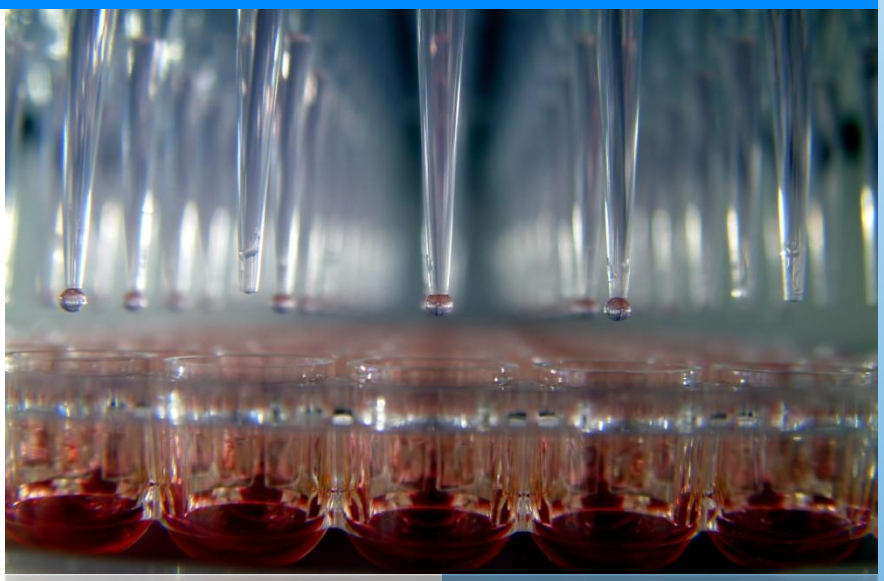
APPLICATION NOTE

Open eVision™
Image Analysis Tools

Application sample – Clinical Analysis



Customer Operations Department

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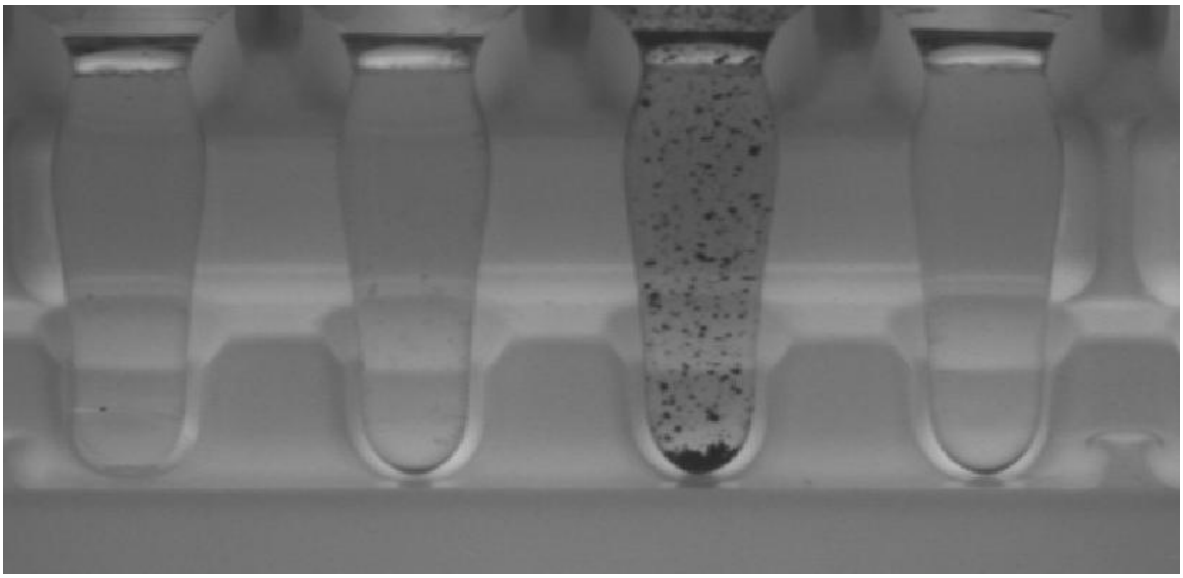
Introduction

It is quite common in clinical laboratories to analyze the reaction of blood plasma samples to test reagents for the determination of substances presence or deficiency. The result of the analysis will then help to diagnose the clinical case.

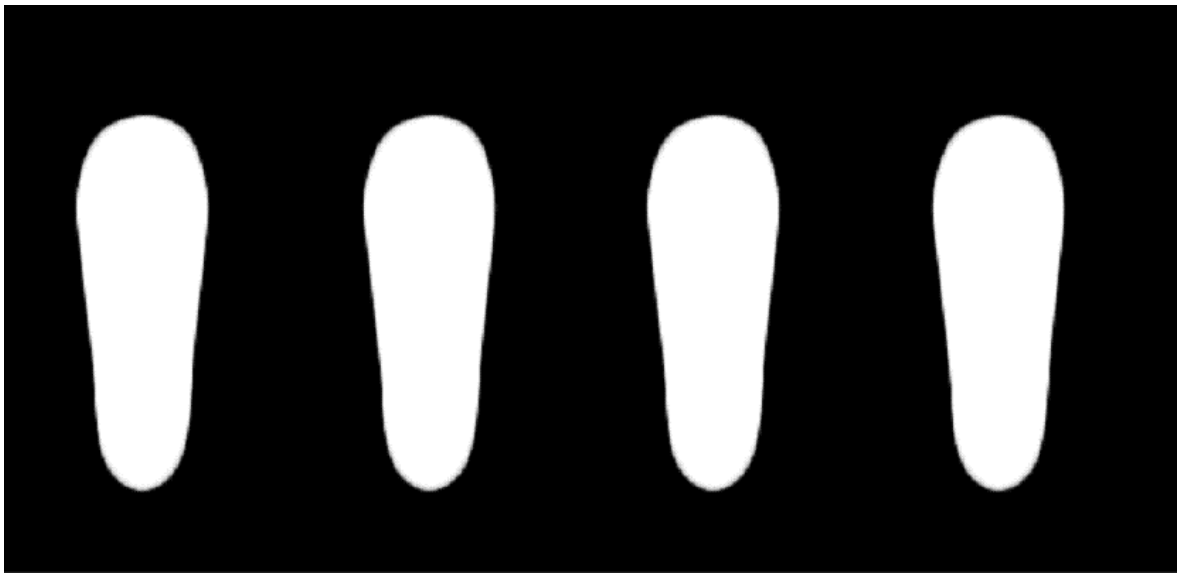
The objective of this application sample is to demonstrate how to detect the reaction of human blood plasma to given test reagents using Open eVision tools. The inspection is based on images featuring four test tubes, containing Reagent 1 to Reagent 4 respectively. The blood plasma sample has been applied to each test tube and its reaction is observed. Any bubbles, discoloration or particles indicates a positive reaction to a reagent.

To run this sample, the EasyImage, EasyGauge, and EasyObject licenses are required.

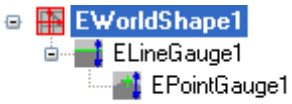


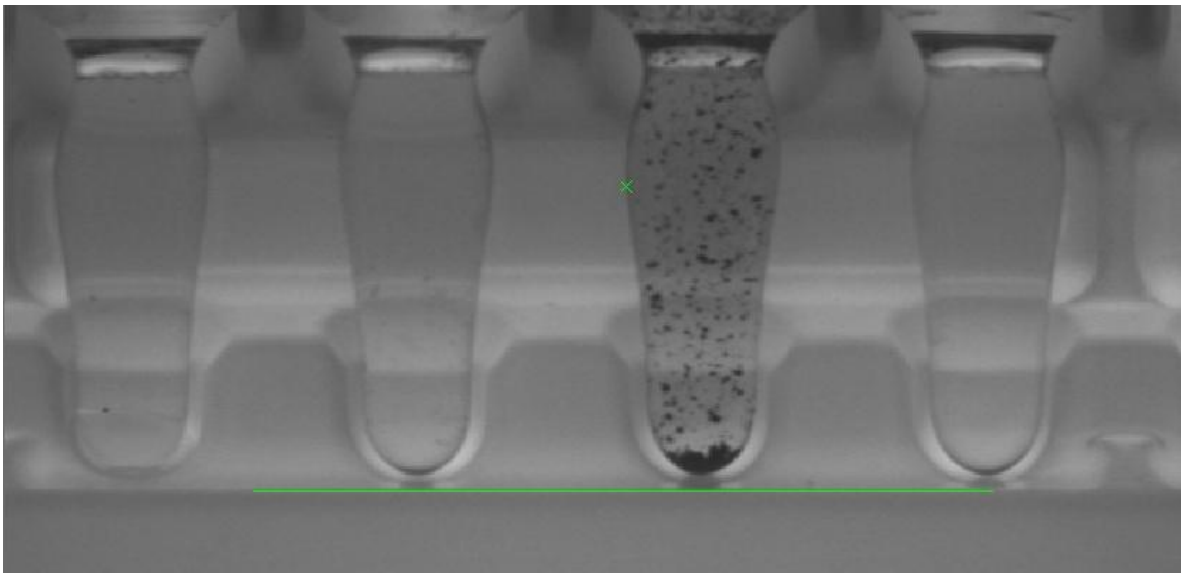
Initialization

The inspection mainly relies on the usage of a flexible mask to restrict the image analysis to the test tubes only. The flexible mask has been created beforehand based on a reference image. Only the white areas of the flexible mask will be processed. The flexible mask image is loaded prior to the inspection.



As the position of the test tubes may vary from one image to another, the flexible mask must be realigned accordingly. To register the position of the test tubes accurately, a combination of ELineGauge and EPointGauge is used. The ELineGauge detects the tubes mounting base line and measures its rotation angle. The EPointGauge detects the third tube left edge. The angle and the point coordinates values retrieved for the reference image are used as reference data.
The corresponding EasyGauge model file is loaded prior to the inspection.

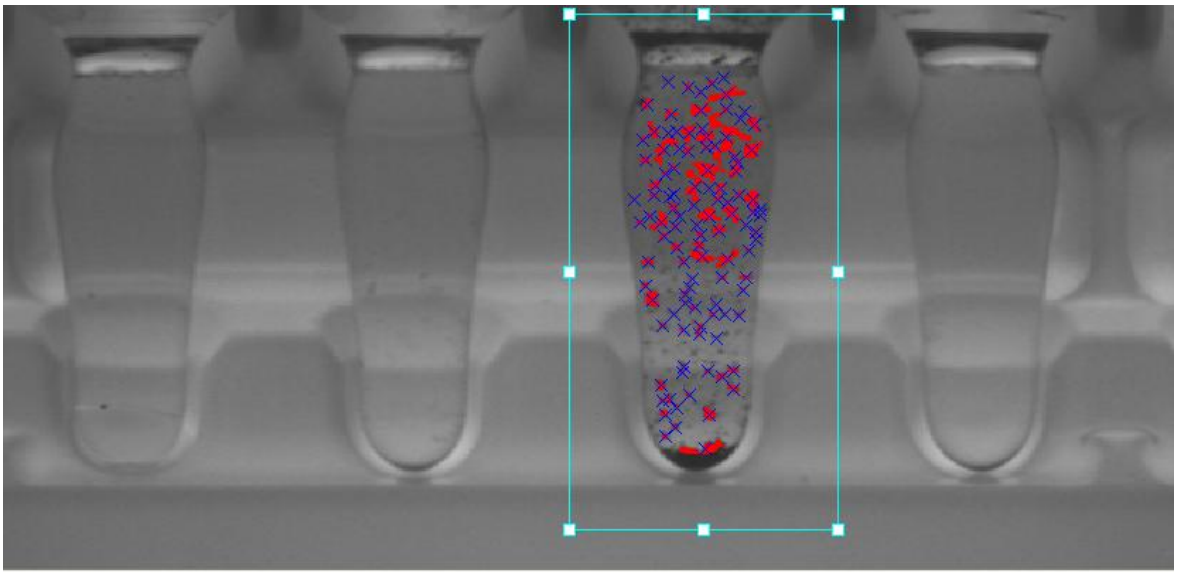




Inspection

The first inspection step consists in aligning the flexible mask with the image under test. Thanks to the ELineGauge and EPointGauge tools, the orientation and the position of the test tubes are retrieved. These results are compared with the reference data. The flexible mask is then realigned accordingly by means of the EasyImage ScaleRotate method.

Once the flexible mask has been accurately positioned, the EasyObject library is used to detect the presence of bubbles, discoloration or particles inside the test tubes. As each reagent exhibits a different reaction, each tube is tested separately with different parameters or pre-processing. An ROI is positioned around each test tube sequentially.



In case of Reagent 1, which exhibits a bubble reaction, some pre-processing is required to reveal the bubbles. WhiteTopHatDisk, Median filtering and ECannyEdgeDetector operations are performed before the blob analysis.