

RiPROCESS

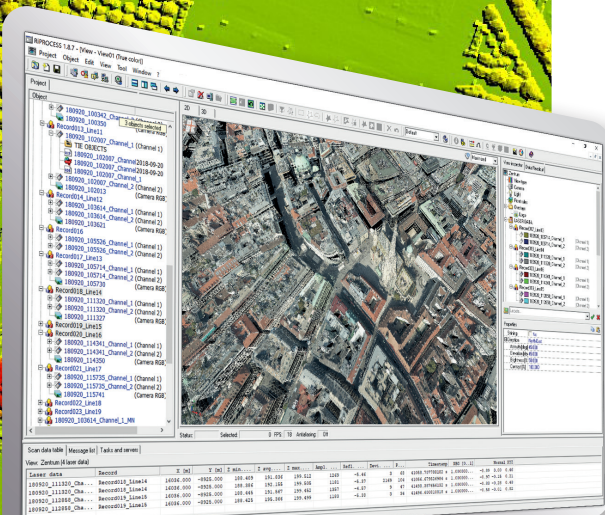
for *RIEGL* Scan Data

- **project-oriented software for managing and processing RIEGL ALS, ULS, and MLS data**
- **operation in a multiple-workstation environment, parallel task processing**
- **fast access to data for inspection in different visualization formats**
- **system calibration and scandata adjustment**
- **statistical analysis of referencing, matching quality**
- **point cloud classification**
- **interfacing to third party software packages**

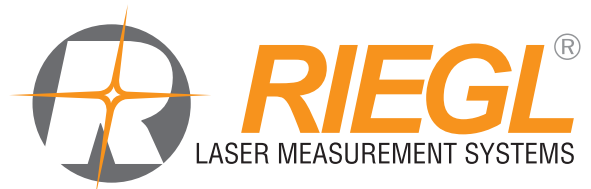
RiPROCESS is designed for managing, processing, analyzing, and visualizing data acquired with airborne laser scanning systems (ALS systems), unmanned laser scanning systems (ULS systems) and mobile laser scanning systems (MLS systems) based on *RIEGL*® Laser Scanners. Data export in geodetic systems is supported by the GeoSysManager.

RiPROCESS is project-oriented and enables the user to manage all data acquired and processed within a single project. This data includes project data, scanning system information such as mounting information and calibration, laser raw data, e.g., the digitized echo signals from the *RIEGL* Laser Scanners, camera data, position and orientation data from the IMU/GNSS system, and georeferenced point clouds with additional attributes for every measured point.

Data processing tasks include, e.g., full waveform analysis and georeferencing laser data by merging it with the trajectory derived from the IMU/GNSS system. These functions are provided by the *RIEGL* Software RIUNITE and GeoSysManager, respectively. RiPROCESS is intended for mass data production in a multiple-workstation environment. RiPROCESS makes use of these programs, which can be installed on different workstations and are accessed via RiSERVER.



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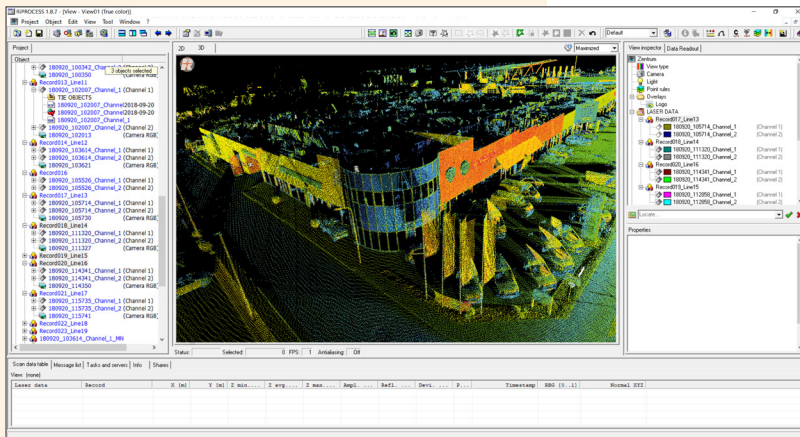


Fig. 1 Mobile laser scan data

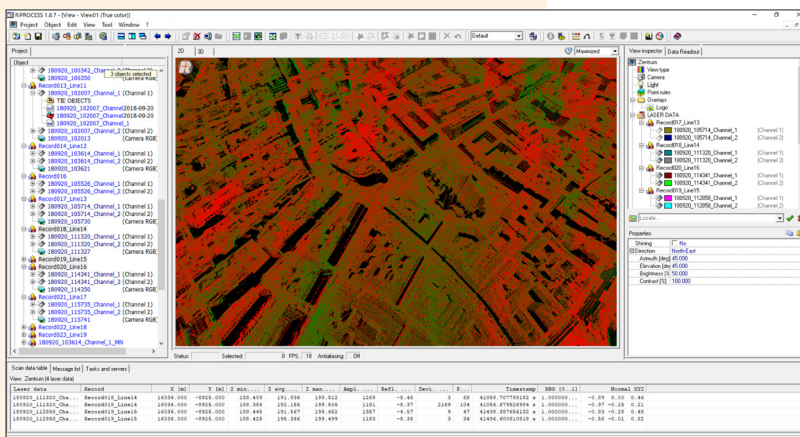


Fig. 2 Airborne laser scan data

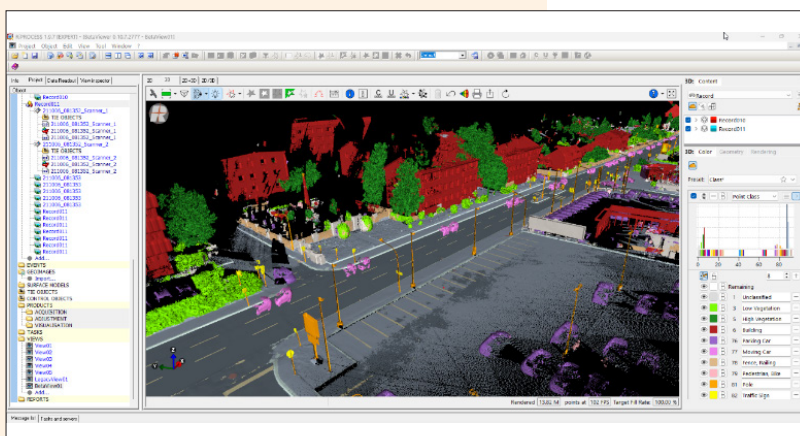


Fig. 3 Mobile laser scan data classified by deep learning classifier

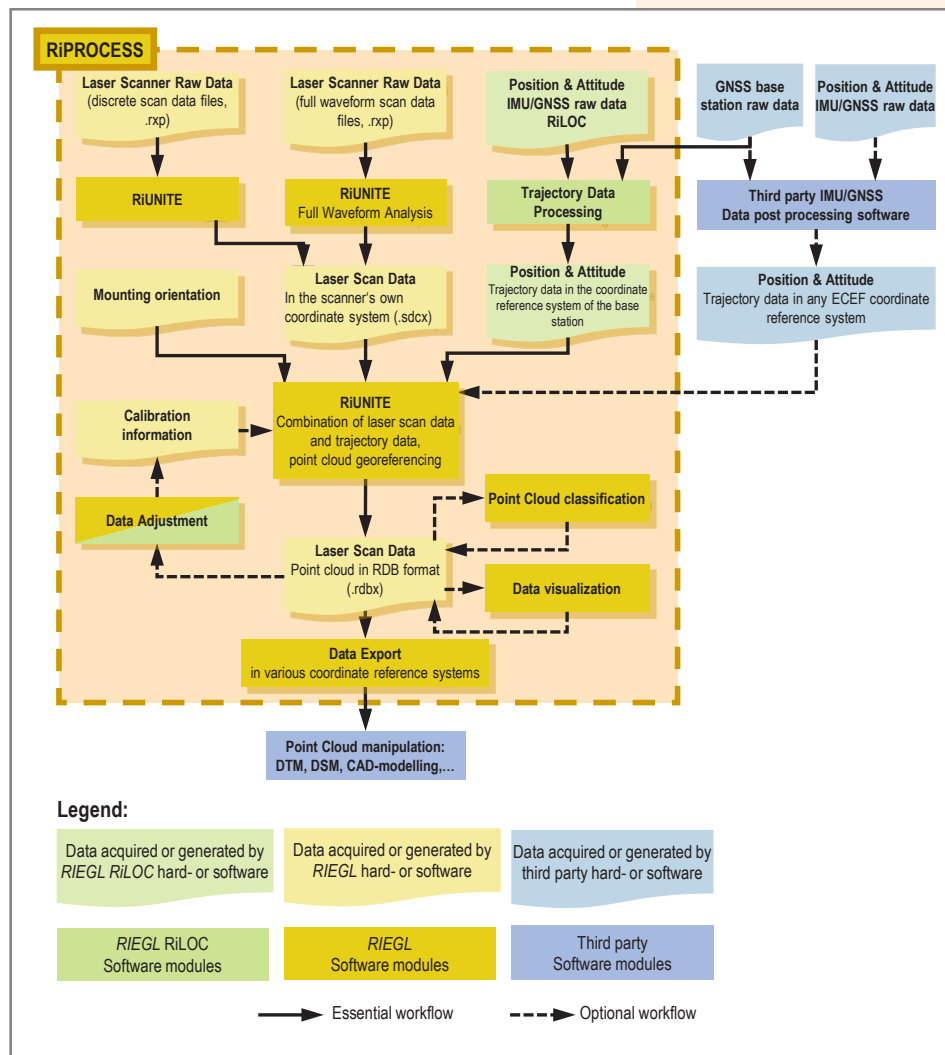
RiPROCESS distributes the computational load to the available server-enabled processing tools in the form of individual tasks thus optimizing data throughput.

For data quality analysis laser scans can be visualized in 2D and 3D in various ways, e.g., in true color, in color-encoded height, height differences, in point density, and many more. Even huge amounts of data can quickly be accessed for display in 3D. Quality of scan data matching can be assessed in different ways, by visual inspection or by statistical analysis.

In order to improve data quality, RiPROCESS offers an integrated scan data adjustment feature based on matching data acquired on planar objects, e.g., roofs of buildings. Data acquired on planar objects is automatically detected within the scan data and displayed for inspection in 2D and 3D. Parameters optimized within the scan data adjustment include system calibration information, and up to 6 offsets (angular and translational) for each single scan. Terrestrially surveyed control points or planar control objects can also be used to additionally improve absolute georeferencing of the data set.

RiPROCESS allows data export in the widely-used LAS format (amongst others) to execute common tasks such as classification, triangulation and decimation by third-party software packages. The included GeoSysManager offers a powerful tool for exporting the geo-referenced point cloud in Cartesian ECEF, geographic and local grid coordinates. An interface to RiSCAN PRO, the accompanying software for RIEGL's terrestrial 3D scanners, allows utilizing further visualization and point cloud manipulation tools.

From manual classification through geometric analysis classifiers to pre-trained deep learning classification tools, RiPROCESS offers a number of classification methods to prepare the data for further analysis. Depending on the classification tool and the dataset (ALS, ULS, MLS), point clouds can be attributed to classes like ground, vegetation, buildings, roads, roadmarkings, cars, poles, catenary wires, gantry, traffic signs and more. The classified point clouds can then be exported to various data formats, e.g LAS for further analysis or processing.



RiPROCESS Key Features

- **Project-oriented managing software for processing of RIEGL airborne and mobile laser scanner data from raw data to point-cloud-based data in Cartesian ECEF or map projection (e.g., UTM) utilizing RiUNITE and GeoSysManager in remote control mode**
- **Fast access to data for visual inspection in a large variety of visualization formats, ranging from color-coded raster data to digitized echo data for every laser measurement (depending on used laser scanner)**
- **System calibration and scan data adjustment based on matching data acquired on flat objects**
- **Automated trajectory processing with tightly-coupled IMU/LiDAR and GNSS positioning for RIEGL RiLOC systems**
- **Statistical analysis of matching quality of scan data; comparison of laser data to surveyed reference objects**
- **Interface to further post-processing tools via LAS and ASCII data exchange**
- **Operation in a multiple-workstation environment enhancing data post-processing throughput by parallel computing**
- **Serves as platform for RiPRECISION MLS/UAV for point cloud adjustment of mobile and UAV-based scan data (optional)**
- **Operates different hydrographic processing tools (optional) for RIEGL's topo-bathymetric laser scanners**

RiPROCESS System Requirements

Operating Systems:

Windows 11

Memory Requirements:

(available for RiPROCESS and RiUNITE,
not used by other programs)

Minimum: 24 GB RAM

Recommended: 64 GB RAM or more

(This includes memory requirements for RiUNITE.)

CPU Requirements:

Minimum:

modern multi-core processor with high single-core performance,
Intel Haswell or AMD Excavator microarchitectures or newer.

Recommended:

Intel Core i processors with

- high Core Base Frequency and a high Max Turbo Frequency,
- high number of Performance Cores.

CPU models with the KS suffix usually meet the above requirements,
e.g., the Intel Core i9 14900KS.

Disk Requirements:

approx. 1 GB of free disk space for the program and plugins
(not including project data)

at least 8 TB recommended for your own projects

optional: Dedicated RAID controller (e.g. RAID 0 mode) and fast
hard disks or solid state drives to speed up file access

Network Interface:

(if processing over network)

Ethernet/LAN

Graphics Requirements:

screen resolution at least 1024 by 768 pixels

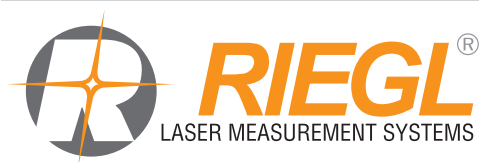
OpenGL accelerated graphics card

(OpenGL 2.0 or higher required)

nVIDIA GeForce series recommended (GeForce series 10 or higher)

Peripherals:

3 button mouse, optical wheel mouse recommended
standard keyboard



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