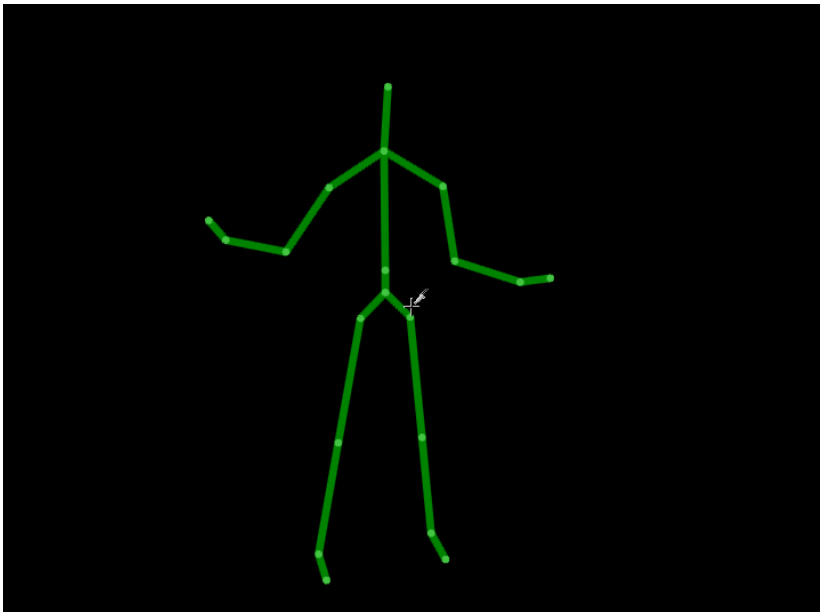
3D Applications

This paper will give a brief overview of some of the more commonly used 3D applications.

Human Tracking



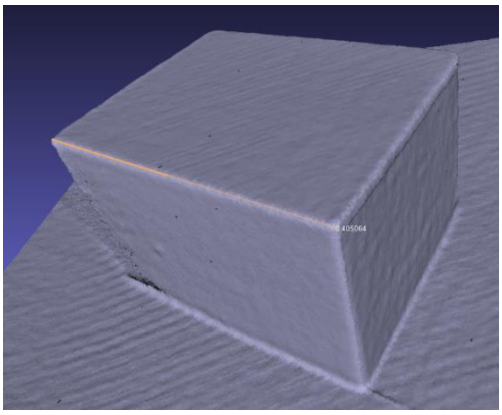
SAFETY: If a robot and human are in the same working areas, the robot needs to recognize human position and movement.

HUMAN MACHINE INTERFACE: Hand gesture or body gesture may be necessary to control equipment

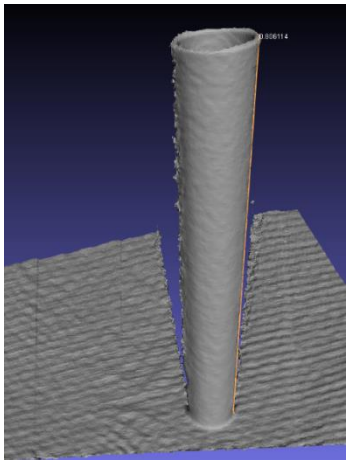
SECURITY: Video surveillance applications

QUALITY/PERFORMANCE: Robot arm tracking/positioning

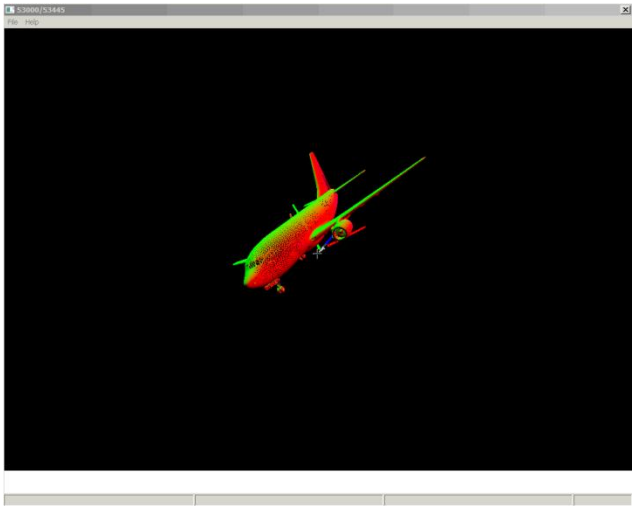
Metrology



QUALITY: Taking measurements in 3D is more robust and repeatable.

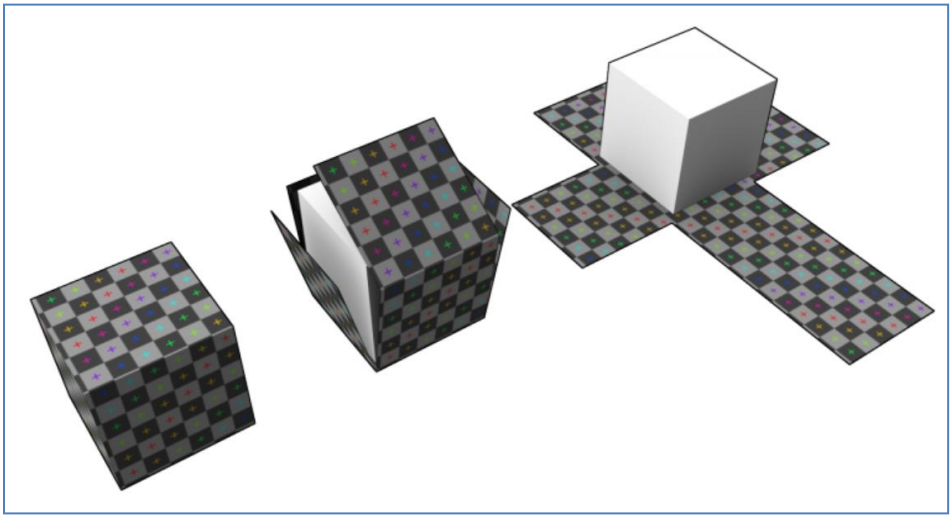


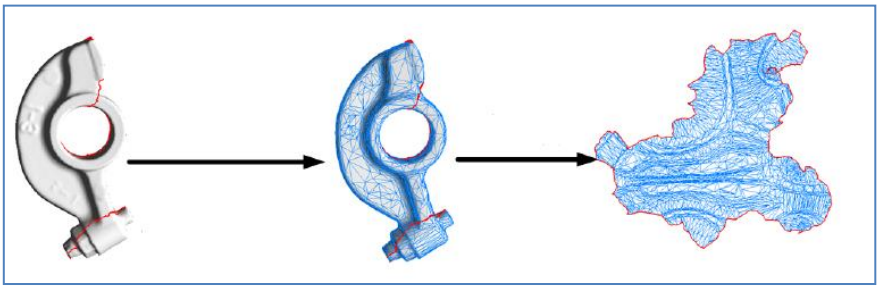
3D Reconstruction



VIEWING: Tilt, Pan, Zoom, Rotate the 3D object in a viewer

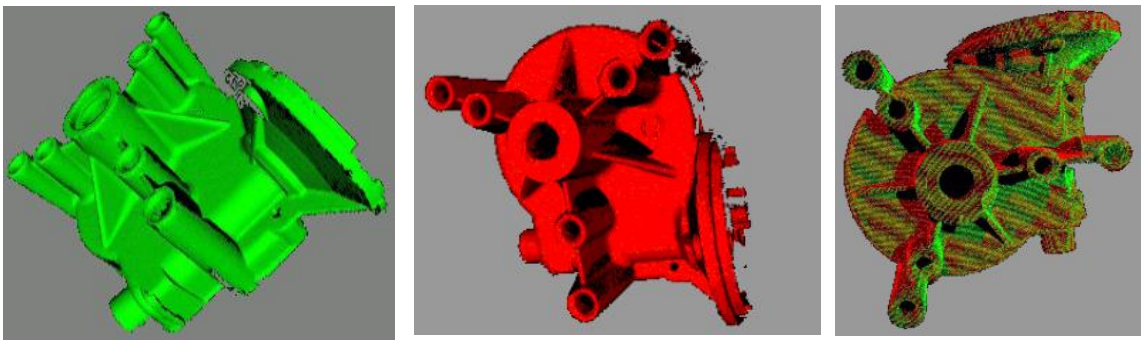
3D to 2D – UNWRAPPING: Perform Analysis on 2D sections of a 3D object



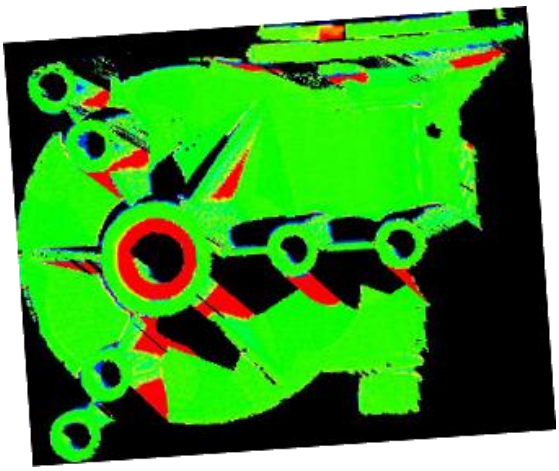


3D to 2D – UNWRAPPING: Flatten out 3D to 2D map of an object for analysis

Change Detection



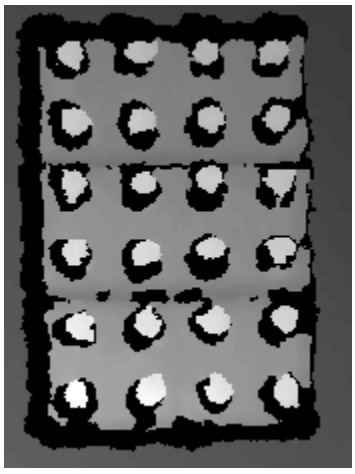
The example above shows a green template or model of the part, a red part that has been scanned in. The image on the right is where the red and green images are registered, or aligned together in 3D space.

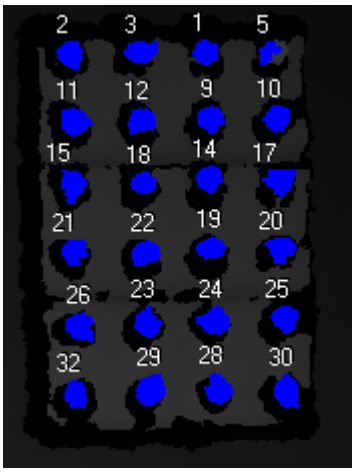


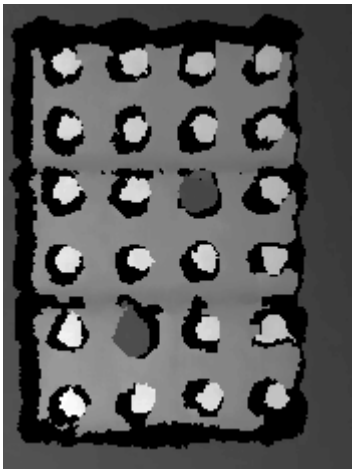
Once the part is aligned with the template, change detection can be performed to assess changes or differences between the template and the part.

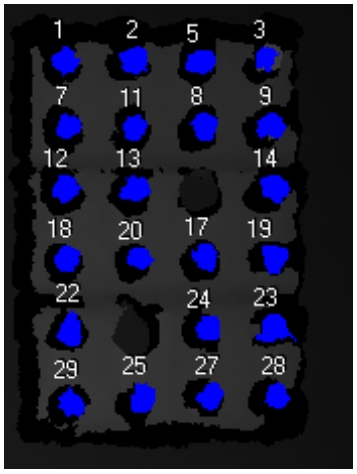
Counting

While counting can be achieved using 2D, the level of complexity dramatically reduces when using a depth map from a 3D camera. The image on the left is 2D of a case of bottles, whereas the image on the right is a depth map of the bottles. It is very easy to find the bottles.









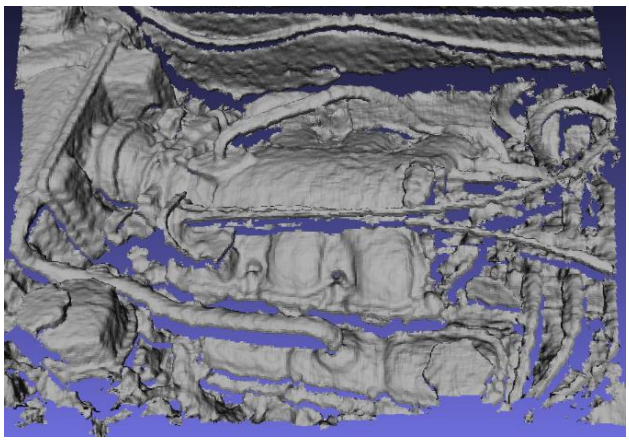
It is also very easy to report that there are missing bottles as shown in the example to the left.

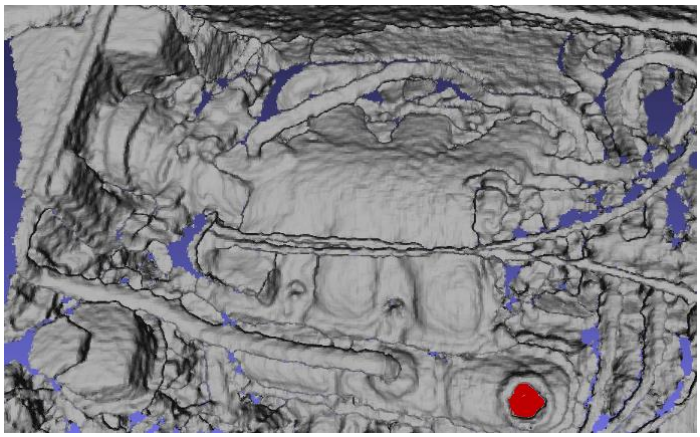
Reverse Engineering

3D is used commonly to reverse engineer a part. Once scanned in, a 3D image can be measured, evaluated, and converted to a CAD drawing.

Parts Presence

In this example, an oil cap is missing from a Chrysler Pacifica engine block. In the 3D images below, the left image shows the cap in place, whereas the image on the right recognizes that the cap is missing and colorized the area red.





These are just a few of the applications where 3D imaging can beneficial. More and more companies are recognizing the ***value added*** that 3D provides to their more challenging machine vision applications. The key challenge to companies is to finding the right solution - sensors, lighting, lens, processing and tools to get their solution up and running for the lowest amount of cost in this fast evolving area of technology.