

Feature Collection in ERDAS IMAGINE

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Introduction

In photogrammetry, the term “feature collection” generally refers to the extraction of 3D information from an oriented stereo pair of images. 3D information usually consists of points, lines, and polygons with locations stored in three-dimensional XYZ coordinate space. Ancillary information, such as annotation or data attributes, may also be collected and documented during the feature collection process.

Feature collection may be performed for a variety of reasons. In general, feature collection can be referred to as “mapping,” as it involves measuring natural and/or manmade objects on the surface of the earth. Specific applications involve national mapping agencies, defense, engineering, GIS, and 3D city modeling. These applications are discussed in further detail below. A general prerequisite for 3D feature collection is an oriented stereo pair: two or more images that have been triangulated. Triangulation allows for stereo viewing and, therefore, precise 3D measurement.

Hexagon Geospatial offers multiple applications within the ERDAS IMAGINE product line for performing 3D feature collection tasks. These include **PRO600**, **Stereo Analyst® for ERDAS IMAGINE® (SAfi)**, and **Stereo Analyst® for ArcGIS® (SAfA)**. All three applications allow for stereo compilation and attribution.

Problem Statement

PRO600 is a MicroStation Development Language (MDL) application that operates in a MicroStation environment. Residing in the MicroStation CAD environment allows PRO600 to make use of MicroStation’s vector and 3D tools. PRO600 is closely coupled with IMAGINE Photogrammetry Stereo, which provides the stereo viewing environment. PRO600 is commonly launched from IMAGINE Photogrammetry, although an IMAGINE Photogrammetry license is not an explicit requirement for PRO600 to run. 3D features are typically collected in the MicroStation DGN format.

PRO600 is most commonly used for precise measurement, when engineering-level accuracy is required. It is a frequent choice for national mapping agencies, state-level organizations such as DOTs, and commercial mapping firms. It is nearly exclusively used for work with airborne imagery, and that imagery is typically large-scale.

The application’s main purpose is to map features such as buildings, roads, and other surface features. The editable feature definition library gives users full control over defining the types of features they are mapping and their characteristics. Experienced users enjoy the high level of control they can exercise over the production process with PRO600.

PRO600 provides the link between MicroStation and IMAGINE Photogrammetry Stereo. MicroStation design file graphics are visualized in full 3D using the IMAGINE Photogrammetry stereo viewer. Coordinate measurements in X, Y, and Z provide input to the active editing tool in MicroStation. PRO600 can be used to provide a stereo editing environment for any MicroStation add-on.

PRODTM provides a variety of tools that can be combined to create productive workflows for terrain modeling applications. Terrain models can be generated by direct measurement. Existing models may be edited and refined using the vector features in the MicroStation design file. PRODTM operates on all terrain file formats supported by IMAGINE Photogrammetry.

In summary, PRO600 is geared towards high-volume production applications, where precision and speed of operation are critical in the success of a project.



Stereo Analyst® for ERDAS IMAGINE®

Stereo Analyst® for ERDAS IMAGINE® (SAfl) is an add-on module to **ERDAS IMAGINE®**. SAfl is a robust product that can be used for extracting features in a stereo environment. It is not integrated with IMAGINE Photogrammetry Stereo, but it does have its own stereo viewing environment. The power of SAfl lies in its easy-to-use tools and GIS data collection capabilities. Unlike PRO600, satellite imagery is frequently used as source imagery for SAfl projects. Airborne imagery is fully supported as well.

SAfl can collect both 2D and 3D data from a variety of input imagery sources. It is typically used by GIS users, and one of its powerful distinguishing features is its ability to transform 2D GIS vector data into 3D, which can then be further edited to increase accuracy. SAfl is a frequent choice for government and commercial users that need to construct accurate 3D city models. SAfl's Texel Mapper allows users to map 2D textures onto Stereo Analyst-derived 3D models. Texture from imagery can also be pasted onto the surfaces of 3D models, which allows for more realistic-appearing final products. SAfl is also commonly used for defense mapping applications.

For defense customers, SAfl is used for 3D modeling (usually to feed ERDAS IMAGINE's 3D viewer) and for simple GIS collection. Defense customers may also use SAfl to perform stereo point checks and drops for accuracy analysis and intelligence graphics.

In summary, SAfl is for GIS professionals and those in the defense community requiring a 3D data extraction tool. It can be particularly effective for city modeling applications and texturing applications.

Stereo Analyst® for ArcGIS®

Stereo Analyst® for ArcGIS® (SAfA) is an extension to **ArcGIS by ESRI**. SAfA fits seamlessly into the ArcGIS environment and makes use of ArcGIS' robust vector editing environment for manual feature collection from stereo data. SAfA automatically inherits ESRI's format and multi-user topological editing support. Production Line Tool Set (PLTS), an advanced feature extraction extension from ESRI, will work with SAfA as well as customer-developed editing tools that are Z-aware. It also supports collection from satellite and airborne sources, including the ADS sensor.

SAfA includes a set of importers that will transform existing 2D data into 3D. It has an advanced snapping environment that allows users to define the snapping target and type on a per-layer base. It also includes a user-configurable feature cache. Both features are extremely important to the main markets of national and defense mapping, where projects tend to have extremely large and high-density feature counts.

Hexagon Geospatial offers a suite of tools that work with Stereo Analyst for ArcGIS. ERDAS Terrain Editor for ArcGIS allows for editing terrain in the ESRI Geodatabase format. A second module, FeatureAssist for ArcGIS is aimed at the assisted feature collection of complex roofs and creation of 3D models for visualization.



Comparison Chart

Function	PRO600	Stereo Analyst for ERDAS IMAGINE	Stereo Analyst for ArcGIS
Platform	MicroStation	ERDAS IMAGINE	ArcGIS Desktop
Collects Shapefiles Natively		x	x
Supports 3D Object Texture		x	
CAD-Integration	x		
GIS-Integration		x	x
Terrain Integration	x		x

Vertical Markets

- PRO600: Production mapping, DOTs, national mapping organizations, users with CAD-based systems
- Stereo Analyst for ERDAS IMAGINE: Defense markets, 3D city modeling, GIS users, users requiring a low-cost solution (no third-party software requirement)
- Stereo Analyst for ArcGIS Desktop: Production mapping, national mapping organizations, users standardized on the ESRI platform solution

2D Feature Collection

ERDAS IMAGINE Essentials[®] supports creating and editing 2D vector files. A set of standard tools are available from the viewer vector tools menu for feature creation and editing of a layer. One of these standard tools is **IMAGINE Easytrace**[™], a 2D assisted feature collection tool that speeds collection by reducing the number of clicks needed to fully capture a linear feature (such as a road) or polygonal boundary (such as the edge of a land cover parcel or lake). In the first clicks, a template for the feature is captured. As the rest of the feature is captured, the software predicts points as the mouse is moved over the feature or as seed points along the feature are collected. The software intuitively fills in the gaps between points, reducing the need for the user to be completely accurate with every click of the mouse.



Conclusion


The ERDAS IMAGINE product line offers plenty of options for performing 3D feature collection tasks and optimizing the overall workflow. Feature collection is an essential step in a variety of industries, but especially in those that often need to perform topographic mapping, land surveying, and height measurement. Defense, engineering, farming, forestry, and utilities industries all make use of mapping in some way and would benefit from many of the products discussed. PRO600 is excellent for users on the Microstation platform for CAD; it offers precise, accurate measurement, so it is often the choice for national mapping agencies, state-level organizations such as DOTs, and commercial mapping firms. Stereo Analyst[®] for ERDAS IMAGINE[®] (SAfI) is most appropriate for extracting features in a stereo environment, so it is most often applied in defense mapping. It is also an excellent tool for city modeling and texturing. Stereo Analyst[®] for ArcGIS[®] (SAfA) is for users on the ArcGIS platform and is particularly important to the main markets of national and defense mapping for its ability to perform manual feature collection from stereo data and handle extremely large and high-density feature counts. All three applications allow for stereo compilation and attribution.



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About Hexagon

Hexagon is a global leader in digital solutions that create Autonomous Connected Ecosystems (ACE). Our industry-specific solutions create Smart Digital Realities™ that improve productivity and quality across manufacturing, infrastructure, safety and mobility applications.

Hexagon's Geospatial division creates solutions that visualize location intelligence. From the desktop to the browser to the edge, we create ACE that bridge the divide between the geospatial and the operational worlds.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 20,000 employees in 50 countries and net sales of approximately 4.3bn EUR. Learn more at [hexagon.com](https://www.hexagon.com) and follow us @HexagonAB.

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