

# Geospatial Modeling & Visualization

A Method Store for Advanced Survey and Modeling Technologies

[GMV](#) [Geophysics](#) [GPS](#) [Modeling](#) [Digital Photogrammetry](#) [3D Scanning](#) [Equipment](#) [Data and Projects by Region](#)

## Scanning

[Airborne Scanning](#) | [Mid-Range Terrestrial Scanning](#) | [Close-Range Scanning](#)

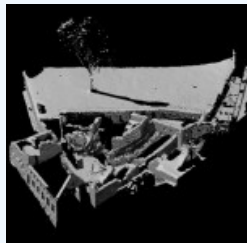
### Featured Tips and Tricks

[Tips for Breuckmann Scanning](#)



### Featured Dataset

[Temple of the Condor](#)



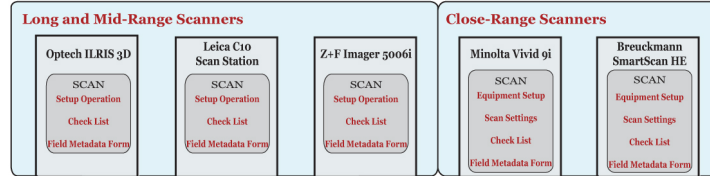
3D scanners allow for a large number of measurements to be collected across the surface of a structure, landscape or object, resulting in a dense three-dimensional digital data file that accurately portrays surface features. The data collected are an accurate mapping of the surface which cannot be obtained as easily or as accurately by traditional surveying or other recording

techniques. The resulting 3D model provides investigators with the means to study and analyze the scanned site, structure, or object. It further provides a "digital copy" of the subject that can be revisited as the site or object changes over time. The benefits of this virtual means of measurement go beyond its very significant presentation value by contributing to design of better sampling strategies, enhancement of scholarly analysis, and potential improvement of interpretation. The Center has an exceptional inventory of high performance scanners. There are [five 3D scanners](#). Three of these are mid to long range units - an Optech ILRIS, a Leica C10, and a Z+F 5006i - and two are short range - a Breuckmann smartSCAN HE and a Minolta Vivid 9i. CAST also provides access to a suite of [software](#) for processing and visualization. In addition to extensive work with close- and mid- range scanning, CAST researchers are working with the [Arkansas NCRS](#) on the [Bayou Meto lidar survey](#), a project using airborne laserscanning to map very low relief areas in Southern Arkansas.

Click on the image below to activate the interactive guide. Links to specific examples and articles will become clickable upon zooming.

# 3D SCANNING

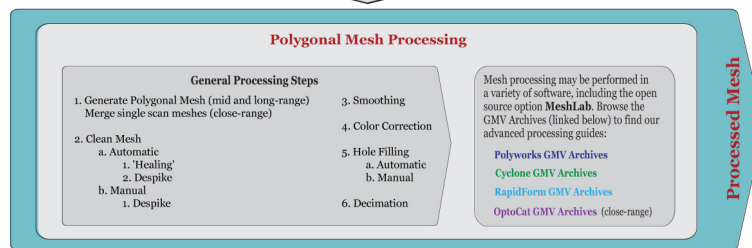
## 1. Data Collection



## 2. Basic Processing



## 3. Advanced Processing



## 4. Derived Data

**NOTE:** There are many methods for deriving data from point clouds and meshes. The links below are intended to introduce you to a few examples of these methods but should not be considered a comprehensive listing.

**Examples of Deriving Visualization Values**

Write values such as CURVATURE & ROUGHNESS to vertices for export in MeshLab in [CloudCompare](#)

**Examples of Deriving Geometric Models**

from Point Clouds

- 2D Geometric MODELS in Cyclone in [CloudWorx](#)
- 3D Geometric MODELS in Cyclone in [CloudWorx](#)

from Polygonal Models

- 2D Geometric MODELS Example in [RapidForm](#)
- Check the GMV Archives for examples in Polyworks in [OptoCat](#) (close-range)
- 3D Geometric MODELS Example in [RapidForm](#)
- Check the GMV Archives for examples in Polyworks in [OptoCat](#) (close-range)

## Looking at the Data

**Viewing and Basic Measurements**

Simple viewing and taking basic measurements are some of the first ways you might begin Looking at the Data

**Free Viewers (See Comparison)**

- [Polyworks IMView](#)
- [RapidForm Explorer](#)
- [Leica Cyclone-VIEWER](#)
- [MeshLab](#)
- [Adobe Reader](#)
- [Bentley Pointools](#)

**Proprietary Software**

- [Polyworks PF Edit](#)
- [RapidForm](#)
- [Cyclone](#)
- [OptoCat](#)

**Data Visualization (Display Options)**

Adjustments to Display Options (such as the visibility of surface color values or the angle at which shadows are projected) in scanning software allows for examination and analyses through visualization

Display options and preferences should be explored in each software that you use

**Animations and 2D Images**

Another common way to look at data is through creating Animations & 2D Images for viewing outside the native point cloud software

Animations and 2D images may be created in a variety of software including **Polyworks, RapidForm, Cyclone, & Pointools**

**Data Set Comparison**

As processes are applied to the data, you might begin comparing results from different processes and software as well as to the original data

Comparing 3D models in [RapidForm](#)

Comparing 3D models in [CloudWorx](#)

Data may be compared in a variety of other software including **Cyclone, MeshLab & CloudCompare**

## Defining Meaning in the Data

**Semantic Model Feature Identification and Attribution**

Through the identification and attribution of features in your 3D model, you can turn a collection of x, y, z coordinates into a meaningful semantic model. Semantic information tells the viewer information such as "this is column." The options for conveying this information are shown on the right.

**Semantic Attributes**

Semantic Attributes are text that define your features (going beyond simple graphic annotation). The text can range from a note, markup or measurement in the data that is tied to an attribute in a spatial relational database.

See a discussion of software options for semantic attribution here

**Subset geometric feature**

Features can be defined through subsetting the points or triangles that comprise a feature such as the "column."

**Extract geometric feature**

New geometries such as "column" CAD models can be extracted from subset features.

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