

# IMAGINGLAB 3D LIBRARY

Preliminary  
Beta Available: Oct 2011  
Release 1.0: Dec 2011

## The 3D Industrial Machine Vision Library for NI LabVIEW

### OVERVIEW

The ImagingLab 3D Library for LabVIEW (based on the porting of the AQSENSE SAL3D library) provides a set of tools to acquire and process 3D COP (Cloud Of Points) directly within the National Instruments LabVIEW environment.

The ImagingLab 3D Library is an hardware independent software architecture therefore compatible with:

- Laser triangulation
- Time of Flight (ToF)
- Structured light
- Stereo vision
- Any other hardware device capable of outputting a COP

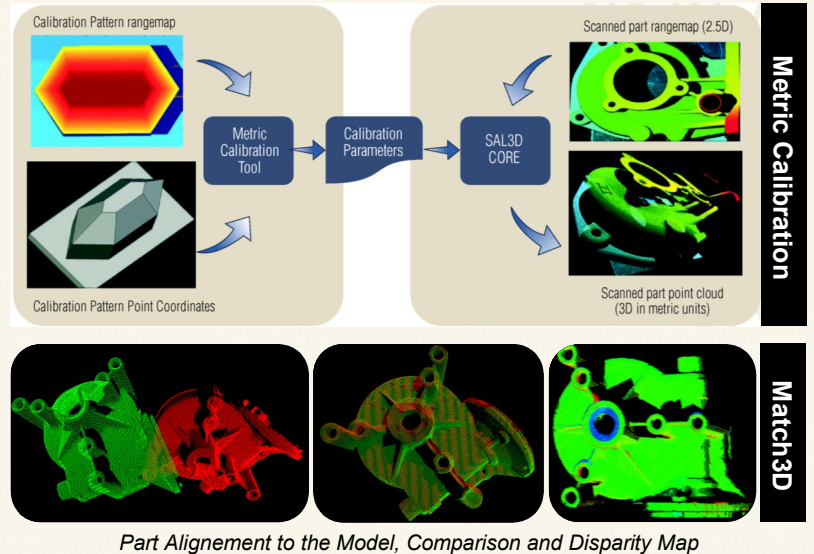
The 3D Library offers speed, accuracy, and reliability to machine builders, equipment manufacturers, system integrators and other end users demanding maximum flexibility and customization in their vision systems based on LabVIEW.

By using calibrated ZMap extracted from the COP the 3D Library can be linked seamlessly to the NI 2D Machine Vision Software for further features extraction.

The Library is particularly suited to laser triangulation profile acquisition and can be easily integrated into industrial robotics applications by means of the ImagingLab Robotics Library (available for different brands of industrial arms).



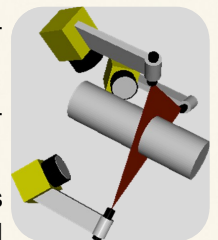
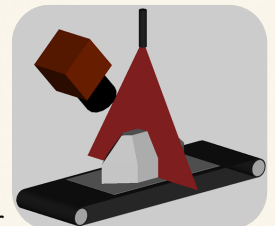
Developed in collaboration with AQSENSE



### FUNCTIONALITIES

The library offers following functionalities:

- Accurate light stripe / peak detection
- Support for both linear and angular scanning
- Easy and fast profiles merging
- Metric calibration for linear and angular scanning
- Primitives for geometric measurements
- Ultra-fast 3D Matching and Alignment for pose determination and dimensional control
- Integration of multiple 3D views into a single mesh
- Easy visualization of range maps, COPs and Z-Maps by means of standard and customized LabVIEW Front Panel objects.
- Compensation for lens distortion



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## USING THE 3D LIBRARY

The ImagingLab 3D Library installs as a palette of functions in LabVIEW.

Most of the acquisition hardware available on the market can already be controlled via LabVIEW and used to generate a rangemap (for instance a set of 3D laser profiles).

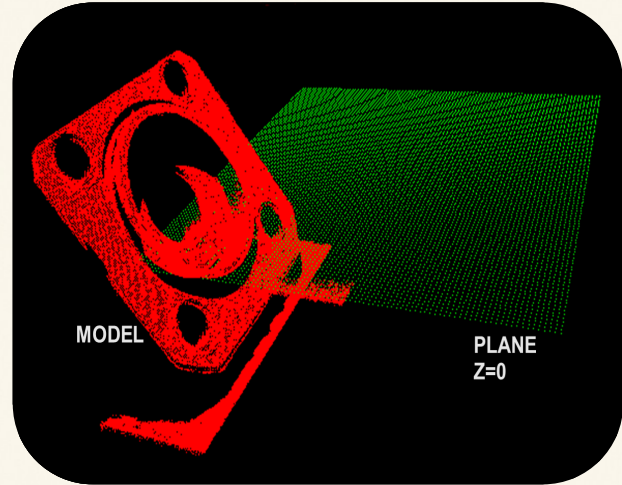
By means of metric calibration the rangemap is transformed into a COP consisting of a set of organized 3D points. Unlike the rangemaps, the COP values correspond to metric coordinates.

COP Object consists on three planes, one for each metric coordinate (x, y and, z).

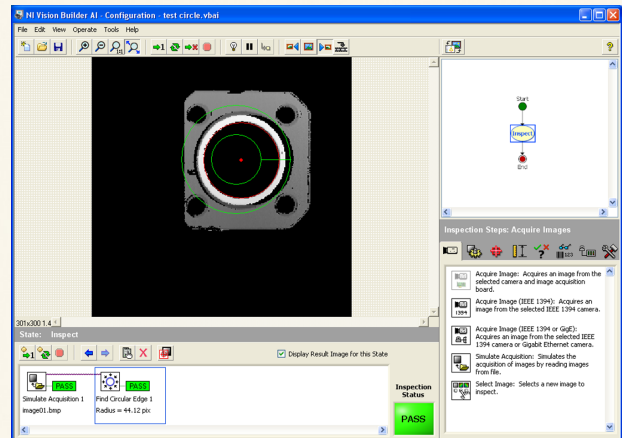
It is now possible to extract a 2D ZMap referred to a specific plane in the 3D space.

A ZMap consists of a planar projection of a COP onto the Z plane, originating a matrix of floating point values containing the metric values of the Z coordinate (represented in the displayed images as grayscale values), and set of ZMap scaling factors.

The floating values 2D grayscale image so obtained is now fully compatible with the NI 2D Machine Vision Software. An example of a feature extraction (for instance a circle) is illustrated.



COP Alignment  
on a Z plane



Feature Extraction  
(Find Circle in NI VBAI)

## FASTER APPLICATION DEVELOPMENT

LabVIEW is a graphical programming environment used by millions of engineers and scientists to develop sophisticated measurement, test, and control systems using intuitive graphical icons and wires that resemble a flowchart. Because the ImagingLab 3D Library works with LabVIEW, engineers and scientist who are not 3D experts can now quickly integrate this technology into their applications and systems alongside with other NI tools for vision.

