

With the latest releases of RiSCAN PRO and RiPROCESS, we may announce not only further useful tools to enhance the capability of *RIEGL's* software suites, but also introduce

RIEGL's Deep Learning Suite

to you. Artificial intelligence methods are now available to support the users with special tools in processing of terrestrial and kinematic data. You will find a corresponding overview on the following pages.

Explore the following tools **available for**

RiSCAN PRO & RiPROCESS

- *RIEGL* Image Anonymizer

RiPROCESS

- AI Airborne LiDAR Point Cloud Classification
- New Export Features for Point Cloud and Image Data
 - Enhanced Export for Tiled Point Cloud Data
 - OrthoImage Wizard

RiSCAN PRO

- Support of Wedge Targets
- New Point Cloud Shader
- LIS GeoTec Plugin Update
- E57 Export Update

If you have any further questions, don't hesitate to contact support@riegl.com

RIEGL Deep Learning Suite

Artificial intelligence methods have also arrived in the geospatial industry in recent years and contribute to the solution of various problems. All the more we are pleased to make these new technologies available to our RiSCAN PRO and RiPROCESS users with the *RIEGL* Deep Learning (DL) Suite.

The first version of this toolbox now includes two tools that were very frequently found on the list of customer requests: Pixelation of faces and license plates in images and base classification of point clouds.

RIEGL Image Anonymizer

Depending on country-specific legislation, the anonymization of image content must be ensured as early as the transfer of data from the service provider to the customer, but at the latest when the data is made publicly accessible. The European General Data Protection Regulation has set a standard worldwide in this area, and it has become apparent that machine learning methods can fulfil the required proportionality between effort and effect for making personal identifiers unrecognizable particularly well.

The Image Anonymization tool of *RIEGL*'s Deep Learning Suite detects faces and license plates in the images of static and mobile scan systems and renders them unrecognizable by different, adjustable methods of pixelation. The pixelation procedure can be triggered by the user at any point in the process chain, for example before coloring the scan data or publishing RiPANO projects.



Key features of the *RIEGL* Image Anonymizer include:

- **Effortless Face Detection:** *RIEGL* Image Anonymizer's deep learning algorithms swiftly identify faces within images.
- **Customizable Blurring Options:** The tool provides full control over the blurring process. Adjust the blur shape style to suit your specific requirements.

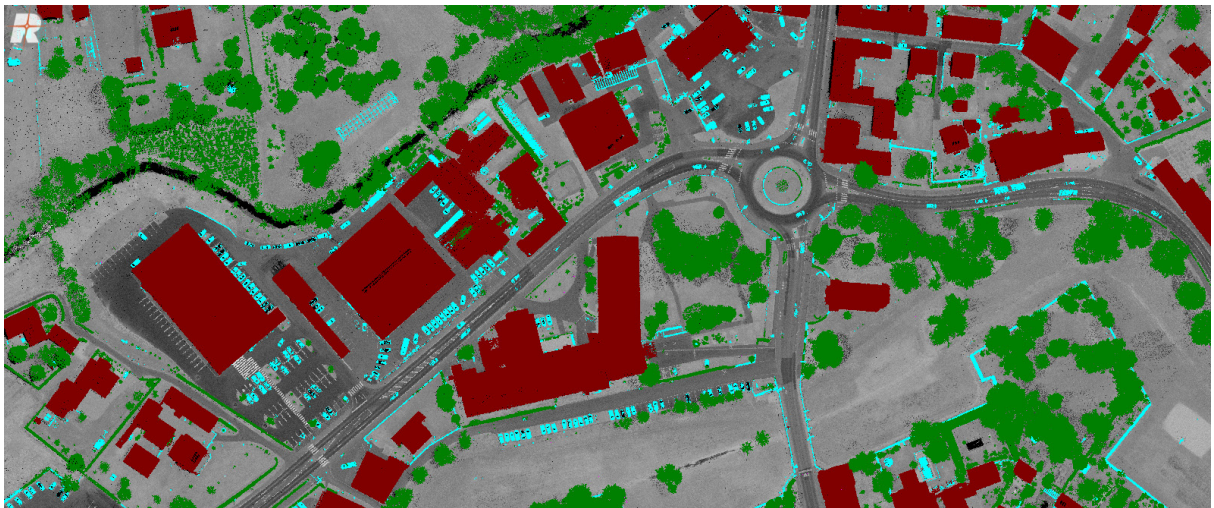
- **Flexible Processing:** Automate the blurring process for multiple images of selected Records or ScanPositions and multiple cameras, saving your time and increase productivity.
- **Secure and Confidential:** Your data privacy is of utmost importance to us. The *RIEGL* Image Anonymizer tool operates locally on your device, ensuring that your sensitive information remains confidential.

The new *RIEGL* Image Anonymizer is available for RiSCAN PRO and RiPROCESS.

New Features in RiPROCESS

AI Airborne LiDAR Point Cloud Classification

This new classification method is a cutting-edge software tool to classify point clouds by advanced artificial intelligence. Leveraging the capabilities of Sparse CNN, Deep Learning LiDAR point cloud classification takes accuracy and performance to unparalleled heights. With Deep Learning LiDAR point cloud classification, you can effortlessly extract valuable insights into ground characteristics, vegetation distribution, and building structures for a variety of applications including urban and regional planning, vegetation mapping, infrastructure development and many more. Make informed decisions and drive your projects forward with confidence.



Key features of the *RIEGL* Deep Learning LiDAR Point Cloud Classification ALS include:

- **Sparse CNN Technology:** Deep Learning LiDAR Point Cloud Classification utilizes Sparse CNN (Convolutional Neural Network) technology, specifically designed for processing large point cloud data. This approach optimizes classification accuracy while significantly reducing computational overhead.

- **CUDA Acceleration:** Deep Learning LiDAR Point Cloud Classification takes full advantage of CUDA enabled graphics cards, unlocking unparalleled performance gains. By leveraging the parallel processing capabilities of CUDA, large LiDAR datasets can be processed swiftly and efficiently.
Note: CUDA enabled graphics cards are required for optimal performance.
- **User-Friendly Interface:** Deep Learning LiDAR Point Cloud Classification features an intuitive and user-friendly interface that simplifies your workflow. With the pretrained model, setting the processing parameters is reduced to a minimum to get you started immediately.

Please note:

The AI Airborne LiDAR Point Cloud Classification tool requires additional licensing.

Please contact your local reseller for further information.

New Export Features for Point Cloud and Image Data

RiPROCESS now comes with support of the new **COPC point cloud** data specification. COPC stands for Cloud Optimized Point Cloud (<https://copc.io/>) and is designed to address the challenges in terms of storage, management and streaming posed by the sheer volume and complexity of point cloud data. By leveraging advanced indexing techniques, COPC introduces the concept of level of detail to standard LAS files for efficient storage and streaming in cloud environments. Quickly retrieve relevant information without the need to process the entire dataset, thus significantly reducing processing time. COPC is an open standard that promotes interoperability across different software platforms and applications, making it easier for developers and users to work with point cloud data seamlessly.

Enhanced Export for Tiled Point Cloud Data: Besides the tiled point cloud files, the RiPROCESS point cloud export wizard now exports the tile boundaries as SHP files. Each tile boundary is attributed with the specified tile identifier, row and column index, boundary min / max coordinates and reference point cloud file name. You can build data catalogues in GIS systems to keep track of data collections and easily find relevant point cloud files in their collections.

OrthoImage Wizard: Extend the usability of your *RIEGL* mobile mapping system's pavement cameras. The new OrthoImage export wizard allows to calculate true orthophotos from a collection of pavement camera image sequences. Referencing the scanned road surface to undistort the images, the software creates highly accurate image products for further analysis of road conditions, like crack detection, road markings analysis and more.

Key features of the *RIEGL* OrthoImage Wizard

- **True orthophoto:** The road surface is reconstructed from LiDAR data for the geometric undistortion of the input images, thus providing the utmost possible accuracy of the resulting orthoimage.
- **Radiometric adjustment:** The OrthoImage tool employs advanced algorithms to ensure accurate radiometric adjustments of the image sequences, resulting in homogeneous

color and exposure consistency across the orthophotos. This feature guarantees superior visual quality and accuracy in image interpretation.

- **Automatic tiling:** Users can effortlessly generate large-scale orthophoto mosaics by automatically dividing them into smaller, manageable tiles. This feature facilitates easy navigation and enhances the overall usability of the data product.
- **Open standards for georeferencing:** With the use of open standards for georeferencing the orthophoto tiles, the image products are compatible with various Geographic Information Systems (GIS) software. It ensures seamless integration into existing workflows and promotes interoperability among different platforms.



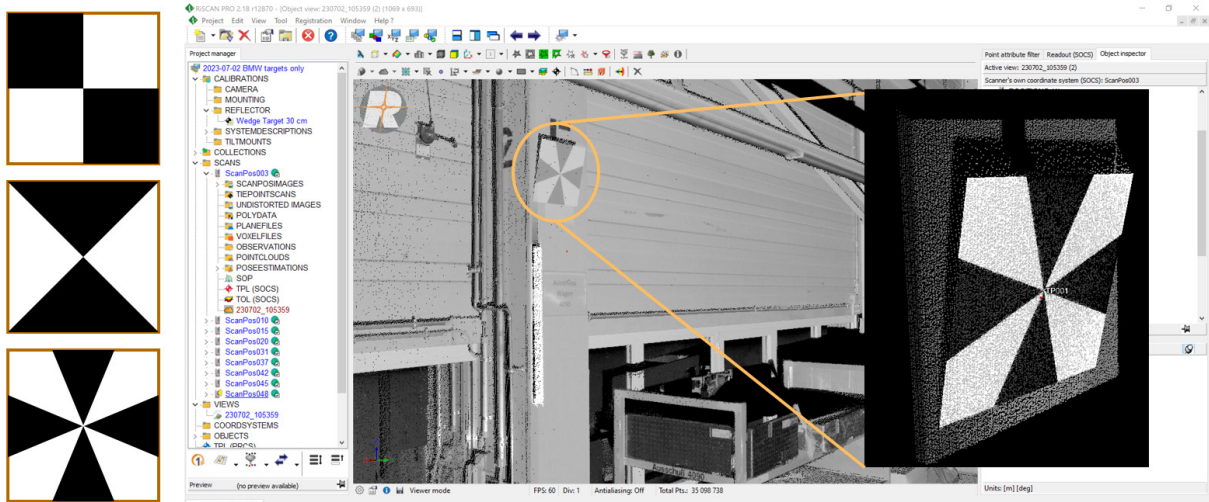
NEW Features in RiSCAN PRO

Support of Wedge Targets

Besides the known retroreflective targets (cylinders, discs), RiSCAN PRO now supports the use of certain rectangular pattern targets:

With pattern type, size, rotation and nominal reflectance of the pattern definition, RiSCAN PRO detects the scanned targets in the point cloud by means of a Deep Learning module.

Having identified a scanned target in the point cloud, the software performs a best fit of the target model to extract the center point coordinates.



New Point Cloud Shader: Introducing a sophisticated shading algorithm that significantly enhances the visual representation of point clouds. By applying advanced rendering techniques, the feature creates a more immersive and realistic visual experience, allowing users to better understand the underlying structures and surfaces within the point cloud.

Key features and benefits of the Point Cloud Shading feature include:

- **Enhanced visual impact:** The shading algorithm adds depth, realism, and immersion to point cloud visualizations, making it easier to interpret and analyze complex datasets.
- **Revealing hidden details:** By intelligently highlighting subtle variations in elevation and curvature, the feature unveils previously unnoticed details within point cloud data.

LIS GeoTec Plugin Update: The updated version of the LIS GeoTec Plugin now comes with an export for the joint plane boundaries. By exporting to 3D SHP files in a user specified target coordinate system, the new feature enhances the interoperability of the geotechnical analysis in RiSCAN PRO with external 3rd party software.

E57 Export Update: The highlights of this software update is the introduction of a panorama image export and support for point normal vectors in the E57 file. With the panorama image export feature, you can now generate high-quality panoramic images from the camera images acquired with the scan data, providing a comprehensive visual representation of the projects. This enables better visualization and analysis, aiding in decision-making processes. Additionally, the newly added support for point normals enhances the usability of the data in 3rd party software. Point normals provide valuable information about the orientation and direction of each point, which is crucial for advanced analysis, modelling, and simulation purposes.