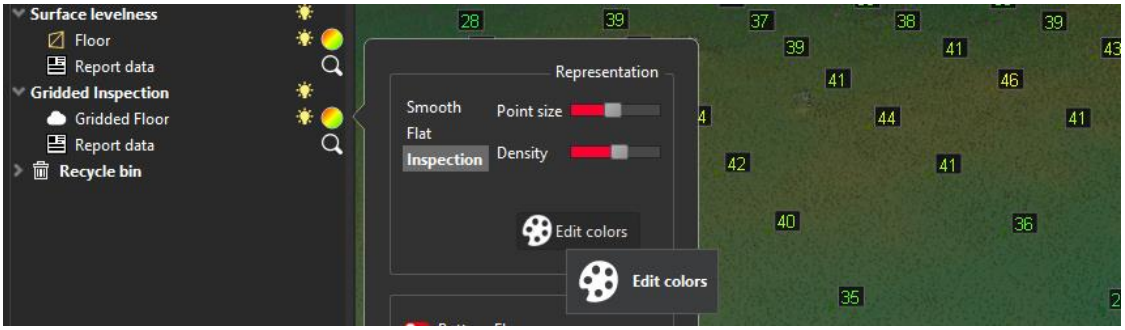


Floor Analysis sent to BricsCAD

After validation, the outputs are:

- A point cloud:
  a) Distributed on a grid
  b) Colorized according to inspection values
  c) With inspection values displayed as texts
- A report chapter, related to automatic viewset, to share the results for decision making.

The representation of the point cloud can be edited after results are calculated via the **Edit Colors** feature (available for all inspection projects in Cyclone 3DR) to improve the legibility of the results.



This feature is available to users with the SURVEY or AEC or PRO licenses.

New interoperability capacities

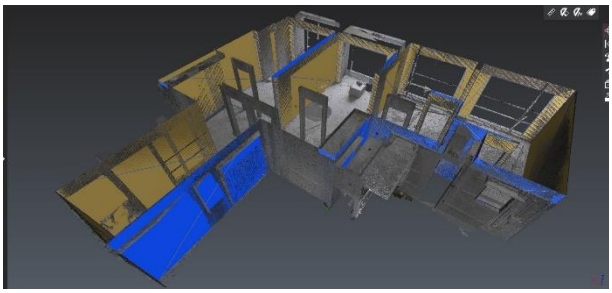
Send to / Send From BricsCAD v23 (Hexagon)

Part of the interoperability new features, the direct connection to Hexagon software product BricsCAD is now embedded in Cyclone 3DR. The feature is compatible with BricsCAD v23 and future versions of the CAD solution.

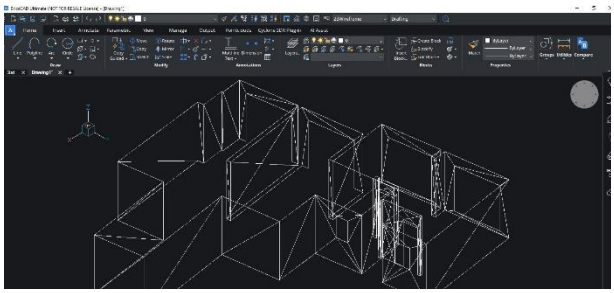
This feature can provide lots of time saving in workflows involving the two products for mesh model creation, reverse engineering, 2D and 3D extraction for engineering applications, and also gives the capacity to save layer information for specific 3DR projects (section added in the last chapter “Leica Cyclone 3DR supported file formats”).

The objects that are compatible with the BricsCAD interoperability are detailed in Cyclone 3DR **Documentation Center** and covers mainly: mesh models, CAD models, polylines, geometries (cylinders, rectangles, planes), orthoimages and specific 3DR projects (Scan to Plan, Contour Lines, Virtual Surveyor, Gridded Inspection, Extract orthoimages).

The data exchange experience is exactly the same as the existing one for Autodesk AutoCAD and Hexagon MinePlan.



Building Extractor use case to monitor the construction of a residential building



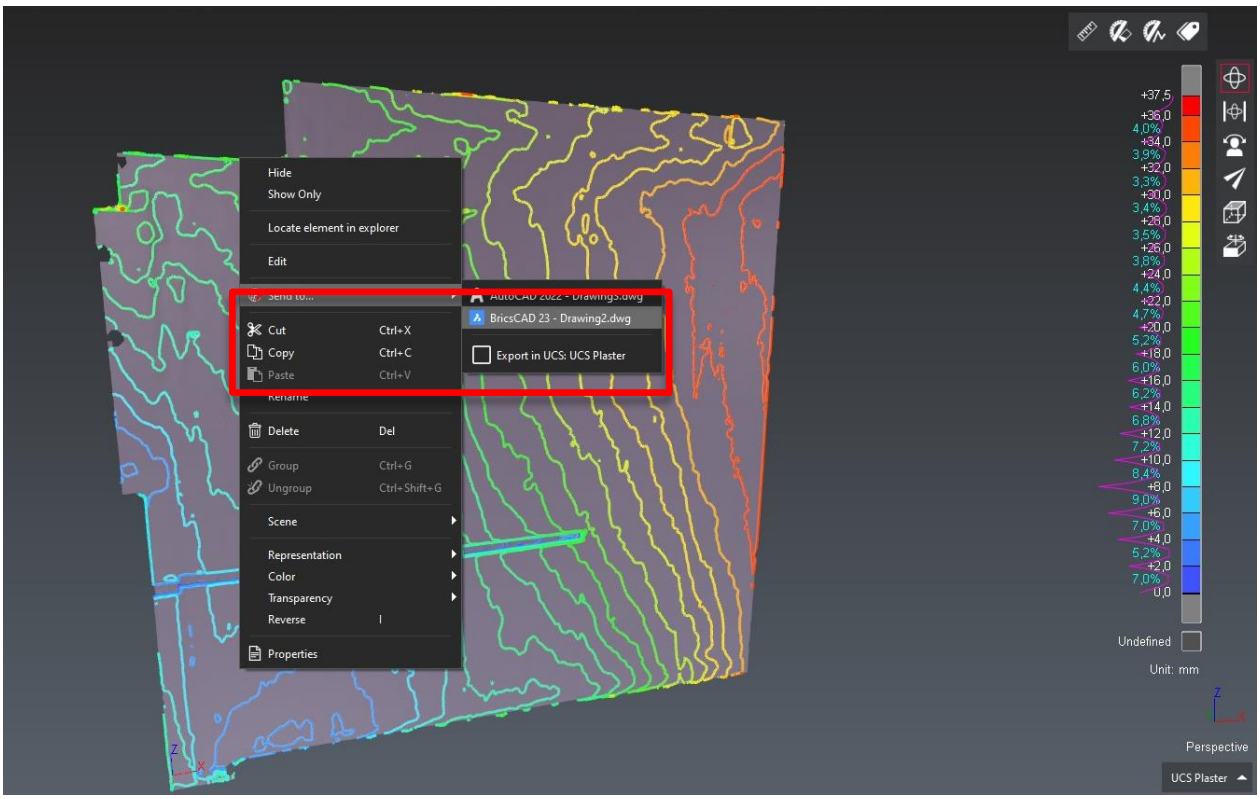
Extracted model sent from Cyclone 3DR to BricsCAD using File Menu > Send to feature

From Cyclone 3DR to BricsCAD:

There are three methods to export Cyclone 3DR deliverables to BricsCAD.

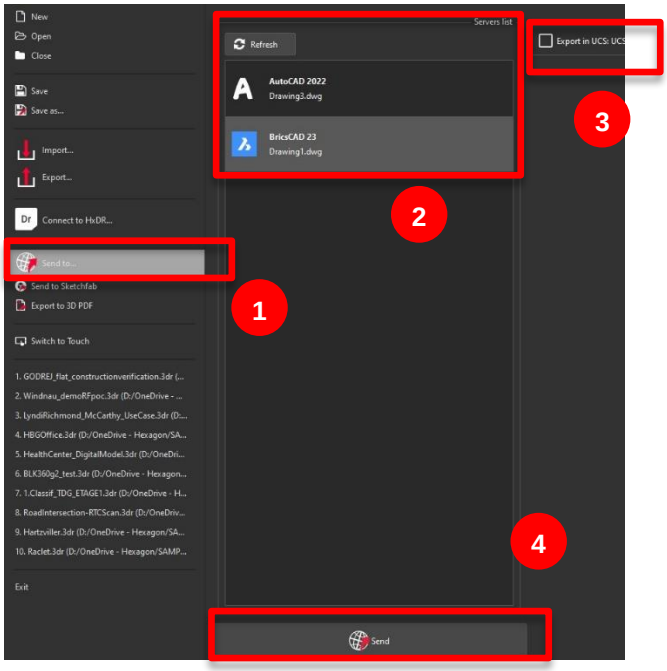
Note: The user must have an active BricsCAD project on the same local machine.

1. **From contextual menu in 3D Scene** after selection of the inputs and right click:



Wall plumbness analysis that can be exported to BricsCAD

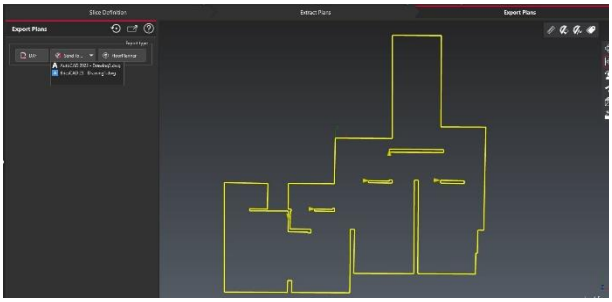
2. **From File menu and Send To feature** after selection of the inputs:



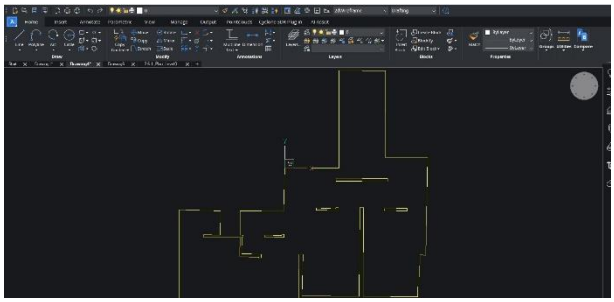
1. Select the Send To feature
2. Select a product from the list of available servers, now including BricsCAD
3. Optionally select the checkbox to export the project in the active UCS or not
4. Select the Send button

3. **From a specific Cyclone 3DR project among the following ones**

Menu	Feature	Comment
Extract	Contour Lines	1 layer for standard contour lines and values. 1 layer for major contour lines and values.
Extract	Scan to Plan	1 layer per slice (floorplans or sections)
Extract	Virtual Surveyor	1 layer per layer created in 3DR Virtual Surveyor project.
Analysis	Gridded Inspection Surface Analysis with a Grid	Points and values on grid can be directly sent to CAD SW product. Sent to active layer.
Texturing	Extract Orthoimage	Sent to active layer.
Analysis	2D Preview Export	1 layer for 2D Grids 1 layer for inspection objects 1 layer per section 1 layer per axis points 1 layer per axis point quotations.
Coord Sys		
Tank		



Floorplan from a 3DR Scan to Plan project of a residential application

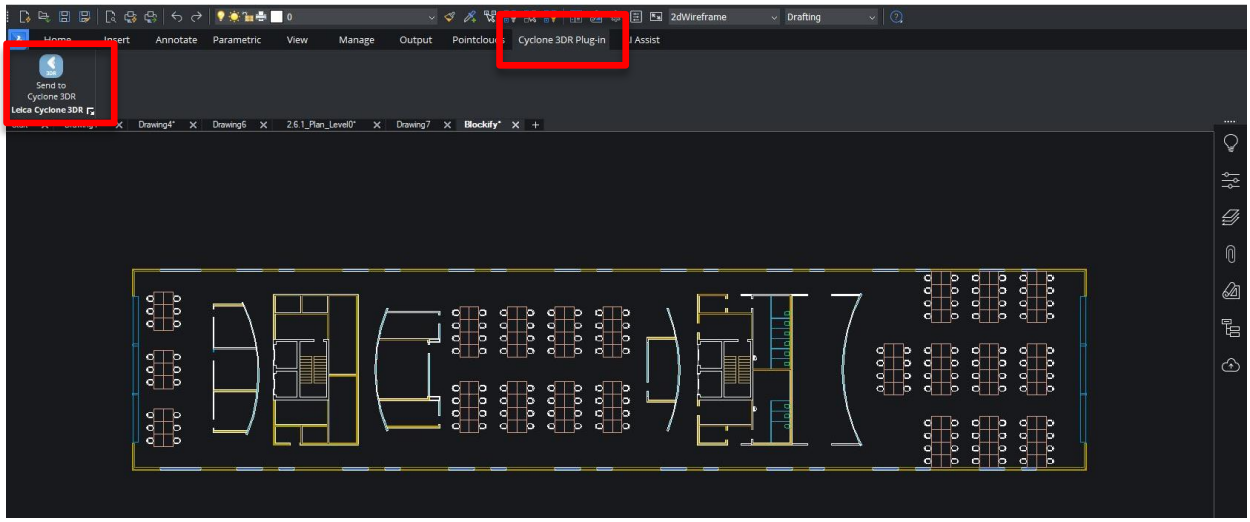


Floorplan is directly sent to BricsCAD v23

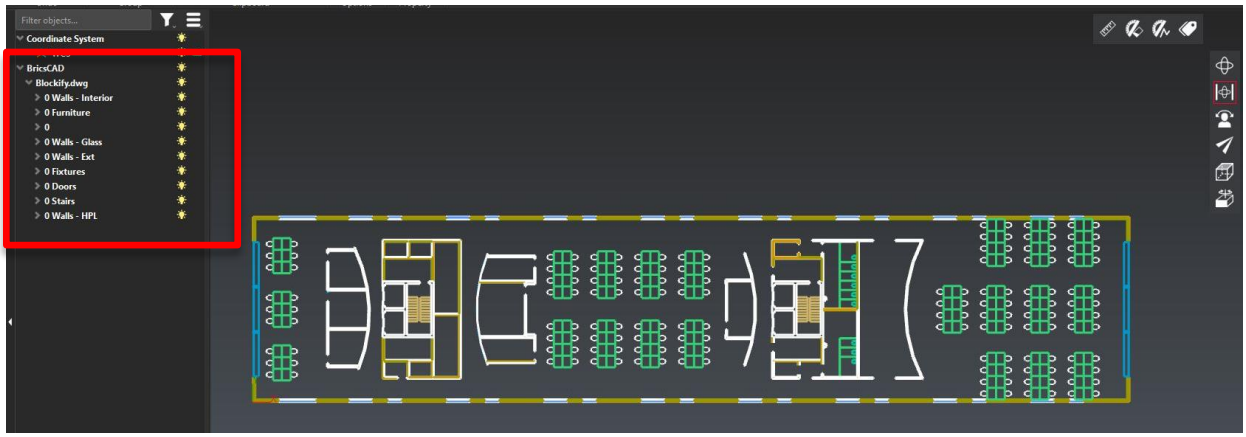
From BricsCAD to Cyclone 3DR:

The workflow is extremely simple:

1. Make sure Cyclone 3DR is launched
2. Select the objects to send to Cyclone 3DR
3. Open Cyclone 3DR Plug-in menu and click on Send To Cyclone 3DR
4. Project is available in Cyclone 3DR



2D CAD Plan designed in BricsCAD



2D CAD Plan directly sent to Cyclone 3DR

This feature is available to users with the STANDARD license. The users must also own a BricsCAD V23 license.

Support of LGS from TRK scanners

Cyclone 3DR 2023.1 can import LGS and JetStream scan data captured with the new TRK sensors published from Cyclone Pegasus OFFICE.

The capacities to consume LGS data from TRK sensors are the same as for the other Reality Capture sensors.

- Streaming and visualizing very large point clouds, relevant for 3D environment capture with Mobile Mapping technologies (real colors, intensity and classification)
- Converting project (point cloud and images): it is recommended to define an area of interest, using a clipping object prior to the conversion of the project into a 3DR point cloud.
- Using point selection and smart picking tools (highest point, lowest point, ground point) without data conversion
- Running features without conversion (Scan to Mesh, Virtual Surveyor, Stockpile Analysis)

The support of LGS and JetStream data captured with TRK scanner benefits many industries related to MMS including Road, Rail and Heavy Construction. In particular, with the release of the new Virtual Surveyor working on native LGS, users can quickly and smoothly deliver Survey CAD Projects from TRK scanners to CAD solutions using Cyclone 3DR.

Note 1: For the full integration of MMS data, a new script function SCWCloud.ToMMSData() has been added to extract a point cloud from LGS data delivered by Cyclone PEGASUS OFFICE.

Note 2: Trajectory and image navigation along trajectory from TRK scans are not supported in Cyclone 3DR 2023.1.

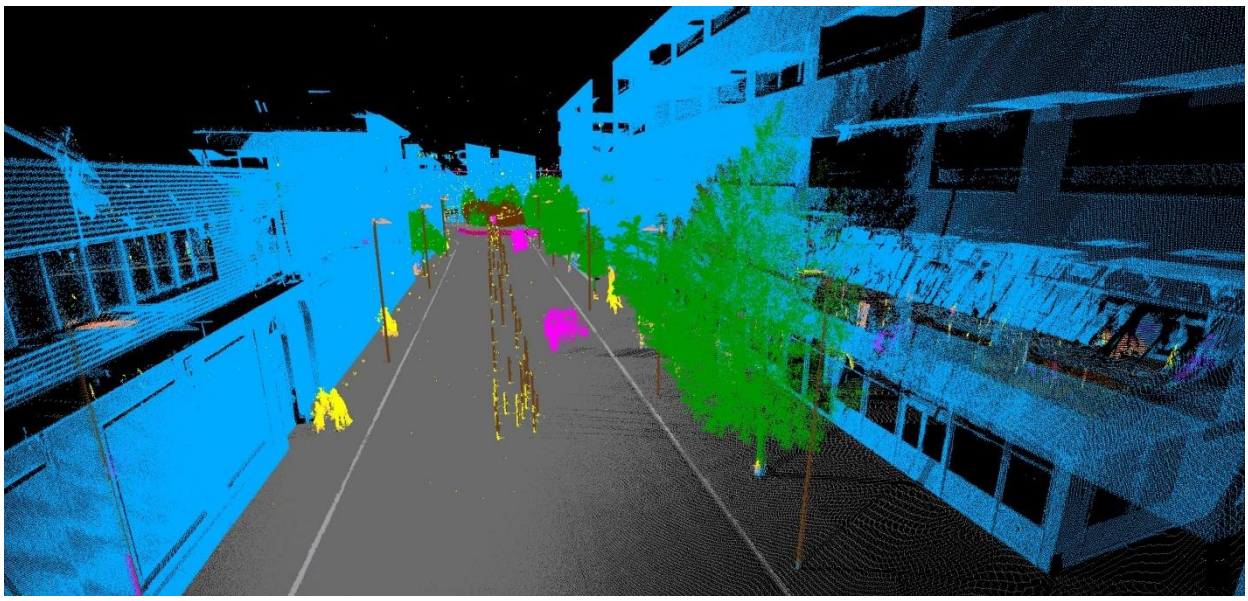
This feature is available to users with the STANDARD license.

Support of classification within LGS

With the 2023.1 release of Cyclone 3DR, the LGS workflow is significantly improved to offer the best experience across all the Reality Capture solutions of Leica Geosystems.

In particular, the classification can now be properly saved and shared thanks to the recent releases of the diverse software products like Cyclone REGISTER 360 PLUS, TruView and Cyclone Pegasus OFFICE. These improvements include:

- Harmonized representation settings and classification parameters across the Reality Capture software portfolio
- Support of classification within a LGS point cloud after IMPORT:
  a) Classification is visible prior to point cloud conversion
  b) Classification is saved after conversion of the point cloud into 3DR point cloud engine
- Support of classification within LGS after EXPORT



Urban environment captured with a TRK sensor displayed in Cyclone 3DR
Without conversion of the LGS scan data

After the point cloud conversion, it is also possible to use the classification features like Automatic Classification, Manual Classification, Explode by Class and Group (and save the classification information) of the converted point cloud.

Users may wish to combine an existing classification with the tools present in Cyclone 3DR for a more advanced analysis or visualization.

- Import classified LGS into Cyclone 3DR
- Convert the area of interest and proceed cleaning of point cloud using smart tools like Explode by Class and other features
- Merge into a single point cloud and export it to LGS
- Import it into Cyclone ENTERPRISE for visualization and project management

This feature is available to users with the STANDARD license. To run automatic classification, SURVEY, AEC or PRO licenses are required.

Extension of Import/Export e57

With the 2023.1 release of Cyclone 3DR, the support of the standard e57 benefits from a significant improvement that offers new capacities to users.

The new features are the support of:

- Point cloud **classification** is preserved at import and export: relevant to use the intelligence of classification for a smart cleaning of data to do a 3DR project
- Point cloud **scanning directions** are preserved at import and export: relevant form mobile mapping applications
- Point cloud **timestamps** are preserved at import and export: relevant for mobile mapping applications

- **Pre-existing Images** are preserved at import and export: relevant to preserve full information for Digital Reality workflow across many products
- **Faster import** in general

FEATURES	IMPORT	EXPORT
Classification	**New in 2023.1**	**New in 2023.1**
Images	Existing	**New in 2023.1**
Timestamps	Existing	**New in 2023.1**
Scanning directions	Existing for TLS sensors **New in 2023.1 for MMS sensors**	**New in 2023.1**

Since e57 format is the most popular and standard format for point cloud across the Reality Capture business ecosystem, this feature is a very important benefit for workflows involving:

- Third-party sensors (not part of the Hexagon family)
- Cyclone 3DR for all its tools (cleaning, meshing, analysis and modelling).
- Third-party application that can consume Cyclone 3DR deliverables:
  - Cleaned 3D data: cleaned and classified point clouds, images, mesh models
  - 3D inspection models
  - 2D or 3D extracted models

This feature is available to users with the STANDARD license.

Connect to Cyclone FIELD 360

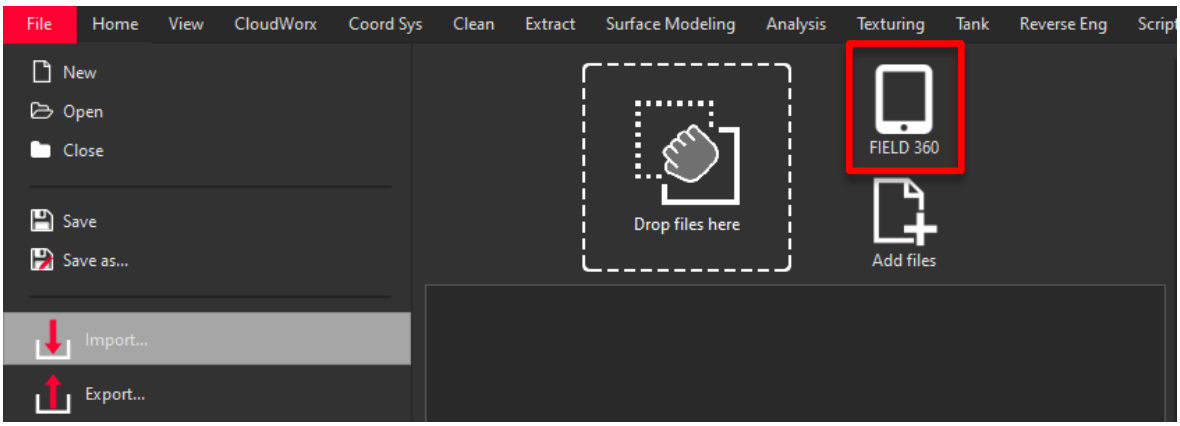
With the release of Cyclone 3DR 2023.1, direct connection to Cyclone FIELD 360 is now possible in Desktop Mode, in addition to the existing capacity in Touch Mode (BIM Inspection workflow).

This feature enables the capacity to realize a quick import of a point cloud from the tablet to an office machine to benefit from Cyclone 3DR capacities.

To start the connection, the requirements are similar to the existing feature in Touch Mode:

- Connect the two devices (tablet with Cyclone FIELD 360 and the machine with Cyclone 3DR) on the same wireless network.
- Active the Sync Server mode in Cyclone FIELD 360

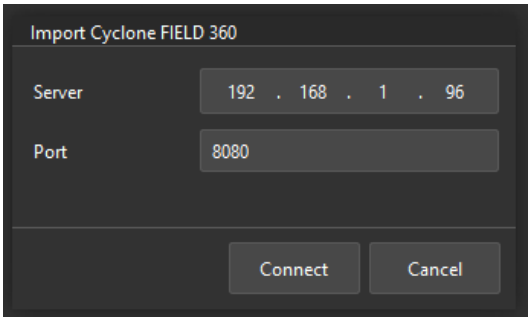
Then in Cyclone 3DR, go to **File** menu and Click on **Import** to display the new feature icon.



Note: As illustrated in the image above, the **Load from BLK** feature is now removed from the application. The new Import from FIELD 360 replaces this feature. This change provides many advantages in comparison to the previous capacity:

- A complete BLK360 project can be loaded in Cyclone 3DR instead of a scan-by-scan process (with no registration before)
- All the sensors that are supported by Cyclone FIELD 360 can be accessed with this command.

Once the connection started, the feature displayed a couple of fields to enter the IP address information of the tablet that hosts Cyclone FIELD 360. Fill the appropriate values and click Connect.



After connection, the list of available projects is displayed with:

1. Project information
2. Refresh connection
3. Import point cloud

- During import, the Sync Server feature must remain active in Cyclone FIELD 360 until the point cloud is imported in Cyclone 3DR.
- The complete point cloud project is imported: all the pre-registered bundles are transferred to Cyclone 3DR application.
- The point cloud is automatically converted into Cyclone 3DR point cloud structure. That means that no conversion step is required and all the 3DR functionalities can be used.
- The original point cloud structure depends on the kind of sensors and of the parameters of Cyclone FIELD 360 projects. The Import feature looks for the following structure by order of priority:
  a) Full data
  b) Light weight LWPO data
  c) LiDAR data (if an Apple LiDAR scan is part of the project)

This new connection feature is complementary to the regular workflow (using Cyclone REGISTER 360 PLUS or LGS format). The advanced workflow indeed provides the complete dataset into Cyclone 3DR, including the images or the classification information. The FIELD 360 workflow is appropriate to get a very quick deliverables from the field to the office, to execute for example a rough DTM, a simple digital model with Scan to Mesh or a floorplan with Scan to Plan.

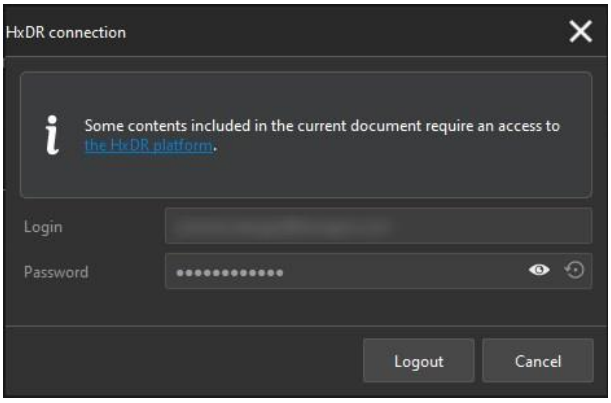
This feature is available to users with the STANDARD license and with a Cyclone FIELD 360 credentials.

Connect to HxDR

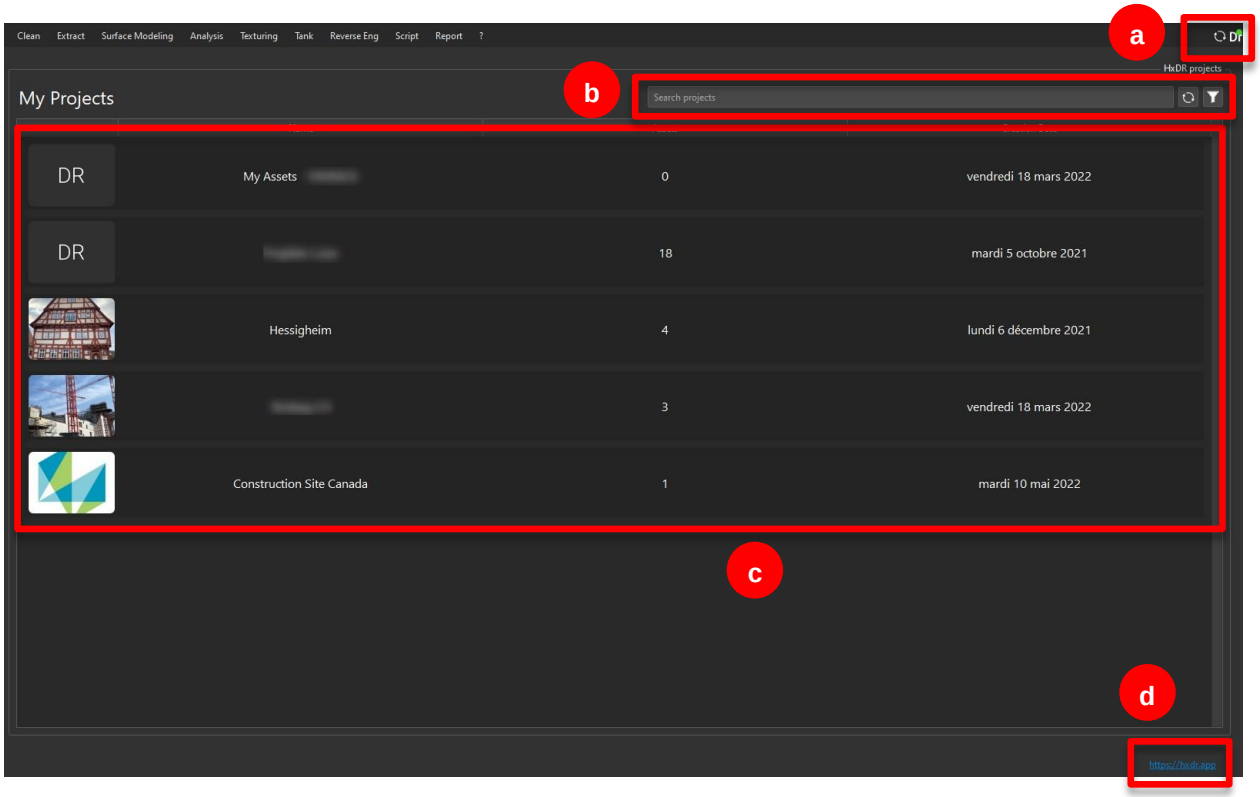
With the 2023.1 version of Cyclone 3DR, the connection to HxDR cloud is now enabled. This new feature allows users to connect to HxDR and visualize point cloud assets hosted in HxDR and to convert it into Cyclone 3DR point cloud conduct a Cyclone 3DR analysis. This feature allows users to leverage the power of HxDR to work on shared point clouds hosted in the cloud.

All data and project access in HxDR is protected by user credentials, allowing admins to provide secure access to specific users.

1. Navigate to the **File** menu and select **Connect to HxDR**



2. Once connected, the list of projects is displayed.



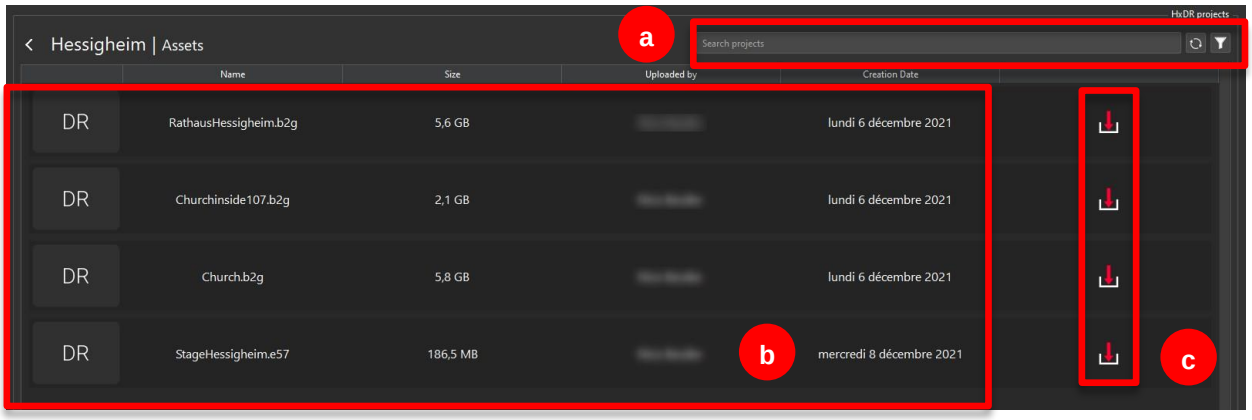
a. Connection management: access to credential management and refresh

b. Search bar and tools of projects (including refresh and filter)

c. List of project information

d. Direct access to HxDR website

3. After clicking on a project, the contained assets are displayed:

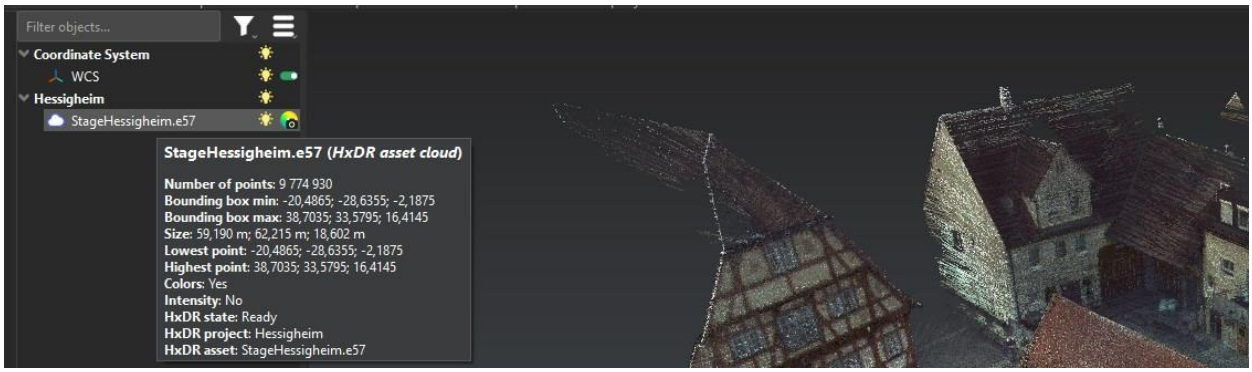


a. Search bar and tools of assets (including refresh and filter)

b. List of asset information

c. Import point cloud asset

4. After clicking on **Import**, the point cloud is automatically loaded and streamed in 3DR Project. Parameters of the point cloud object are available and visible (illustration below).



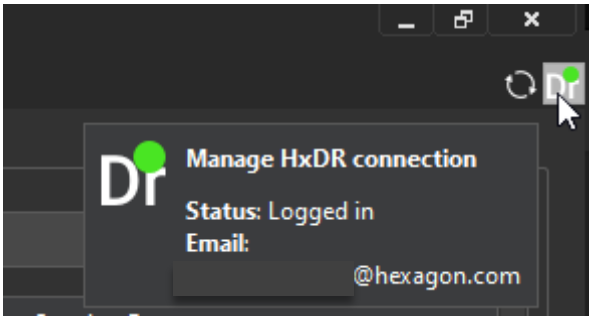
The HxDR streaming experience is analogous to streaming a JetStream project. Users can navigate with all Cyclone 3DR tools, make basic measurements, click on points to define a clipping object, and display the area of interest.

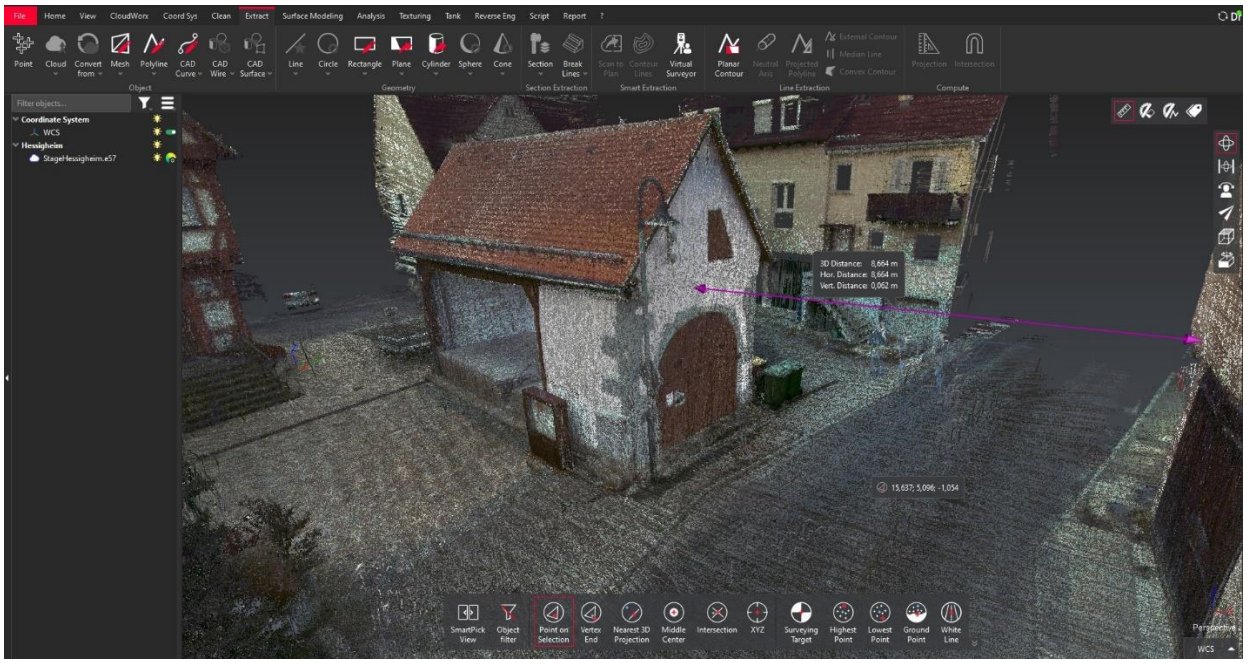
The next step for a complete HxDR - Cyclone 3DR workflow, after defining an appropriate clipping object (optional to reduce the area of interest for very large point clouds), is to convert the HxDR point cloud into a Cyclone 3DR point cloud structure. Only the visible points are converted with:

- A right click > **Convert Project** (from the treeview or the 3D Scene)
- From the **Extract** menu > **Convert from HxDR** feature

The Convert Project experience is simple with a definition of the maximum number of the visible points that can be converted (right image below).

Note that the credential management is permanently accessible on the top right of the main Cyclone 3DR window (illustration below).





Example of BLK2FLY urban dataset streamed in Cyclone 3DR

Like the JetStream experience, the number of simultaneous streamed point cloud is limited to a single point cloud. Therefore, it is necessary to convert a first point cloud asset and then and closing the project, prior to streaming a second project.

This feature is available to users with the STANDARD license and with Cyclone 3DR Viewer. HxDR Credentials are required.

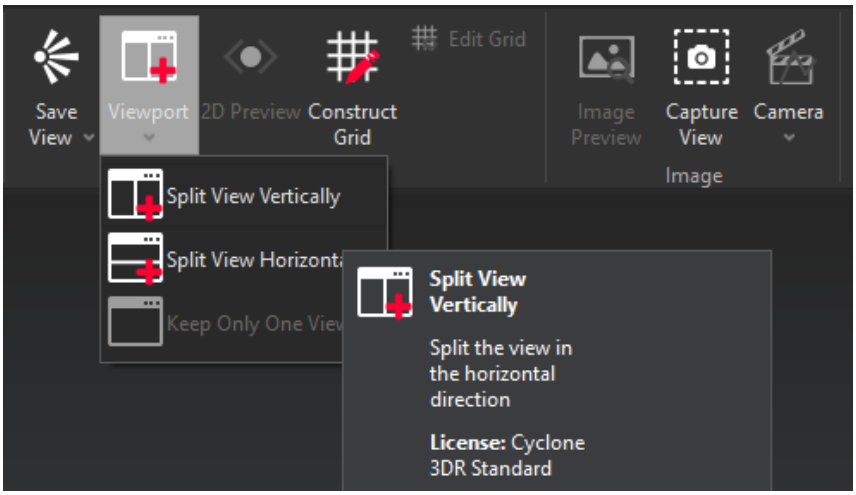
3D Scene > New experience

The new 2023.1 version of Cyclone 3DR offers a large series of new capacities of the 3D Scene experience that brings more comfort for users working in complex 3D environments. The following new features are described in the chapter:

- Support of multi-windows
- First Person Navigation mode
- Transparency management of point cloud
- Rendering of inspected models
- Point selection toolbar > New Pole Center extraction

Viewport > Multi-window support

The existing feature **Viewport** from the **View** menu provides a significant improvement with the capacity to dock and undock multiple new windows. To benefit from the new experience and to use the Viewport capacities, begin by using the existing **Viewport** feature.

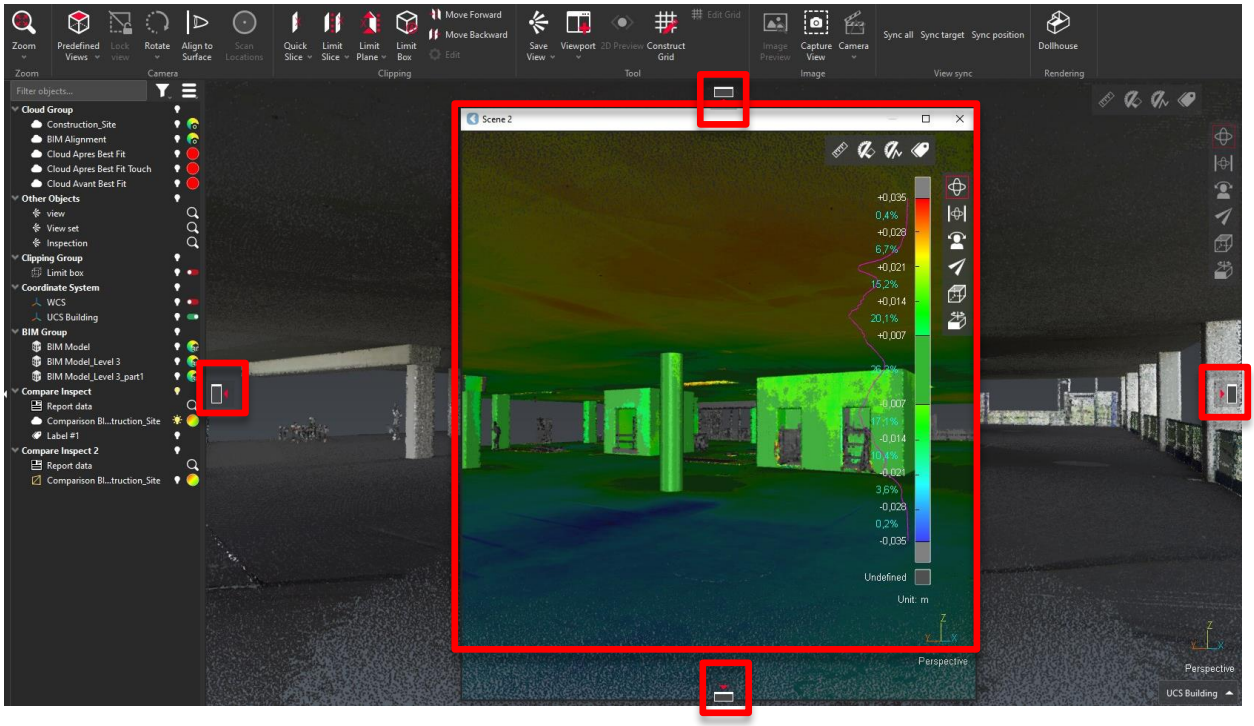


After the creation of a new view, users can define a specific and different view and to choose which objects are displayed in the 3D Scene.

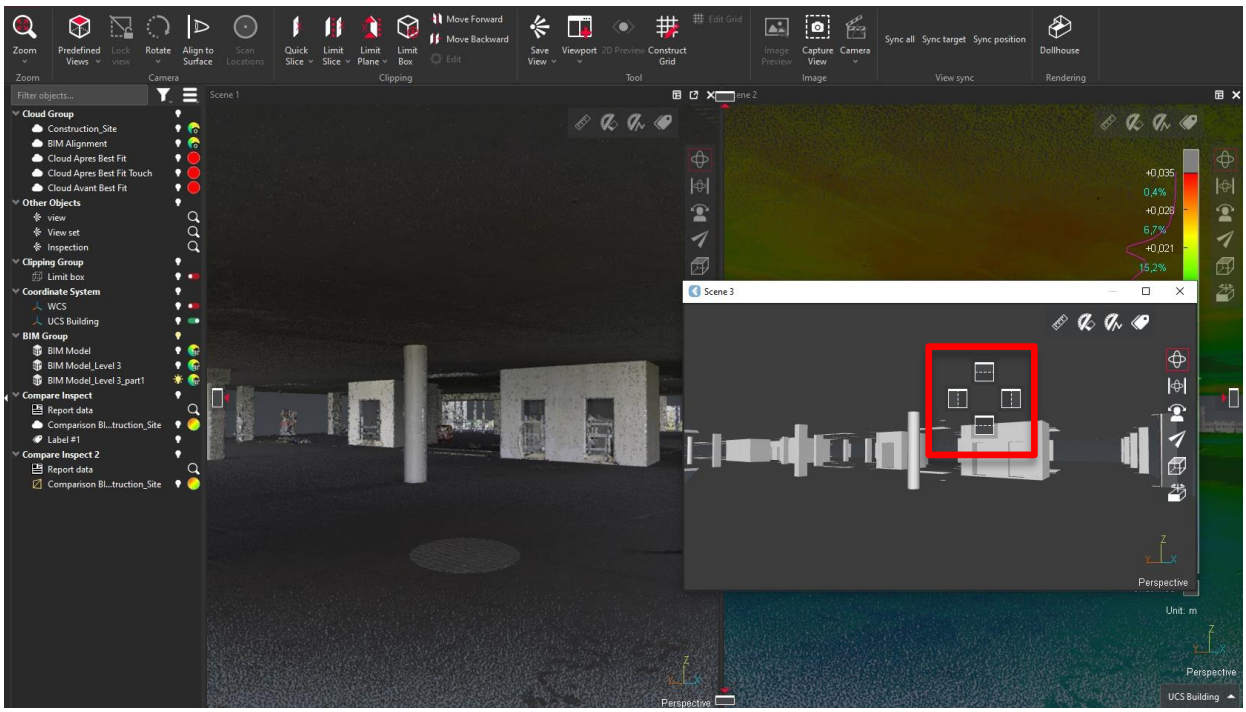
From the top bar of each view, new icons are exposed to (illustration below):

- Close the scene
- Dock/undock the scene
- Duplicate the scene and choose a pre-defined position (bottom, left, right, top)

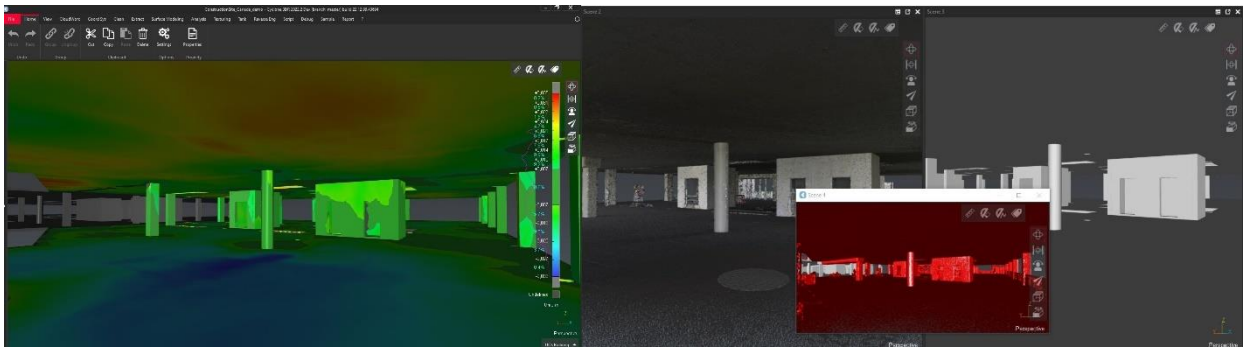
The capacity to dock/undock a 3D Scene is a significant improvement that gives users flexibility to position the different views where it is convenient for the most comfortable experience. The image below illustrates the “Scene 2” that has been undocked and that is displayed in front of the main screen of Cyclone 3DR. The illustration also highlights the capacity to redock a floating screen onto a pre-defined position with 4 widgets (top, bottom, left and right) that are visible and active when doing a drag and drop of the floating scene from the top-bar.



Depending on the number of views, another central widget can be displayed in the middle of one view, in addition to the 4 position widgets, to reposition the floating scene according one of the views instead of the main global window of Cyclone 3DR. In the image below, the Scene 3 can be repositioned according to the scene 2.



To illustrate the power of this new experience, the final image below illustrates a inspection project that is displayed on 2 computer screens, showing for each scene a different object: colorized point cloud, deviation analysis, BIM Model and a single color point cloud.



Cyclone 3DR with 4 undocked 3DScene view on 2 different screens

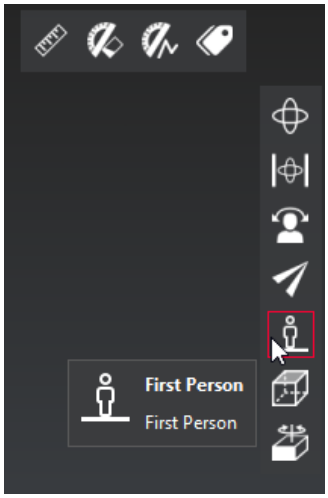
This new feature can help for all the applications of Cyclone 3DR, for users working with multiple screens. Some examples of usage can be:

- Visual Inspection:
    i. same object at different timing (different scans of same environment, or different analysis jobs of the same situation)
    ii. different object for the same situation
- 3D Navigation for the best understanding as possible of the digital environment to create views, measures, labels or to create different layers of representations.

This feature is available to users with the STANDARD license.

First Person Navigation mode

In the navigation toolbar, Cyclone 2023.1 introduces the First Person Navigation mode. This new navigation capacity is extremely relevant for Indoor application and gives users new tools for smooth navigation with the mouse and the keyboard.



All the tips and the instructions are detailed in the Document Center. The main new capacities are the following ones:

- **One-left-click mouse** to reposition the camera view and orientation at a relevant distance from the click to offer a human-like experience in the 3D environment.
  a) On a floor to position the camera view above the click
  b) On a wall to be positioned in front of the wall
  c) On a ceiling to be positioned below with the appropriate orientation

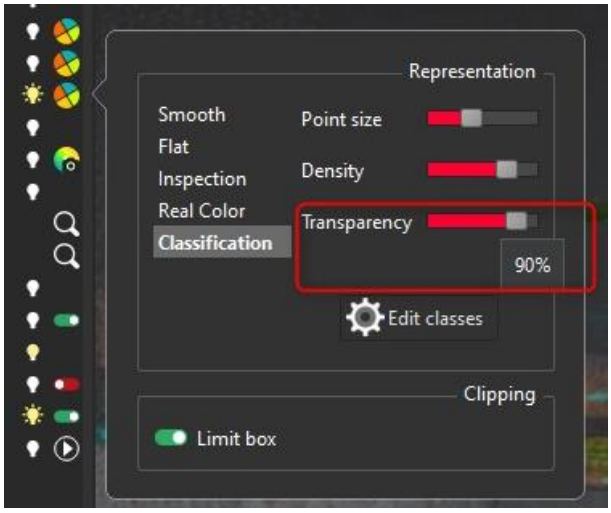
- **Main arrows on keyword** to move forward or backward and to turn right or left.

First Person Navigation mode requires the normal of the clicked object to position the camera position and orientation. Thus, this feature is not available for JetStream point cloud (LGS).

This feature is available to users with the STANDARD license.

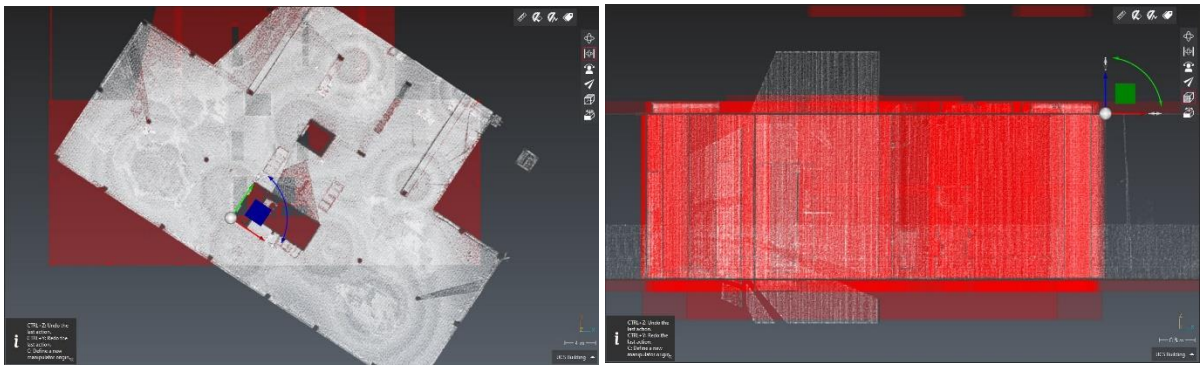
Rendering > Transparency mode of point cloud (X-Ray representation)

With the 2023.1 release of Cyclone 3DR, a new transparency mode is available for point clouds. The transparency level can be managed from the treeview:



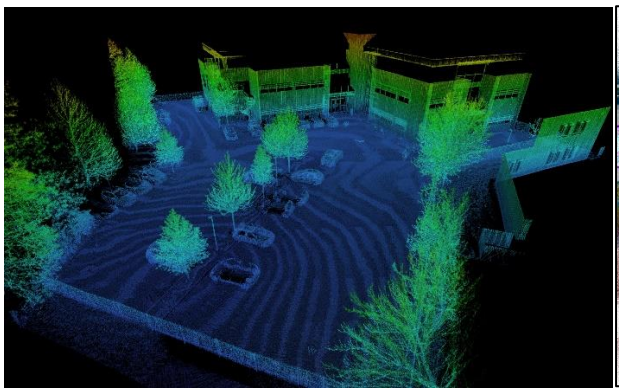
In addition to a pleasant and easy navigation through the software product, this new feature can provide an amazing visualization experience and is appropriate for many applications:

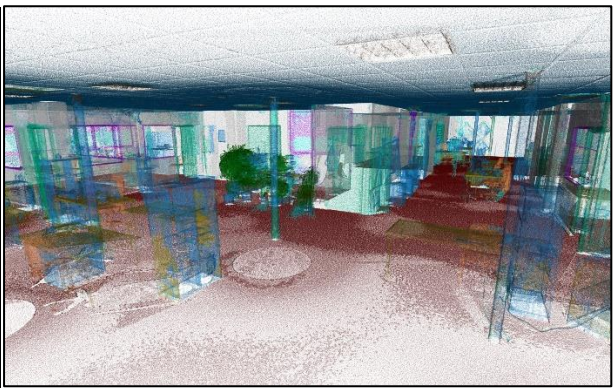
- Manipulation of object in the scene. With **Free Move**, it is possible to conduct an efficient pre-alignment before best fit between a model.



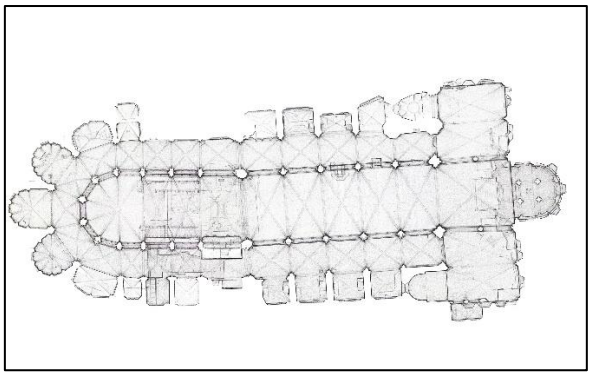
Pre-alignment in 2 steps (Top and Side views)

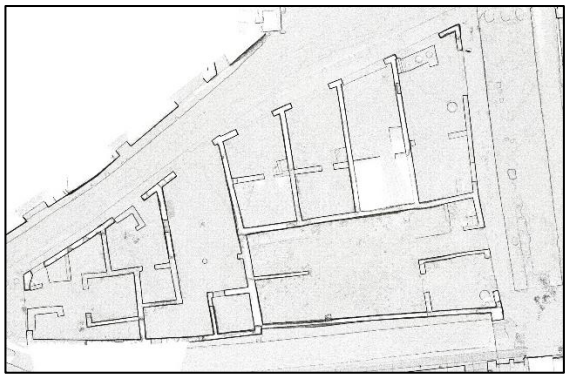
- Video creation with the feature **View > Camera path** can provide a very attractive visual effect.
- High Resolution images creation with **View > Capture View** (examples below)





- Highly detailed ortho-image creation with **Texturing > Extract Orthoimage**, which is typically relevant for floorplan or section creation.





Foorplan or sitemap for a Heritage application

Section of an old house

Note that transparency mode is demanding on the Graphics card when it's activated. It is recommended to lower the points display density or limit the number of transparent elements to maintain a high frame rate.

This feature is available to users with the STANDARD license.

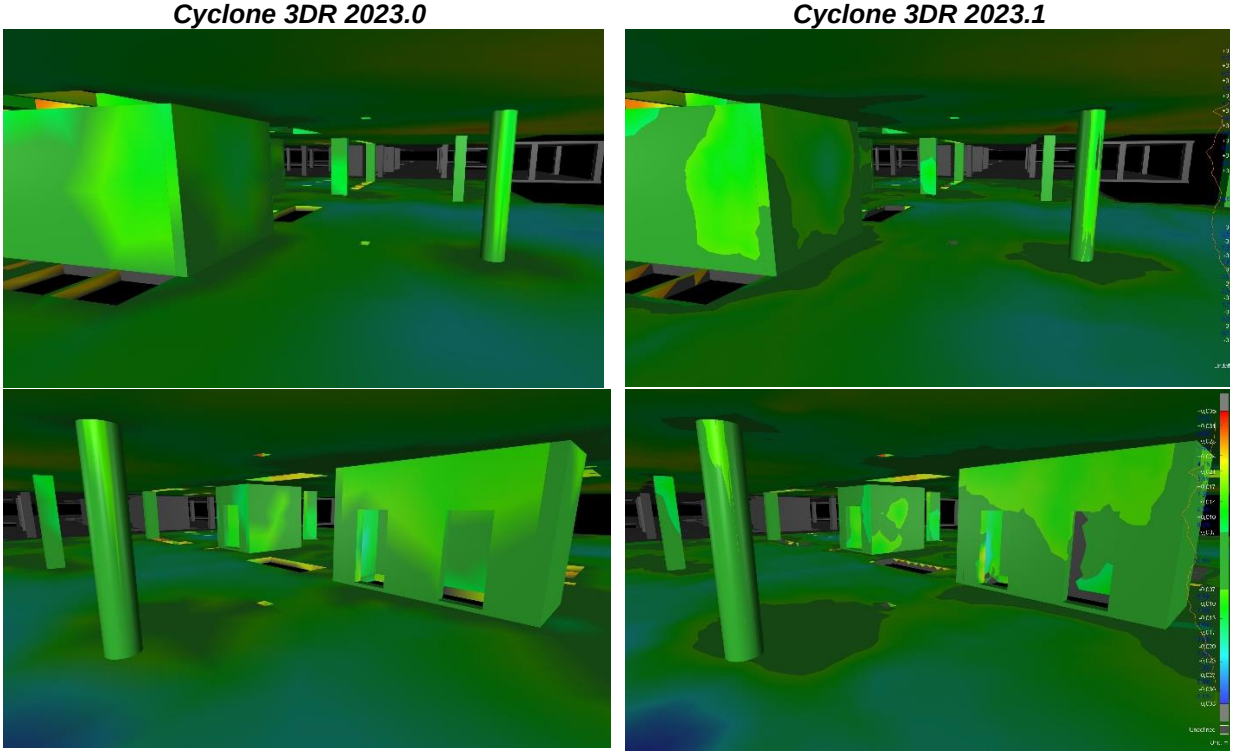
Rendering > Inspected models

Cyclone 3DR offers now a much more realistic rendering of inspected models.

The illustrations below demonstrate that the new higher quality rendering with better management of color transition, which is extremely important to analyze inspection results (tolerance / out of tolerance areas as an example).

This feature serves all the inspection workflows that involve a surface model (CAD, BIM, Mesh, Geometry). It is mandatory to apply the result colors on the surface model to benefit from the new rendering.

Cyclone 3DR 2023.0 ***Cyclone 3DR 2023.1***



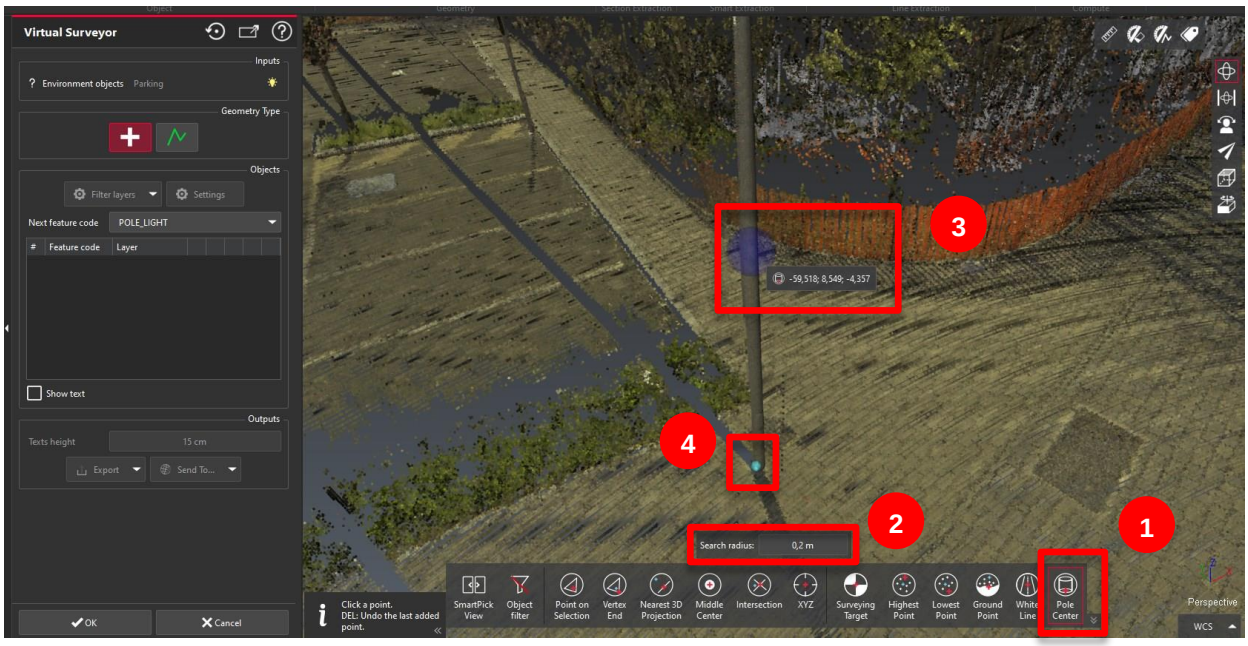
Difference of rendering of inspected models showing more realistic details with the new release

This feature is available to users with the STANDARD license.

Point selection toolbar > Pole Center extraction

For the benefit of the new Virtual Surveyor feature, a new way to extract points in the Point Selection toolbar is available with the 2023.1 version of Cyclone 3DR: **Pole Center**.

With a search radius parameter, this new feature allows users to extract the center position at the bottom of a pole-like object (road signs, poles, trees).



1. Make sure Pole Center mode is activated
2. Define the Search Radius
3. Click on a point on the pole in the point cloud where the pole is well defined
4. Point is automatically extracted in the middle of the pole and projected on the ground

The feature is enabled with the point selection toolbar across the product interface. Thus, the new feature is not limited to the new Virtual Surveyor feature, but it can be used for other applications too. This new point extraction tool is not compatible with JetStream (LGS or Cyclone ENTERPRISE) or HxDR point clouds.

Feature codes marking the center of a group of trees in a parking lot

This feature is available to users with the SURVEY or PRO licenses.

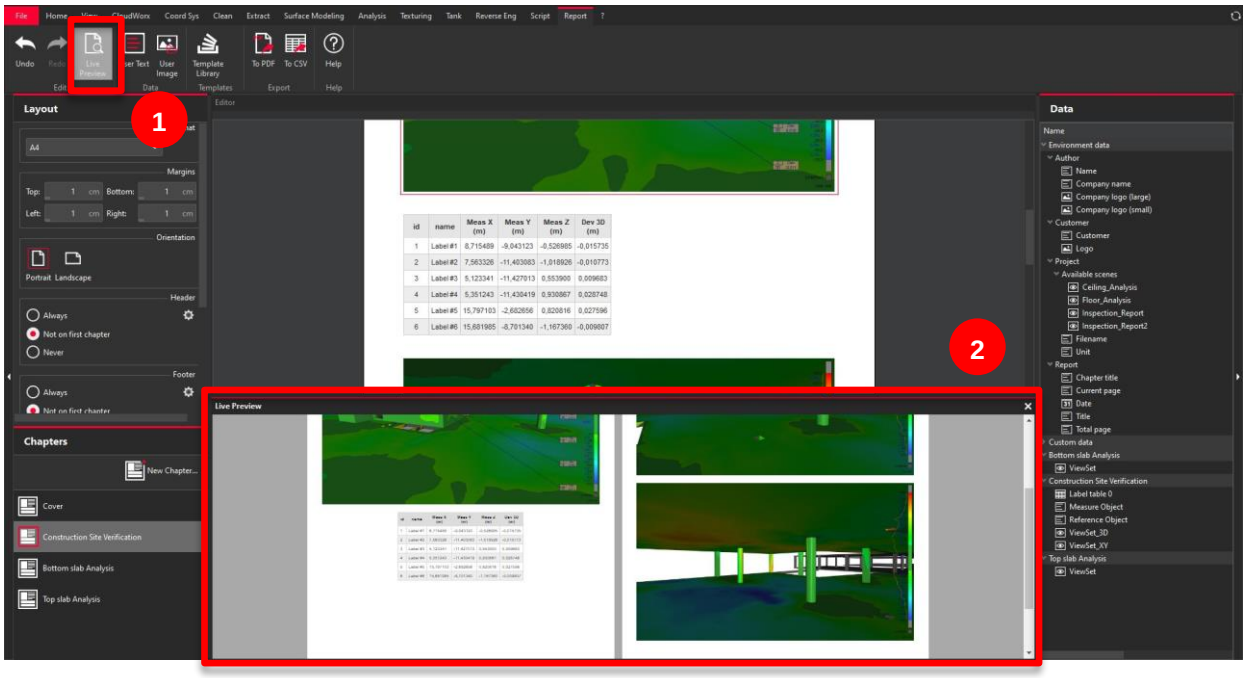
Report Editor > New experience

A series of improvements have been made to the report editor with the 2023.1 release of Cyclone 3DR. The improvements come mainly from customer feedback.

This feature is available to users with the STANDARD license.

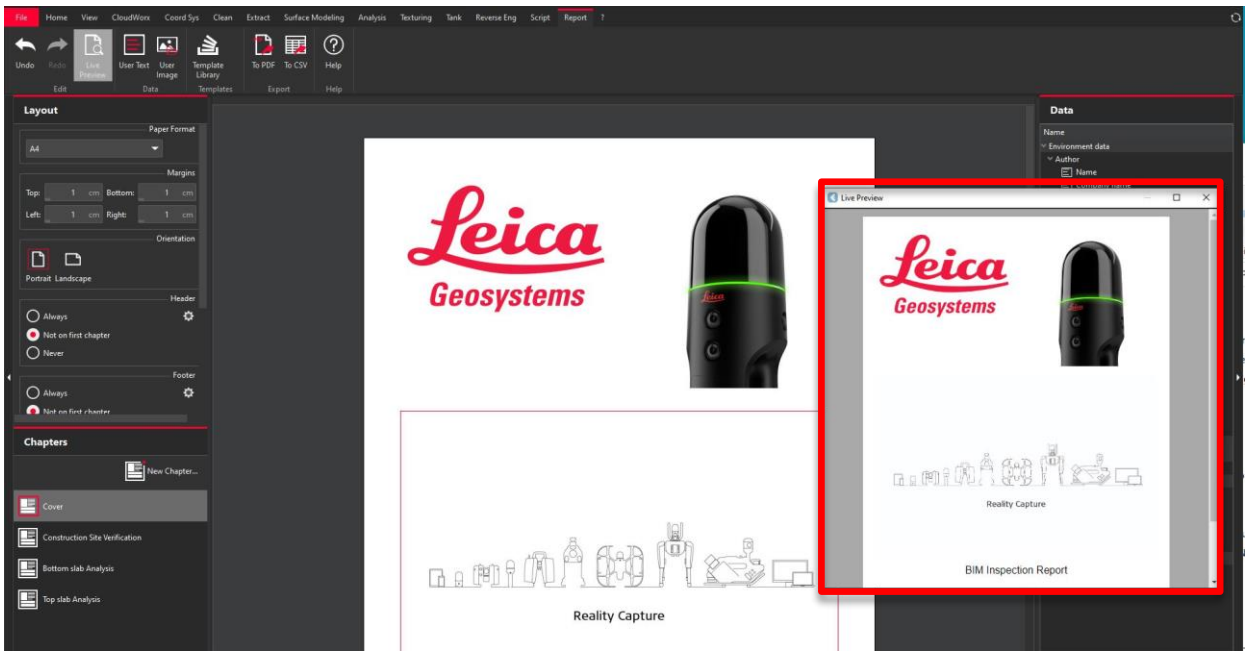
Report Live Preview

In addition to the template that is part of the main screen of the report editor, a faithful and live rendering of the future printed PDF is useful to improve the experience of the report creation. With the 2023.1 release, a **Live Preview** of the PDF report is automatically generated as the user adds and removed components.



1. Activate Live Preview
2. Faithful PDF preview is automatically displayed

In addition to this new capacity, the **Live Preview** mode benefits from the new capacity to create multiple windows. Therefore, this PDF preview can be un/docked from the main window, which is extremely convenient to double check the created report. It is recommended to deploy the preview on a second screen for the best experience possible.

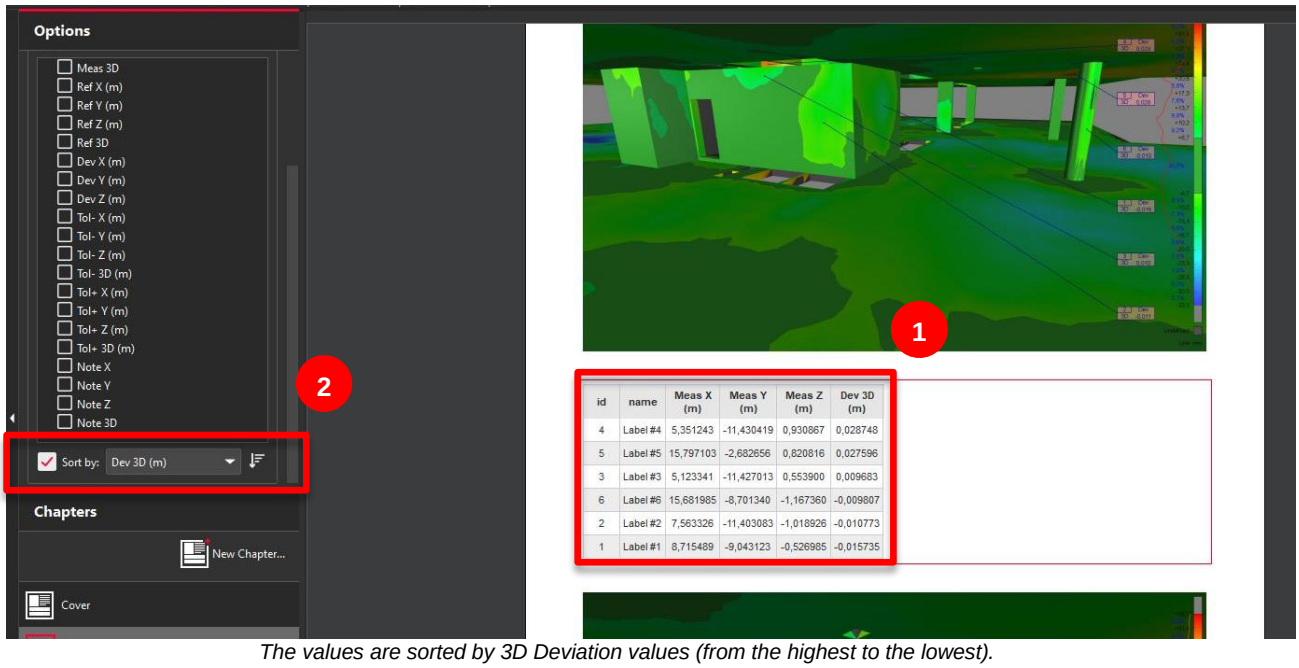


The preview can be undocked and positioned wherever it is convenient

Generic updates for Report Editor

- Capacity to sort label values according to a specific column

1. Select the table
2. Check the option Sort by and choose the appropriate column. Choose the sorting order.



The values are sorted by 3D Deviation values (from the highest to the lowest).

- Drag and Drop images from Windows Explorer into the 3DR Report Editor: time-saving feature to add user images.
- Better default organization of chapters: when there are multiple chapters, they have the same names as the analysis in 3DR project and sorted in the same order as the one used for the creation of the different analysis
- Better management of 3D objects: when an object of the project is changed, its parameters are properly saved in the report.
- Default name of a printed PDF report is the same as the 3DR project name.
- Better visual aspect of inspected models (mesh, BIM or CAD) in printed 3D PDF (more realistic and clearer drawing of gradient limits).

Performances

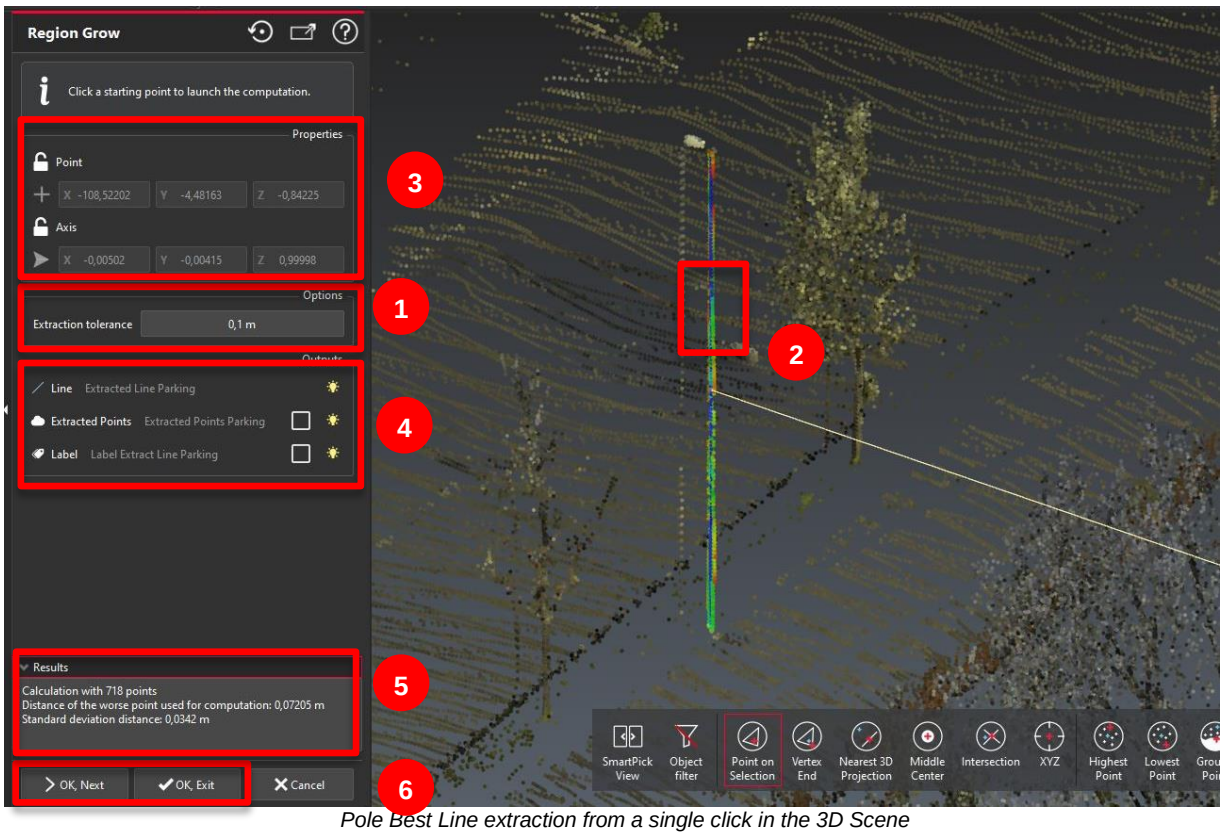
With the 2023.1 release, performance of the navigation through the report editor has been significantly improved to reduce the time of loading the different pageviews in the report editor (cover, different chapters) and the transition time from the main 3D scene to the report editor.

Time performance has been improved up to 10 times.

Extract > Line Region Grow

With the 2023.1 version of Cyclone 3DR, users can now extract lines from 3D objects with the Region Grow feature for line extraction. A new algorithm has been developed to extract the best line from an object with one click.

To execute the feature, no input selection is required. The new feature can be launched from the **Extract** menu, in the **Line** group, **Region Grow** feature.



Pole Best Line extraction from a single click in the 3D Scene

The mechanism for the Line Region Grow feature is the same as the other existing Region Grow features (Cylinders, Circles, Rectangles, …). The different aspects of the command are detailed below. Like the other Region Grow features, the steps from 1 to 4 can be executed in a random order:

1. Define a tolerance of extraction
2. Click once on an object in the 3D Scene
3. Option to force the parameters of the extracted Best Line (Center and Axis)
4. Outputs (Line, Extracted Cloud, Label)
5. Information on Region Grow operation
6. Click **OK, Next** to start a new Region Grow Line extraction or **OK, Exit** to go back to the main environment.

The applications for this new feature range from outdoor Surveying applications to manufacturing, construction and reverse engineering—any situation where a geometric axis is required to achieve the workflow in Cyclone 3DR.

Axis of poles extracted in 1-click from Line Region Grow with OK, Next capacity

This feature is available to users with the STANDARD license.

Script > New engine

The 2023.1 release of Cyclone 3DR embeds a new engine for the script module to address a technical limitation.

- First, there are many improvements that accompany this engine migration. They are described in the following chapter.
- Secondly, this migration of engine brings some changes in the script creation experience. This aspect is covered in detail in the documentation center and briefly introduced in the release notes.
- Finally, this migration resulted in the depreciation of a group of functions. They are detailed in the chapter.

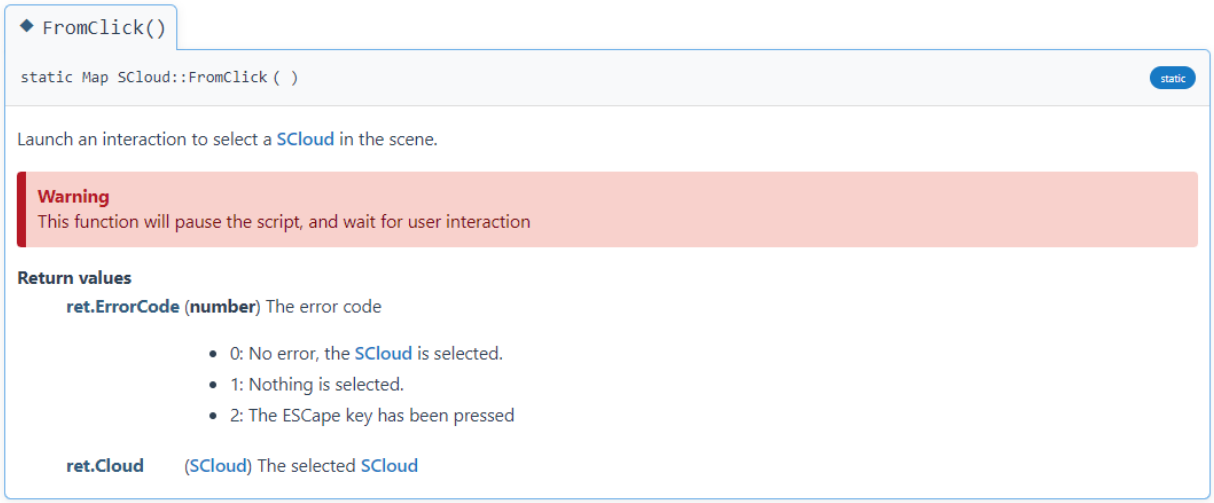
This feature is available to users with the STANDARD license.

New engine benefits

The list of benefits are the following ones:

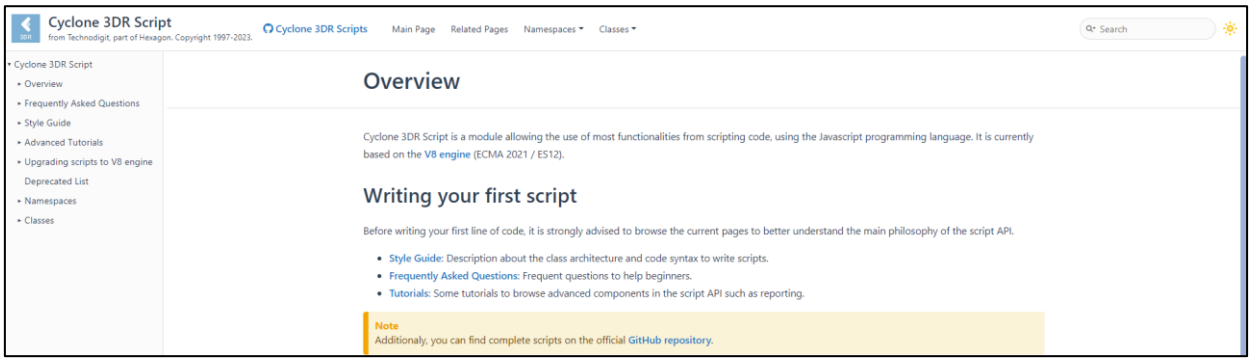
- **Significant gain of performance:**
  a) A gain from 1.5x to 20x in some complex scripts has been measured.
  b) In particular, the pre-defined script Curb Extraction is significantly accelerated (20x).

- **Renewed and modernized documentation**
  a) Standardized description of functions

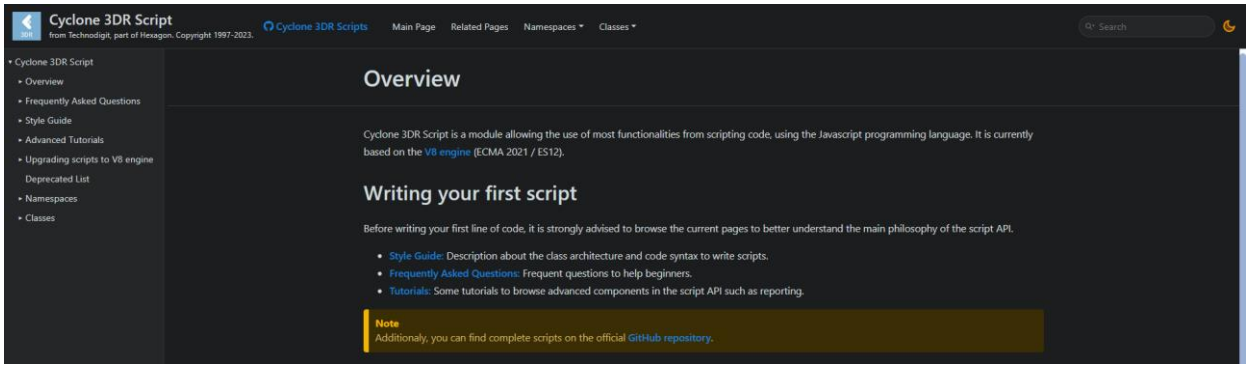


Example of the description of script function

  b) Better style, dark and bright themes supported in the documented API

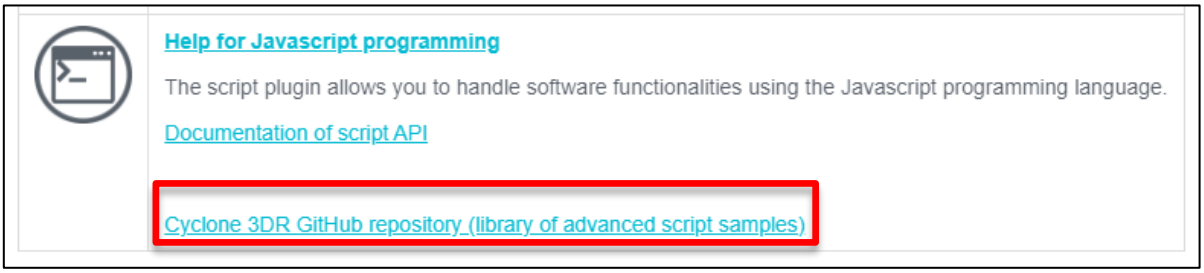


Light mode

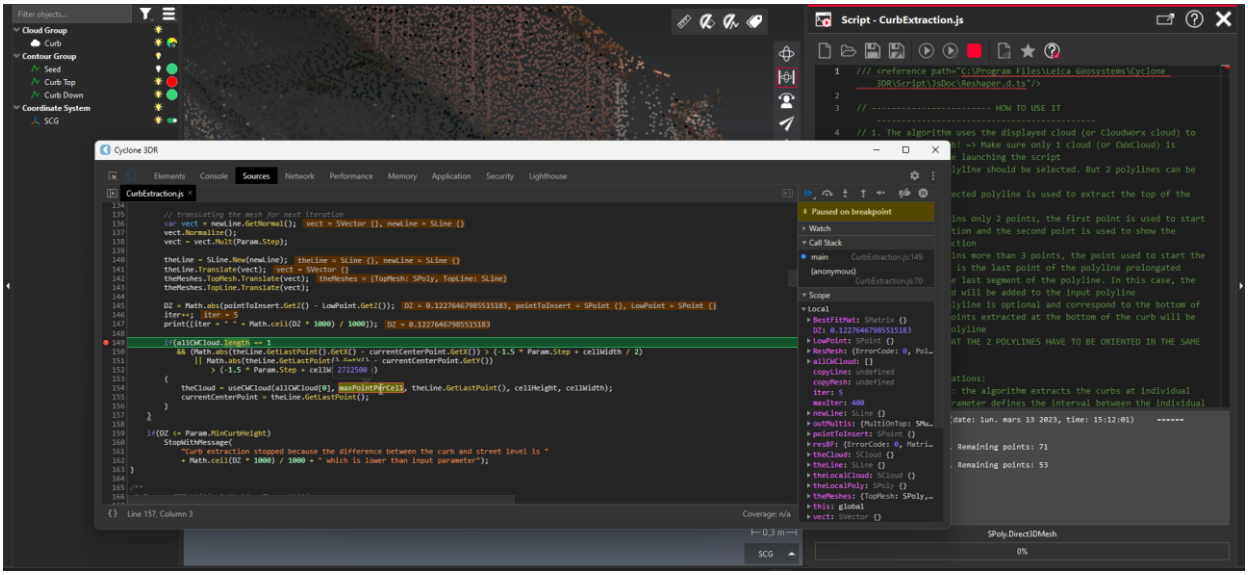


Dark mode

c) Direct link to GitHub



- **New debugger**



a) Full support of light/dark theme

b) More advanced capabilities for debugging (custom breakpoints, evaluation console, callstack, variable watch mechanism)

c) Based on Google Chrome DevTools

- **Improved user interface:**

a) More pieces of information are exposed to users when there are errors.

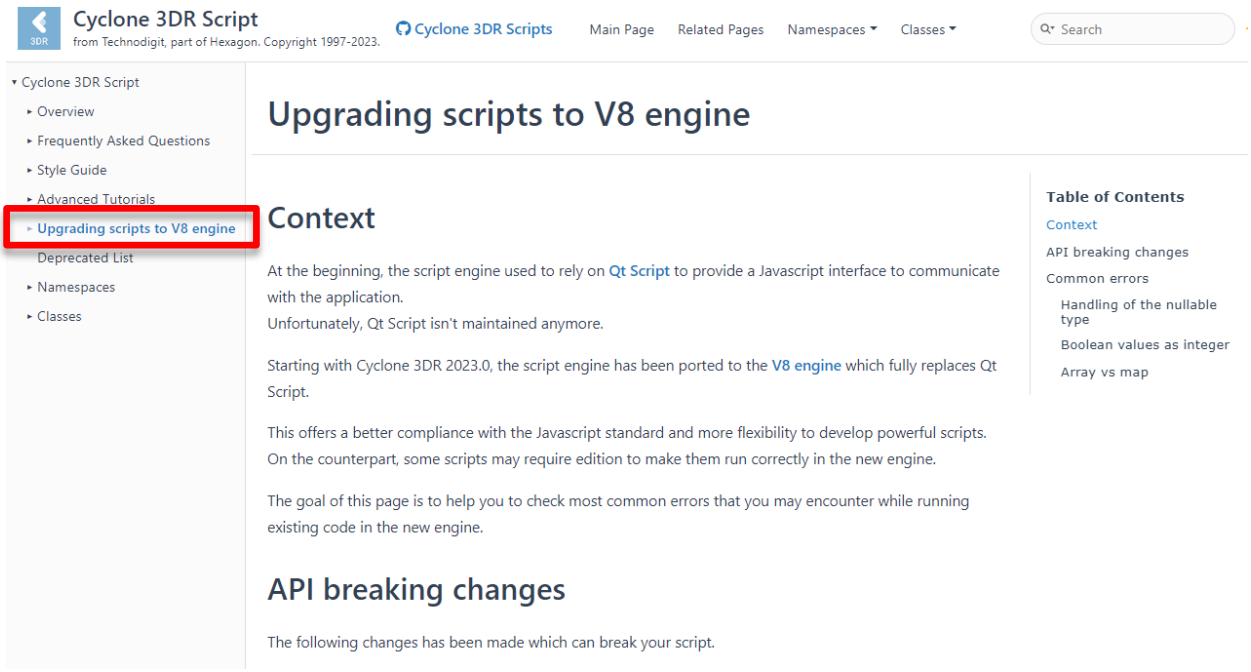
b) Pre-suggestions for coding are exposed in the script dialog to guide users.

c) Debugger benefits from an experience improvement.

Migration guide

To accompany users in the migration to the new script engine, a dedicated chapter explains the process and tips to update scripts based on the old engine in the Documentation of the script API.

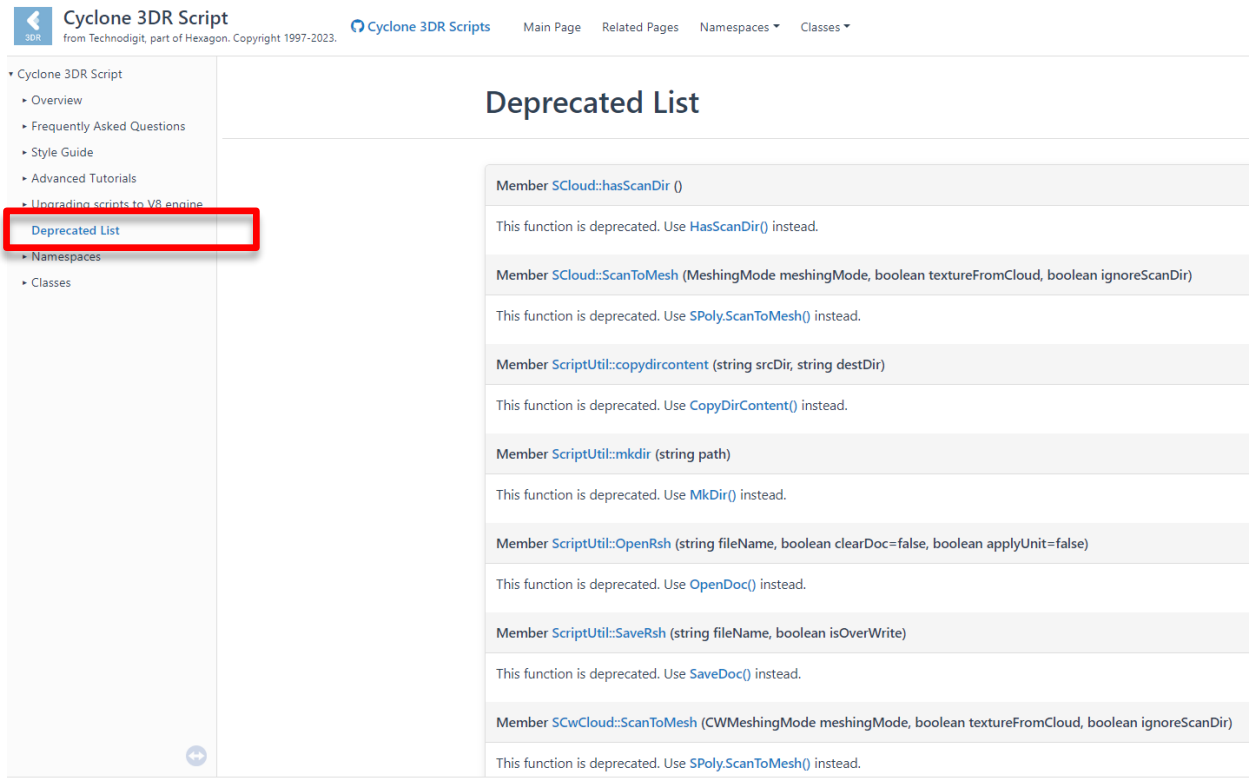
Users that are familiar with the ancient script API are highly recommended to read this section.



Extract of the new documentation explaining the migration plan

Deprecated script functions

With the migration to the new engine, some script functions are deprecated. This list will remain updated and available on the script documentation.



Extract of the new documentation listing the deprecated functions

Script > New functions

The section lists some interesting new script functions that are added with the Cyclone 3DR 2023.1 version.

The new functions are available to users with the STANDARD license.

Density of point clouds

Two functions are added to colorize a point cloud according to its density. These two advanced functions offer a path to clean complex data and remove noisy and irrelevant areas:

a) **SCloud.ComputeDensityFromNearestPoints**

b) **SCloud.ComputeDensityFromSphere**

This feature is available to users with the STANDARD license.

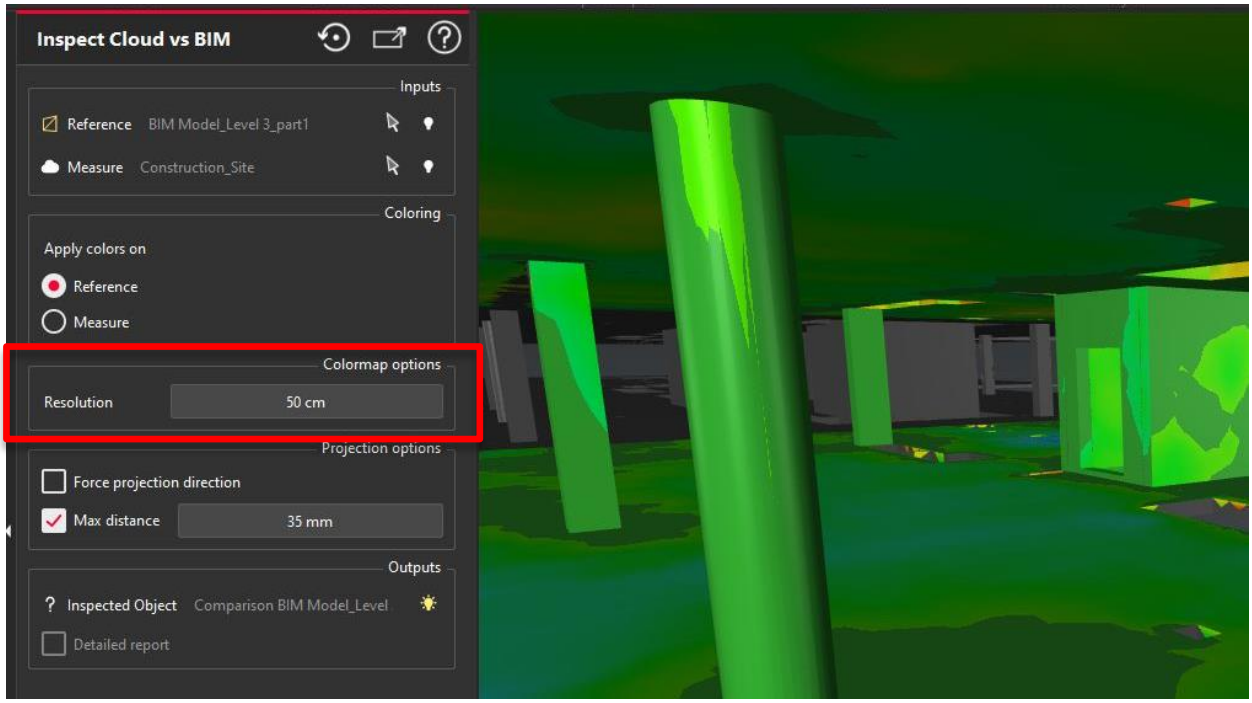
Document management

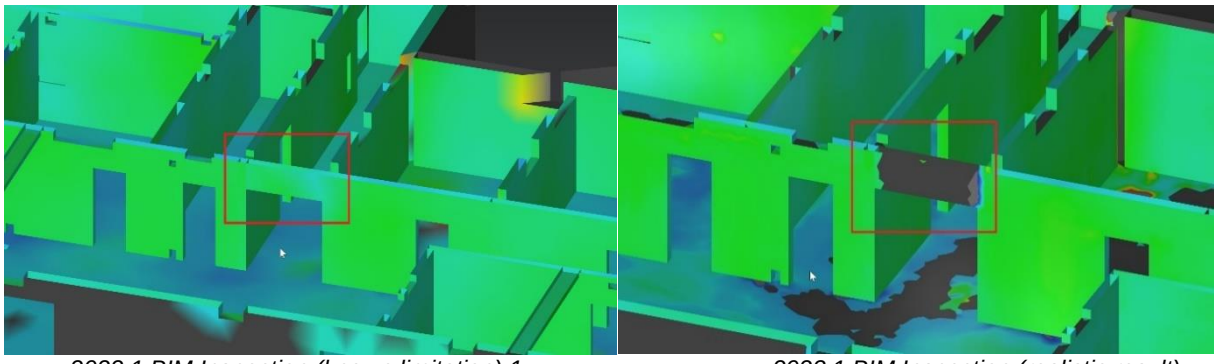
A new script function **CurrentDocPath()** is added to get the path of the current document. It offers better flexibility for any kind of script workflows.

Improvements

- **Analysis > Compare / Inspect:**

  a. With a surface model (Mesh CAD, BIM) there is now a new option to control the inspection resolution of the inspected surface model (Mesh, CAD, BIM).



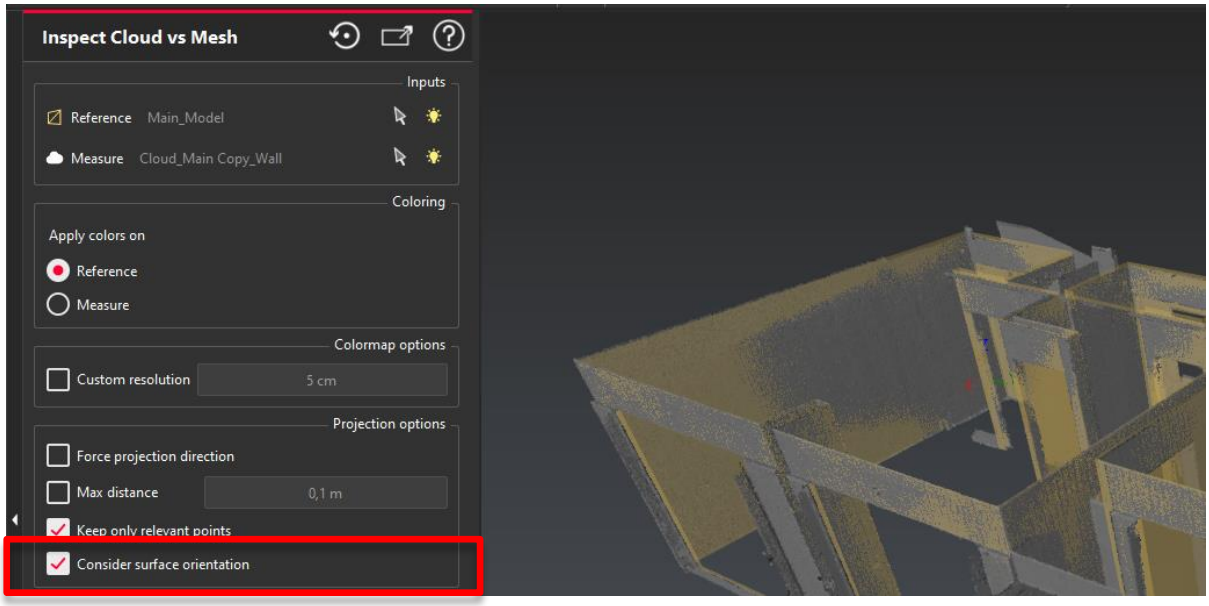


2022.1 BIM Inspection (known limitation) 1 *2023.1 BIM Inspection (realistic result)*

Known issue can be fixed with the new resolution feature (the missing beam above the door is not built and not detected with the new 2023.1 version of Cyclone 3DR inspection tools)

b. With a point cloud: Add an option to consider surface orientation when comparing with

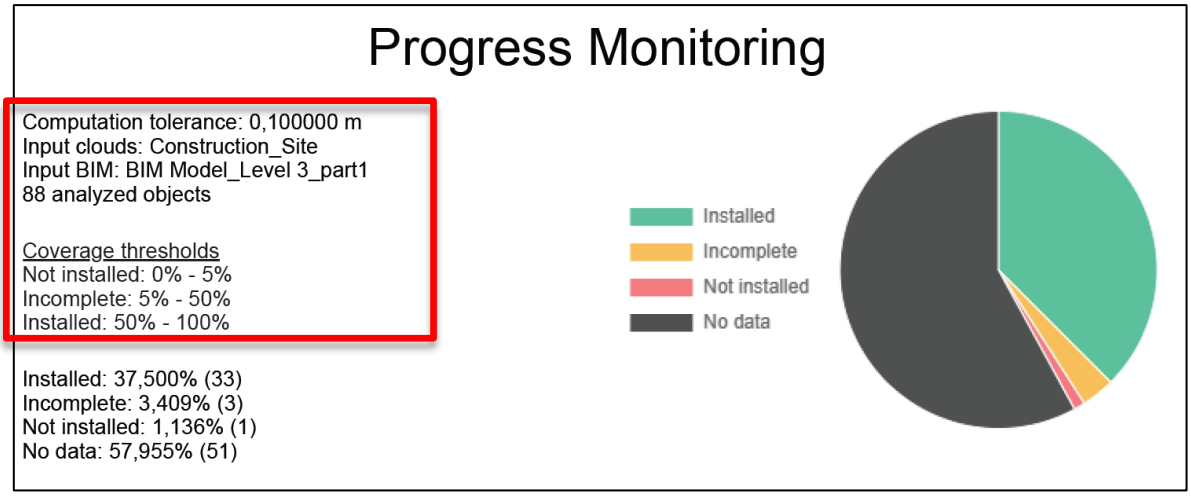
a surface object (Mesh, CAD, BIM).



- **Analysis > Measure Distance Point with other objects:** Added an option to sign distances (positive or negative values).

- **Analysis > Measure Volume from Elevation:** The graph can be customized in the report.

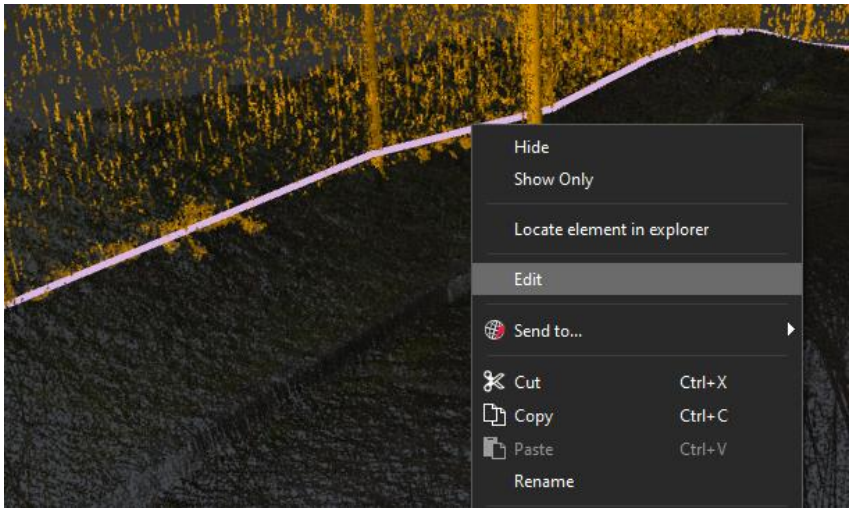
- **Analysis > Progress Monitoring:** Report information is now completed with the user parameters for the definition of progress status.



- **Analysis > Surface Analysis:** Added the possibility to generate a regular grid from an inspected surface and export it to AutoCAD. See detailed chapter on Gridded Inspection for more information.

- **Application > Generic behavior:** Changed the exit shortcut of a command from ESC to SHIFT + ESC to prevent accidental cancellation of the results.

- **Clean > Edit polyline:** Added the possibility to launch the Edit Polyline command with a double click on a polyline or with “Edit” in the contextual menu.



- **Extract > Scan to Plan:** Significant improvement of accuracy of the automatic extraction mode in matter of accuracy. Need of rework is reduced after automatic extraction.

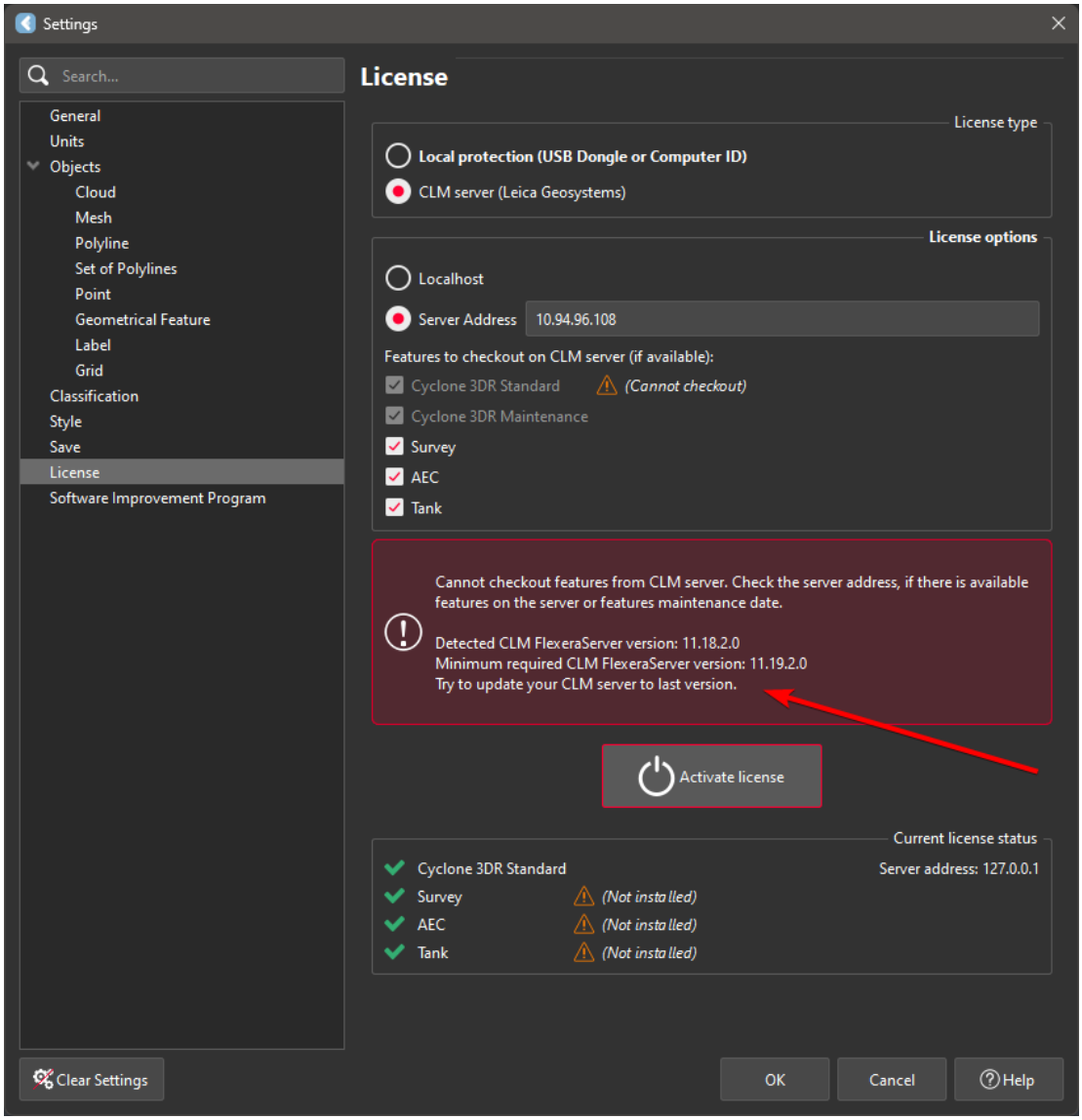
- **File > Export Mesh to OBJ / GLB:** Improve the quality of textures generated from a color gradient.

- **File > Export PDF3D:** Improve visual aspect of inspected mesh.

- **Licensing:**

  a. CLM 2.6.2.0 is embedded with Cyclone 3DR installer. The installation of CLM is automatically processed. In addition, notifications have been added in the settings to inform users when the last version is required.

b. When using a server-based license, the installation of CLM 2.6.2.0 cannot be done during the installation of Cyclone 3DR and must be proceeded by the IT service that manages the company server network. Notification message is displayed to inform users.

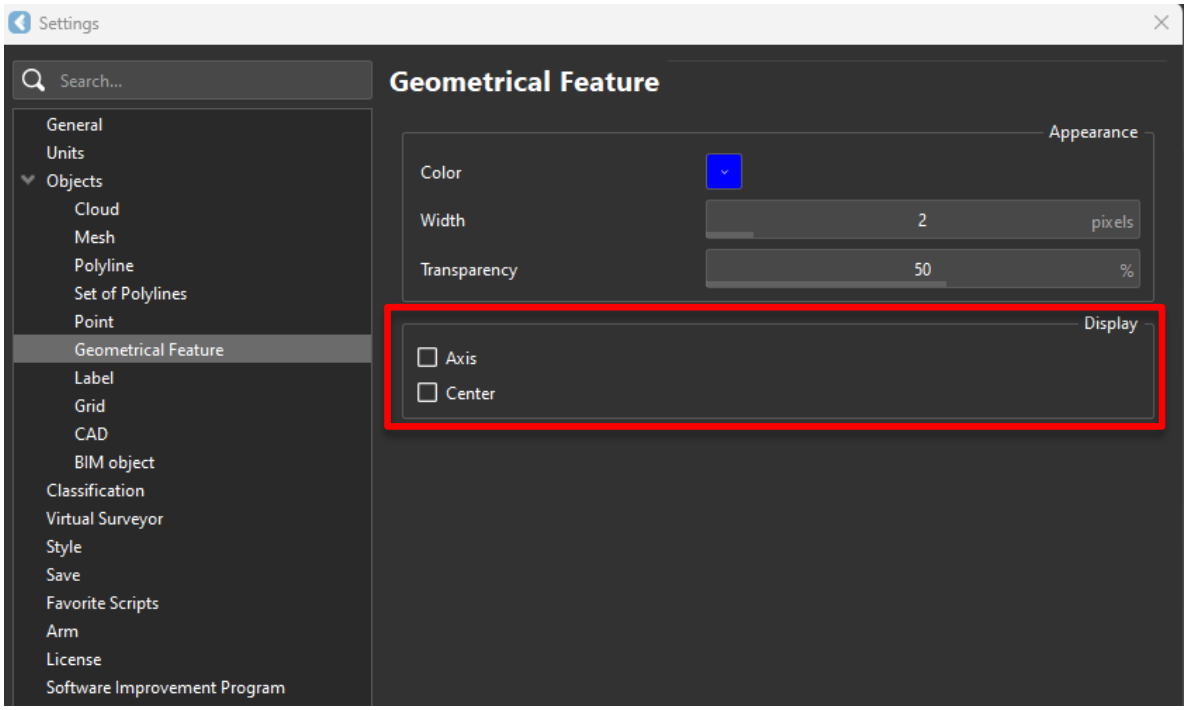


- **Rendering:** Disabled shading effect on 3D images.

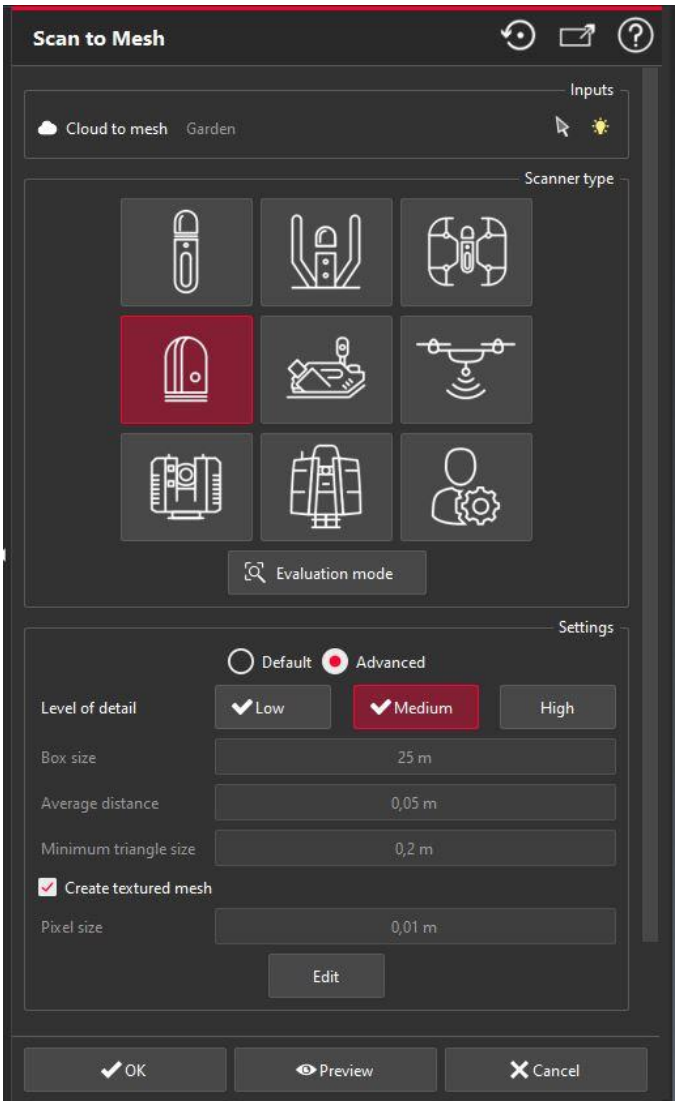
- **Reverse Engineering > Edit Network:**
  - Improved projection accuracy when moving a node above the mesh.
  - Prevented from picking nodes that are behind the mesh.

- **Script > Favorite scripts > BLK ARC scripts:** Added support for docking station. A reference model can now be exported and the end of the script execution. Update JSON file structure.

- **Settings:** Added the possibility to set default aspects on geometrical features (axis, center) and polylines (arrows).

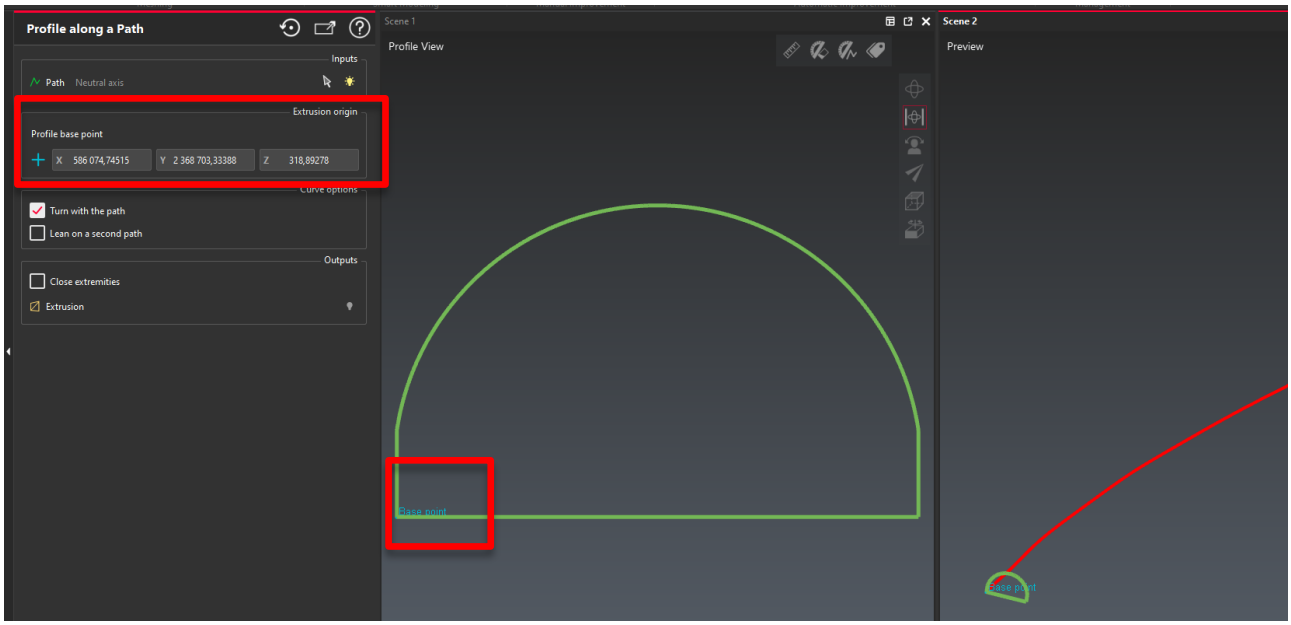


- **Surface Modeling > Scan to Mesh:** New User Interface > the dialog has been reviewed to simplify the extended choice of the meshing parameters by scanner-type.



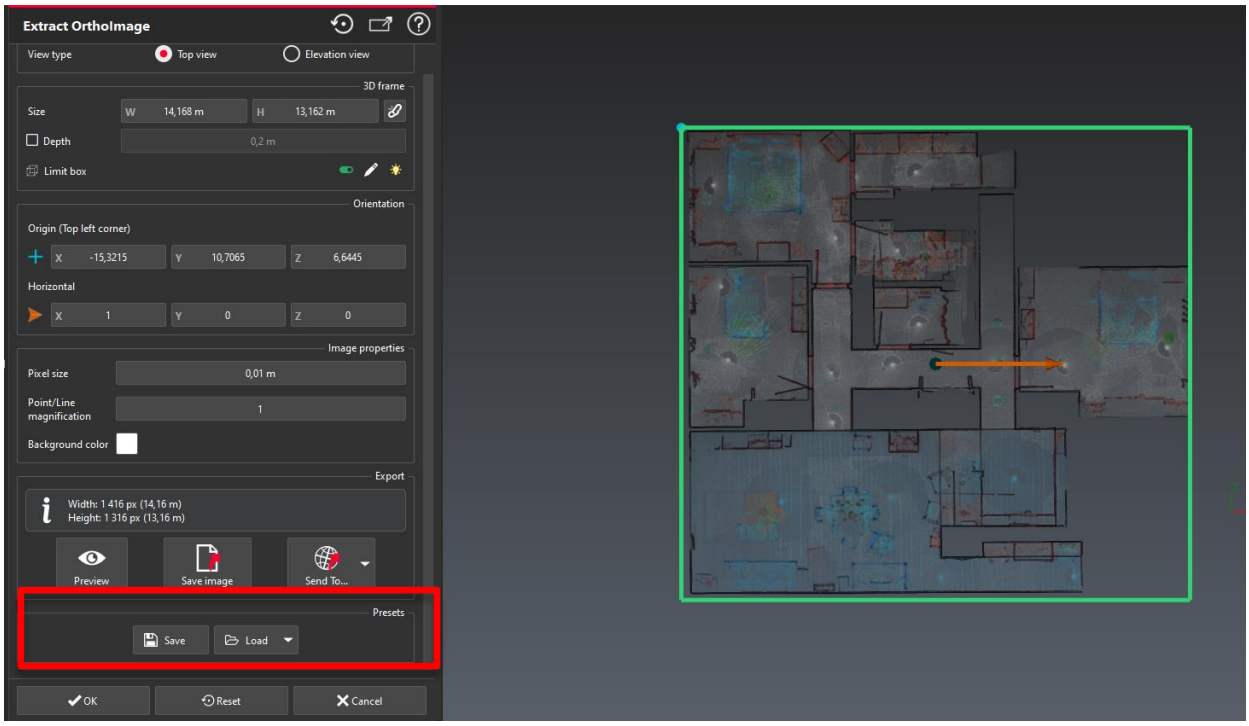
- **Surface Modeling > Extrude > Profile along a Path:**

  Added the possibility to define a profile base point and a profile lean point.



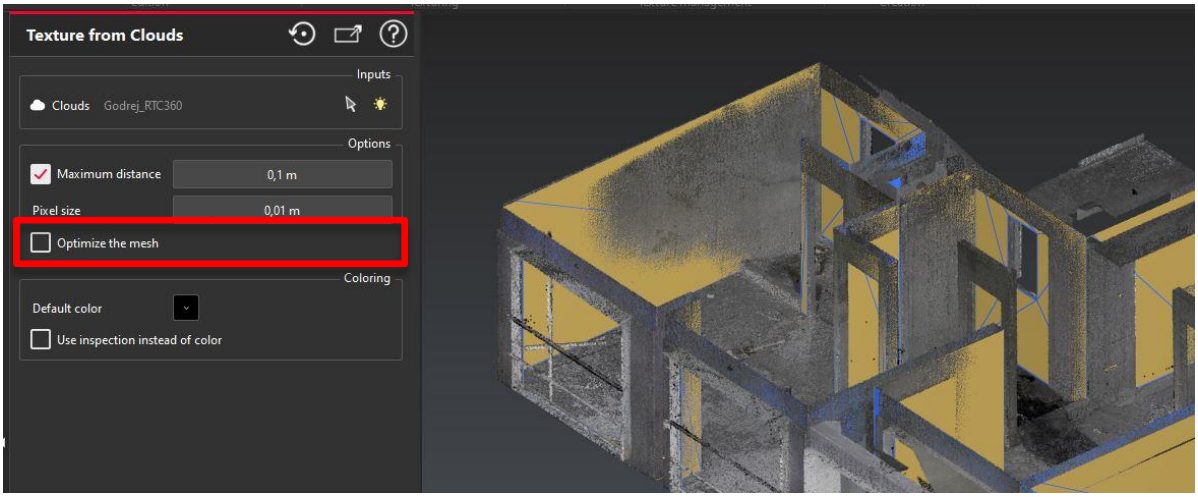
This improvement makes the extrusion more accurate for this feature. As a consequence, and prior to the usage of the feature, it is necessary to prepare the data to make sure to position the base point on the extruded profile.

- **Texturing > Extract orthoimage:** Added the capacity to save and load settings of the orthoimage.

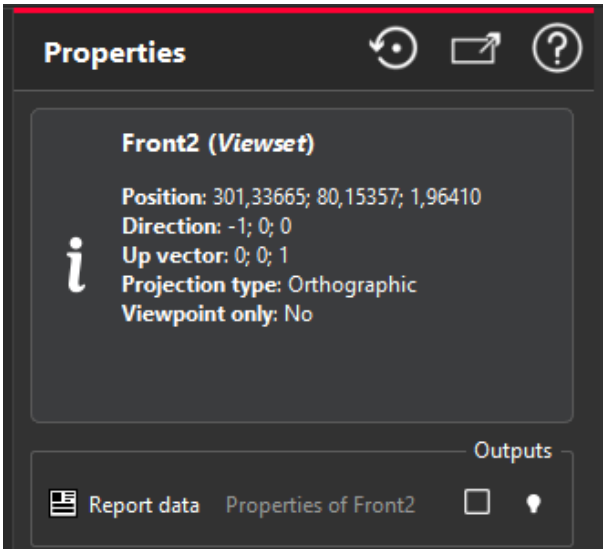


- **Texturing > Smart Texture:**
  - **a.** Accuracy and major performance improvement: The resolution of the texture is adjusted to the resolution of images.
  - **b.** Ability to control if the triangle orientations are taken into account during the texturing process.

- **Texturing > Texture from Clouds / Smart Texture:** Added an option to disable the mesh reduction.



- **View > Viewset:** The properties of viewsets now contain camera position information.



Bug Fixes

In 2023.1.0 release:

- **Analysis > Compare Inspect Section:** Fixed inversion of columns (measure and reference) in the detailed report.
- **Analysis > Compare Points vs Cloud:** Fixed inaccuracy of deviation values in the labels table.
- **CLM:** Fixed a crash that could occur while defining an invalid license.
- **Extract > Region Grow:** The values displayed inside the label now use the UCS if any exist.
- **File > Export to OBJ / GLB / FBX:** In some 3rd party software applications, exported textured meshes were displayed with unwished grooves. Fixed.
- **Report Editor:**
  - Fixed a crash that could occur while editing custom data.
  - Fixed truncated characters during the edition of text fields.
- **Script functions:** Following functions are fixed:
  - Folders were not deleted by ClearDoc().
  - Removed end-of-line characters in SFile.ReadLine output.
  - SaveDoc() must use the global settings value to save or not the content of the bin.
- **Settings:** Settings are now saved between major software updates.
- **Surface Modeling > Subdivide:** Removed thin triangles that could be generated if the option “improve curvature areas” was unchecked.
- **View > 2D Preview:** Fixed the number of decimals and improved offset of the grid texts.

Deprecated features

Leica Geosystems strives to provide support for the widest array of operating systems and file formats possible as is reasonable given current technologies and support from third-party partners.
With each release, we review our list of currently supported formats and operating systems in line with industry trends and announced product terminations.

Leica Geosystems may add or terminate support for a file format during any release. Obsolete operating systems will be supported for six months after their announced termination or the next major software release, whichever comes first. Server products will be supported in alignment with Leica’s Client License Manager (CLM) supported servers to guard users against incompatibility.

In Cyclone 3DR 2023.1.0:

- **File > Import GIF:** GIF images cannot be imported anymore.
- **File > Load from BLK 360:** Replaced by the wireless connection to Cyclone FIELD 360 in Desktop Mode.
- **Script functions:** Some functions are deprecated due to the migration to the new engine. They are detailed in script API documentation.

Generic specifications

Leica Cyclone 3DR 2023.1 Compatibility

Cyclone 3DR is compatible with CLM 2.5.0 and higher.

Cyclone 3DR is compatible with JetStream ENTERPRISE 1.3 and higher.

Cyclone 3DR is compatible with LGS files.

Cyclone 3DR is compatible with Cyclone ENTERPRISE 2022.0 and higher.

Cyclone 3DR is compatible with Cyclone REGISTER 360 2021.1 and higher.

Cyclone 3DR is compatible with Cyclone IMP databases from Cyclone 6.0 or higher, however improved rendering will only be seen with IMPs from Cyclone 9.3 or higher.

Recommended Computer Specifications

Regular workflows in desktop application:

CPU: 2 GHz Dual Quad Core i7 or higher (i5 minimum)

RAM: minimum 16 GB or more for 64-bit OS

Graphic Card: NVidia Quadro or GeForce 1 GB (with OpenGL support, versions 4.3 or higher)

Operating system: Microsoft Windows 7, 8, 10, 11 (64 bits supported)

Hard Disk: 3 GB free disk space

Tablet device for Touch Mode:

Microsoft Surface PRO Core i7 1.5 GHz – 16GB RAM.

Minimum specifications for Auto-classification (in addition to other recommended specifications for the desktop application:

RAM: minimum 32 GB

Graphic Card: NVidia with GPU capabilities

- Compute capability: 3.7 or higher
- Minimum GPU memory: 4 GB

Hard Disk:10 GB free disk space

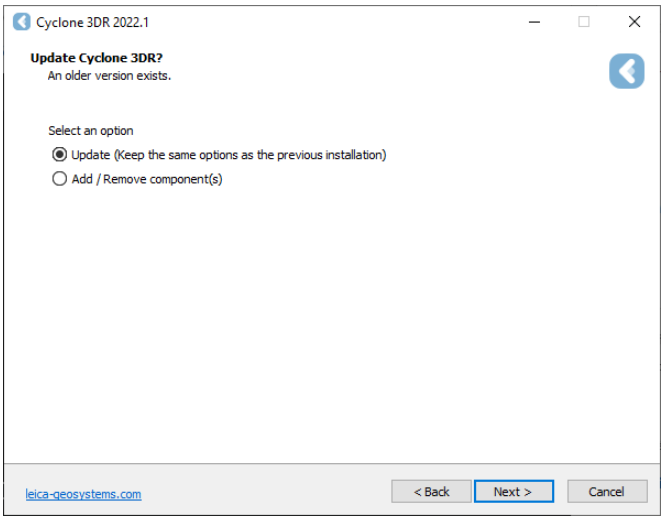
CUDA® 11.6 Toolkit (from NVidia). **The 11.6 version of CUDA is mandatory for Auto-Classification.**

Installation and Licensing Recommendations

Installation update Procedure

1. Launch the Cyclone 3DR EXE and follow the instructions in the Setup Wizard

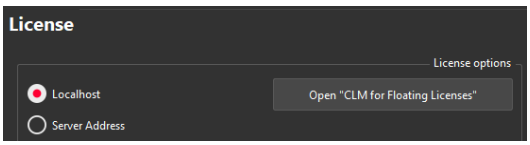
2. Select the option to update Cyclone 3DR (or repair if you want to change installing options)

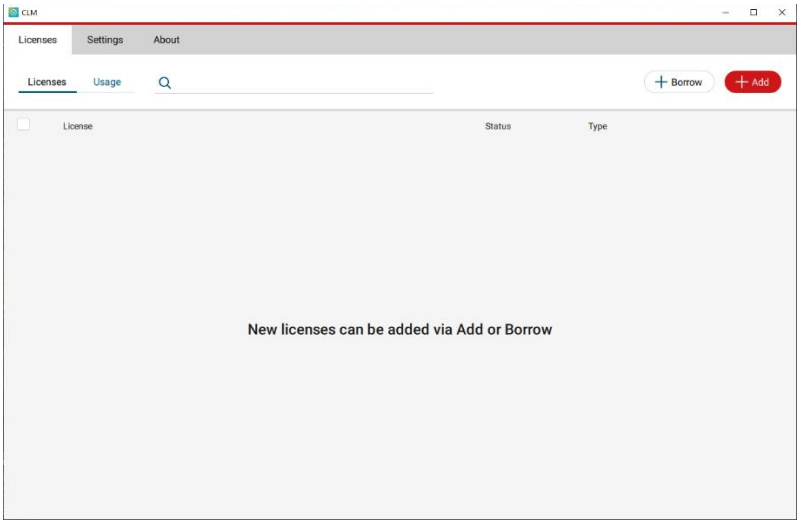


3. Complete the installation by selecting “Finish”.

Licensing Setup

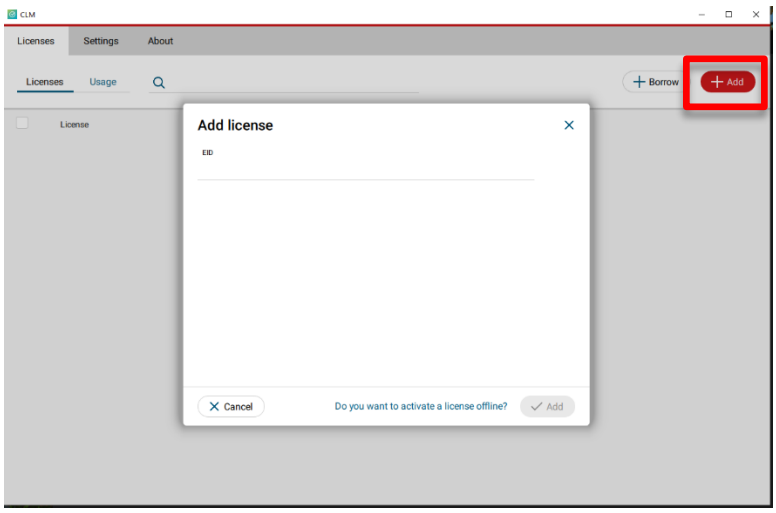
1. Once you have installed Cyclone 3DR, open the Client License Manager for **Floating** Licenses via Cyclone 3DR (Home/Settings/License) or via the program located here:
   Start Menu | All Programs | Leica Geosystems | Client License Manager



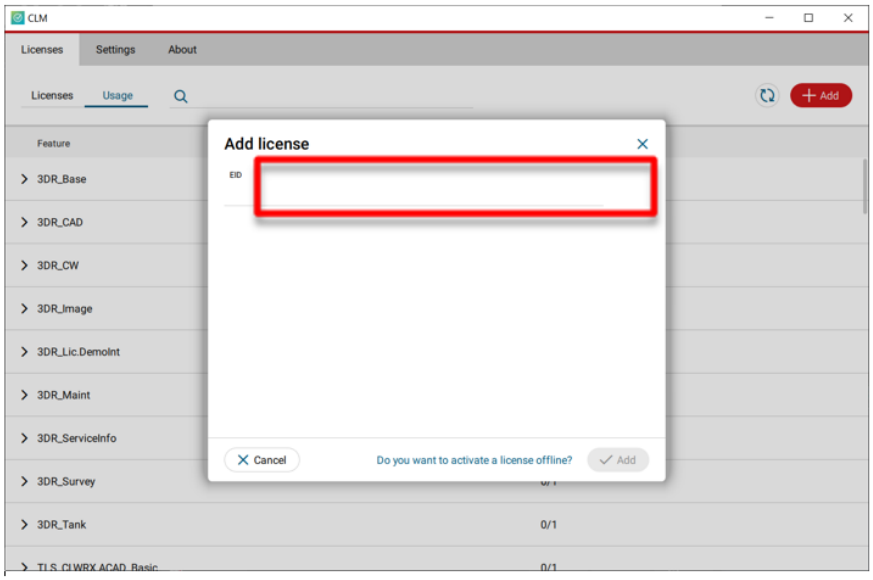


***NOTE* Be sure to choose the CLM Floating option (there are two CLM options and the Nodelocked CLM will not activate your license)**

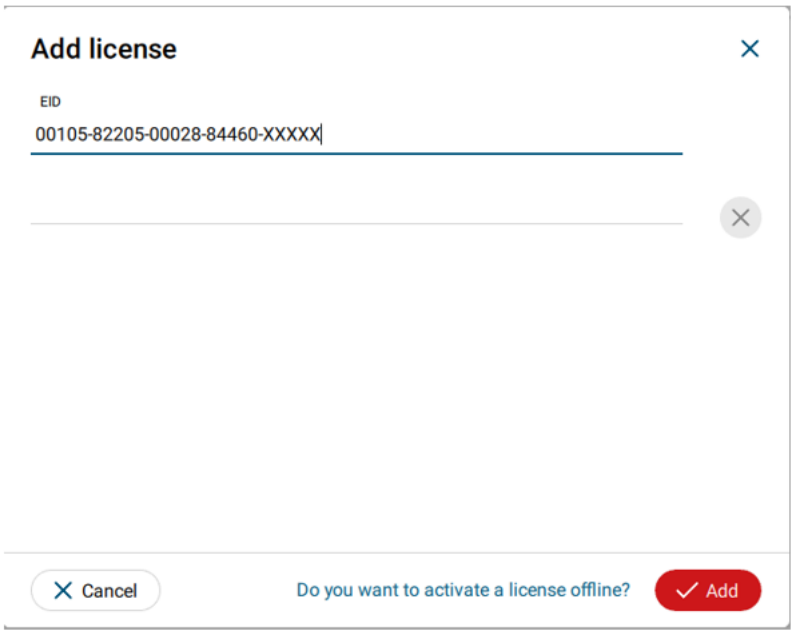
2. Click “Add”.



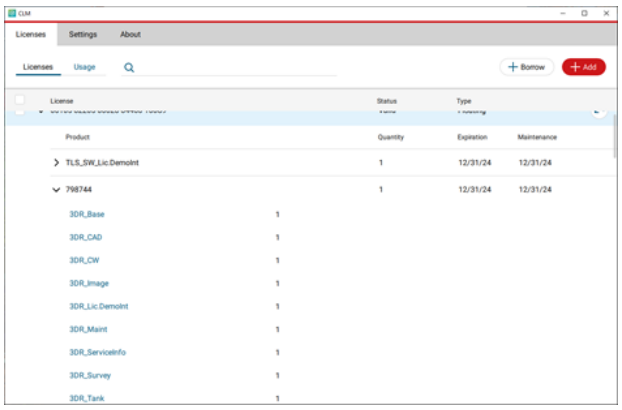
3. Enter your Entitlement ID (EID) in the field (copy / paste). To enter multiple EIDs separate them with a semicolon ";" and no space.



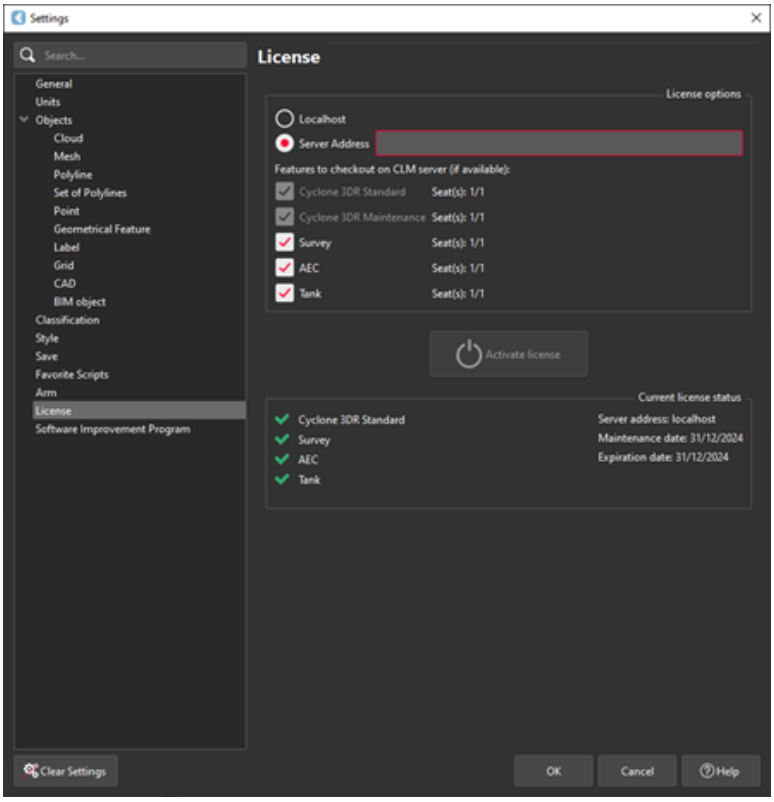
4. After you have entered your EID, click on the “ADD” button in the bottom right of the page



5. Once your licenses are activated you can close CLM and launch or return to Cyclone 3DR.

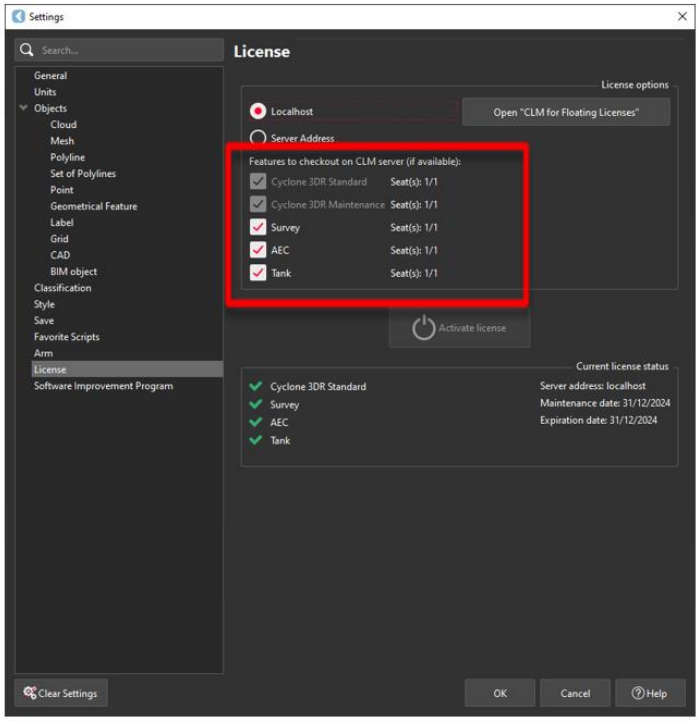


6. Go to Home / Settings and select License.

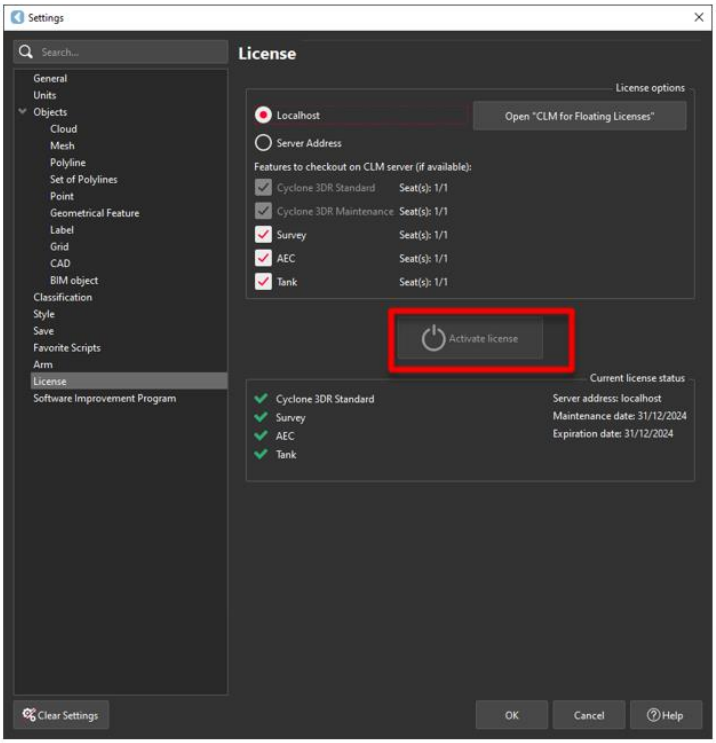


7. If you have entered the EID inside your local CLM, select **Localhost**. If the license is on a dedicated server, enter the server's name in **Server Address**.

8. You can select the features you want to check out from CLM. The available options to checkout will correspond to the options you purchased which are contained in your EID.



9. Once the options are selected, click on **Activate license**.



Licensing

All users with valid CCP or CCP which was valid as of 18 March 2023 for Cyclone 3DR, can run this new version of Cyclone 3DR.

All users with valid CCP or CCP which was valid as of 18 March 2023 for 3DReshaper, can run this new version of Cyclone 3DR with no new license required.

Users with 3DReshaper licenses with expired CCP must migrate to Cyclone 3DR in order to continue to access updates and support. Please contact your sales or support personnel for more information.

Known Issues

- The Documentation Center is only available in English.
- Some CAD import and export issues might happen. For example, when exporting a cloud in DXF, some entities might be missing. To avoid this, it is preferable to use the Send to AutoCAD option.
- If DXF can be imported with a standard version, DWG requires the AEC or PRO Edition. One workaround is to use the 3DSend command from AutoCAD to Cyclone 3DR.
- .RSH files are natively compatible with Cyclone 3DR, and the last version of 3DReshaper is compatible with .3DR files (with a limit on textures and CAD objects).

Leica Cyclone 3DR supported file formats

Import / Export

Please reference the Cyclone 3DR Technical Specification for a complete list of supported file types per license.

	Import	Export
Point Cloud	Files ASCII (*.asc, *.csv, *.xyz, *.yxz…) Leica Geosystems (*.pts, *.ptx) and LGS (*.lgs) Leica Nova MS50/60 (*.sdb, *.xml) ShapeGrabber (*.3pi) 3DReshaper binary file (*.nsd) AutoDesk DXF (*.dxf) STL (*.stl) Polyworks (*.psl) Leica T-Scan + Steinbichler (*.ac) LIDAR data (*.las; laz) Other ASCII (*.*) Zoller and Fröhlich *(.zfs - *.zfc) PLY points without triangles (*.ply) ESRI ASCII (raster format *.asc) FARO (*.fls - *.fws) POLYWORKS (*.psl) E57 (*.E57 files) LandXML files (*.xml) DOT Products (*.dpl) RDBX	ASCII FILES (*.asc, *.csv…) Binary files (*.nsd) Leica Geosystems (*.pts, *.ptx, *lgs) E57 (*.e57) IGES (*.igs) LAS (*.las) LAZ (*.laz) Autodesk DXF (*.dxf)
Mesh	STL format (*.stl) Binary PBI format (*.pbi) DXF 3Dface format (*.dxf) Ascii POLY format (*.poly) OBJ format (*.obj) Ascii Leica format (*.msh) OFF files (*.off) PLY (*.ply) GLB format (*.glb, *gltf)	Ascii and binary STL format (*.stl) Binary PBI format (*.pbi) DXF 3Dface format (*.dxf) Ascii POLY format (*.poly) Vertices only (*.asc) DXF polyline (*.dxf) Ascii Leica format (*.msh) PLY (*.ply) LandXML (*.xml) OBJ format (*.obj) GLB format (*.glb)

		FBX format (*.fbx) IFC / IFCSite type (*.ifc, *.ifczip)
Contour / Section	IGES format DXF polyline format Binary MLI format (*.mli)	IGES format DXF polyline format Binary MLI format (*.mli) ASCII formats
CAD / BIM Models	IGES STEP DWG IFC RVT	IGES STEP DXF
Project	Cyclone 3DR (*.3dr) DXF - DWG XML Cyclone ModelSpace View (from IMP) JetStream Enterprise project	Cyclone 3DR (*.3dr) DXF PDF 3D SKETCHFAB
Report		PDF CSV BCF
Image	BMP JPEG JPG PNG	Ortho-image including georeferencing information as TXT file JPG JPEG BMP PNG TIF

Send To / Send From

Cyclone 3DR provides “SendTo” features as well to import and export certain kinds of data with third-party products. More information is available in Cyclone 3DR documentation center (from the software help menu).

	Send From	Send To
Point Cloud	-	-
Mesh / Surfaces	AUTODESK AutoCAD HEXAGON MinePlan 3D HEXAGON BricsCAD	AUTODESK AutoCAD HEXAGON MinePlan 3D HEXAGON BricsCAD
Contour / Section / Points	AUTODESK AutoCAD HEXAGON MinePlan 3D HEXAGON BricsCAD	AUTODESK AutoCAD HEXAGON MinePlan 3D HEXAGON BricsCAD
CAD Model	AUTODESK AutoCAD HEXAGON BricsCAD	-
Image	-	AUTODESK AutoCAD (ortho-image) HEXAGON BricsCAD

The following commands in Cyclone 3DR include a direct “Send to” capacity that provides the possibility to export the outputs in different layers in the CAD 3rd party software product:

Menu	Feature	Comment
Extract	Contour Lines	1 layer for standard contour lines and values. 1 layer for major contour lines and values.
Extract	Scan to Plan	1 layer per slice (floorplans or sections)
Extract	Virtual Surveyor	1 layer per layer created in 3DR Virtual Surveyor project.
Analysis	Gridded Inspection Surface Analysis with a Grid	Points and values on grid can be directly sent to CAD SW product. Sent to active layer.
Texturing	Extract Orthoimage	Sent to active layer.
Analysis	2D Preview Export	1 layer for 2D Grids 1 layer for inspection objects 1 layer per section 1 layer per axis points 1 layer per axis point quotations.
Coord Sys		
Tank		

Compatibility with native JetStream point clouds

The following commands can use native JetStream point clouds (LGS files or connection to Cyclone CORE, Cyclone REGISTER 360, Cyclone ENTERPRISE) as inputs. **In other words, it is not required to proceed a CloudWorx > Convert project step prior to execution of the listed features.**

Menu	Feature	Comment
Extract	Virtual Surveyor	Note that a selection is not required for this feature. Thus, it can used for any kind of objects in an 3DR project.
Surface Modeling	Scan to Mesh	A clipping box as input is recommended to define an area of interest.
Analysis	Stockpile	

The functionalities of the menus View, CloudWorx and Script can obviously be used for JetStream point clouds.

Point clouds with classification

Classification of point clouds is saved and supported after Import/Export for the following formats:

E57, LAS, LAZ, LGS

Export BCF tickets

The following commands embeds the capacity to export BCF (BIM Collaboration Format) files that contain information from IFC model for an open-BIM experience with other software and BIM solutions.

Cyclone 3DR 2023.1 support BCF 2.1 format (export).

Menu	Feature	Comment
Analysis	Inspection Notes / BCF	**Input: Inspected BIM Model** Feature to report issues from an inspection and that gives the ability to create manual notes that contains screenshots, images from disk, labels and deviation values (attached CSV), clipping object information and coordinates and orientation of viewpoint ; but also a user-defined title, an assignment (email address), a comment and a priority.
Analysis	Clash	**Input: A point cloud and a BIM Model** Feature to report clashes that contain screenshot, clash status (clash, no clash or undefined) and a comment. All tickets refer to the same assignment (email address).
Analysis	Progress Monitoring	**Input: A point cloud and a BIM Model** Feature to report the progress monitoring analysis. Default export contains a summary (progress distribution between installed, in progress, not installed and no data). Ability to customize the export and to create additional single tickets per analyzed element depending on their status (installed, not installed, in progress). All tickets refer to the same assignment (email address).