Geomatica Core

Geomatica Core is the base Geomatica product offering dynamic solutions for all types of desktop geomatics.

Geomatica Core includes many built-in capabilities to support your organization's geospatial data processing needs and increase productivity. By breaking down the conventional divisions in traditional remote sensing, GIS, photogrammetry, and cartography, Geomatica delivers greater productivity with fewer errors.

With full raster and vector integration and support for over 100 geospatial data formats, Geomatica offers solutions for all of your geomatics processing needs while maintaining complete interoperability with outside software packages.

State-of-the-art tools in Geomatica Core include those for geometrical correction, data visualization and editing, image classification, cartographic map production, and much more.

This technical specification document outlines the tools and functionality available in Geomatica Core.

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 1

Table of Contents

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 2

Geomatica Focus

Viewing Environment

Geomatica Focus includes all of the tools and functionality needed to view and analyze geospatial data. The Focus viewing environment is divided into six sections:

- Menu bar
- Toolbars
- Control pane
- View pane
- Overview window
- Status bar

Menu Bar

Please note that many of the Geomatica Focus menu items are also available as keyboard shortcuts. The shortcut combinations are shown in the pulldown menus.

File Menu

- New Project – starts a new project and clears the Focus window
- Open – accesses existing data or project files
- Save Project or Save Project As – saves project files to specific destinations or overwrites existing project files
- Utility >
  - Import to PCIDSK – convert any GDB-supported file to a PCI format file
  - Link – creates an empty PCI format file and allows indirect access to GDB-supported source data
  - Translate – Translates data from one GDB-supported format to another
  - Transfer Layers – allows user to copy layers from one file to another
  - File Utility - allows the user to view detailed information about a selected GDB file. Certain types of information may also be edited, depending on the GDB format type and read/write status of the file
  - Import ASCII table/points – wizard tool to import and convert tabular ASCII data
  - Overview Manager – allows users to create, manage, and delete raster overviews for a specific image file or layer
- Print Map – prints a specified map
- Export Map – exports a map to an Adobe Illustrator, JPEG, JPEG 2000, PCIDSK, TIFF, BMP, or EMF format
- Export to Google Earth – exports current view to KML or KMZ format. Optionally opens the output file in Google Earth 4.0 or greater
- Close Window – closes the active window
- Exit – exits Focus

Edit Menu

- Undo/Redo – undoes and redoes performed actions
- Cut, Copy, and Paste – removes, copies, and pastes layers in the tree list
- Group/Ungroup – links or separates vector elements such as polygons, shapes, text, and symbols

- Attach/Detach – connects or separates items in the same layer using the Attribute Manager or Arrow selector
- Vector Editing – opens the Vector Editing Tools toolbar. You can also choose any single one of the vector editing tools from the pulldown menu.
- Set Style Attribute – lets you set attributes in a vector layer that determine the representation style

View Menu

- Area View Mode – shows the loaded data in the full extents of the view area (no cartographic elements are shown)
- Map View Mode – shows a print preview of the cartographic element data
- Zoom Window – creates a secondary viewer window that can be used to create different views of the same dataset
- Clone View – creates a secondary viewer window that can be used to reorder the layers and create different views
- Zoom to >
  - o Overview of area – will zoom to an overview of all layers loaded into an area
  - o Zoom In – zooms in the view by a power of 2
  - o Zoom Out – zooms out the view by a power of 2
  - o 1:1 Image Resolution – zooms to a 1:1 view of the highlighted layer in the tree list
  - o Zoom to Scale – allows the user to zoom to a particular map resolution
- Named Regions – lets a user create and work with custom views
- Visualization Tools – Opens a panel that will allow a user to simultaneously view and compare multiple image layers
  - o Flicker – switch between two layers in the same map
  - o Swipe - displays a file in increments across another
  - o Blend - merges two layers together at a specified rate. The transition from one view to another helps you see changes between layers.
  - o Loop - multi-view tool that extends automatic file comparison capabilities to include three or more files. A user must have at least three layers open to enable the Loop tab.
- Toolbars – lets you select the toolbars you want to display on the interface
- Show Grid – displays grid lines or points in the view pane
- Snap to Grid – snaps text to grid lines
- Layout Grid Setup – defines grid properties
- Display Options – lets the user turn off the default WYSIWYG feature controls in the viewing environment
- Properties – lets you view properties for the current highlighted item in the tree list. Properties are enabled for layers, maps, areas, and all layers on the Files tab.

Layer Menu

- Add – opens the Add Layer Wizard, which allows you to add the following layer types to the Maps tree:
  - o Vector
  - o RGB
  - o Grayscale
  - o Pseudocolor
  - o Bitmap
- Visible – allows you to turn a layer on or off

- Selectable – allows you to select shapes from a vector layer
- RGB Mapper - the RGB Mapper window shows the color composition used by the active map layer and lets the user change or map the channel data to a color element and show the changes in the viewer
- Attribute Manager – allows you to view the attributes of the shapes in a selected layer
- Charts – allows you to create a number of different chart types using your data. Available chart types include:
  - o Column
  - o Bar
  - o Line
  - o Area
  - o Pie
  - o Scatter
- Histograms – displays the histogram(s) for the bands in the currently selected raster layer
- Numeric Values – allows users to work directly with the pixel values in raster data. One can view and edit the individual pixel values for grayscale and RGB channels through individual tables. Each table provides a sample of values that correspond to the cursor coordinates in the view pane
- Scatter Plot – creates a scatter plot of the bands in the currently selected raster layer. Scatter plots are primarily used as data visualization tools. Each plot shows the correlation between the histograms for two channels.
- Profile – allows users to view a graph profile and table of the raster values corresponding to a selected vector layer.
- Filter – panel that enables users to apply low-pass, high-pass, or custom filter(s) to an raster layer
- DEM Editing – panel that enables users to apply editing techniques to digital elevation data
- Area Neighbors – determines the adjacent polygons (neighbors) of selected polygons
- Aggregate Attributes – shows summary statistics for an attribute table and allows users to combine data for analysis.
- Layer Manager – lists layer properties in a table format that shows properties for each object in the map and the hierarchical structure of maps, areas, and layers. This panel allows users to manage and edit layer properties

Analysis Menu

- Image Classification>
  - o Supervised – allows you to perform supervised image classification
  - o Unsupervised – allows you to perform unsupervised image classification
  - o Post Classification Analysis – allows users to analyze their classification results using one of the following methods:
    - ▪ Accuracy Assessment – provides tools to determine the correctness of the classified image.
    - ▪ Aggregation – provides tools for combining classes in a resulting classified image.
    - ▪ Class Editing – provides tools for the user to correct classification errors in specific areas of the classified image
    - ▪ Class Labelling – provides the user with tools to modify the characteristics of the output classes in a classified image.

Tools Menu

- Algorithm Librarian – provides easy access to many robust geospatial processing and analysis algorithms
- Raster Calculator – lets you formulate, write, and run calculations based on data associated with raster files; supports multiple files and raster attributes
- Data Merge – lets users merge data from different sources into a common file
- Reprojection – the Reproject window allows users to manually change the projection of imagery, bitmaps, or vectors in GDB-supported files with a valid projection, and save the data to a new file
- Clipping/Subsetting – use the Clipping/Subsetting window in Focus to clip or create a subset of your data
- Representation Editor – representation can be used to control the appearance of map layers. It is most commonly used with vector data but can be also be used for raster (raw or thematic) data. This tool allows users to modify the representation of the layers currently being viewed
- Options – lets you customize how Focus handles certain features and uses system resources

HELP Menu

The Help menu includes the online Help system. It also allows you to check for updates and information by connecting to the PCI Geomatics Web site. Using this menu you can also view Geomatica version information.

Toolbars
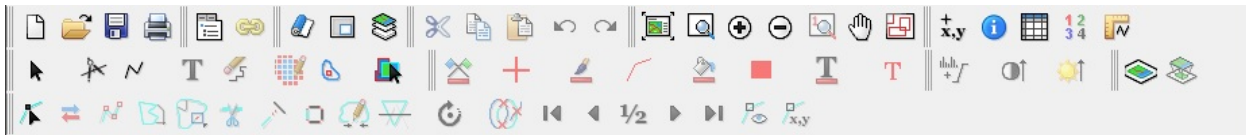
The Focus toolbars provide easy access to the following functions: (listed in default order)

Row 1

- Project Toolbar
  - New Project
  - Open File
  - Save
  - Print
- Window Toolbar
  - Control Pane toggle
  - Chained Window (Link windows)
- Maps Toolbar
  - New Map
  - New Area
  - Add Layer Wizard
- Clipboard Toolbar
  - Cut
  - Copy
  - Paste
  - Undo
  - Redo
- Zoom Toolbar
  - Zoom to Overview
  - Zoom Interactive
  - Zoom In
  - Zoom Out
  - Zoom to 1:1 Image Resolution
  - Pan
  - Named Regions
- Tools Toolbar
  - Cursor Control
  - Information
  - Open the Attribute Manager
  - Numeric Values
  - Measurement Tools

- Editing Toolbar
  - o Selection Tools
  - o Vector Editing
  - o New Shapes
  - o New Text
  - o Raster Erase
  - o Raster Editing
  - o Spatial Query
  - o Map Layer Selection
- Enhancements Toolbar
  - o Enhancements
  - o Contrast
  - o Brightness

- o Advanced Contrast and Brightness
- View Mode Toolbar
  - o Map View Mode
  - o Area View Mode
- Display Toolbar
  - o Set Symbol Color
  - o Set Symbol Style
  - o Set Line Color
  - o Set Line Style
  - o Set Area Color
  - o Set Area Style
  - o Set Text Color
  - o Set Text Style

Row 3 – Vector Editing Toolbar

- Find
- Reverse Vertices
- Add Vertices
- Reshape
- Merge Line/Polygon
- Split Line/Polygon
- Extend Line
- Auto Merge Line
- Close Shape
- Mirror Tools

- Rotation Tools
- Break Line/Polygon
- Start Vertex
- Previous Vertex
- Midpoint
- Next Vertex
- End Vertex
- Show Vertices
- Vertices…

Control Pane

Maps Tree

The Maps tree contains the layers that are currently displayed in the view area. Layer types include:

- RGB image layer
- Grayscale image layer
- Pseudo-color image layer
- Vector layer
- Bitmap layer

A context menu for each of these layer types is available by right–clicking the layer. These options, which differ for each layer type, include the following:

RGB/Grayscale Image Layer
- Cut and Copy – moves a layer in the tree list
- Save – saves an edited layer
- Save As – saves an edited layer as a new file or as a new layer in an existing file
- Remove from Area – removes the layer from the view pane
- Rename – renames the layer in the tree list
- Overview of Layer – fits the selected layer to the view pane
- 1:1 Image Resolution – zooms to a 1:1 image resolution based on the selected layer

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 7

- Enhance – applies a selected enhancement
- RGB Mapper – allows one to change the RGB mapping for the selected layer
- Representation Editor (grayscale only) – determines the appearance of shapes in thematic mapping
- Filter – allows you to apply a filter to a layer or to the entire file
- Attribute Manager – opens a related attribute table
- Numeric Values – lets you work directly with the pixel values in raster data
- Histograms – lets you visualize the relationship of digital-number values within an image band and extract statistical information about image bands
- Scatter Plot – lets you visualize your data
- Profile – lets you control various aspects of the profile graph and table
- Image Classification – lets you create or edit a classification session
- Properties – shows layer properties, including file information, enhancements, and resampling methods

PCT Image Layer
- Includes the same choices as RGB and grayscale, except for: enhance, scatter plot, spectra plot, and image classification
- Selectable (thematic layers) – lets you select shapes from the current layer
- Select all shapes (thematic layers)
- Unselect all shapes
- Edit PCT – lets you define the value colors for a selected image
- Legend Items – shows or hides legend items
- Attribute Manager – opens a related attribute table

Bitmap Layer
- Cut and Copy – moves a layer in the tree list
- Save and Save As – saves an edited layer
- Remove from Area – removes a selected layer from the project
- Rename – renames a selected layer in the tree list
- Overview of Layer – fits the selected layer to the view pane
- 1:1 Resolution – zooms to a 1:1 image resolution based on the selected layer
- Color – lets you choose a predefined color or create a color for the layer
- Representation Editor – determines the appearance of shapes in thematic mapping
- Properties – shows layer properties, including file information and color applied to the bitmap layer

Vector Layer
- Cut and Copy – moves a layer in the tree list
- Save and Save As – saves an edited layer
- Remove from Area– removes a selected layer from the project
- Rename – renames a selected layer in the tree list
- Selectable – lets you select shapes from the current layer
- Select All Shapes – selects all of the shapes in the currently selected layer
- Clear Selection – clears the current selection in the active layer
- Overview of Layer – fits the selected layer to the view pane
- Color – lets you choose a predefined color or create a color for a layer
- Representation Editor – determines the appearance of shapes in thematic mapping

- Legend Items – shows or hides legend items
- Attribute Manager – opens a related attribute table
- Properties – shows layer properties, including file information and the type of applied representation

Right-clicking in the space surrounding a layer also displays a context menu with the following options:

- Paste
- Save Project
- Save Project As
- Open
- New Project
- New Map
- Layer Manager

Legend in MAPS Tab

By default, the layers displayed in the Maps tree are represented in a legend that itemizes the representation and is unique for the type of layer selected as follows:

Vector

Shows the legend entries for all the representation that is being used for that layer. For an RST layer, all repcodes that are present are listed.

RGB Image Layers

Shows a color ramp for each band and shows the range of raw pixel values.

Grayscale Image Layers

Shows a gray ramp with the range of raw pixel values. If the layer is represented using a thematic display, each class is shown

Pseudo-colored

Shows one entry for each range in the PCT. If a layer has metadata specifying legend items, only those are shown. If a layer is represented using thematic display, each class is shown.

Bitmap

Shows one entry with the color and an optional description of the bitmap. If a bitmap is represented using thematic display, there are two legend entries. These layers can be toggled on and off by right-clicking in the Maps tree and clicking Legend Items.

FILES Tree

The Files tab contains information about all files that are added to a project. Each file is listed with all layers in those files.

Right–clicking in the Files tree opens a context menu that lets you add a file to the current project, launch the Data Merge wizard or access the Utility functions, such as Import, Link, Export, Reproject, and Clipping/Subsetting.

The context menu in the Files tree includes:

- Save – saves the entire file with any edits
- Translate – lets you translate the file into any GDB-supported file format
- New – lets you add different layer types to a selected file
- Remove from Project– removes the file from the current project
- Delete – removes the file from the project and deletes the file from the disk
- Overview Manager – opens the overview manager panel, which allows users to build overview layers for faster data rendering and also to edit existing overviews.
- Algorithm Librarian – launches the Algorithm Librarian
- Properties – lets you access file properties, including:
    - General tab – provides information about the file path, type, and size
    - History tab – lists any operations performed on the selected file
    - Metadata tab – displays any metadata for the selected file
    - Projection tab – lists projection information for the selected file, including projection, datum, and corner coordinates

For each layer type, there is a context menu that contains the following options.

Image Layers

- Save – saves the layer with any changes
- Delete – removes the layer from the file
- View – automatically loads the layer to the view area and places the layer in the current area in the Maps tree
- Attribute Manager – opens a related attribute table
- Export (Save As) –saves an edited layer as a new file or as a new layer in an existing file
- Histogram with Statistics – provides a detailed graph and statistics about a selected layer
- Overview Manager – opens the overview manager panel, which allows users to build overview layers for faster data rendering and also to edit existing overviews.
- Properties – lets you access the properties for the selected layer, including:
    - General tab – displays information about the file path, type, and size
    - History tab – lists the operations that have been performed on this file
    - Metadata tab – displays any metadata for the selected file

Vector Layers

- Save – saves the layer with any changes
- Delete – removes the layer from the file
- View – automatically loads the layer to the view area and places the layer in the current area in the Maps tree
- Attribute Manager – opens a related attribute table
- Export (Save As) – saves an edited layer as a new file or as a new layer in an existing file
- Properties – lets you access the properties for the selected layer, including:
    - General tab – displays information about the file path, type, and size
    - History tab – lists the operations that have been performed on this file
    - Metadata tab – displays any metadata for the selected file
    - Projection tab – lists projection information for the selected file, including projection, datum, and corner coordinates

Other Layers (such as look-up tables, bitmaps, pseudo-color tables, GCPs, signatures, and text)

- Save – saves the layer with any changes

- Delete – removes the layer from the file
- View – automatically loads the layer to the view area and places the layer in the current area in the Maps tree
- Export (Save As) – saves an edited layer as a new file or as a new layer in an existing file
- Properties – lets you access the properties for the selected layer, including:
  - General tab – displays information about the file path, type, and size
  - History tab – lists the operations that have been performed on this file
  - Metadata tab – displays any metadata for the selected file

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 11

View Pane

The view pane displays the actual loaded data. In this area, you can place the cross-hair pointer within the loaded data to obtain the position, image values, or vector ID in the message bar at the bottom of the pane. Information that is displayed depends on the selected layer in the Maps tree. If a vector layer is selected with the selection tool enabled, the vector layer name, entity ID, and length is displayed.

For some toolbar functions, the pointer location in the view area controls the image that is affected. If you have two or more images loaded in the view pane, the top-most image is affected by any enhancements. Also, if you want to zoom to 1:1 resolution, it is done based on the visible image and where the pointer is located.

View Modes

In Focus, there are two view modes: Area View Mode and Map View Mode.

The **Area View Mode** shows data in the full extents of the view pane. In this mode, no cartographic elements are shown; only the loaded geospatial data is shown.

The **Map View Mode** shows data as it can be printed. The paper size is controlled by selecting the map layer in the tree and accessing its properties.

Added cartographic surround elements (for example, scale bars, legends, and north arrows) are available in Map View Mode only. You can access the Area View Mode at any time to view data for a particular area rather than the entire map. The cartographic elements are not available in this mode, but are still active in the project.

The different view modes let you perform processing and analysis work and create cartographic output in the same interface.

Right-clicking in the view pane provides a context menu that includes the following options:

- Clone View – opens a second viewer
- View Map – lets you view a selected map from the Maps tree
- Zoom To – lets you zoom to one of the following views:
    - Zoom to Overview
    - Zoom In
    - Zoom Out
    - 1:1 Image Resolution
    - Zoom Percent
    - Named Region
- New Shapes – lets you select one of the following shape tools:
    - Points
    - Line
    - Polygon
    - Rectangle
    - Ellipse
    - Trace
    - Raster seeding
- Cut, Copy, and Paste
- Vector Editing

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 12

- Set Style Attribute

<u>Secondary View Windows</u>

In Focus, there are two types of secondary viewing windows: Zoom and Clone View.

Zoom Window – creates a second viewer that can show different views of the same data sets. For example, if you want to zoom in one window and leave the second at overview zoom level.

Clone View – creates a second viewer in which you can create a completely different layer.

When the Clone View window is open, a copy of the entire map allows you to reorder layers and create a different data set.

You can link the pointer in the two windows by clicking the Chained Windows button on the toolbar.

Overview Window

The Overview window is located to the left of the view pane and below the control pane, and displays a complete overview of the Focus view pane.

The Overview Window shows a smaller version of the image in the Focus view pane with a bounding outline that you can use to control what is displayed in the view pane. You can resize the bounding outline and zoom the image.

Status Bar

The status bar at the bottom of the Focus window displays particular values based on the location of the pointer, including:

- **Location coordinates** – can be any of the following units:
  - Paper (mm)
  - Raster (pixels/lines)
  - Geocoded (projection)
  - Geographic (latitude/longitude)
  - MGRS (US Military Grid Reference System)
  - Screen (based on window size)

You can set units by clicking the arrow next to the coordinate display.

- Image layer value(s) –if an image layer is selected in the Maps tree, the gray-level values of that layer are displayed in the status bar for the pointer location. This information includes three values for an RGB layer or one value for a grayscale or pseudo-color layer
- Vector ID –if you use a vector selection mode and select a single vector, the following information is displayed about that line: layer name, ID number, and line length. If you select multiple entries, the number of selected lines displays
- Zoom factor – displays the magnification value for the current layer
- Approximate Scale Factor – displays a value that is calculated from an assumed screen size
- Hint text – displays information about a button on a toolbar when you point to it
- Progress Monitor – displays the progress of long-running processes

These options can be turned on or off by clicking the first arrow in the status bar and clicking the option. A check mark next to an option indicates it is enabled.

Data Access Tools

Loading Data

Geomatica uses generic database (GDB) technology for reading raster, vector, and other information directly from an extensive list of supported file formats. Because no conversion is needed, this technology offers the advantage of quick and direct access to data and eliminates the need to reproduce files. Data of any bit depth, size, and resolution can be read into a single window.

Remote Data Wizard

The Remote Data Wizard provides access to any compatible data from an Oracle database, a Web service (Web Feature Server or Web Map Server), a URL, and through Open Database Connectivity (ODBC)

The Remote Data Wizard includes a connection manager that saves the connection information after you have successfully obtained data from the external data source. It functions like an address book for your established connections

Import ASCII Tables/Points Wizard

You can use the Import ASCII Table/Points Wizard to import and convert tabular ASCII data. You can format ASCII data the same way as you would with a spread sheet application. In the wizard, selecting the Delimited option from the Data Format area lets you specify a formatting character for the table columns. You can either select a delimiter or specify another delimiter by enabling the Other check box and identifying the character in the Other box.

The Data Preview area displays an updated version of the information. The wizard detects delimiters and file formats when you open a text file. When you select the Fixed Width data format and click the Next button, you can identify the number of characters in a column of a fixed width formatted file.

Import/Link

The Import utility lets you import GDB-supported formats into a PCIDSK format.

The Link utility protects source data by creating an empty PCIDSK database and allowing indirect access to imagery on both GDB-supported and PCIDSK files.

Project Files

Focus uses project files, which are a collection of links to data files that refer to how data from those files is currently viewed, including the order in which the layers display and any enhancements that have been applied. Project files also save auxiliary information, such as cartographic surrounds.

A project saves information and lets you distribute it to other users (data files must also be sent).

Data Management Tools

Clipping/Subsetting

Selecting the Clipping/Subsetting option lets you create a new subset database from selected layers and other information sampled from an existing source file.

There are four subset option areas:

- Input file selection area – lets you select the subset input file
- Available layers area – lets you select the input file layer that you want subset to the output file. Any number of layers can be subset at once.
- Define clip region – lets you select the clip or subset area that you want to use. You can do this visually by displaying an overview and dragging out a clip size definition box. You can also type the coordinates in the provided text boxes.

Other clip definition methods include:

- Subset-defined coordinates
- Subsets based on the extents of a selected file
- Subsets based on the extents of a selected layer
- Subsets based on a named region
- Script subset files

You can also create a script that adds a single file subset to a group of smaller files, the size of which is determined by the script.

Different reference systems can be used to select a subset area, including:

- Raster extents
- Geocoded extents
- Longitude and latitude extents
- Raster offset and size
- Geocoded offset and size

You can also create tiles from the input file.

- **Output file selection area** – lets you select the output file name and format. You can also specify No Data Values or create an Output Clip Boundary Vector layer.

Reproject

You can reproject an existing file, which creates a new file with the same data in a different projection. The following three areas are available:

- **Source and Destination File selection area** – lets you choose the input and output files with the format file that you want to create
- **Reprojection Bounds area** – lets you select the type of bounds that you want to use:
  - Pixels/lines and bounds - lets you vary the pixel size to create a file with the pixel, lines, and bounds values
  - Pixels/lines and resolution – lets you vary the bounds based on the resolution of the source file
  - Bounds and resolution – lets you enter the file size in pixels and lines, and set the pixel size

You can select a projection to reproject and set up the suggested projection parameters.

You can also set the Resampling and Transform orders and the sampling interval.

- **Selectable Layers area** – lets you select the layers from the input file that you want in the output file. Any number of layers can be selected at a time.

Translate (Export)

You can translate a file from one format to another; neither the source nor destination file has to be in a PCIDSK format.

The Translate window consists of three sections:

- Source and Destination File selection area – lets you choose the input and output files by browsing your file system
- Format selection – lets you choose from any of the GDB-supported formats. For a list of supported formats, see the GDB technology technical specification sheet.
- Some formats have different options; for example, a TIFF file can be compressed using any one of five different methods. You can see the available options for the selected format by clicking the ? button.
- Selectable Layers area – lets you select the layers from the input file that you want in the output file. You can translate any number of layers at once. When a particular format is selected, only the layers that are applicable to that format are available from the input list. For example, if you translate from a PCIDSK format to a Shapefile format, only vector layers are available for the selection.

Transfer Layers

You can transfer individual layers from a source file to a destination file from the Transfer Layers window. The transferred data can either be added to a new layer or overwritten in the destination file.

Visualization Tools

Flicker

Using the Flicker feature allows a user to toggle between two layers within the same map. When you select any two layers in the Maps tree, the associated images flicker from the front to the back of the view pane, making it easier to see subtle differences between them.

Swipe

Using Swipe displays a file in increments across another; at any point during the process, you can look at a specific percentage of the swiped file.

Blend

Using Blend merges two layers at a specified rate. The transition from one view to another helps you see changes between layers.

Loop

Loop mode is a multi-view tool that extends automatic file comparison capabilities to include three or more files. You must have at least three layers open to enable the Loop tab.

Information Tools

Numeric Values

- Display digital values in one or more image layers centered on the current cursor position
- Display values for one image layer while investigating another layer

- Displays cursor location coordinates
- Shows coordinates in paper, raster, geocoded, and user-defined values
- Finds a particular location based on displayed coordinates

Information Report

- Displays individual attributes of selected vectors or the uppermost raster layer
- Lets you view and edit attributes

Analysis Tools

Named Regions

- Define the boundaries of various targets in your image or map and save them as named regions
- Navigate rapidly to each named region

Multi-Histogram Display

- Displays statistics such as mean, median, standard deviation, minimum value, maximum value, and total pixels for the selected layer
- Controls the range of DN values and occurrence counts in the histogram
- Exports a histogram to a new text file or prints it to a PostScript or ASCII format file

Scatter Plot

- Provides a data-visualization tool that lets you instantly see where the majority of data values (or pixels) are concentrated
- Takes two specified image channels and displays a scatter plot of the pixel distributions (one channel used as x-axis and the other as the y-axis)
- Displays a linear equation derived from a linear regression calculation and the correlation coefficient associated with the scatter plot in a Statistics area
- Exports the scatter plot to a graphic file format (such as BMP or TIFF) or prints it to a PostScript or ASCII format file

Profile Windows

- Creates a vector over imagery and calculates a profile graph across that vector
- Shows gray values along the y-axis and the distance of the vector along the x-axis
- Lets you measure between any points along the profile line by using mensuration bars
- Lets you export a profile graph to a graphic file format (such as BMP or TIFF) or print it to a PostScript or ASCII format file
- Lists numeric information for each sample pixel along the current profile in the Profile Table, which contains:
    o Gray-level values of the currently selected layers
    o Position of sample pixel in pixel and line coordinates
    o Georeferenced x and y position of the sample pixel
    o Distance in meters to the first sample pixel
- Profile Table values can be exported to a text file

Filter

- Lets you quickly filter an image in order to sharpen, smooth, or detect edges

- Supports filters include Average, Gaussian, Median, Mode, Gamma, Edge Detector, Laplacian, Sobel, and Prewitt filters
- Lets you create custom filters
- Lets you apply filter to a view or to a file that saves the filtered layer to disk

<u>Charting</u>

Charting is a great way to visualize your data. A chart is a table of attributes displayed as a graphic where the values of selected records and fields are compared. It displays quantitative data so you can see how the numbers relate to each other, which helps you to interpret the information more easily. Trends or anomalies may become evident when displayed using the right chart type. For example, it may be difficult to identify trends by looking at a table filled with population statistics, but with the right chart the pattern become easily discernable.

The Charting functionality in Geomatica Focus includes a wide variety of chart types.

- Column charts display the selected data as vertical stripes of different colors or patterns. The categories are organized along the x-axis (horizontally) and the values are measured along the y-axis (vertically). Types include:
    - Clustered Columns
    - Stacked Columns
    - 100% Stacked Columns
- Bar charts display the selected data as horizontal stripes of different colors or patterns. In contrast with the column chart type, the values are organized along the x-axis (horizontally) and the categories are measured along the y-axis (vertically). Types include:
    - Clustered Bar
    - Stacked Bar
    - 100% Stacked Bar
- Line charts display the selected data as lines of different colors or patterns connecting points at equal intervals. The categories are organized along the x-axis (horizontally) and the values are measured along the y-axis (vertically). Varieties of Line charts include:
    - Basic Line type
    - Stacked Line
    - 100% Stacked Line
- Area charts display the selected data as polygons of different colors or patterns connecting points at equal intervals. Area types include:
    - Basic Area type
    - Stacked Area
    - 100% Stacked Area
- Pie charts are circular graphics which display the data as wedges representing their portion of the whole. Pie chart varieties include:
    - Standard Pie type
    - Exploded Pie
- Scatter charts are graphs of points comparing two sets of data. One set is plotted along the x-axis and the other along the y-axis. It is used to uncover a possible correlation between the data sets, representing their portion of the whole

Vector Data Tools

<u>Attribute Manager</u>

- Lets you view attribute data for a selected layer
- Lets you search for particular values
- Lets you change view to a single-record or table style
- Lets you view all or selected data
- Lets you sort based on a particular attribute or multiple attributes in ascending or descending order
- Lets you select a particular record and highlight it in the view area and in the spreadsheet
- Lets you build complex queries based on attribute data (query by example)
- Prints to a file
- Lets you add and delete records or fields
- Computes new fields based on existing fields
- Lets you zoom to a selected shape from the Attribute Manager
- Links attribute tables based on a common attribute

<u>Aggregate Attributes</u>

- Generate statistics based on pixel value or area by using the following functions: First, Last, Sum, Mean, Min, Max, Mode, Median, Standard Deviation, Ignore, and Weighted Average
- Produces a tabular result that is displayed in a new spreadsheet window in memory only

<u>Spatial Queries</u>

- Lets you query a layer to find vector features within a certain proximity to selected vector features
- Lets you select query results with the original selection, including:
    - Fully Within – selects all other shapes that fall completely within a selected shape or area
    - Partially Within – selects shapes that share at least one common vertex with a selected shape or area
    - Within Distance – selects shapes that fall completely or partially within a specified distance of a selected shape or area
    - Fully Within Distance –selects only shapes that fall completely within a specified distance of a selected shape
    - Crosses – selects all shapes that share at least one common vertex with a selected shape
    - Query By Example (QBE) - selects records that correspond to a set of criteria that you define

<u>Display Styles</u>

- You can display vectors in many ways with Focus, including:
- Default Representation:
    - Is automatically applied to each vector layer when it is opened
    - Can be used when no other representation style is applied to the layer
    - Is saved in a project file (.gpr) and is not portable
    - Can be customized using the Style Selector
- Internal Representation Mechanism:
    - Stores the vector representation internally in the PCIDSK file

- o Controls a simple representation by using the Representation Editor
- o Cannot be separate a representation from the PIX file or use it with another project or file
- Representation Style Table:
  - o Produces complex maps
  - o Creates multiple parts for one representation, each part with a level of priority (to the top)
  - o Links the RST with the attribute layer table
  - o Saves the RST separately (.rst), making it portable to other maps or projects
  - o Links the RST to any GDB-supported vector format

Editing Tools

You can edit image, vector, and bitmap layers and display color, line, style, thickness, fill color, fill pattern, font color, font, and point symbol with the following tools:

- Selection tools
- Vector Editing tools:
  - o Find
  - o Reverse
  - o Add Vertices
  - o Join
  - o Split
  - o Extend
  - o Merge
  - o Mirror Tools
  - o Rotation Tools
  - o Start Node
  - o Previous Vertex
  - o Midpoint of Segment
  - o Next Vertex
  - o End Node
  - o Show Vertices
  - o Vertices
- Line Drawing tools:
  - o Draw lines, perform freehand tracing, and add points
- Shape Drawing tools:
  - o Draw squares, rectangles, circles, ovals, polygons, and seed a polygon
- Text Editing tool:
  - o Place text in a vector layer
  - o Enable a more complex tool by attaching an RST to a vector layer
- Erase tool:
  - o Erase edits in bitmap layers and classification sessions
- Raster Editing tool:
  - o Replace pixel values in an image
- Spatial Query

DEM Editing

Digital elevation models (DEMs) may contain pixels with failed or incorrect values. You can edit a DEM to smooth out irregularities and create a more accurate model, and in turn, generate more accurate orthorectified images. For example, areas such as lakes often contain misleading elevation values;

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.
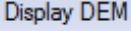
Page | 20

setting those areas to a constant value improves the model that will produce a more accurate representation of the lake in the ortho image.

Using the Focus DEM Editing window requires only a DEM; that is, a raster channel in a writable format. To fully use all the functionality available in the DEM Editing window, however, and to produce the best possible DEM, the DEM file should contain additional information. In particular, if the DEM file was extracted from epipolar images, you can make use of that imagery to help with your editing.

DEM files created using PCI technology contain extra information that facilitates DEM editing, including a cutline vector segment and file-level metadata.

The main toolbar on the DEM Editing window provides quick access to several functions that facilitate working with the DEM.

The following table describes the buttons on the DEM Editing toolbar:

Button	Label	Description
Display DEM	Display DEM	Toggles the display of the digital elevation model layer in the Focus viewer.
	DEM Display Options	Allows you to set display options for the DEM layer. Choose from: • *Grayscale Shaded Relief:* displays the DEM using grayscale hill-shading, where a top-left light source and the elevation values are used to cast shadows. • *Fixed Color Shaded Relief:* displays the DEM using colored hill-shading, where a top-left light source and the elevation values are used to cast shadows. Colors are interpolated across elevation values to give a smooth gradation of the colors. • *Dynamic Color Shade Relief:* displays the DEM using colored hill-shading, where a top-left light source and the elevation values are used to cast shadows. This option, the default setting, automatically re-renders the color display of the DEM as you pan or zoom across the viewer so that only the pixels currently being viewed are the basis of the colorization. • Contoured Color Shaded Relief: Displays the DEM using color hill-shading, where a light source and the elevation values are used to cast shadows. Colors are not interpolated, which provides crisp definition of the various contour intervals. DEM pixels that are within one interval will use the same color in the map. Typically, editing is most effective when the DEM is displayed as a *Dynamic Color Shaded Relief*.
	Enhancements	Allows you to apply enhancements to the images automatically loaded in the Focus viewer. Available enhancements are: • None • Linear • Root • Adaptive • Equalize

| Button	Label	Description
		• Infrequency • Tail Trim (toggle) • Exclude Min/Max (toggle) • Set Trim % Select the Auto Re-enhance option so that, as you pan across the data, the view is automatically refreshed in the Focus viewer to apply the selected enhancement.
	View DEM Polygons	Toggles the visibility of existing DEM polygons. If a Status layer exists, this option also displays polygons from that layer.
	Set View As Verified	Creates a status polygon using the full extents of the current display area and sets its status to *Verified*.
	Define Preview Region	Allows you to specify a rectangular region to be displayed in a separate viewer. After you define the preview region, the Full Res. Ortho Preview window opens, displaying a preview of the full-resolution ortho image computed using the modified DEM.
	Open FLY!	Launches the Geomatica FLY! application. FLY! uses the modified DEM and ortho imagery (when available) to allow interactive 3-D display. The FLY! view is centered on the current view, but is restricted to 4096 DEM pixels in x and y.
	Save	Saves the modified DEM and all other associated layers.
	Undo/Redo	Allows you to undo or redo previous actions.

Image Classification

All class information and setup is stored as metadata, which prevents the loss of any previous work. All layers used for classification are grouped into a metalayer in the tree. A metalayer has a number of options available in a context menu, including:

- Remove –removes the metalayer from the view pane
- Rename – renames the layer in the tree
- Configuration – lets you change the input, visible, training site, and output layers
- Edit PCT – lets you change the class colors
- Open Training Sites – lets you edit training sites
- Run Classification – lets you run classification processes using any of the supported algorithms
- Utilities – includes options for displaying the signature separabilities or the classification preview
- Post-classification analysis – lets you start any post-classification process, including: accuracy assessment, aggregation, class editing, and class labeling

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 22

Unsupervised Classification

- Includes Isodata, K-Means (minimum distance), and Fuzzy K-Means unsupervised clustering (255 classes and 16 input channels)
- Lets you specify ignored background values during classification or the number of samples to collect for performing the iterative clustering
- Lets you use a bitmap to include or exclude areas for classification

Supervised Classification

- Includes:
  - Parallelpiped and Parallelpiped with Maximum Likelihood Classification tie breaker (254 classes and 16 input channels)
  - Maximum Likelihood Classification with optional null class
  - Minimum Distance Classification based on Euclidean distance (256 classes, 16 input channels)
- Lets you use a bitmap to include or exclude areas for classification
- Lets you create signatures for a region under a mask using data from a set of image channels
- Lets you create new classes, import classes (from vector, bitmap, or signature), and merge classes
- Lets you create and edit graphic training sites using all of the New Shapes tools, including the polygon seeding function. Other training site editing options include:
  - Value – specifies a class value
  - Name – provides a name for each class
  - Color – lets you select a representation color for each class
  - Threshold –sets threshold values to reduce the chance of a pixel being classified into more than one class
  - Bias –weighs one class in favor of another to resolve overlapping between classes
  - Imported Signature –imports signatures to define class training sites
  - Description –provides a description of each class
  - Opacity – specifies the opacity to enhance training area displays
- Lets you analyze training sites, using:
  - Signature Separability – calculates correlation and covariance matrices using Bhattacharrya Distance and Transformed Divergence
  - Scatterplot – uses two specified image channels to display a scatter plot of the pixel distributions, letting you see where the majority of data values are concentrated
  - Signature Statistics – show the mean and standard deviation for each input channel under the class training area mask, using Correlation and Covariance matrices
  - Histograms –creates a signature histogram for a currently selected training site to show that the training site data is distributed normally
- Lets you generate a preview of the classification using any of the supported classification algorithms

Post Classification Analysis

- Accuracy Assessment
  - Generates area and percentage reports on classification results for the entire image or a specified sub-area
  - Generates confusion matrix reports
  - Generates user, producer, and overall accuracy reports, and kappa statistics
- Class Editing

- Combines several classes throughout the entire image or for all pixels under a bitmap mask
- Class Aggregation
    - Lets you edit class colors
    - Group classes into aggregates for entire image or under a mask
    - Generates pseudo-color tables
- Class Labeling
    - Lets you edit the class name, value, color, and description
    - Sorts the class information list in ascending order by value, name, color, or description

Map Production

- Lets you create cartographic maps in the same environment as the image and vector processing
- Lets you build a map structure with many "Areas" that show multiple themes or geographic regions
- Uses layer "Priority" to control the visibility of features in your map (that is, prioritize label layer on top, then line layer, polygon layer, and raster layer at the lowest priority on the bottom)
- Uses Default Representation
- Internal Representation Mechanism, and Representation style tables to control how map features look
- Creates numerous surround elements, including:
    - Neatline
    - Border
    - Grid – georeferenced or paper coordinates
    - Legend – for both imagery and vectors
    - Logo – import custom logos
    - North Arrow – 22 built-in styles
    - Scale bar – six built-in styles
    - Title/Sub-title
- Allows easy access to the style selector with visual previews
- Provides a Paragraph tool that adds multi-line descriptive text anywhere on a map layout
- Imports text from any ASCII file
- Provides easy adjustment of paragraph position, rotation, text, and style
- Provides streamlined workflow and the ability to add labels to thematic rasters
- Allows easy access of a single cartographic symbol, rather than many

Map Printing

You can print maps using Windows-native printer drivers to send a map directly to your configured printer. You can also:

- Separate colors for commercial printing using CMYK
- Print to the following file formats:
    - Adobe Illustrator (AI, EPS)
    - PCIDSK
    - TIFF
    - BITMAP
    - JPEG
    - JPEG 2000

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 24

o EMF

Algorithm Librarian

The Algorithm Librarian provides easy access to many robust algorithm modules for geospatial data processing and analysis.

The Algorithm Librarian lists modules by category and subcategory. You can also define categories and subcategories. The Find search tool performs intelligent keyword searches for individual tasks.

Functions Available in Geomatica Core

The following algorithms are available with Geomatica Core and can only be accessed through the Algorithm Librarian.

- ADAPT – Adaptive PCT Maker
- ADJDEM – Adjust DEM using Surface Fit
- ANG – Angle of Incidence from Elevation
- ARE – Elevation Data Area under Bitmap
- AREAREPORT – Generate an area report
- AREAXTAB – Generate an area cross tabulation export
- ARI – Image Channel Arithmetic
- ARICONST – Image Channel + Constant Arithmetic
- ARRREAD – Read an Array of Numbers from a Text File
- ARRWRIT – Write an Array Layer to a Text File
- AUTOMER – Automatic signature merging
- AUTOREG – Image-Lock Data Fusion Registration
- AVG – unsupervised texture segmentation
- AVHRCOR – automated geometric correction
- AVHRPANO – panoramic correction
- AVHRRAD – radiometric correction and calibration
- BBT – Bitmap to Bitplane Transfer
- BIT2LINE – Convert a bitmap layer to a line layer
- BIT2POLY – Convert a bitmap layer to a polygon layer
- BLO – Bitmap Logical Operations
- BURNMASK – Burn masks into raster layers
- CAR – Constraint Analysis Report
- CDALOS – Reads ALOS imagery from a LGSOWG format CD
- CDASAR – Read ASAR Imagery from a CD Format
- CDASTER – Read ASTER Imagery from a CD Format
- CDCBERS – Read CBERS-1 imagery from TIFF format CD
- CDDMC – Read DMC imagery from a TIFF format CD
- CDEROS – Read EROS Imagery from an EROS Format CD
- CDFORMOSAT – Read FORMOSAT Imagery from a CD Format
- CDIKONOS – Read IKONOS Imagery from a CD Format
- CDLAND7 – Read LANDSAT7 Imagery from a CD Format
- CDMERIS – Read MERIS Imagery from a CD Format
- CDMODIS – Read MODIS Imagery from a CD Format
- CDOV – Read OrbView Imagery from a CD Format

- CDQB – Read QuickBird Imagery from a CD Format
- CDSAR – Read ERS/RADARSAT Data from a CD Format
- CDSAT – Read satellite imagery from a CD
- CDSH – CD Source Header Listing
- CDSPOT5 – Read SPOT 5 Imagery from a CD Format
- CHNSEL – Channel Selection
- CIB – Clear Image Bitplanes
- CLIP – Clip layers from a dataset based on a user-defined clip region
- CMPRSS8 – Compress a 24-bit Image to 8-bit
- CNTGTHMR – Creates a contiguous thematic raster
- CONTOUR – Contour Generation from Raster Image
- CPMMSEG – Copy math model layer
- CRCENTROID – Creates centroids for vector layer
- CRCHN16S – Create 16-bit signed channels
- CRCHN16U – Create 16-bit unsigned channels
- CRCHN32R – Create 32-bit real channels
- CRCHN8U – Create 8-bit unsigned channels
- CRNEAT – Create a neatline
- CROSSMOD – Image Cross Correlation
- CRPROJ – Create an OrthoEngine Project
- CRTHMR – Create thematic raster from vector data
- CSE – Class Signature Editor
- CSG – Multiple Signature Generator
- CSR – Class Signature Reporter
- DCWREAD – Read the Digital Chart of the World
- DECORR – De-correlation Stretch
- DEMWRIT – Write DEM to a Text File
- DEMZREF – Convert DEM elevation reference (Mean Sea Level <-> Ellipsoid)
- DESATUR – Desaturate an image
- DIEST – Estimation Procedure for Spatial Data Integration
- DIGRP – Groups Data Layers for Spatial Data Integration
- DSTRIPE – Image Destriping
- EDGE – Edge detection filter
- EDMATCH – Perform edge matching on vector layers
- ERRDIFF – Compress Image with Error Diffusion
- EXPORT2KML – Export to Google Earth KML or KMZ
- FAV – Averaging (Mean) Filter
- FCONT – Upward/Downward Continuation Filter
- FED – Edge Detection Filter
- FFREQ – Frequency Domain Image Filter
- FGA – Gaussian Filter
- FLTRNOI – Filter Noisy Bands
- FME – Median Filter
- FMO – Mode Filter
- FPR – Programmable Filter
- FPRE – Prewitt Edge Filter
- FRD2P – Reduction to Pole Filter

- FSHARP – Sharpening Filter
- FSOBEL – Sobel Edge Filter
- FTF – Frequency Transforms Forward
- FTI – Frequency Transforms Inverse
- FUN – Image Enhancement via Functions
- FUSE – Data fusion for RGB images
- FUSEPCT – HIS data fusion for pseudo-color imagery
- FUZCLUS – Fuzzy K-Means Clustering
- FVDIF – Vertical Differentiation Filter
- GCD – Global Change Detection
- GCPELEV – GCP Elevations from a DEM
- GCPEXPORT – Export GCPs from an OrthoEngine project file
- GCPFOOT – GCPs conversion foot/meters
- GCPIMPORT – Imports Ground Control Points from a GCP segment into an OrthoEngine project file
- GCPPRO – GCP Transformed by Projection
- GCPREAD – Read GCP Points in a GCP Layer
- GCPREP – Ground control point segment report
- GCPWRIT – Write GCP points to a text file
- GNG – Gaussian Noise Generation
- GRATGRID – Generates a graticule or grid
- GRATIC – Generate a LONG/LAT Graticule
- GRDINT – Vector Grid Interpolation
- GRDVEC – Vector Encoding
- HIS – Histogramming Database Image
- HISDUMP – Image Histogram Export
- HOM – Homogeneous Classification
- IHR – Read Database Image Header
- IHS – RGB to IHS conversion
- ILLUMCAST – Illumination map and cast shadow mask
- IMAGECOS – Trigonometric cosine of raster data
- IMAGEINV – Arithmetic inverse of raster data
- IMAGELG2 – Arithmetic natural logarithm of raster data
- IMAGELN – Live Link to BSQ/BIL/BIP Image File
- IMAGENEG – Arithmetic negation of raster data
- IMAGERD – Non PCIDSK to PCIDSK Image Transfer
- IMAGESIN – Trigonometric sine of raster data
- IMAGESQR – Arithmetic square root of raster data
- IMAGESUM – Arithmetic summation of raster data
- IMAGEWR – PCIDSK to Non PCIDSK Image Transfer
- IMGFUSE – image fusion
- IMGLOCK – image locking
- IND – Index Analysis
- IPG – Image Polygon Growing
- ISOCLUS – Unsupervised Clustering via ISODATA method
- KCLUS – K-Means Clustering
- KNN – K-Nearest Neighbor Supervised Classifier

- LACD – Adaptive Change Detection
- LINE – Lineament Extraction
- LINE2PNT – Convert a line layer to a point layer
- LINE2POLY – Convert a line layer to a polygon layer
- LINE2RAS – Convert a line layer to a raster
- LINE2TLINE – Convert a Line Layer to a Topological Line Layer
- LRP – Image Line Replacement
- LUT – Image Enhancement via Lookup Table
- LUTREAD – Read LUT from a Text File
- LUTREP – Lookup Table Segment Report
- LUTWRIT – Write LUT to a Text File
- MAL – Mallat wavelet transformation
- MAP – Database Bitmap to Channel Encoding
- MAT – Matrix Analysis
- MATCH – Histogram Matching LUT
- MERGPROJ – Merge OrthoEngine Projects
- METAIN – Import Image Metadata
- METAOUT – Export Image Metadata
- MINDIS – Minimum Distance Classifier
- MLC – Maximum Likelihood Classifier
- MLR – Maximum Likelihood Report
- MODEL – Modeling Program
- MOSAIC – Image Mosaicking
- MTE – Martin-Taylor Enhancement
- MTEXTRD – Read text from a file to a segment
- MTEXTWR – Write text from a segment to a file
- NDVI – Compute NDVI from AVHRR data
- NGCLUS – 8-bit Narendra-Goldberg Clustering
- NGCLUS2 – Multi-bit Narendra-Goldberg Clustering
- NNCLASS – neural network classification
- NNCREAT – neural network creation
- NNREP – neural network report
- NNTRAIN – neural network training
- NUM – Database Image Numeric Window
- NUMREAD – Read Image Data from a Text File
- NUMWRIT – Write Image Data to a Text File
- OEMODEL – Export Math Model using a Project File
- OLO – Overlay Logical Operation
- ORBITRD – Read Orbit Segment from a Text File
- ORBITWR – Write Orbit Segment to a Text File
- ORTHO – Generate Orthorectified Image
- PCA – Principal Components Analysis
- PCE – Pseudo-color Encoding
- PCTFUS – IHS data fusion of two input PCT images
- PCTINT – Pseudo-color Table Interpolation
- PCTMAKE – Make a Pseudo-color Table
- PCTREAD – Read PCT from a Text File

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics.
PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 28

- PCTREP – Pseudo-color Table Segment Report
- PCTWRIT – Write PCT to a Text File
- POG – Polygon Information Report
- POL – Polynomial Test Image Generation
- POLY2BIT – Convert a polygon layer to a bitmap layer
- POLY2LINE – Convert a Polygon Layer to a Line Layer
- POLY2PNT – Convert a polygon layer to a point layer
- POLY2RAS –Convert a polygon layer to a raster
- POLYMODEL – Generate a polynomial model
- PROCONV – Projection Conversion Report
- PROREP – Georeferencing Layer Report
- PROSET – Set Georeference Layer
- PRX – Proximity Analysis
- PSGIMAG – Image Perspective Scene Generation
- PSGMESH – Mesh Perspective Scene Generation
- PSIQINTERP – Convert complex data
- PWLUT – Piece wise contrast stretch
- PWLUT2 – Piece wise contrast stretch
- PYRAMID – Build Image Overview Pyramids
- RANDBIT – Generate Random Bitmap Sample
- RAS2BIT – Convert a raster layer to a bitmap layer
- RAS2LINE – Convert a Raster Layer to a Line Layer
- RAS2PNT – Convert a raster layer to a point layer
- RAS2POLY – Convert a Raster Layer to a Polygon Layer
- RAS2THMR – Convert a Raster Layer to a Thematic Raster
- RCSTATS – Generate Row/Column Statistics
- REC – Create a Repcode-LUT Layer
- REDUCE – image channel reduction
- REG – Image Registration
- REGUT – Image registration with user defined transformation
- REPROJ - Reprojection
- RESAMP – Resample data to a new file with a different resolution
- RGB – IHS to RGB Conversion
- RGB2PCT – Compress Image with a PCT
- RGBFUS – IHS data fusion of two input images
- ROT – Database Channel and GCP Rotation
- ROTBIT – Bitmap Rotation
- RTR – Ratioing Transformation
- SCALE – Image Gray Level Scaling and Quantization
- SCIWRIT – PCIDSK to SCITEX HandShake Disk File Transfer
- SETELEV – Set Elevation for Vector Layer
- SIEVE – Sieve Filter (Class Merging)
- SIGCLAS – Maximum likelihood classifier
- SIGMERG – Class Signature Merging
- SIGSEP – Signature Separability
- SKYVIEW – Sky Visibility from Elevation data
- SLASP – Slope and Aspect from Elevation data

- SMBOYLE – Boyle smoothing on a vector layer
- SMCHAIKEN – Chaiken smoothing on a vector layer
- SMMCMASTER – McMaster smoothing on a vector layer
- SPLREG – Scatterplot linear regression equation
- SPOTBLUE – Generate simulated blue band for Spot data
- SST – calculate sea surface temperature
- STE – Stereo Image Pair from Elevation Data
- STR – Image Contrast Stretch
- SUBPROJ – Extract Sub-Project
- TASSEL – Tasselled cap transformation
- TEXREAD – Read Text from a Text File
- TEXREP – Text Report
- TEXWRIT – Write Text Segment to a Text File
- THMR2RAS – Convert and thematic raster to a raster layer
- THR – Thresholding Image to Bitmap
- TIG – Test Image Generation
- TILE – Tiles Input to Create Multiple Subset Files
- TININT – TIN raster interpolation
- TLINE2LINE – Convert a Topological Line Layer to a Line Layer
- TPEXPORT – Export TP from OE Project File to a Text File
- TPIMPORT – Import Tie Points Record from a Text File
- TPOLY2POLY – Convert a Topological Polygon Layer to a Whole Polygon Layer
- TPSMODEL – Thin plate spline model generation
- UNMIX – linear spectral unmixing
- USUPCLAS – Unsupervised classification
- VDEMINGEST – Ingest vector files
- VDEMINT – Grid DEM from Vector Layers
- VECAPPEND – Append vectors from one segment to another
- VECAREA – Add area and perimeter to vector segment
- VECCLEAN – Vector layer cleaning
- VECMERG – Merge Database Vector Segments
- VECREG – Vector Registration (Warping)
- VECREP – Vector Report
- VECSEL – Vector Selection
- VECTHIN – Vector layer thinning
- VECZREF – Convert Vector Elevation Reference (Mean Sea Level <-> Ellipsoid)
- VEGINDEX - Compute vegetation indices
- VREAD – Read Vector Data from a Text File
- VSAMPLE – Sample Image Along Vectors
- VWRITE – Write Vector Data to a Text File
- ZVALTRNS – Transfer a Z-Value To or From a Shape via an Attribute

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics. PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 30

OrthoEngine

Geomatica Core includes simple geometric correction and mosaicking capabilities through OrthoEngine. For more advanced orthocorrection and automation, you will need to purchase additional functionality through PCI's Geomatica add-on modules.

Polynomial and Thin Plate Spline Math Models

The Polynomial and Thin Plate Spline math models are used to perform geometric correction on your data. The Polynomial Math Model is a simple math model that uses a first-through-fifth-order polynomial transformation, which is calculated on two-dimensional ground control points and mathematically produces the best fit set of two-dimensional GCPs on an image. The Thin Plate Spline Math Model is a simple math model in which all collected ground control points are used simultaneously to compute a transformation. The warping is distributed throughout the image with minimum curvature between the GCPs becoming almost linear away from the GCPs.

Importing Images

You can import GDB-supported satellite images from a CD or digital distribution format (See the GDB technical specification sheet for more details about supported formats)

Ground Control

OrthoEngine satellite models support GCP and tie-point ground controls.

GCP Collection

Select one of the following ground-control sources:

- Manual entry
- A geocoded image
- Geocoded vectors
- A chip database
- An imported text file

Other GCP features include:

- Easy access from multiple sources
- Reference Image Table displays all images with specified ground coordinates
- Stereo-GCP collection
- Converts GCPs to check points to exclude from model calculation
- Displays individual and overall RMS error for GCPs

Tie-Point Collection

- Extends ground control over areas without GCPs
- Identifies how images in a project relate to each other
- Ensures the best fit for all images in a project
- Lets you enter elevations for each tie point manually or extract them from a DEM
- Allows you to import and export tie points using several different formats
- Shows individual and overall RMS errors

Residual Report

Using residual reports, you can:

- Display GCPs, check points, tie points, and stereo-GCP error information in one report
- Represent residuals with graphical vector representations for visual analysis
- Adjust vector colors and representation
- Edit points in a residual report and update bundle adjustments
- Display residuals in ground or image coordinates
- Print the report to a file

Project Summary Information

Raw Image Summary Table

A summary of information about all of the images in your OrthoEngine project can be viewed in the Raw Image Summary Table window. This window provides information about the following:

- Total number of images in the project
- Total number of ground control points (GCPs), tie points (TPs), and check points (CPs)
- Image-specific information, including image ID, GCPs, TPs, CPs, root mean square (RMS) error, number of overlapping pairs connected by TPs, number of potential overlapping pairs that could be connected by TPs, and the percentage of all overlaps connected by TPs

The Raw Image Summary Table provides you with a dynamic view of your project, allowing you to better target your quality assurance efforts to achieve your desired project requirements.

Image-specific information is displayed in tabular format. The tabular contents can be sorted, making it easier for you to analyze the data in your project and identify areas on which to focus your quality assurance activities.

The Raw Image Summary Table window displays both active and inactive images in your project. You can activate and deactivate one or more of the images in your project using the check box column. An active image is included in any processing you want to do on your project. When you deactivate an image, it is still in your project, but is excluded from processing. You can also activate and deactivate images in the Project Overview window.

Project Overview

The Project Overview window provides a graphical display of the raw images in your project, while the Raw Image Summary Table lists all pertinent information in table format. You can use both windows together to gather relevant information about each image in your project, allowing you to better target your quality control efforts and manage your project.

By default, the Project Overview window displays centers of each raw image in project. You can choose to display image centers, geocoded vector footprints, and/or thumbnails of the imagery. You can also toggle the display of ground control points, tie points, and check points, as well as Image and Point IDs, for all images or for selected images only.

Note: When the Raw Image Summary Table is open, the Project Overview window displays the current image with a yellow border and its image ID.

This viewer helps users to better assess their project using a graphical overview. It also includes some simple tools to assist in project management like:

- Ability to display reference imagery or vectors
- Rotating the kappa of the input imagery
- Measurement tools

Geometric Correction

Geometric Correction:

- Lets you perform batch processes
- Increases working cache for processing
- Increases sampling interval for faster processing
- Offers the following resampling methods:
  - Nearest Neighbor
  - Bilinear Interpolation
  - Cubic Convolution
  - 8-pt Sin X/X
  - 16-pt Sin X/X
  - Average filter
  - Median filter
  - Gaussian filter
  - User-defined filter
- Clips the image size upon geometric correction
- Lets you set a starting time for processing

Mosaicking

Mosaicking lets you detect and remove image brightness variations and radiometric color balancing between images to minimize the visibility of seams in the mosaic.

With the release of Geomatica 2018 the mosaicking process is now done completely outside of the OrthoEngine product. The "Mosaic" processing step now includes a single icon, which will open the Mosaic Tool application.

Mosaic Tool

With Mosaic Tool, you create high-quality mosaics. You can remove hot spots (areas of distortion), create cutlines, perform color balancing, and much more.

The Geomatica Core user will be able to complete a manual mosaicking process using the Mosaic Tool.

This includes the following capabilities:

- Define a mosaic area
- Preview your mosaic before it is generated
- Import and export cutlines
- Manually edit cutlines
- Blend seams using Blend Width
- Specify image Z-ordering
- Perform manual color balancing on individual images, or all images
- Perform manual color balancing:

- o Based on samples identified in the overlap between images
- o Based on match areas of any size and shape
- o Based on histogram matching
- o By adjusting the dark end or light end
- o By editing mean and sigma value for each image (global adjustments)
- o By editing dodging points created by the bundle colour method (localized adjustments)
- Perform image normalization
- Mosaic unreferenced images when seamless imagery is required and no ground control is available
- As you inspect the quality of your mosaic and edit images needing changes, you can assign a status to each image. The image status can be either verified or unverified. By default, images are classified as unverified.
- Customize how the Mosaic Tool handles certain features:
  - o Setting cursor options
  - o Setting default RGB options
  - o Setting mosaic WYSIWYG options
  - o Setting vector editing options
  - o Setting selection options

FLY!

FLY! is a powerful terrain visualization tool that drapes imagery and vectors over DEM data to create 3-D perspective scenes in near real-time. An intuitive point-and-click user interface lets you control flight speed, direction, elevation, and perspective parameters interactively during flight. With FLY!, you can quickly and easily view imagery in 3-D from any position or perspective. FLY! also allows rendering in anaglyph 3-D mode and includes fogging effects.

Loading Data

- Full-color visualization: three color channels are required (one red, one green, and one blue)
- Gray-level visualization: one channel is required
- 8-bit pseudo–color:
  - o One channel is required
  - o Uses imagery such as 8 bit TIFF, BMP, and SPANS files
- Shaded gray-level or full-color visualization: specifies the direction and inclination of the light source
- True vector overlay: all GeoGateway vector formats are supported

Visualization Controls

- Change Position/Speed/Direction: lets you modify the viewing position as well as the speed and movement direction with provided values
- Change Render Size: lets you specify the size of the rendering window with provided values or by interactively resizing the display
- Change Perspective:
  - o Modify the perspective parameters of the rendered image with provided values
  - o Exaggerate terrain with Height Magnification
  - o Vary horizon position, in degrees, with Horizon Tilt
  - o Control the size of foreground pixels with Pixel Zoom
  - o Control the view cone used in the rendered image with Field of View
- Change 3-D:

- o Modify the parameters that control 3-D viewing with provided values
  - o Specify the focusing point, in pixels, with Focal Length
  - o Specify the distance between the left and right images with Base Line
- Control Panel: lets you set and report parameters related to the view position, direction, elevation, and speed
- Coordinates: lets you choose a position reporting system:
  - o In pixels and lines in the loaded terrain with Display
  - o In geocoded units as eastings and northings with Geocoded
  - o In geographic units as longitude and latitude with Geographic
- Units: lets you choose a reporting unit for distance and speed in metric or imperial values
- Speed Options:
  - o Lets you determine the range of speed values (minimum value is always 0) with Speed Maximum
  - o Lets you determine the type of scale used to translate the range value to an actual speed with Scaling
- Elevation Options:
  - o Determine the range of elevation values with Elevation Minimum and Elevation Maximum
  - o Determine the type of scale used to translate the range value to an actual elevation with Scaling
  - o Choose how the flight moves over the surface of the terrain with one of the following Mode options:
    - ▪ No Collision – rendering height is never allowed to occur below the land elevation
    - ▪ Relative – the view elevation is the land elevation plus the value of the elevation scale
    - ▪ Absolute – the elevation scale value is used directly as the rendering height

Nadir View

- Shows the overhead (nadir) view of the terrain
- Shows the current position in the nadir view as a black and white marker; the extension on the marker indicates the current move direction
- Zooms imagery in the nadir view
- Controls position and direction of flight by using the mouse:
- Clicking in the nadir view places the viewer at that location on the terrain
  - o Right-clicking changes the movement and viewing directions to point to that location
  - o Center-clicking changes the view direction only
  - o Lets you toggle between views of the nadir terrain imagery or elevation
- Shows and edits flight path

Rendering

Rendering Window

You can use the mouse to turn, pause or run, and change elevation quickly and naturally.

- Left Button changes the direction of viewing (new direction faces the position clicked on in the rendered image
- Middle Button toggles between pause (stop) and run (go)
- Right Button changes the elevation proportional to the position of the mouse cursor in the vertical direction

Fogging mode

The Fogging mode lets you simulate a fogging effect in rendered scenes.

Render Mode

FLY! offers the following rendering modes:

- Normal 2-D perspective color mode
- Anaglyph 3-D mode to render in true 3-D using anaglyph glasses
- SGI workstation rendering allows for full color true 3-D flight with liquid crystal stereo glasses

Rendering Quality

You can specify the quality of the rendered images from the following options.

- Blocky – each pixel appears as a box with pronounced steps between pixels
- Fitted – the edges of the pixels are interpolated so they fit without any step effects
- Smooth – the edges of the pixels are interpolated so they fit without any step effects and the colors of the pixels are blended smoothly

Flight Path Creation

- Lets you create a flight path from several specified nodes
- Stores the position, direction, speed parameters, and perspective parameters for each node in a flight path
- Lets you edit flight path nodes: the path is composed of a series of Bezier Splines made to fit through the nodes
- Lets you view the total length of the current flight path; the flight playback includes forward, reverse, and continuous playback, which flies the path repeatedly
- Lets you create a movie loop by writing out the flight path as a series of individual image frames (TIFF, TARGA, BMP, PPM, and JPEG formats).

Saving Data

You can save terrain renderings to an image file on disk in a variety of supported formats. When saved to disk, rendered scenes can be imported or printed by other software packages.
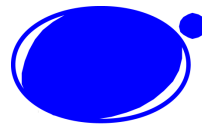
For more information, contact

PCI Geomatics
90 Allstate Parkway, Suite 501
Markham, ON L3R 6H3
Canada

Phone: 1 905 764 0614
Fax: 1 905 764 9604
Email: info@pcigeomatics.com
Web: www.pcigeomatics.com

〒 101-0021
東京都千代田区外神田6丁目2番8号 松本ビル
TEL: 03-3833-8201   FAX: 03-3833-8203
E-mail: product_info@infoserve.co.jp
URL: http://www.infoserve.co.jp

The information in this document is subject to change without notice and should not be construed as a commitment by PCI Geomatics.
PCI Geomatics assumes no responsibility for any errors that may appear in this document.

Page | 36