- when it has to be right

Leica Geosystems
Release Notes

Product: Leica Cyclone 3DR 19.1

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From: HDS Software Product Management

Contents

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Introduction

Leica Cyclone 3DR is a seamless extension of the Cyclone product family, working hand in hand to take users from field data collection with Cyclone FIELD 360 through registration in Cyclone REGISTER 360 to deliverable creation in Cyclone 3DR.

Cyclone 3DR fuses Leica JetStream technology for centralised, full-scale point cloud management with automated point cloud analysis and modelling into one simple, workflow-based software with tailored tools for surveying, construction and inspection applications. Where most software will focus on a single workflow to create a specialised deliverable, Cyclone 3DR includes a range of adaptable tools for inspection and meshing that can be leveraged to create an assortment of 3D deliverables and reports.

Based upon the simple design of the next-generation Cyclone family, Cyclone 3DR allows both new and experienced users to move from import through analysis to publishing deliverables intuitively and simply. By automating common tasks, customers can reduce unexpected project delays and quickly deliver actionable information to clients.

Options and Editions

Cyclone 3DR is available both a la carte and as packaged, all-inclusive editions.

A la carte ordering options

- Cyclone 3DR Standard: This license includes the core feature set of Cyclone 3DR and serves as a base on which industry-specific options can be added
    - Cyclone 3DR AEC Option
        - This license includes specialized tools for architectural and construction applications
    - Cyclone 3DR Survey Option
        - This license includes specialized tools for survey applications
    - Cyclone 3DR Tank Option
        - This license includes specialized tools for tank inspection applications

Edition ordering options

- Cyclone 3DR AEC Edition
    - This is an all-inclusive license containing both Cyclone 3DR Standard and the AEC Option
- Cyclone 3DR Survey Edition
    - This is an all-inclusive license containing both Cyclone 3DR Standard and the Survey Option
- Cyclone 3DR Tank Edition
    - This is an all-inclusive license containing both Cyclone 3DR Standard and the Tank Option
- Cyclone 3DR Pro Edition
    - This is an all-inclusive license containing Cyclone 3DR Standard plus the AEC and Survey Options

Additional options may be added to a Cyclone 3DR Standard license or an Edition license at any point.

FEATURES	STANDARD	SURVEY OPTION	AEC OPTION	TANK OPTION	PRO EDITION
Point cloud (including loading LGS, JetStream and IMP) import/export	X				X
Mesh import/export	X				
Standard CAD import (IGES, STEP, DXF)	X				X
Cleaning tools (cloud, mesh, polylines)	X				X
Standard meshing and inspection (colourmaps)	X				X
Geometric feature creation (best-fit, region grow etc.)	X				X
Automation (scripting)	X				X
Report editor	X				X
Send to CAD	X				X
Survey vectorisation tools (multiple-breaking lines, contour lines)		X			X
Survey specialised cleaning and meshing (DTM, DSM)		X			X
Survey specialised measurement & inspection (Flatness, Tunnel, Road)		X	X		X
Stockpile measurement		X			X
Image processing tools (texture, pose estimation)		X			X
Reverse Engineering workflow (Mesh to CAD) + export to IGES/STEP			X		X
AEC CAD format import (DWG, IFC, Revit)			X		X
AEC specialised cleaning (Building and Tunnels) and meshing (Building)		X	X		X
Tank inspection specialised workflow				X	

Feature highlights

For a full list of all features within Cyclone 3DR please see the Technical Specification document located on the Cyclone 3DR product page on the Leica Geosystems website.

Fully integrated with the Leica Geosystems Reality Capture Product Family

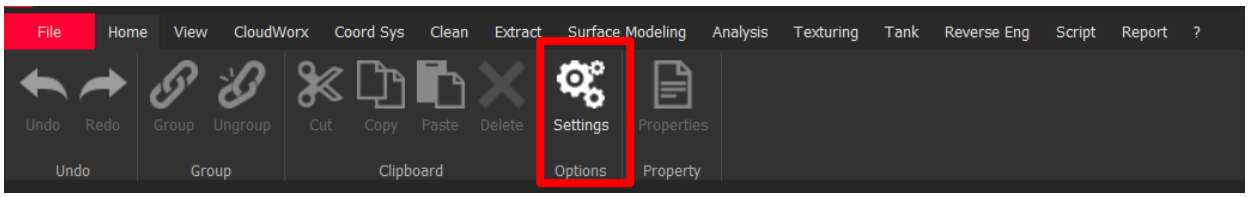
With the release of Cyclone 3DR, all CloudWorx functionality is available within the Standard license so all users benefit from the simplicity and speed that comes with opening data stored in Cyclone, JetStream Enterprise or as an LGS file.

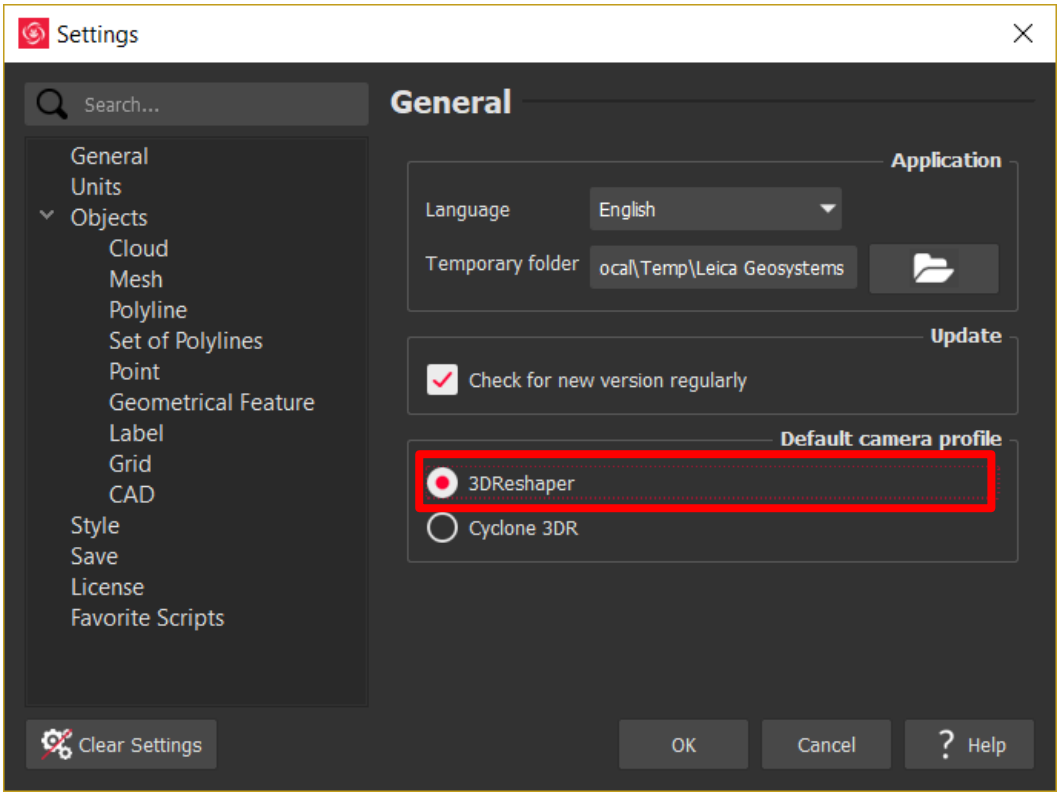
The appropriate, corresponding license is required for JetStream Enterprise. LGS files can be freely opened once published.

Workflow-based UI

Cyclone 3DR has taken the popular features of 3DReshaper and reimagined them with a simple, new UI based around common workflows. Users can quickly move from project creation to completion along the guided workflows detailed below.

The navigation mode and interactions have been standardized to Cyclone REGISTER 360 actions, but for long-time users of 3DReshaper, the 3DReshaper view can be enabled in **Settings | General**.





All-new CAD engine

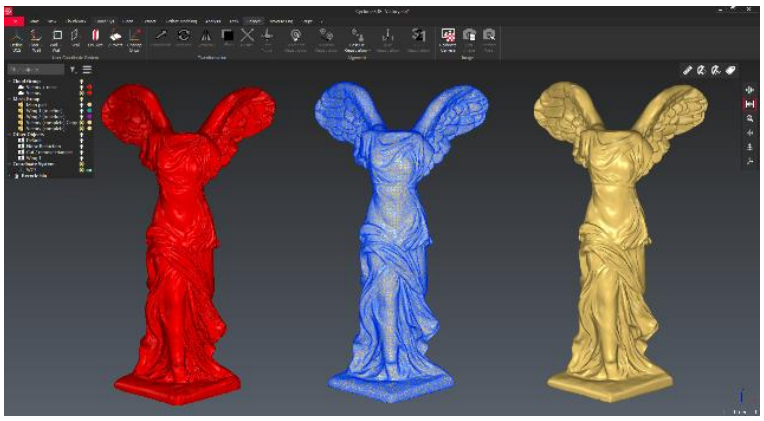
Cyclone 3DR has been outfitted with an all-new CAD engine to support large datasets and compatibility with popular BIM formats (Revit and IFC).

Fast, light and flexible meshing tools

Cyclone 3DR has adopted the industry-leading meshing process from 3DReshaper. Process large point clouds quickly and easily to deliver lightweight, accurate and beautiful models.

Cyclone 3DR includes an array of meshing tools suited to different project needs including:

- Real 3D Meshing for realistic rendering with a high level of detail
- Spherical Meshing according to scan position and direction
- 2D Meshing from polylines and specific points
- Mesh Refining for meshing in two steps for a best triangulated surface
- Improvement tools: Smoothing, Decimation, Hole Filling, Sharp Edges and Borders Reconstruction, Junctions and more
- Profile Extrusion for theoretical models from CAD lines
- Meshing under constraints (with polylines)
- Spike Detection



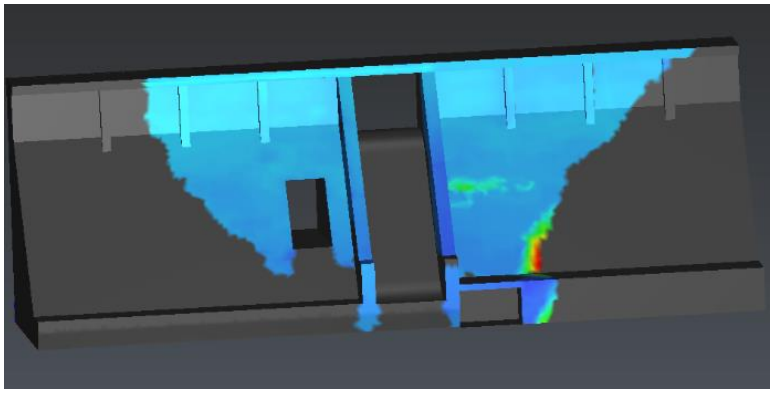
Meshing tools are available to all users in the Cyclone 3DR Standard license.

Inspection and measurement for design-in-context

Point to model inspection is a key workflow of Cyclone 3DR. Available within the Standard license, this flexible tool can be applied to all point and model formats which Cyclone 3DR supports (see the import and export support table at the end of this document). Inspection results are quantified with immediate feedback on the models for on-the-fly decision making and can be added to customizable reports for professional delivery to clients and stakeholders.

Inspection and Measurement Workflow

1. Import the point clouds and CAD objects
2. Make sure they are aligned in the same UCS
3. Select both objects and launch the inspection mode
4. Choose which object to apply the inspection colour map onto (points, mesh or model)
5. Adjust the colour
6. Add labels
7. Create a report



Surface analysis (levelness, flatness, slope)

Surface analysis tools can be applied to numerous applications such as verticality studies, floor flatness and slope analyses.

- Use the general **Surface Analysis** tools to check the verticality of walls and visually identify

areas of deformation with a customizable heat map.

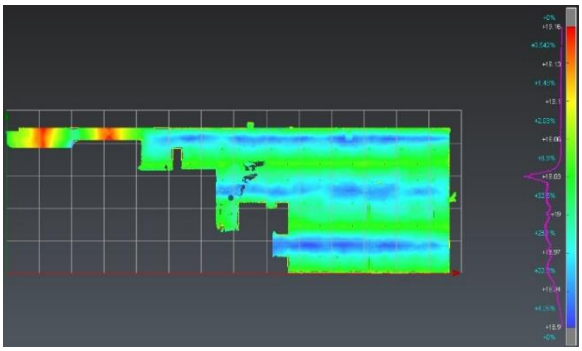
- Execute **Floor Flatness** analysis directly on a point cloud or a mesh. Perfect for quick checks of the flatness of a parking area, building floor, road, etc. Quickly visualise out of tolerance areas with customisable colour mapping and create labels and reports in a few clicks.
- Use the Slope Analysis tool to display slopes on your 3D mesh or point cloud. Easily colour slope gradients within certain thresholds.

Surface analysis tools are contained within the AEC and the Survey Options.

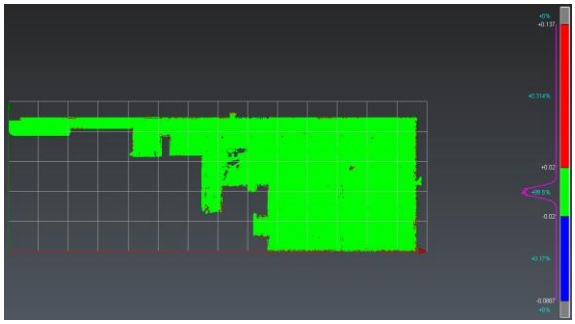
Surface Analysis Workflow

Cyclone 3DR facilitates the process of surface analysis through three functions that automate the workflow:

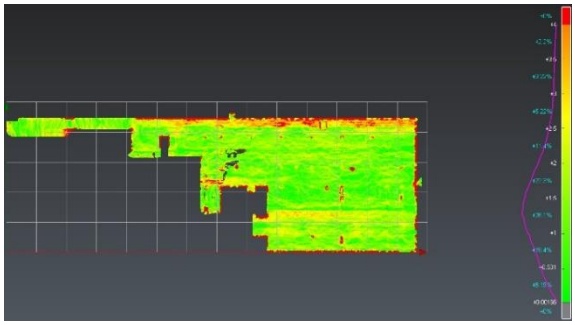
- **Surface Levelness:** compute the levelness compared to an average plane.



- **Surface Flatness:** check for bumps and holes thanks to a virtual ruler with customisable tolerance.



- **Slope Analysis:** Inspect the local slope of each point from a horizontal base.

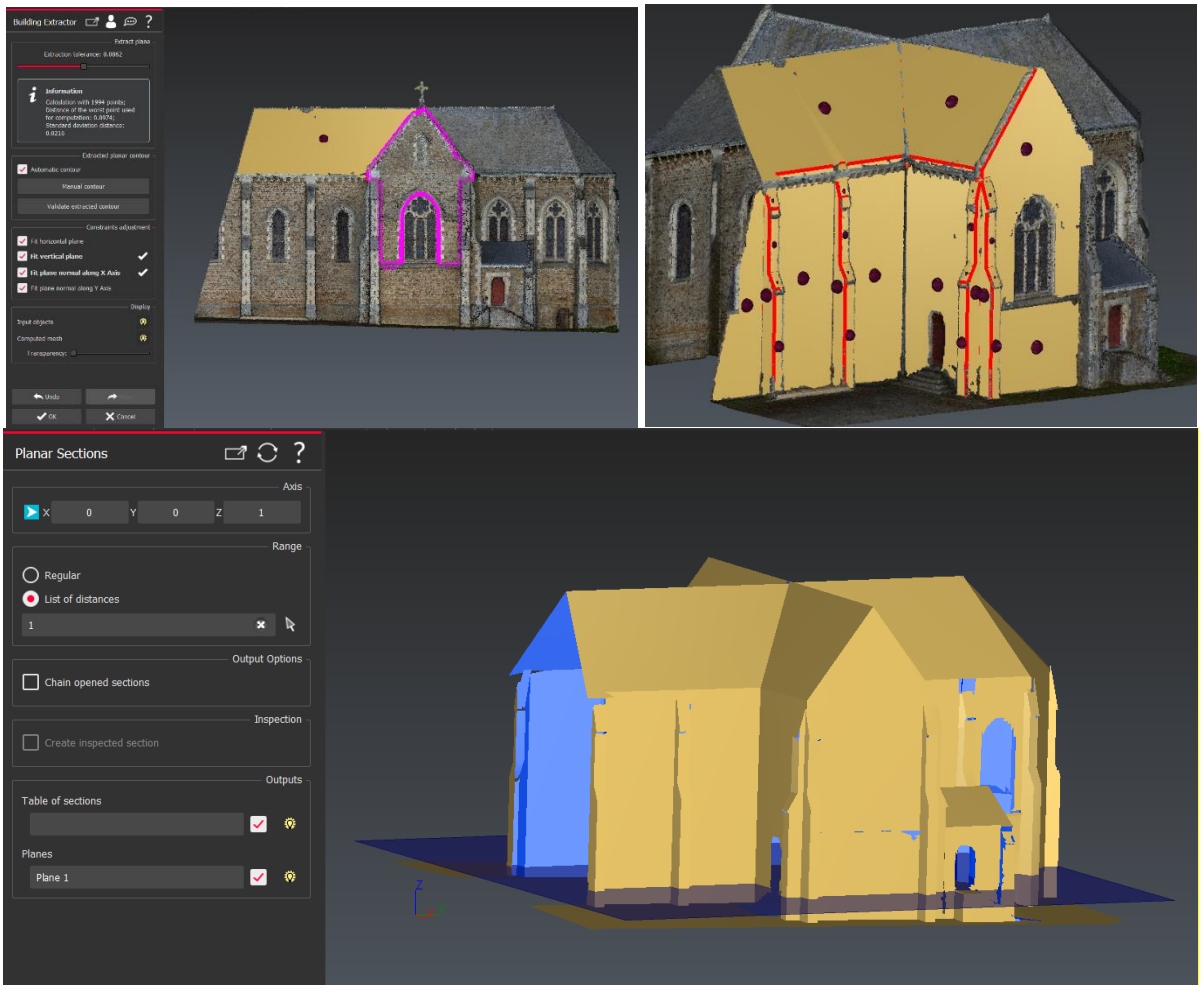


For each analysis, it is possible to edit the colours and generate a customised report.

Building Extractor

Automatically or manually extract walls and roofs as meshes joined by polylines at intersections to rapidly generate models from real-world conditions captured with laser scans.

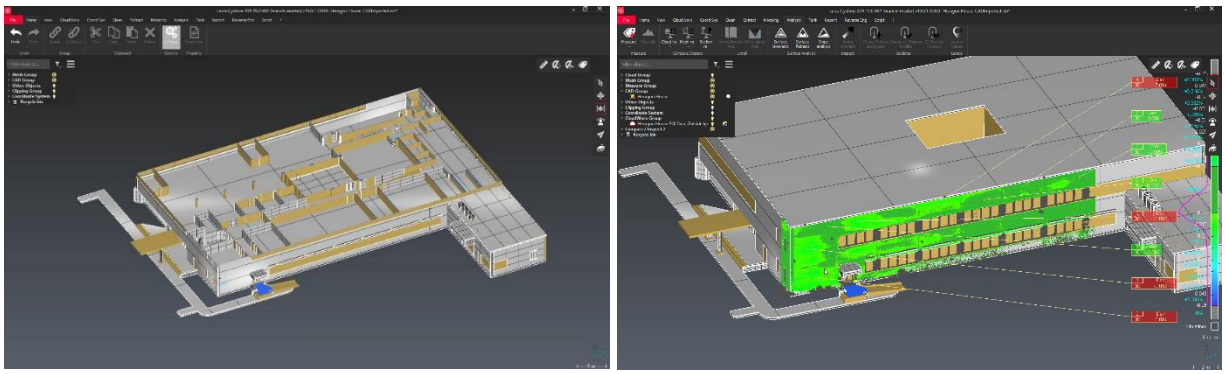
The building extration workflow is available to all users in the Cyclone 3DR Standard license.



2D or 3D comparison workflow between objects including Revit or IFC models

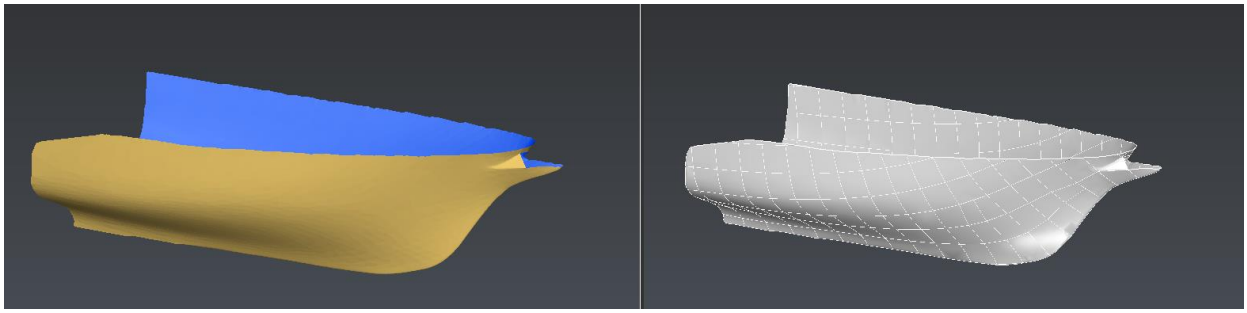
Cyclone 3DR supports numerous comparison workflows such as monitoring a structure for change over time or comparing real-world conditions to design intent. Cyclone 3DR easily inspects or compares clouds, meshes, surfaces or polylines in 2D or 3D.

Support for IFC, Revit and other popular design model formats is available in the AEC Option.



Reverse engineering

When a mesh is not sufficient, users can compute real surfaces for use in third-party tools. From a 3D mesh and a polyline network, Cyclone 3DR allows you to create real NURBS surfaces for export to IGES or STEP files.



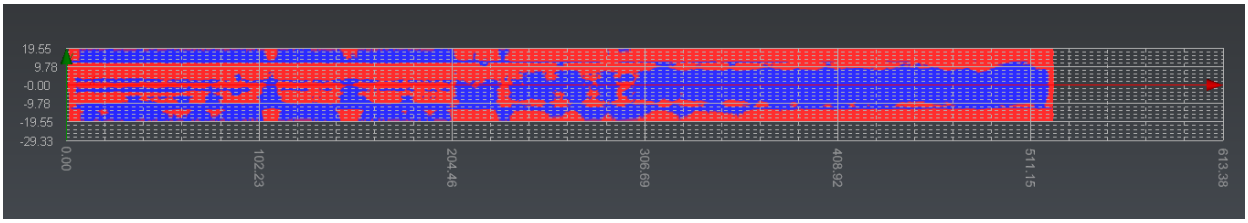
Reverse engineering tools are contained within the AEC Option.

Cross-sections workflow for 3D tunnel or 2D road inspection

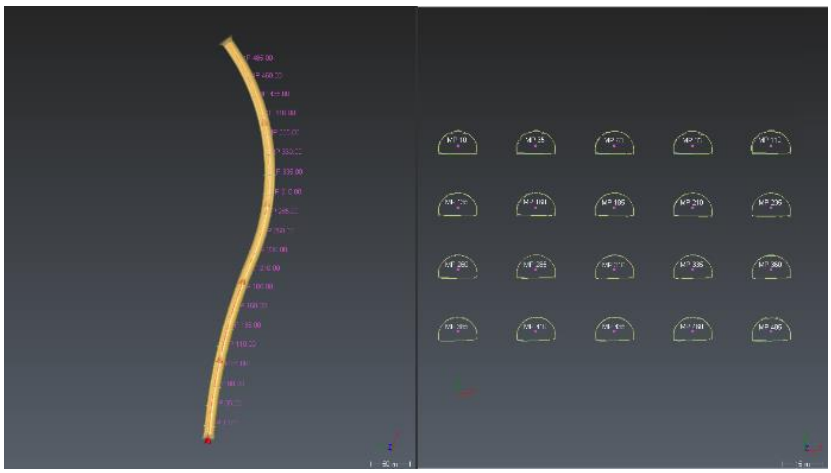
Both the AEC and Survey Options include specialized tools to enable a cross section workflow which can be applied in both 2D and 3D applications such as road and tunnel inspection.

Cross-section workflow

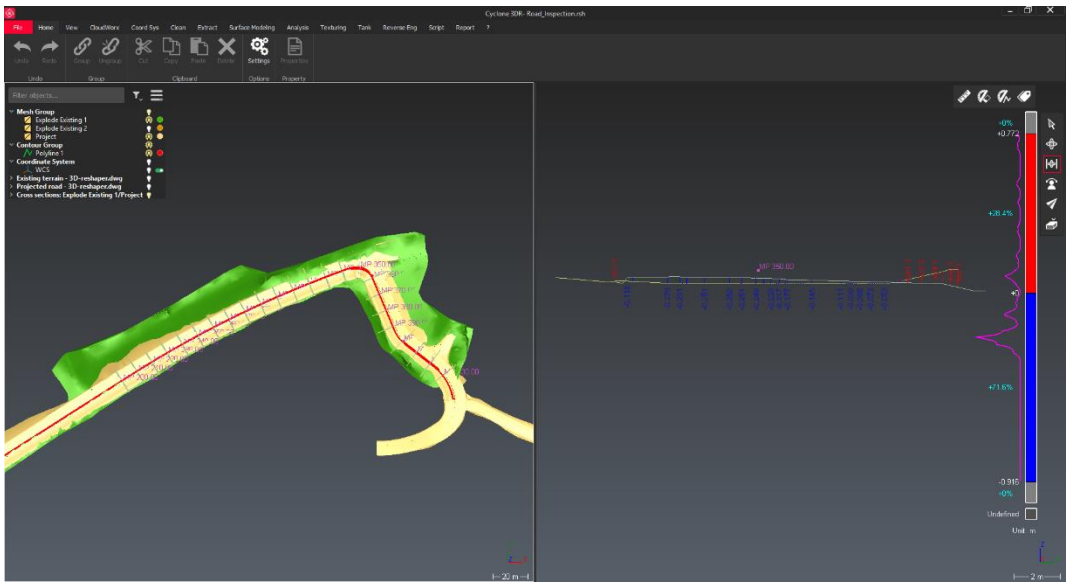
1. Remove extraneous data from the inside of the shaft or tunnel
2. Create the neutral axis or import the existing CAD model of the neutral axis
3. Compute 3D surface inspection and unroll a colour map



4. Compare profiles



5. Compute Overbreak and Underbreak volumes
6. Generate a report
7. Export profiles to AutoCAD in 2D or 3D



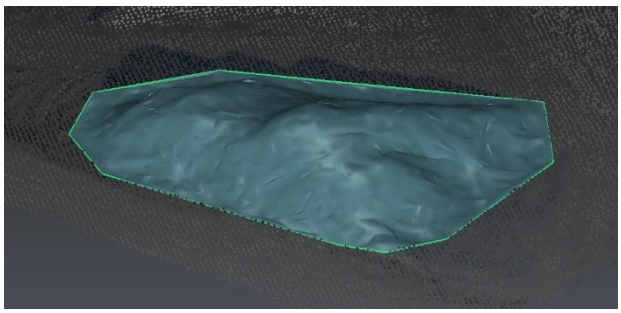
Stockpile measurement workflow

Specialised stockpile tools allow users to quickly isolate stockpiles, generate surface meshes, query volumes and report the results with immediate readouts or as part of a customised report.

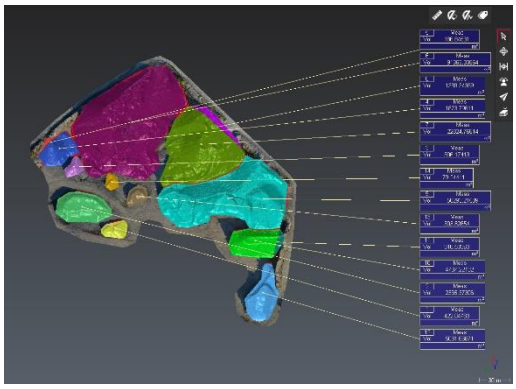
Stockpile measurement functions are contained within the Survey Option.

Stockpile Workflow

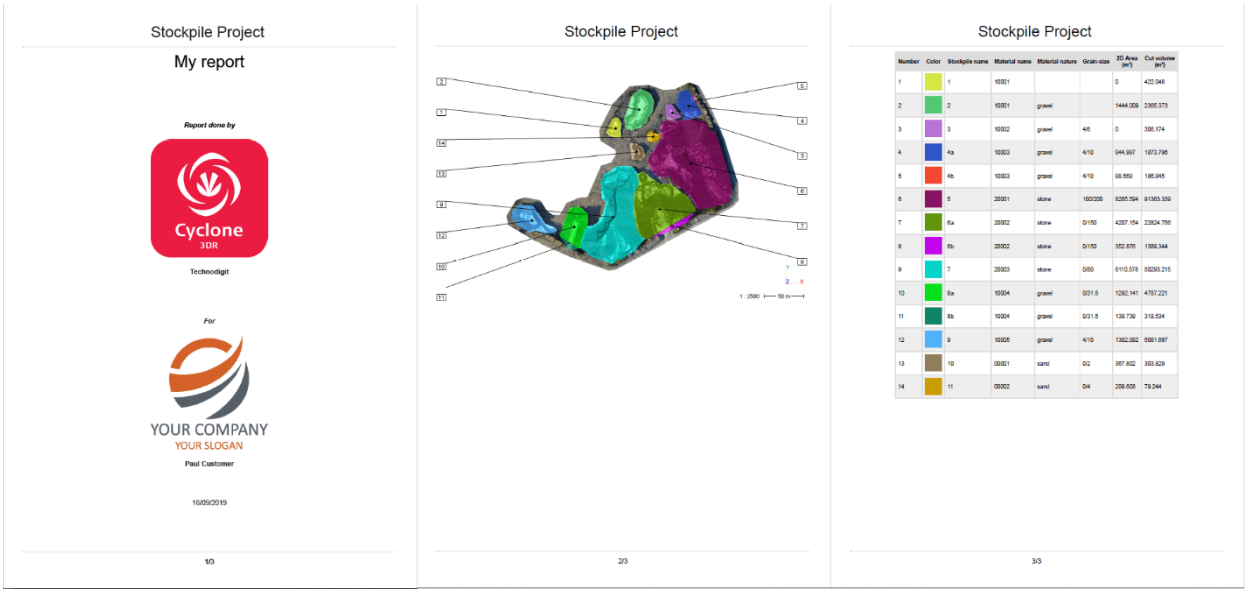
1. Create the project and define its characteristics
2. Draw or use a polyline to define the base contour line of each stockpile



3. Define the reference plane to compute the volume
4. Add labels



5. Generate a report

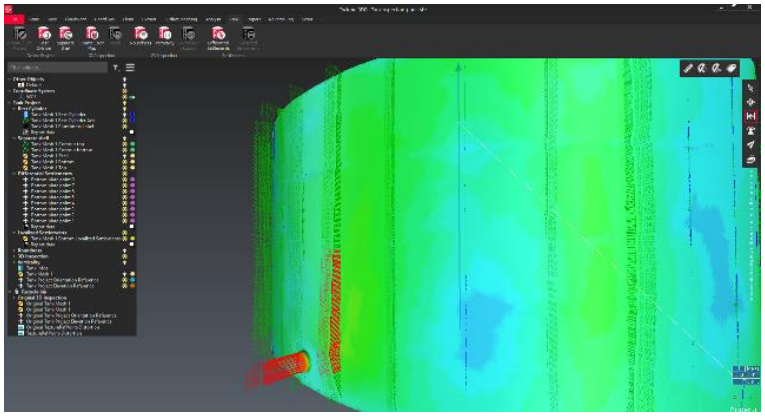


Tank inspection workflow

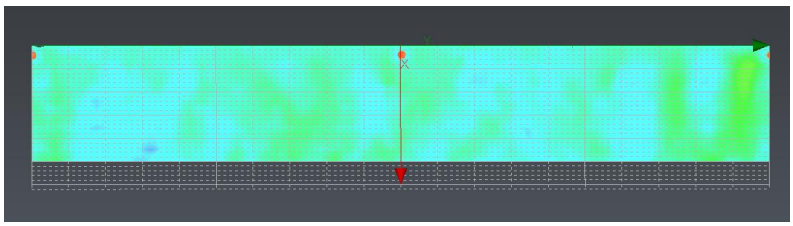
3DReshaper's popular tank inspection workflow remains the core of the Tank Option of Cyclone 3DR. Cyclone 3DR guides users through the inspection process to check for roundness, plumbness and verticality as well as settlement computation.

Tank tolerances are automatically calculated and reported in accordance with API 650/653 standards or users may alter the tolerances to suit project needs. Reports can be delivered graphically or as CSV tables for evaluation in third-party software.

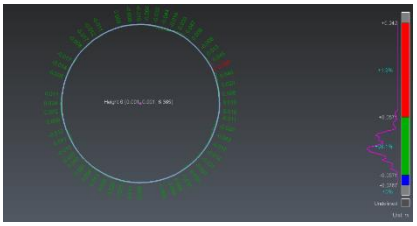
1. Create the project and define its characteristics
2. Compute the best cylinder
3. Separate the shell
4. Compute the inspection with a colour map



5. Unroll the colour map to show a 2D inspection



6. Check the roundness and verticality



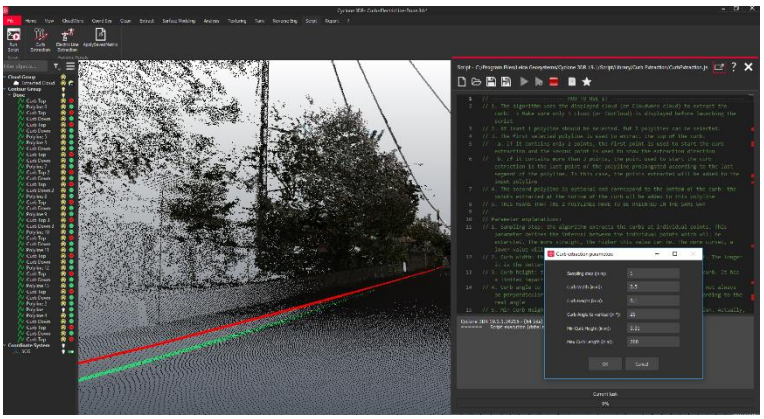
7. Measure differential settlement and localised settlement
8. Generate a report

Advanced customisation through a rich scripting engine

Cyclone 3DR allows users to build upon its already rich toolset with a robust scripting engine. This python-based engine comes pre-loaded with two useful scripts to simplify and automate common tasks: curb extraction and electrical line extraction.

Users can write additional scripts to help speed their routine processes and automate repetitive tasks.

Scripting is available to all users in the Cyclone 3DR Standard license.

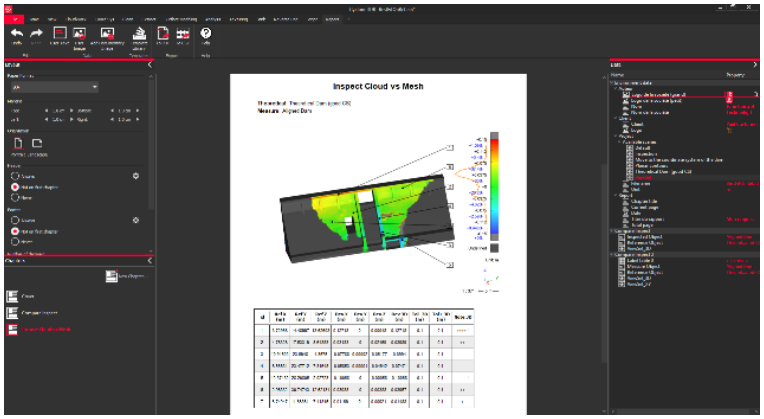


Customisable reporting

Cyclone 3DR leverages the best-in-class reporting engine from 3DReshaper to help both new and experienced users create complete, professional deliverables for clients.

The report editor provides users maximum flexibility to create a report template that presents project information as they see fit.

Reports can be created from scratch or modified from a default template by adding headers, tables, images, text, data from labels and more. The report can then be exported as a 2D or 3D PDF and the tables can be exported as CSV files for final delivery.



All reporting operations are available to all users in the Cyclone 3DR Standard license.

Robust QA operations

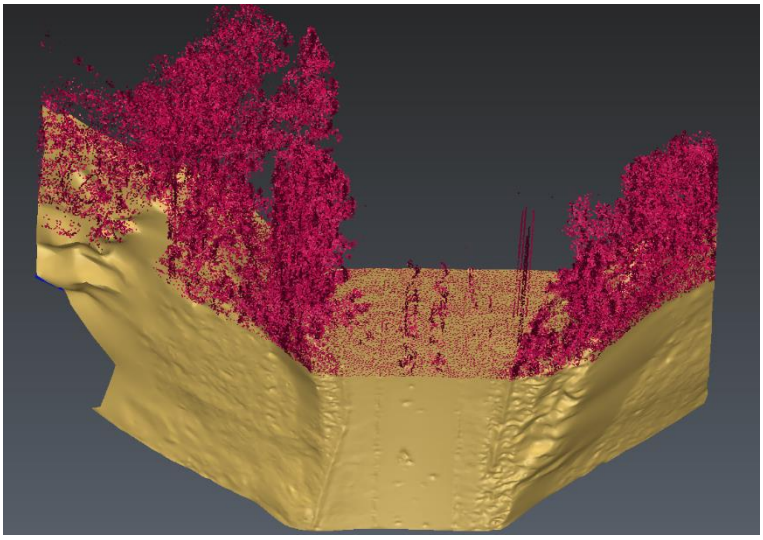
Cyclone 3DR has QA at the heart of the product. Where applicable, tools include reporting to industry standards and most tools also include customisable colour mapping to user-defined tolerances to enable quick, visual QA on the fly.

Ground extraction

The Ground Extractor tool in Cyclone 3DR is the fastest way to get a Digital Terrain Model directly from a point cloud. The tool automatically processes the point cloud to create a clean and accurate mesh of the terrain with only a few parameters:

- Maximum slope of the terrain
- Direction

Once extracted, ground meshes can be coloured by elevation for easy visualisation.



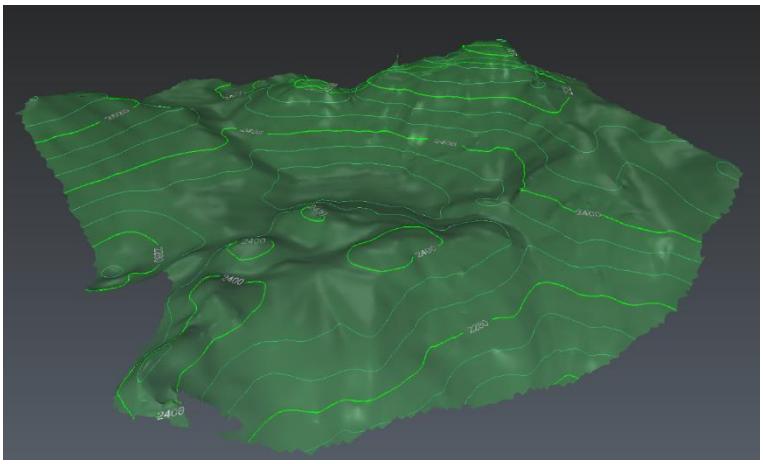
Ground extraction is available in the Survey Option.

Contour extraction

Once extracted, ground meshes can be used to compute contour lines for inclusion in reports or export as a DXF file for use in third-party software.

Contour extraction is automatic and based on only a few user-defined parameters:

- Contour lines interval and range definitions
- Contour line and major lines display specifications



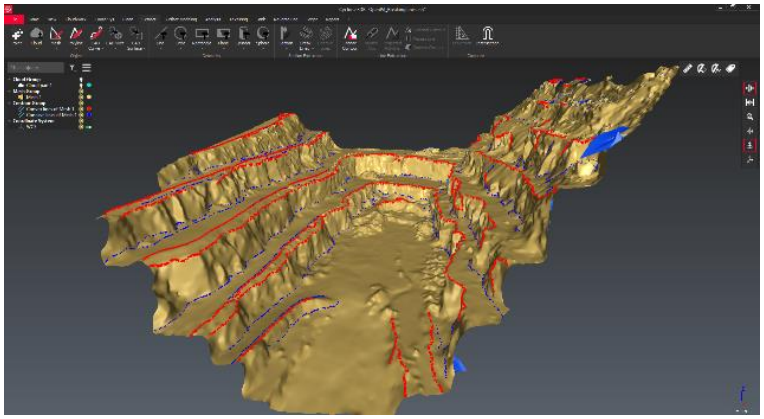
Contour extraction is available in the Survey Option.

Break Line extraction

Extract streets, sidewalks or other items from a mesh in bulk using the Extract Break Lines tool in Cyclone 3DR. Automatically find the edges of contours (both convex and concave), adjust the extraction sensitivity, trim, extend and chain or edit your contours to precisely dial in the results you want.

Extract individual lines which follow the mesh curvature between user-clicked points, using the Feature Line command.

Note that the break lines can also be extracted from the iso gradient lines on the slope analysis inspected mesh.



Break line extraction is available in the Survey Option.

Image management

Cyclone 3DR supports an all-new image management workflow designed to handle datasets with embedded images from terrestrial laser scanners, imaging scanners, MultiStations or UAVs.

The image management workflow is available in the Survey Option.

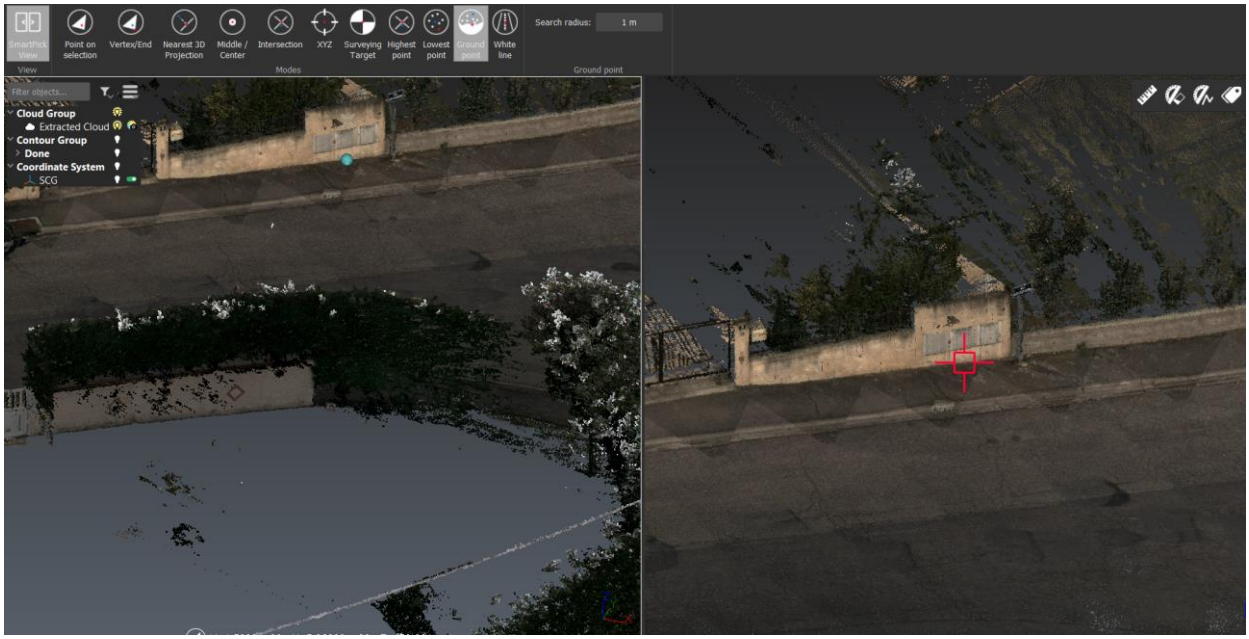
- Import and display images as objects in the scene
- Automatically texture the mesh from E57, XML, Pix4d project, ortho-image or use reference points to manually map and apply the images as a texture
- Export the textured mesh in OBJ or VRML

Note that you can convert a coloured mesh into a textured one if, for example, you need to export your heatmap.

Smart Picks

New smart pick options assist users in selecting precise points of interest by analysing the user-pick and returning the point that best matches the setting. Smart picks allow for easy extraction of the highest point, lowest point, ground points, or white lines thanks to an interactive multi-view interface.

Smart picks are available to all users in the Cyclone 3DR Standard license.



Virtual Visits: fly though animations

Cyclone 3DR supports the creation of camera paths to create and export ready-to-use videos.

Fly through animations are available to all users in the Cyclone 3DR Standard license.

Leica Cyclone 3DR 19.1 Compatibility

- Cyclone 3DR is compatible with JetStream Enterprise 1.3 and higher.
- Cyclone 3DR is compatible with LGS files.
- 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

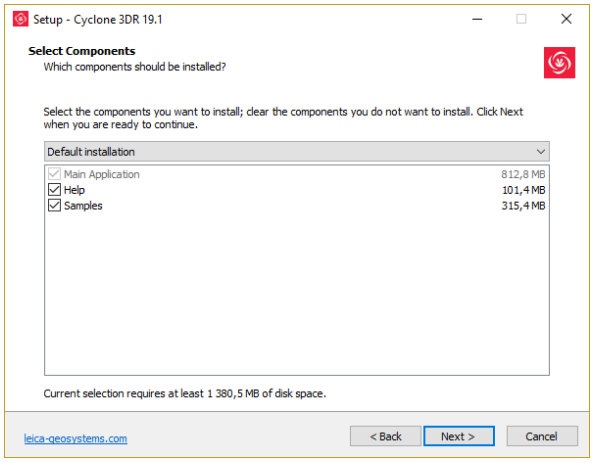
- CPU: 2 GHz Dual Quad Core i7 or higher (i5 minimum)
- RAM: minimum 16 GB or more for 64-bit OS
- Graphic Card: NVidia Quadro or GeForce 1 GB (with OpenGL support, versions 4.3 or higher)
- Operating system: Microsoft Windows 7, 8, 10 (64 bits supported)
- Hard Disk: 3 GB free disk space

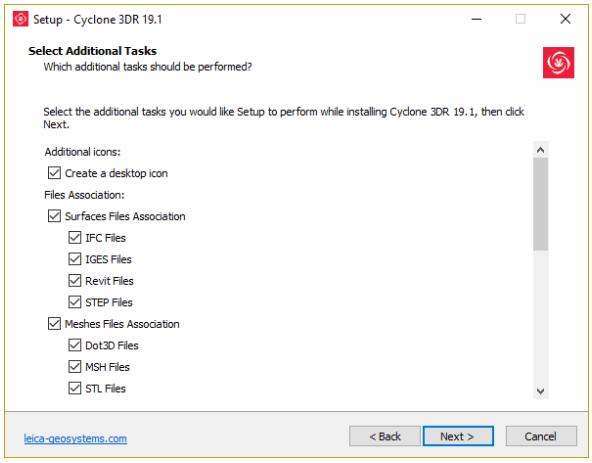
Installation and Licensing Recommendations

Installation Setup

1. Follow the directions in the Setup Wizard

2. Select the components and the additional options you wish to install

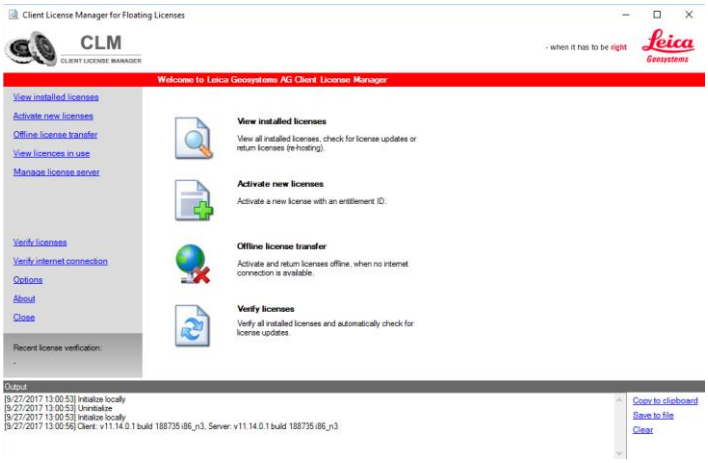




3. Complete the installation by selecting “Finish”.

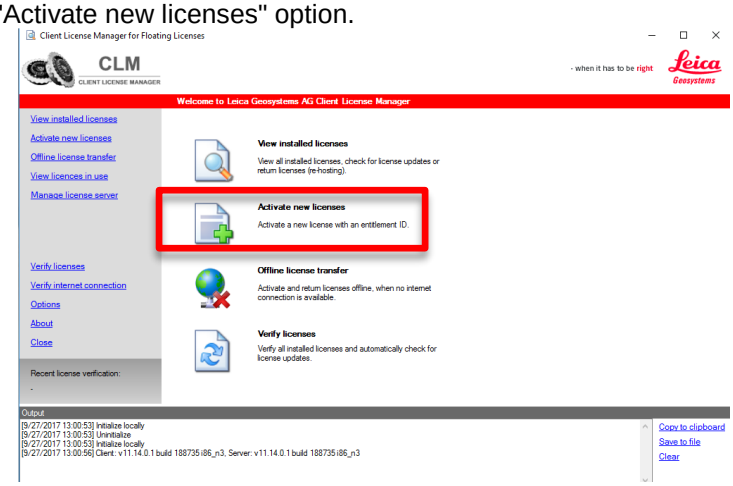
Licensing Setup

1. Once you have installed Cyclone 3DR, open the Client License Manager for **Floating** Licenses. The program is located here: **Start Menu | All Programs | Leica Geosystems | Client License Manager**

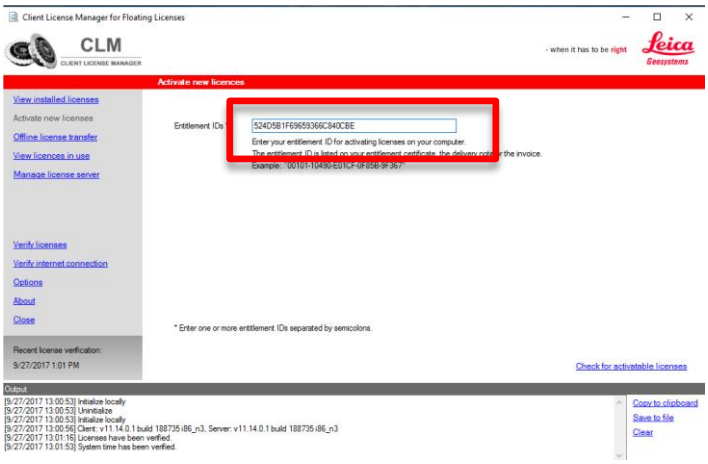


NOTE *Be sure to choose the CLM* ***Floating*** *option (there are two CLM options and the Nodelocked CLM* ***will not*** *activate your license)*

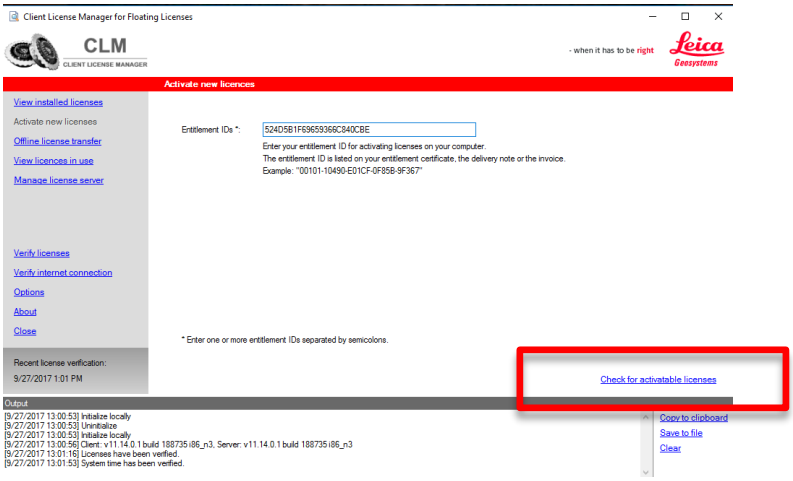
2. Choose the "Activate new licenses" option.



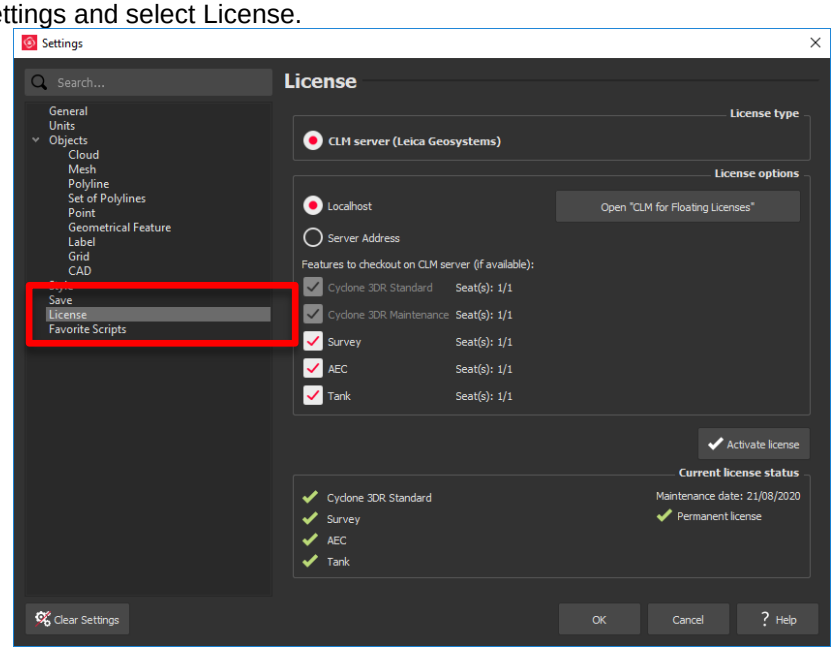
3. Enter your Entitlement ID (EID) in the field. To enter multiple EIDs separate them with a semicolon ";" and no space.



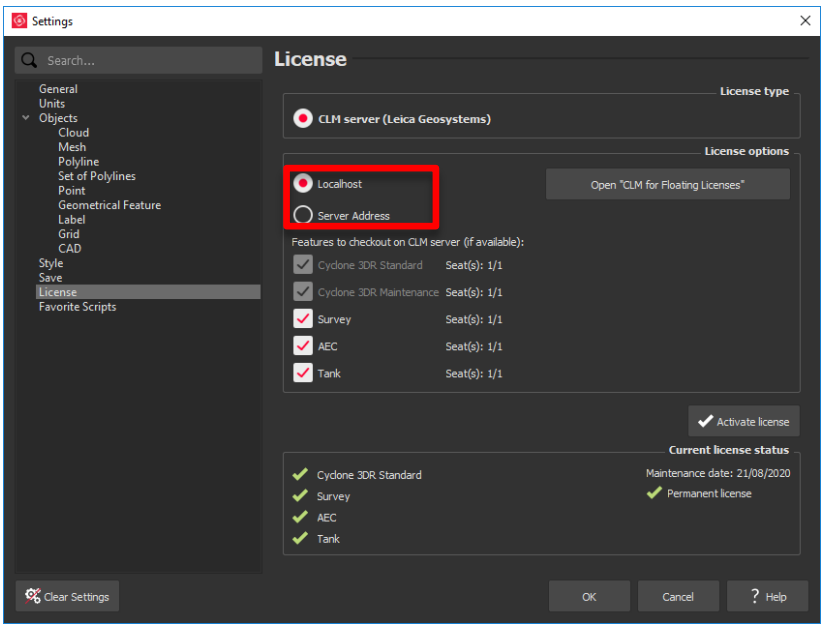
4. After you have entered your EID, choose the "Check for Activatable licenses" button in the bottom right of the page



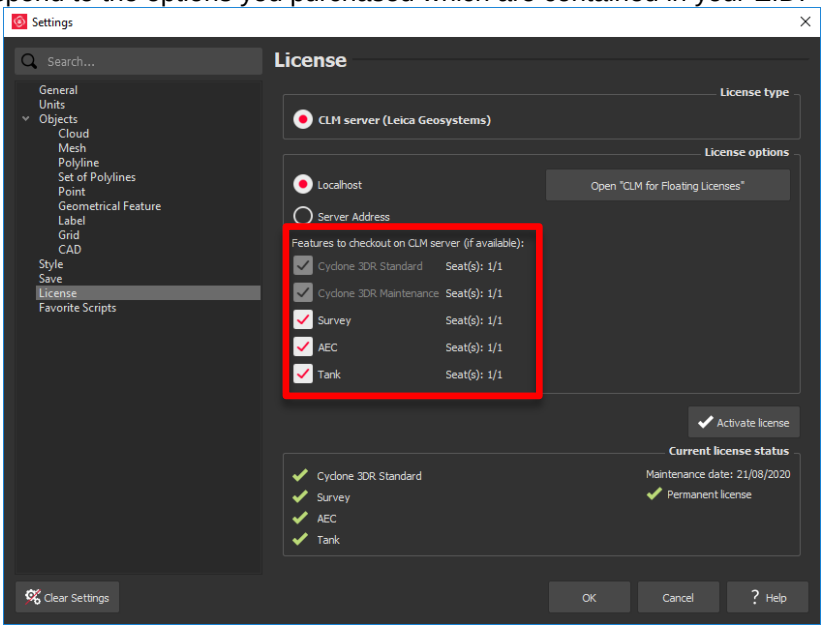
5. Once your licenses are activated you can launch Cyclone 3DR.
6. Go to Settings and select License.



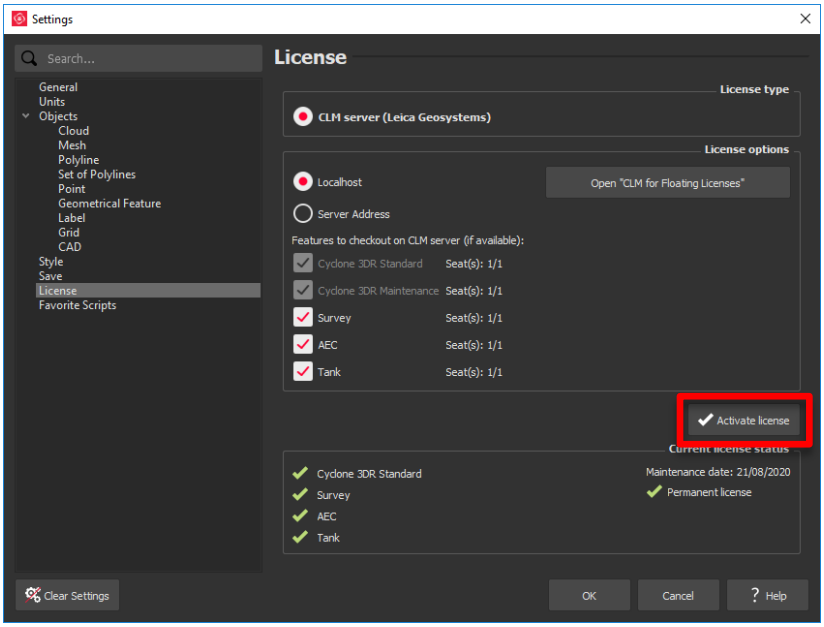
7. If you have entered the EID inside your local CLM, select **Localhost**. If the license is on a dedicated server, enter the server name in **Server Address**.



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**.



Known Issues

For the initial release of Cyclone 3DR, certain 3DReshaper features are not yet enabled. These features will be added to Cyclone 3DR in future releases. Cyclone 3DR will reach core feature parity with 3DReshaper. The following differences exist:

- The application is fully translated to English and French only. Other languages to follow:
  - German
  - Spanish
  - Italian
  - Portuguese
  - Russian
  - Chinese
  - Japanese
- The Documentation Center is only available in English.
- Creating a mesh between two contours is not available at initial release.
- Stretching, extending or shortening a polyline is not available at initial release.
- Adjusting textures or texturing with a material is not available at initial release.
- Functionalities related to cones (drawing a cone, creating a best cone, etc.) are not available at initial release.
- The functionality for separating a mesh by colour is not available at initial release. A workaround exists:
  - Using the contours created by the Localize Values command, cut the mesh along these contours.
- Several functions for fine tuning CAD curves and surfaces are not available at initial release.
- When in Cyclone 3DR navigation mode in Estimate Poste, it is impossible to click on the selection mode tool to click points on the picture. A workaround exists:
  - Use the selection shortcut (S) to click on the image.
- 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.
- .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

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) 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) VRML files (*.wrl / *.vrml / *.iv) OFF files (*.off) PLY (*.ply)	Ascii and binary STL format (*.stl) Binary PBI format (*.pbi) DXF 3Dface format (*.dxf) Ascii POLY format (*.poly) Vertices only (*.asc) DXF polyline (*.dxf) STEP file (*.stp) Ascii Leica format (*.msh) VRML 2 (*.wrl / *.vml / *.iv) PLY (*.ply) LandXML (*.xml) OBJ format (*.obj)
Contour / Section	IGES format DXF polyline format	IGES format DXF polyline format

	Binary MLI format (*.mli)	Binary MLI format (*.mli) ASCII formats
CAD Model	IGES STEP DWG	IGES STEP IFC Revit (*.rvt)
Project	Cyclone 3DR (*.3dr) DXF - DWG XML Cyclone ModelSpace View (from IMP) JetStream Enterprise project	Cyclone 3DR (*.3dr) DXF PDF 3D SKETCHFAB
Image	BMP JPEG JPG PNG	Ortho-image including georeferencing information as TXT file JPG JPEG BMP PNG TIF GIF