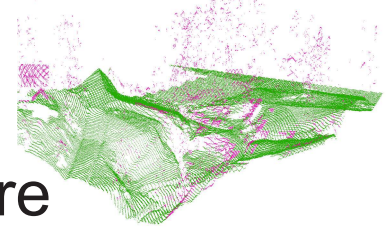


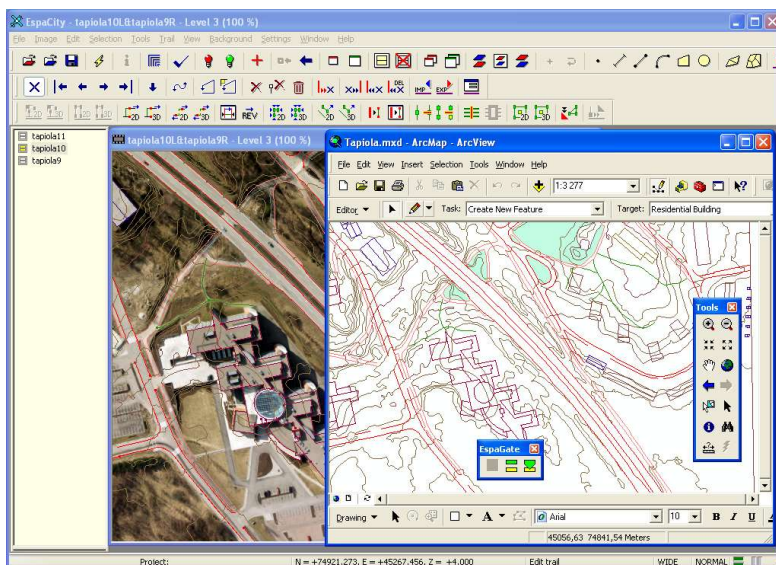
ESPA Systems Photogrammetric & LIDAR Software



ESPA Systems offers you the latest developments in the field of digital aerial photogrammetry and airborne LIDAR data processing. Our products are made of innovative software solutions combined together with modern digital technology. Take a closer look at the key features inside ESPA Systems software and think how your organisation could benefit from this functionality.

ESPA Systems software supports completely digital flow of work

- ESPA Systems software is designed for digital aerial triangulation (EspaBlock, EspaBundle), digital orthophoto production and mosaicking (EspaOrtho), stereoscopic 3-D data acquisition (EspaCity, EspaGate, EspaKernel) and processing of georeferenced airborne LIDAR data (EspaEngine).
- ESPA Systems product concept separates production from use of digital aerial images. The concept opens stereoscopic 3-D data acquisition to ever-increasing group of users. Our EspaGate application ties tightly together 3-D stereoscopic work and spatial data maintenance in the GIS environment.
- ESPA Systems software supports completely digital flow of work, from digital imaging to the stereoscopic viewing with the latest digital viewing technologies.

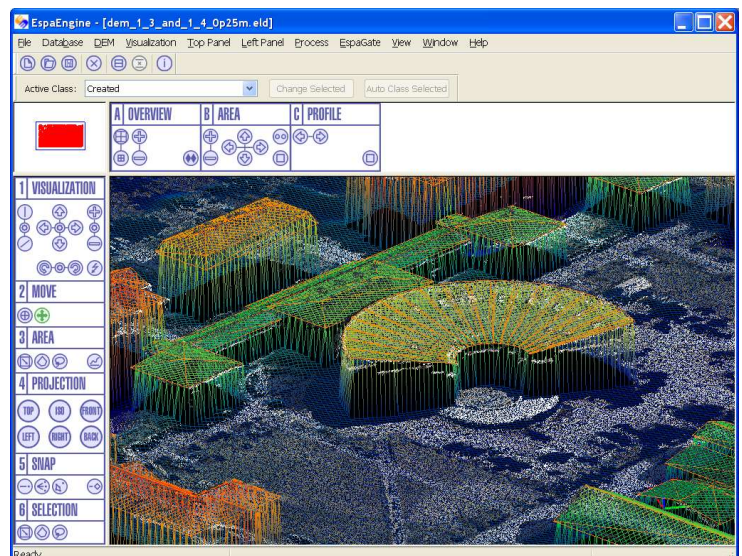


EspaCity for spatial data maintenance

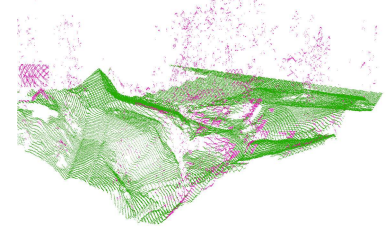
- Use EspaCity for stereoscopic 3-D mapping of spatial objects like buildings, roads and terrain forms from digital aerial imagery.
- Check and maintain the content of your spatial database using EspaCity and EspaGate.
- EspaGate connects EspaCity stereoscopic 3-D data collection directly to your GIS environment.
- EspaGate connection is available for all major GIS products, in addition, you can develop your own EspaGate application using EspaGate API library written with C++.

EspaEngine for airborne LIDAR data

- Manage and process huge georeferenced point data sets i.e. point clouds in EspaEngine.
- Compute large continuous grid elevation models and use this functionality to classify georeferenced point data automatically.
- Check and classify point data stereoscopically on digital aerial images.
- Visualise grid elevation models and point data in free viewing angles with various techniques including wrapping of digital images over elevation model.



Key Features



Recommended computer set-up

- Intel-compatible processor
- Microsoft Windows XP
- Microsoft Vista (stereoscopic viewing in EspaCity with interlaced stereoscopic viewing device)
- 2 GB of RAM recommended
- Windows compatible pointing device, trackball recommended
- Parallel port or USB-port
- Stereo-ready graphics card (OpenGL quad-buffer stereo)
- Stereoscopic viewing
 - Planar's SD Stereo LCD display product line
 - REAL D StereoGraphics CrystalEyes Eyewear with Emitter
 - REAL D StereoGraphics Monitor ZScreen
 - Hyundai, Arisawa / XPol (horizontal interlace)

EspaKernel

- Create and manage image sets and frames
- Combine image data and orientations
- Read and write RAW images
- Read and write TIFF images
- Read and write tfw format files
- JPEG image compression
- GZIP image compression
- Create tiled images
- Rotate, flip and swap images
- Sharpen images
- Create image pyramids
- Create block overview mosaics
- Combine image from separate channels
- Split image to separate channels
- Define stereo pairs
- Compute epipolar images
- Transfer orientations (MATCH-AT)
- Import EnsomOSAIC orientations
- Create artificial points for orientation transfer

EspaBlock

- Prepare triangulation work using project wizard
- Measure fiducial marks automatically
- Measure tie points automatically
- Measure and edit points visually
- Adjust tones automatically
- Compute blocks efficiently using bundle adjustment program included (EspaBundle)
- Utilise iterative flow of working in triangulation
- Use approximate image orientations to guide image measuring
- Visualise adjustment results

EspaBundle

- Use aerial film cameras
- Use aerial digital cameras (UltraCam, DMC)
- Use multiple observation files
- Define interior orientation (focal length, the location of principal point in the image plane, lens distortion)
- Compute fiducial mark transformation with 6-, 8-, or 12-parameters
- Correct effects of earth curvature and refraction
- Compute approximate values using 4-parameters transformation (Helmert transformation)
- Compute bundle adjustment
- Adjust with XYZ-, XY- and/or Z-known control points
- Adjust with distance observations
- Adjust with GPS observations and drift parameters
- Adjust with additional parameters i.e. self calibration
- Write orientation parameters
- Write accuracy estimates
- Write adjustment report

EspaOrtho

- Define orthophotos from input imagery
- Compute grid elevation models for orthophotos from random points or from existing grid models
- Rectify imagery to orthophotos
- Clip and attach image patches
- Create seamless orthophotomosaics
- Preview orthophotomosaics
- Adjust tones manually
- Compute automatic tone adjustment for images
- Adjust tone with color balance
- Adjust white and black balance

EspaCity

- Extract 3-D data using stereoscopic measuring, image-wise measuring or orthophoto measuring
- Utilise various alternatives for stereoscopic viewing
- Compute y-parallax free epipolar images on-line
- Adjust tones automatically
- Superimpose 2-D or 3-D vector data on stereo images
- Exchange spatial data between EspaCity and other applications using EspaGate linkage
- Import and export spatial objects using shape files
- Select object type from various alternative geometry types with or without attribute information

- Use layer techniques to separate vector data sets (active, hidden, 2-D, background)
- Use Object Edit to work in 3-D
- Use Trail Edit to work in 3-D
- Find height level automatically
- Control height level continuously
- Compute point data automatically for digital elevation model (DEM)
- Check and measure point data efficiently with EspaDrive tools
- Compute and edit grid elevation models
- Visualise grid elevation models with various techniques
- Compute smooth contour lines
- Utilise pre-defined feature models for 3-D modeling of spatial objects

EspaGate

- Standard set-up enables spatial data transfer between EspaCity and the
 - (a) ArcGIS environment,
 - (b) AutoCAD environment and
 - (c) MicroStation environment
- Special set-up enables spatial data transfer between EspaCity and the
 - (d) Smallworld environment or
 - (e) Tekla Xcity environment
- Develop your own EspaGate application using EspaGate API library written with C++

EspaEngine

- Manage and process huge point data sets i.e. point clouds
- Read and write LAS format files
- Read and write XYZ format files
- Compute large continuous grid elevation models
- Classify georeferenced point data automatically
- Visualise grid elevation models and point data in free viewing angles with various techniques including wrapping of digital images over elevation model
- Check and classify point data manually in the visualisation window
- Check and classify point data stereoscopically on digital aerial images

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