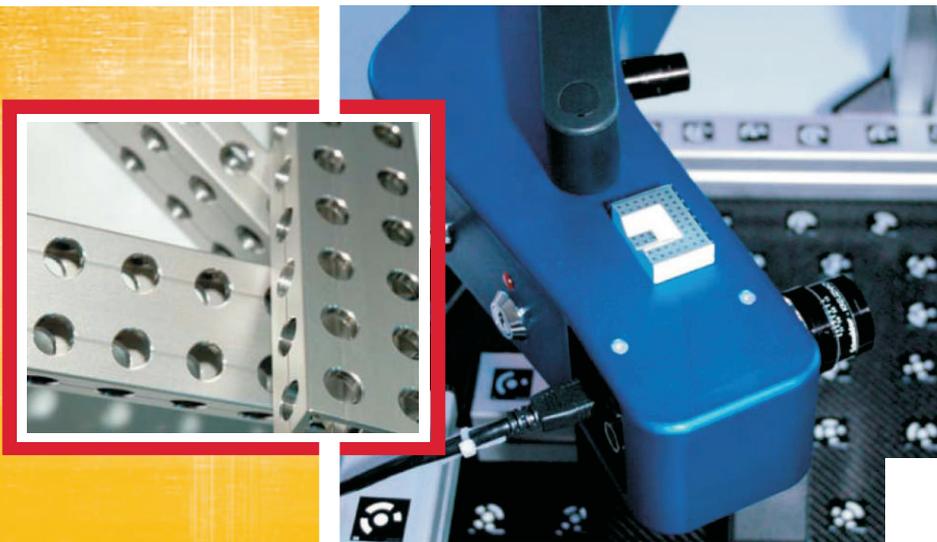


HALCON

in Industrial Applications

3D Calibration for Inspection Stereo Camera System Eases Highly Precise Measurement



Features

- Inspection
- 3D camera calibration
- Measuring

Industries:

Automotive | Iron, Steel and Metal |

Application Areas:

Precision Engineering
Inspection | Position Recognition |
Measuring | 3D Calibration

If one wants to precisely effect 3D measurement of industrial components, the non-contact measurement via stereo images is a good option. Specially for these purposes, the SOLVing3D GmbH (Garbsen near Hanover in Germany) has developed its camera system PrOMPT.stereo. This robust and compact hardware equipment can be used as a mobile measurement device, or alternatively it can be integrated in existing plants, e.g., for 100% inspection.

The device is composed of a robust aluminium frame (Figure 1) with changeable camera racks for a wide range of different cameras used in industry (Allied Vision Guppy, Marlin, Oscar; Baumer TXD; IDS uEye; Prosilica GC; Sony XCD V50, XLC X700, XLC 5000, XC HR57/58). All cameras can be accessed by the integrated machine vision software based on MVTec's HALCON.

The smooth exchanging of the camera racks is part of the system. Optionally, the system provides racks for laser devices to project lines and crosses in different executions. The exchanging of lenses enables the variation of the volume of interest from 70x50x20 up to 390x290x200 mm³. The precision of measurement ranges from 2 µm up to 20 µm.

This high accuracy (1: 10,000) can be achieved by the highly precise system calibration. Caused by newly developed 3D calibration bodies and a special mathematic model, the calibration is not only highly accurate but also easy to handle. An assistant leads through the calibration process, therefore also unskilled users can handle it.

The entire image processing is based on the operators and algorithms of MVTec's machine vision software library HALCON. One special feature of the processing software is its robust point operator that not only detects marks but even precisely appoints boreholes under reflected light. The automation & assembly technologies GmbH, Bremen (Germany), employs the system for such borehole measurements in complex welded automotive assemblies (Figure 2). By inclusion of the stereo geometry for interpretation and intelligent image processing routines, boreholes can be measured by definition of only one point. During the teaching modus, this point has only to be approximately marked, the exact measurement of the 3D position and the diameter are automatically effected. Moreover, during the fully-automated inline mode, the measurements are completely controlled by the program. The target/actual comparison is executed under position- and rotation-invariancy by steric transformation. Thus, a precise positioning or guidance of the objects is not necessary.

The cameras are delivered with precision lenses from Schneider-Kreuznach and different sensors with up to 6 mega pixels. Optionally, white, red, or infrared ring-lights as well as structured laser-lights are available. Furthermore, a high-end version of the PrOMPT.stereo camera system for up to 100 Hz recording frequency can be received.

Among the referred example of the borehole measurement, the Continental Automotive Systems (Hanover, Germany) employs the PrOMT.stereo camera system for deformation measurement of pneumatic shock absorption devices. Furthermore, within the scope of crash tests the system software is used by the Volkswagen AG (Wolfsburg, Germany) to calibrate high speed cameras upgraded to a stereo camera by a mirror device (Figure 3).



Figure 1: PrOMT.stereo camera system with a small calibration body for a volume of interest of 0.1 liter (on top of the blue aluminium box)



Figure 2: Boreholes in a welded automotive assembly

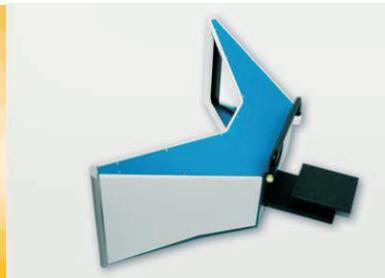


Figure 3: Stereo camera mirror device 3D-CamSplitter

About HALCON

HALCON is the comprehensive standard software for machine vision with an integrated development environment (IDE) that is used worldwide.

HALCON leads to cost savings and improved time to market: its flexible architecture facilitates rapid development of machine vision, medical imaging, and image analysis applications.

HALCON provides outstanding performance and a comprehensive support of multi-core platforms, MMX and SSE2, as well as GPU acceleration. It serves all industries with a library of more than 1600 operators for blob analysis, morphology, matching, measuring, identification, and 3D vision, to name just a few.

HALCON secures your investment by supporting a wide range of operating systems and providing interfaces to hundreds of industrial cameras and frame grabbers, including GenICam, GigE Vision, and IIDC 1394.

► More information: www.halcon.com