

QCoherent Software LLC¹

LP360 Product Family

LP360 is a family of point cloud exploitation tools for both native Windows (“standalone”) and the ArcGIS® desktop platform. LP360 for ArcGIS is the world’s most popular LIDAR visualization, editing and information extraction tool set for ArcGIS®. It is available directly from QCoherent Software LLC (www.LP360.com), from GeoCue Group Inc.² (www.geocue.com) and (outside North America) from a global reseller network (www.LP360.com/purchase/resellers.html).

LP360 applications are available in four platform configurations (all Microsoft Windows®-based):

- LP360 – This is the native Windows version of LP360. It has no software prerequisites other than Windows. It is available in both a 32 and 64 bit version.
- LP360 for ArcGIS® - A fully qualified extension for ArcMap® desktop. LP360 for ArcGIS® requires the Basic level of ArcMap® ("the "ArcView®" level of ArcMap under the ESRI versions prior to the 10.1 naming scheme). This remains a 32 bit product until ESRI® releases ArcGIS® desktop for 64 bit.
- LP360 for sUAS (small, Unmanned Aerial Vehicles) – LP360 is an ideal platform for exploiting point clouds generated by correlating imagery obtained via sUAS platforms. First released with the 2014.1 version of LP360, it is currently identical to the Standard level of LP360.
- LP360 for GeoCue³ – This version of LP360 is very similar in its feature set to LP360, Standard level. It integrates into the GeoCue® Client platform, providing a high performance environment for project-based Quality Check and interactive editing.

LP360 and LP360 for ArcGIS are available in four capability levels:

- Viewer – This is a free viewer level of the software. It is available for only for standalone Windows
- Basic (Windows, ArcGIS®) – This is the basic level, suitable for visualization, Quality Check and some derived product generation.
- Standard (Windows, ArcGIS®) – This level adds interactive classification and analysis capabilities.
- Advanced (Windows, ArcGIS®) – This level adds point cloud “tasks” and automatic classification routines.

LP360 and LP360 for ArcGIS are available in two licensing models:

- Node Locked – The software is assigned to a specific machine and can be executed only on that machine

¹ A GeoCue Group company

² Note that special versions of LP360 are available from GeoCue for applications such as large project QC and Railway Feature Extraction. Please contact GeoCue (info@geocue.com) for details.

³ Previously “LP360 EQC”

- Floating – The software can be loaded on any machine and up to the number of owned floating licenses can be simultaneously run

LP360 for sUAS is available only in a node-locked version.

LP360 for GeoCue is available only as a floating license version and requires a GeoCue Client.

This matrix reflects functions that will appear in the 2014.1 release of LP360, planned for release in late October of 2014.

Data Import (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS ⁴ LP360 for	SILAS LP360 for	GeoCue LP360 for
Load Points from LAS format file (Version 1.0 to 1.4)	V	B	✓	✓
Import points from ASCII files	V	B	✓	
Load points from LizardTech MG4 format and convert to LAS (Viewer supports single file import only)	V	B	✓	
Open/Display multiple LIDAR files simultaneously	V	B	✓	✓
Generate reduced resolution data sets (pyramids) for rapid access	V	B	✓	✓
Selectively load/unload point data (file based) from Table of Contents	V	B	✓	✓
Files can be opened for viewing (Read Only)	V	B	✓	✓
Files can be opened for modification (Read/Write)	S	S	✓	✓
Inspect LAS header data in the file Open dialog and optionally export to the clipboard for direct copy into Excel®	V	B	✓	
Automatically segregate data into layers based on compatible LAS formats	V	B	✓	
Open most image sources supported by GDAL including N band, 16 bit per pixel and Float	V	*	✓	✓
Inspect Image header data in the file Open dialog and optionally export to the clipboard for direct copy into Excel®	V		✓	
Automatically group imagery into layers based on compatible properties	V		✓	
Load Shape Files, 2D	B	*	✓	✓
Load Shape Files, 3D	B	*	✓	✓

Map View Visualization (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS ⁴ LP360 for	SILAS LP360 for	GeoCue LP360 for
Support multiple collections (folders) of LAS data in potentially multiple formats	V	B	✓	✓
In multi-layer sessions, toggle the Active LAS layer	V	B	✓	✓
Toggle display of LIDAR file boundaries	V	B	✓	✓
Change View backdrop color	V	*	✓	✓
Filter display by: Class, return combination, elevation bracket	V	B	✓	✓
Filter display by: Intensity, Classification Flags, Point Source ID	V	B	✓	✓
Filter display by classification flags (synthetic, model key point, withheld, overlap)	V	B	✓	✓

⁴ * indicates a features supplied by ArcGIS Desktop

Map View Visualization (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for SUA	LP360 for GeoCue
Filter display by scan angle	V	B	V	V
Display LAS file boundaries	V	B	V	V
Display points by elevation	V	B	V	V
Display points by elevation color bands	V	B	V	V
Display by elevation with “flood fill” (show flood zones based on Z)	V	B	V	V
Display points by classification	V	B	V	V
Display points by intensity	V	B	V	V
Display points by return combination	V	B	V	V
Display points by point source	V	B	V	V
Display points by RGB values	V	B	V	V
Display points colored by file source	V	B	V	V
2D measurement	V	*	V	V
Personalize color-coding schemes for display	V	B	V	V
Create and display shaded Triangulated Irregular Network (TIN)	V	B	V	V
Create and display TIN Wireframe	V	B	V	V
Display points superimposed on shaded/wireframe TIN	V	B	V	V
Set separate display filters for TIN and Points (allows, for example, point vegetation superimposed on a Ground TIN)	V	B	V	V
Modulate any display mode by point Intensity (blend intensity into display)	V	B	V	V
Dynamically generate and display contours	V	B	V	V
Step-wise zoom in, zoom out, pan, fit	V	B	V	V
Quick move to previous/next zoom level	V	B	V	V
Zoom to rectangle	V	B	V	V
King’s Move via toolbar arrow buttons	V		V	V
Continuous zoom of display	V		V	V
Point Information readout (select point and display properties)	V	B	V	V
Set vertical display clipping plane (used for mobile mapping)	V		V	V
Display backdrop imagery	V	*	V	V
Display rotated images	V	*	V	V
Set “NODATA” transparency or color in images	V	*	V	V
Replace an image pixel value or range of values with transparency or a color	V	*	V	V
Enhance imagery by automate stretch	V	*	V	V
Support Web Mapping Services (WMS) backdrop imagery	B	*	V	V

Profile View Visualization (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for SILAS	LP360 for GeoCue
Create arbitrary profile view graphically from top view	V	B	✓	✓
Support all visualization modes supported in the Map View	V	B	✓	✓
Support all point filter modes supported in the Map View	V	B	✓	✓
Display vertical and/or horizontal graticules	V	B	✓	✓
Display 3D vector graphics	V	B	✓	✓
Measure	V	B	✓	✓
Drape points with line	B	B	✓	✓
Set separate sources for Points and Drape Line	B	B	✓	✓
Drape profile by point source ID (used for laser swath QC)	B	B	✓	✓
Set visualization clipping plane (for mobile mapping data)	B		✓	✓
Dynamically move, rotate profile via mouse wheel, arrow keys	V	B	✓	✓
Dynamically synchronize Map View and 3D View to Profile View (move in lock-step for QC)	V	B	✓	✓
Dock/Undock Profile View window	V	B	✓	✓

3D View Visualization (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for SILAS	LP360 for GeoCue
Define 3D view by dragging rectangle in top view	V	B	✓	✓
3D Window moveable to detached window	V	B	✓	✓
Zoom, pan, rotate 3D View	V	B	✓	✓
Support all visualization modes supported in the Map View	V	B	✓	✓
Support all point filter modes supported in the Map View	V	B	✓	✓
Set elevation flood fill	B	B	✓	✓
Display 3D Vector graphics	B	B	✓	✓
Drape imagery from Map View (Image fusion)	B	B	✓	✓
Drape vectors from Map View (vector fusion)	B	B	✓	✓
Dynamically generate and display 3D contours	V	B	✓	✓
TIN hill shading	V	B	✓	✓
Line of sight visualization		B		

Breakline Enforced Visualization (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for GeoCue	LP360 for GeoCue
User selected features employed for breakline enforcement	B	B	✓	✓
Support multiple breakline layers	B	B	✓	✓
Use designated layers of closed polygons to denote data voids (for example, water bodies)	B	B	✓	✓
Use selected attribute to override Z for elevation	B	B	✓	✓
Perform on-the-fly Topology correction when using multiple breakline layers	B	B	✓	✓
Exclude “buffer class” points from breaklines	B	B	✓	✓
Enforce islands and holes in breakline model	B	B	✓	✓

LIDAR QC and Annotation Tools (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Inspect Point via information readout	V	B	✓	✓
Inspect TIN via information readout	V	B	✓	✓
Inspect image via information readout	V	*	✓	✓
Inspect vector via information readout	V	*	✓	✓
Visualize contours superimposed on wire frame model of TIN	V	B	✓	✓
Quick access QA/QC toolbar	B	B	✓	✓
“Jump” views by user specified amount on key click	B	B	✓	✓
Synchronize Map, 3D and Profile views during review	B	B	✓	✓
Center views on mouse click	B	B	✓	✓
Create “Issues” shape file	B	B	✓	✓
Add user defined issue types	B	B	✓	✓
Annotate issues using rectangle, circle, polygon	B	B	✓	✓
Modify an issue’s attributes	B	B	✓	✓
Point statistics computation and report generation	B	B	✓	✓
Display colorized by point density (point density testing)	B	B	✓	✓
Export raster file(s) colorized by point density (point density testing)	B	B	✓	✓

Vertical/Horizontal Accuracy Testing (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Import Control Points from an ASCII file, creating a Shape File	B	B	✓	✓
Assign Control Point data from 2D or 3D Shape Layer	B	B	✓	✓
Navigate through control point list, centering views	B	B	✓	✓
Support Horizontal, Vertical and Full (HV) control/check points (“Types”)	B	B	✓	✓
Generate Control Report, optionally export report	B	B	✓	✓
Navigate control points via control point report rows, including Type mode (navigate by Horz, Vert or Full)	B	B	✓	✓
Withhold points	B	B	✓	✓
Filter control surface by class, returns, elevation bracket	B	B	✓	✓
Compute vertical difference between control point and LIDAR surface	B	B	✓	✓
Interactive measurement of horizontal Control/Check Points in the Map View	B	B	✓	✓

Vertical/Horizontal Accuracy Testing (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Computer residuals between control points and measured points (both Horizontal and Vertical)	B	B	✓	✓
Computer NMAS/VMAS and ASPRS/NSSDA accuracies	B	B	✓	✓
Display by delta Z in overlap regions (relative accuracy testing)	B	B	✓	✓
Export raster of delta Z for synoptic visualization of relative accuracy	B	B	✓	✓
Drape profile colorized by point source ID (used for laser swath QC)	B	B	✓	✓

Product Generation (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Export Points in LAS 1.0 – 1.4 format	B	B	✓	
Export Points in Shape, DGN, DXF, ASCII format	B	B	✓	
Convert compatible previous LAS versions to LAS 1.4, Point Data Record Formats 6, 7 and 8	B	B	✓	
Create surfaces using Triangulated Irregular Network (TIN) method	B	B	✓	
Create surfaces using Inverse Distance Weighting (IDW) method	B	B	✓	
Apply breakline enforcement using shape layers during surface creation	B	B	✓	
Perform “on-the-fly” topology correction when creating surfaces from multiple breakline layers	B	B	✓	
Apply LIDAR point buffers to breaklines during surface creation	B	B	✓	
Create and export elevation data in binary raster, XYZ raster, ASCII X, Y, Z	B	B	✓	
Create and export elevation data in ESRI® format		B		
Create and export elevation difference (delta between two elevation surfaces) data	B	B	✓	
Create and export slope surface in binary raster, XYZ raster and ASCII xyz	B	B	✓	
Create and export Aspect surface in binary raster, XYZ raster and ASCII xyz	B	B	✓	
Create and export Hill Shade surface in binary raster, XYZ raster and ASCII xyz	B	B	✓	
Create and export Contours in shape format	B	B	✓	

Product Generation (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Create and export intensity images (LIDAR “orthos”) in binary raster, XYZ raster and ASCII xyz	B	B	✓	
Create, export profile draping line	B	B	✓	
Export raster of delta Z for synoptic visualization of relative accuracy	B	B	✓	
Export raster of density for synoptic LIDAR point density testing	B	B	✓	

Map View Interactive Point Classification (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Filter source points by any combination of Class, Return Combinations, Elevation Range, Intensity, Classification Flags, Scan Angle, Point Source ID	S	S	✓	✓
Move from Filtered source to specified destination class	S	S	✓	✓
Set classification flags (withheld, synthetic, overlap, model key point) of destination points ⁵	S	S	✓	✓
Adjustable paint brush sizes	S	S	✓	✓
Classify by rectangular paint brush	S	S	✓	✓
Classify by circular paint brush	S	S	✓	✓
Classify points within a user drawn polygon	S	S	✓	✓

Profile View Interactive Point Classification (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Filter source points by any combination of class, Return Combinations, Elevation Range, Intensity, Classification Flags, Scan Angle, Point Source ID	S	S	✓	✓
Set classification flags (withheld, synthetic, overlap ⁶ , model key point) of destination points	S	S	✓	✓

⁵ Overlap flag available in LAS 1.4 only⁶ Overlap flag available in LAS 1.4 only

Profile View Interactive Point Classification (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Classify points above user drawn line	S	S	✓	✓
Classify points below user drawn line	S	S	✓	✓
Classify points within user drawn polygon	S	S	✓	✓
Classify points via “paint brush” (small, medium, large)	S	S	✓	✓

Feature-Based Classification⁷ (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Filter source points by any combination of Class, Return Combinations, Elevation Range, Intensity, Classification Flags, Scan Angle, Point Source ID	S	S	✓	✓
Set classification flags (withheld, synthetic, overlap, model key point) of destination points	S	S	✓	✓
Classify by file-based feature set	S	S	✓	✓
Classify by user selected features	S	S	✓	✓
Classify by point feature	S	S	✓	✓
Classify by line feature	S	S	✓	✓
Classify by polygon feature	S	S	✓	✓
Dynamically adjust classification rules based on user specified type field	S	S	✓	✓
Classify “within distance of” (2D and 3D features)	S	S	✓	✓
Classify “completely within”	S	S	✓	✓
User defined buffer distance for spatial relationships (2D and 3D)	S	S	✓	✓

Conflate Z from Point Cloud (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for sUAS	LP360 for GeoCue
Assign Z to points	S	S	✓	✓
Assign Z to polylines	S	S	✓	✓
Assign Z to polygons	S	S	✓	✓
User defined vertex spacing	S	S	✓	✓

⁷ This moves to a Point Cloud Task (PCT) as of 2014.1

Conflate Z from Point Cloud (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS LP360 for	sILAS LP360 for	GeoCue LP360 for
Compute Z from nearest point	S	S	√	√
Compute Z from statistical analysis of nearby points	S	S	√	√
Compute Z from TIN (surface) of nearby points	S	S	√	√
Set Z to a user specified constant value	S	S	√	√
Assign No Data to vertices within void areas	S	S	√	√
Classify points within a user specified distance of conflated features	S	S	√	√
Compute individual vertex Z or compute an average Z (summary Z) for entire feature	S	S	√	√
On-the-fly refresh/redisplay for summary Z features	S	S	√	√

Breakline/Hydro Feature Editing (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS LP360 for	sILAS LP360 for	GeoCue LP360 for
Designate user selected features as breaklines	B	B	√	√
Create breakline by feature draping		S		
Create stream center line with downhill constraints		S		
Apply statistical validation during downstream digitizing		S		
Water body flattening (lakes, ponds)		S		
Water body flattening with downhill constraints (flatten river polygons)		S		
Digitize retaining wall		S		
Digitize culvert		S		

Point Cloud Tasks (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS LP360 for	sILAS LP360 for	GeoCue LP360 for
“Batch” movement of points from source classes to a destination class	S	S	√	√
Elevation bracketed classification above a surface TIN defined by a class (classify by height above surface)	S	S	√	√
Planar region detection and classification (used e.g. for building extraction)	A	A		
Vectorize (and optionally square) point groups (point group tracing)	A	A		

Point Cloud Tasks (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS LP360 for	sLAS LP360 for	GeoCue LP360 for
Low point detection and classification (low noise filter)	A	A		
Isolated points detection and classification	A	A		
Ground detection and classification (automatic ground filtering) via Adaptive TIN algorithm	A	A		
Vertical accuracy-based Model Key Point (MKP) extraction ("intelligent" thinning)	A	A		
Apply classification macros by envelope, rectangular or circular stamp, user defined circle, Polygon layer(s), project	S	S	✓	✓
Preview point cloud tasks in Preview Window prior to actual application	V	V	✓	✓
Conflation of Z based on all Point Cloud Task methods including interactive sketching of Points, Lines, Polygons	S	S	✓	✓
Volumetric analysis with cut/fill graphical image	S	S	✓	
Output Volumetric LAS file based on Volumetric analysis	S	S	✓	
Rail detection, classification, alignment vector creation	A	A		
Line vertex smoothing and respacing	S	S	✓	✓
Cross-section generator with optional clipping to enclosing polygon	S	S	✓	✓
Populate LAS Intensity field based on LAS RGB fields (needed for Pix4D workflows)	S	S	✓	✓
Classify by Feature 2D & 3D (see separate feature table for details)	S	S	✓	✓

ArcGIS Toolbox Tools (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	ArcGIS LP360 for	sLAS LP360 for	GeoCue LP360 for
Define LAS File Projection - Define or assign a projection for one or more LAS files.		B		
Reproject LAS Files - Reproject the points in a LAS files into the desired coordinate system		B		
Scale LAS File- Scale the x, y and/or z components of the points within a LAS file		B		
Shift LAS File- Shift the x, y and/or z components of the points within a LAS file		B		

Batch Tools⁸ (V = Viewer, B = Basic, S= Standard, A = Advanced)	LP360	LP360 for ArcGIS	LP360 for SILAS	LP360 for GeoCue
LASGuid.exe – Assign GUID to LAS file	V	B	√	√
LDDump.exe – Dump the LAS Header or point records	V	B	√	√
LDFltLine.exe – Assign point source IDs to all points in a file	V	B	√	√
LDImport.exe – ASCII conversion	V	B	√	√
LDMerge.exe – Concatenate LAS files	V	B	√	√
LDMvCls.exe – Basic classification change	V	B	√	√
LDPyramid.exe – Construct LP360 overviews for LAS files	V	B	√	√
LDReorder.exe – Spatially reorder LAS files	V	B	√	√
LDThin.exe – Unintelligent thinning	V	B	√	√
LP360ExpLAS.exe - Export	B	B	√	√
LP360PntDen.exe – Point Density	B	B	√	√
LP360Stats.exe – Statistics Extractor	B	B	√	√

⁸ Tools marked “V” under LP360 do not require a license to run