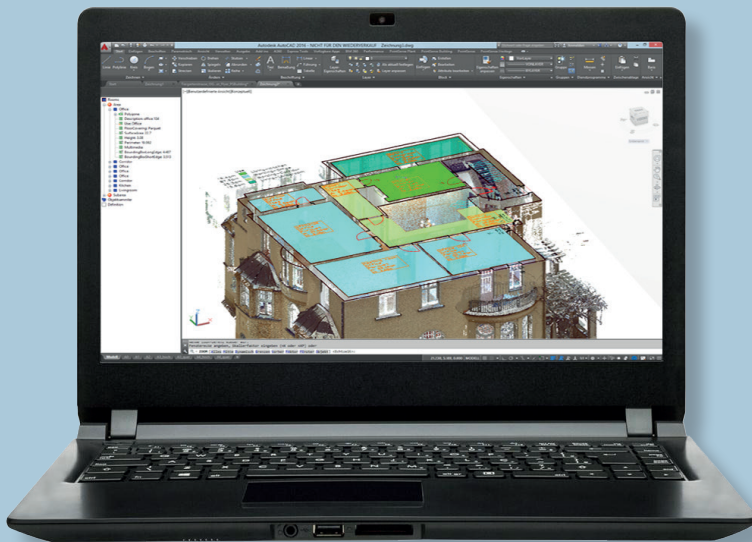# PointSense Building

From 3D laser scanner data to 2D plans

FARO

Areas of application
PointSense Building is used in situations when 2D plans must be quickly generated from 3D scan data. Common examples include planning within existing structures, capturing existing data for facility management or interior outfitting and special forms of construction such as ship building

Special features
- Fast construction of 2D sections with tools for the automatic fitting of polygons
- Special drawing and dimensioning commands for building elements such as windows, doors, stairs , profiles etc...
- Covenient database region management
- Computation of ortho images from the point cloud

Classical features
- Efficient point cloud management: Isolation, masking and naming of point cloud regions
- Snap planes, corners or edges directly in the point clouds with the SmartSnap function
- Intuitive navigation in the planar view

Floor plans and sections from 3D laser scanner data
PointSense Building is the industry specific solution for fast and efficient processing of 3D laser scan data of existing architecture. The resulting floor plans, sections and elevations are produced directly in AutoCAD. PointSense Building offers numerous tools for the management of point cloud data and for the efficient drawing of well designed plans.

Drawing 2D plans from 3D scanner data
A powerful section manager divides point clouds into processing relevant sub-regions in the form of polygon-shaped or thin-like slices. The sections can be hidden and displayed, joined, inverted or also individually exported. Slices are especially suited for generating floor plans and elevations at any desired position. Interfering objects such as trees or furniture can be quickly cut out by using polygonal sections.

Automatic drawing of wall, floor, profile runs and ceiling forms
PointSense Building supplements AutoCAD with useful tools to create 2D plans from 3D laser scanner data. With the SmartSnap function planes, corners or edges are directly snapped in a point cloud and the Fit Profile feature fits 3D profiles along a point cloud. Line/polygon fitting tools create wall, floor and ceiling runs efficiently and precisely. Powerful fitting algorithms determine the best

line run in point cloud layers, optionally with forced perpendicularity.

Special commands for building surveying save time
Special commands for doors, windows, stairs, alcoves or pillars speed up the drawing of building plans. For example, minimal clicks for doors are sufficient and the typical building plan type dimensioning is automatically created at the same time.

Trace the CAD plan from the ortho image
PointSense creates ortho images in any direction from the point cloud. These photo like raster images display all objects true to scale and parallel to the projection plane. The ortho image can drawn over with CAD objects and dimensioned or it can itself be used as an image plan. An example of its use can be for facade views.

Structured room schedules
In addition to the CAD drawing, a list of floor areas can be created simultaneously. Room polygons and additional spatial information are managed in a clear and freely adaptable tree structure. At the press of a button the polygons are created, surface areas calculated and the room information blocks created. Visualizations (e.g. different room hatches for each type of room use) are likewise automatically created. The area data can be exported in different ways, e.g. to text tables or directly to databases (for example to a CAFM system).

Technical Requirements

Platform	PointSense Buiding is compatible with AutoCAD and associated products such as Civil 3D, Architecture and Map 3D for versions 2015 and above. Should older Autodesk products be used, please contact your FARO representative.
Operating system	Dependent on the version of AutoCAD being used, 64-bit systems only .
Recommended hardware requirements	Computer: Graphics card as recommended by Autodesk, RAM at least 8 GB, better 32GB and more, processor at least 2.5 GHz, better 3-4 GHz and 4-8 cores, SSD for larger projects; Laser scanner type to suit job in hand.
Data requirements	Registered, that is to say they are oriented to each other.
Supported scan data formats	E57, ASCII, LAS, FARO (LSPROJ, FLS, FWS), Leica (PTZ, PTS, PTX), Zoller&Fröhlich (ZFS, ZFPRJ), Topcon (CL3, CLR) Leica (PTG) and Riegl RiScanPro-Projects (RSP).

Important features

General features
- Point cloud management and clipping
- Definition, editing, colouring and management of slices and regions of point clouds
- SmartSnap, snapping to planes, corners or edges of a point cloud
- Import of various scan data formats

Drawing and construction tools for building plans
- fast and precise determination of wall forms from one or more point cloud slices (for straight and free formed contours) as well as constrained perpendicular walls
- Drawing and annotation/dimensioning of building elements: Doors, windows, stairs, ceiling grids, alcoves

Drawing sections and elevations
- UCS Features: Define a perpendicular or inclined UCS with minimal clicks
- Create ortho images of the point cloud from any viewpoint

General features for drawing plans
- Construction tools: Fillet lines, 2D lines, extend longitudinally or perpendicularly, extend and trim 3D lines, rotate the crosshairs, plumb points onto lines, place measurements on lines, determine tie distances, fitting 3D profiles along a point cloud
- Draw rectangles by clicking on points, e.g. for rectangular pillars
- Draw 2D and 3D arcs and circles through three points, for example for circular columns or wall forms
- Height dimensions: Symbols for absolute and relative heights, subsequently change the datum height, symbols are customizable
- 3D Distance dimensioning
- Construction planes to determine inaccessible corners and edges:
  - Plane fitting to point cloud regions - with constraints
  - Plane fitting with one click, automatic determining of plane boundaries
  - Draw planes by clicking on points

  - Determine intersection points and intersection lines of multiple planes
  - Change boundaries
  - Create a UCS from planes
- Fitting of cylinders and truncated cones

Analysis commands
- Analysis of planes, cylinders and truncated cones
  - Deformation analysis
  - Calculation of (partial) volume
  - Unrolling of the point cloud and profiles
- Deformation analysis of arbitrary surfaces with customizable deviation coloring in 3D

Planar View
- Displaying the scans in a photo like, planar view
- Transfer coordinates from the planar view into the AutoCAD drawing
- Freely defined AutoCAD command macros

Commands for completing plans and adding details
- Plan analysis: Find small gaps, line remnants and double lines
- Flatten the drawing: Reduction of the 3D measured data to a pure 2D plan
- Automatic alignment of walls: rectangular/parallel/aligned
- Helmert transformation for the subsequent alignment of plan segments

Surface data for room schedule management
- Automatic recording of bounding polygons and calculation of the surface data, with the help of intelligent pattern recognition.
- Recording of alpha numeric spatial information in a clear tree structure
- Numerous features for exporting the data in a database suitable format (Excel, ASCII tables, XML, HTML, AutoCAD blocks, CAFM suitable polygon)
- Drawing visualization relevant to the selected object attributes (e.g. different coloured hatching for the rooms dependent on the type of use)