What's new in RECONSTRUCTOR® 4.0

KEY FEATURES

• **NEW MODULARIZATION and USER INTERFACE to organize your tools and build your software**
  Reconstructor® 4.0 and its add-ons are organized in a completely new user interface that provides a more direct access to the software tools.

• **NEW RENDERING ENGINE for a new way to display your 3D models**
  Reconstructor® 4.0 provides a completely new and more efficient rendering for clouds and meshes ([watch video](#)). The new rendering gives a completely different experience in terms of 3D visualization. Reconstructor® 4.0 makes more efficient use of your PC graphics resources, letting to handle the point clouds up to 200% larger than before.

• **FASTER and MORE EFFICIENT DATA IMPORT and PROCESSING**
  The required time for scan importing and filtering phases is more than 2 times faster respect to previous software release.

• **LINEUP to automatically register your CAD and BIM models**
  LineUp®, the well-known and appreciated technology for scans registration, is now fully included in Reconstructor® 4.0. The automatic target-less registration supports now also CAD/BIM and mesh models ([watch video](#)).

• **X-RAY ORTHOPHOTOS for easy measuring and drawing**
  A completely new way to extract orthophotos and blueprints enhancing the important feature of a 3D object. Share your X-Ray with the innovative [GoBluprint free tool](#).

Let's now discovering in detail all the new features covering the entire workflow: filtering, vegetation removal, meshing, coloring, up to the integration with the Gexcel HERON® iMMS.

NEW MODULARIZATION to build your software

• **Add-on policy**: Reconstructor® 4.0 is now organized following a new add-on policy.
  Reconstructor® includes all the functionalities to import, process, automatically align, and measure 3D point clouds. In a very easy way, it is possible to add the MINING add-on (for mining and terrains applications), the COLOR add-on (to integrate 3D models with external images) or the HERON add-on (to integrate the HERON® data).
  During the trial period all the add-ons can be tested to verify what commands are more suitable for your work.
NEW USER INTERFACE to organize your tools

- **Top toolbar**: Reconstructor® 4.0 and its add-ons are organized in a completely new user interface that provides more direct access to the software tools. Besides a top menu, with all the software commands organized in 8 main areas, the most used commands are organized in a top toolbar that guides the user along the main processing steps from scans registration (LineUp®) to the final model analysis (Analyze).
- **Dashboard**: a Dashboard command supports the user to find the location and the meaning of all the commands and shows the commands' short cuts when available.
- **Custom toolbar**: expert users can customize the top toolbar choosing their most frequently used commands and create a new toolbar with a desired workflow.
- **Larger visualization space**: command toolbars, log window, and recipes window are organized to optimize the 3D navigation space.

NEW RENDERING ENGINE to display your 3D models

- **Reconstructor® 4.0** provides a completely new and more efficient rendering for clouds and meshes ([watch video](#)). The new rendering gives a completely different experience in terms of 3D visualization. Reconstructor® 4.0 makes more efficient use of your PC graphics resources, letting to handle the point clouds up to 200% larger than before.
- **New light setting** allows the user to better render clouds and meshes.
- **Shaders options** provide new ways to display 3D point clouds both for indoor and outdoor mapping.

NEW INTERACTION WITH 3D OBJECTS to play with your models

All the objects (clouds, meshes, points, planes, sections) can be selected from the 3D window and the user can interact with them:

- Double click LMB to select an object in 3D and automatically in item menu.
- Ctrl + Double Click LMB to add a new project item in the 3D object selection.
- Double Click RMB to access the contextual menu and apply commands directly to a selected object.

The described interactions are perfectly designed to use the new primitive tool ([go to MESH AND SHAPES paragraph](#)).

NEW SUPPORT TOOLS to quickly become an expert of Reconstructor®

- All the software details are now available on the online help.
- Reconstructor® 4.0 automatically checks new updates when available.
- In case of unexpected problems during the software use, a log file is automatically saved and it can be sent to the Gexcel Support Team for deeper analysis.
- A dedicated tool automatically checks the user hardware providing important information about the performances of the user's PC.

NEW PROJECT STRUCTURE to organize your results

- The project of Reconstructor® 4.0 has a new structure that allows to organize inputs data and results in a more efficient way:
• Imported point clouds, meshes or BIM/CAD models are automatically stored in *Point Cloud* and *Triangle Meshes* folders respectively.

• *Geometric shape* folder organizes points, lines and primitives generated with the new Mesh and Shapes tools (go to MESH AND SHAPES paragraph).

• *Survey tools* group all the items to measure, investigate, and annotate 3D objects in a Reconstructor® project.

• In the *Results* folder, orthophotos and cross sections are stored and visible in the project.

• The project structure and all its contents are accessible also with the new Reconstructor Viewer (go to RECONSTRUCTOR VIEWER paragraph) to deliver results to final users.

• The *project window* offers new comprehensive tools to load/un-load items and search them.

• A new locking mechanism prevents the user to open the same project contemporary.

**NEW PROPERTY BROWSER to search and know your data**

• Connected to the improved project window, the property browser offers new advanced tools to interact, edit and analyze the project items.

• *Point cloud histogram* includes manual and automatic cut-off and the possibility to recover shadow effects.

• A comprehensive information window provides complete information about the project items (point cloud statistics, fitting reports, etc.).

• The position of the project items can be easily and accurately changed thanks to the improved adjust pose tool.

• Each project item can be hyperlinked to an external document or to internal items.

**DATA IMPORT & EXPORT in a multi sensor platform**

• Reconstructor® 4.0 maintains, improves and enlarges the capability to read native scanners raw formats and standard open formats.

• FARO® data importing is now much faster, includes the point cloud colorization and the full panorama image generation.

• *.las and *.laz formats are supported both in import and export, including main classification layers.

• *.e57 format is supported both for scan data (gridded point clouds) and unstructured point clouds (full 3D).

• Direct export to ReCap® software is now much easier: the Gexcel ReCAP plug-in is provided inside the software installation.

• A dedicated function allows to import a large number of CAD/BIM/mesh, including interchange CAD format (*.ifc) and mesh models.

**ADVANCED FILTERING TOOLS to clean your clouds from noise and vegetation**

• The pre-processing phase, that starts at the data import, is now much faster and efficient.

• The normal computation, fundamental steps for clouds registration, meshing and compatibility with third parties software (i.e. EdgeWise), provides new algorithms to properly estimate normal directions from any type of point cloud. It is now possible to visually verify the normal direction and invert it, if necessary.

• The vegetation removal is now faster thanks to the improved point curvature filter and the color mapping tool.
- A new robust and parameterized noise filter is available. It is very efficient for cleaning lidar mobile data.
- The creation of a single point cloud with a user defined resolution, merging together several point clouds, is now faster with the improved "Level 3D density" tools.

LINEUP AUTOMATIC REGISTRATION for all your models

- LineUp®, the well-known and appreciated technology for scans registration, is now fully included in Reconstructor® 4.0.
- The automatic pre-registration supports now also CAD/BIM and mesh models (watch video). It is possible to automatically pre-register a mesh or a CAD/BIM model with a point cloud. After the pre-registration, a cloud fine registration or a manual refinement is possible.
- The point cloud automatic registration works also scans constrained origins. If the scan position is known in topographic coordinates with related confidence, these information can be used during the registration. Point clouds is registered and geo-referenced in one step.
- Pre-registration of large areas (such as open pit mines or stock piles) is now more robust and fast thanks to the new internal parameterization.
- The LineUp® settings are enhanced and accessible through a dedicated setting command with the possibility to keep the setting persistent.
- Specific parameters for the cloud to cloud fine registration (ICP) are improved to provide more accurate translational constraints.
- Improved bundle adjustment window with the possibility to set the ICP parameters.
- The targets associated to a point cloud are now child of the related point cloud. Selecting a target, it is possible to zoom to its position and check its correctness.
- The target registration with sphere has been improved to remove false positives in complex environments.
- The point list registration between multiple point cloud targets and an external list of geo-referenced points is now much faster than in the past, with the possibility to match long unpaired lists.
- The UCS creation is now extremely easy and versatile. A dedicated recipe window provides different methods to create a new UCS (i.e. UCS by fitting a horizontal surface and a vertical one).

MESH AND SHAPES to create, interact, intersect and measure mesh models

- The primitives (planes, cones, cylinders, spheres) can be created by a robust fitting algorithms. An accurate fitting reports is also provided.
- The plane creation to support cross sections and volume calculation is now faster and more efficient thanks to a dedicated recipe window.
- An interactive recipe window allows to constraint 3D draw polylines or 2D polylines on a reference plane.
- The minimum distance between fitting primitives can be quickly calculated; bridge clearance, building heights, poles/pillars inter-distances, tank diameters can be easily extracted.
- Fitting primitives can be intersected providing precise polylines.
- Point picking and point collection are now supported by a dedicate window. Collected points can be used to fit primitives, draw polylines or convert points to targets.
PHOTO & COLOR to integrate images and LiDAR

- The dedicated tool for cameras calibration (perspective, spherical) has been simplified in terms of parameters setting and results delivery.
- The calibration points can be picked from any generic 3D point cloud.
- A bubble view can be adopted to calibrate images on 360° gridded scans.
- The mesh models can be used to calibrate images.
- The real-time camera projection applies the image color only in the camera viewing frustum with large benefit during the orthophoto creation.
- The color mapping tool, to add and edit point clouds color layer, is now more efficient when large point clouds are edited.
- A new ambient occlusion color layer is now available; visualization of outdoor large mapped areas can be enhanced with this layer.

ANALYZE, MEASURE and EXPORT TO CAD: increase your production of orthophotos, measures and CAD outputs

- New tools to measure the distance between two selected points or two primitives. The extracted distances are displayed with 3D components according to the current UCS.
- New tool for angle calculation within three points, two segments, one segment, and one plane, or two planes.
- New annotation tool to pick point from 3D data and associate notes and hyperlinks to external documents. The annotation list is exportable in *.csv format.
- New "read out window" to retrieve coordinates and associate information (intensity, inspection or planarity/verticality values) from displayed models and copy these values to any document.
- X-Ray orthophoto tool: a completely new way to extract orthophotos and blueprints enhancing the important features of a 3D object such as edges, corners, walls, etc. The X-Ray orthophotos can be exported in AutoCAD® with a dedicated script or published to the Gexcel GoBlueprint free tool.
- Orthophoto visualization: X-Ray orthophotos and standard orthophotos from point clouds or texture meshes can be displayed with a dedicated tool. The user can extract linear dimensions and areas, export in AutoCAD® with a dedicated script or publish to the Gexcel GoBlueprint free tool.
- X-Ray and standard orthophotos are now items visible in 3D windows together with the extracted linear measures.
- Cross sections are now named according to the altitude from the current UCS; it is easier to choose and export the right isoline.
- The direct connection with ReCAP™ is simpler than before. The Gexcel ReCap plug-in is automatically provided inside the Reconstructor® 4.0 installation file.

NEW FREE RECONSTRUCTOR VIEWER to deliver your projects

Reconstructor® 4.0 project (including point clouds, meshes, measures, orthophotos) can be delivered to final users through the new Reconstructor Viewer.

NEW GOBLUEPRINT TOOL to deliver your orthophotos and blueprints

Orthophotos and X-Ray orthophotos can be managed, visualized and shared with the Gexcel GoBlueprint free tool.
HERON add-on to process, interact, integrate HERON® iMMS acquisitions

- **Dedicated toolbar** to import HERON® data from HERON® Desktop after the data optimization.
- **Blueprint navigator**: the HERON® survey can be displayed overlapping the LiDAR 3D clouds with the spherical images.
- **HERON geo-referencing tools**: dedicated toolbox to geo-reference HERON® data, refining targets or control points that are identified in real-time.
- **Send to HERON Desktop**: specific tool to integrate any 3D point cloud (static scan, UAV, mobile) with HERON® data. HERON® mobile data can constraint or be constrained from point cloud collected with other sensors.
- **Reference map creation**: specific tool to generate a reference map, starting from any 3D point cloud, to use the HERON® system in tracking mode.
- **Direct export to Orbit GT software**: direct function to export HERON® point clouds, trajectories, and synchronized 360° images directly in Orbit GT environment also in the 3D mapping cloud.