

Dynamic Imaging Based Particle Analysis
&
The Application of this Technology for the
Analysis of Mammalian Cells

Presentation Outline

Dynamic Imaging Principle

Image Retrieval – Hardware

Image Analysis – Software

Application of Technology to Analysis of Mammalian Cells

Vision Based Particle Sizing Basic Principle

JM Canty's vision based technique works on the basic principle of presenting the product between a high intensity light source, and microscopic camera

The captured images are then sent to Cantyvision Client Software for analysis, where they are measured under a number of different size & shape parameters (major axis, minor axis, area, perimeter, circularity, aspect ratio....)

The software can then output user defined particle size distribution and particle concentration information

Image Retrieval - Hardware

JM Canty's vision based systems are made up of 3 critical components;

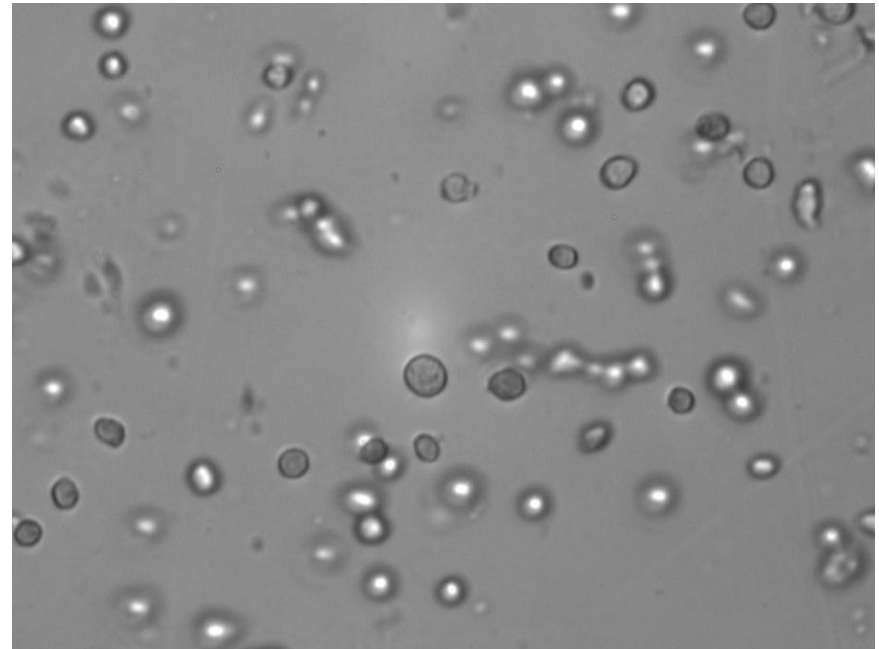
- CCD Ethernet Camera
- Flow Path between two Canty fused glass pieces
- Canty High Intensity Light Source

Image Retrieval – Hardware – CCD Camera

Gigabit Ethernet technology for optimum image retrieval

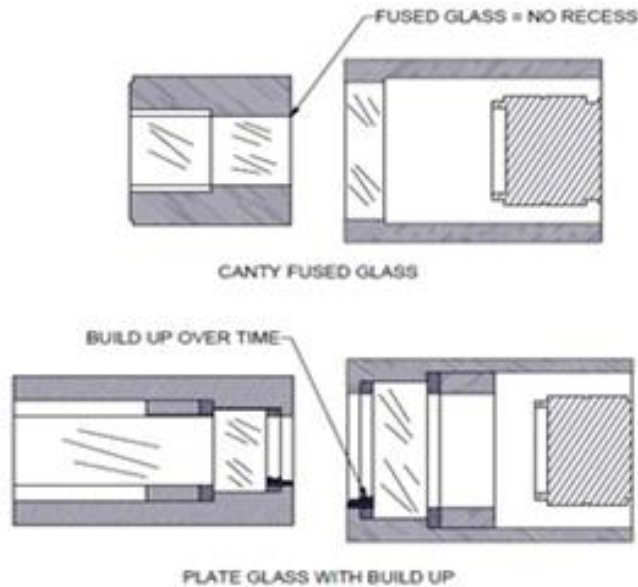
Simple RJ45 Network Connection to control PC

Possible to analyse suspended particulate as small as $0.7\mu\text{m}$



Mammalian Cells

Image Retrieval – Hardware – Fused Glass Technology



Fusion of glass to metal – one piece construction

Hermetically sealed one piece construction means no recesses or gaps where product can adhere to and start to build up

Image Retrieval – Hardware – Lighting System

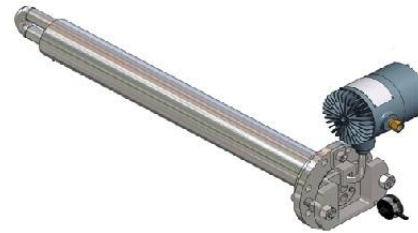
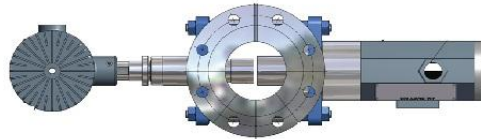
High Intensity Halogen light source – greater magnification possible

Cold light output – no unaccounted for heat source which may affect cell behaviour

Cold light output – no build up



Image Retrieval – Hardware – System Options



A different system is used depending on where the measurement is to be taken
(Lab TruFlow, InFlow , Particle Probe, Small Scale Reactor)

Each system contains lighting, flow gap, and camera

Each system contains identical optics* which allows for easy correlation between
lab & online analysis

Image Analysis – Software –Cantvision Client

The Cantvision software identifies particle within the retrieved images through grayscale thresholding.

These images are binarised by the Cantvision software

These images are analysed through pixel counting and the application of a pixel scale factor to provide information on different size shape and concentration parameters

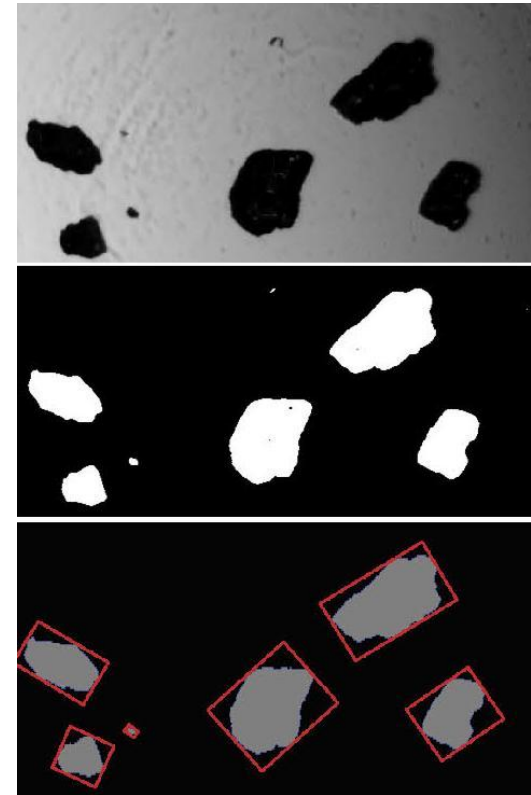
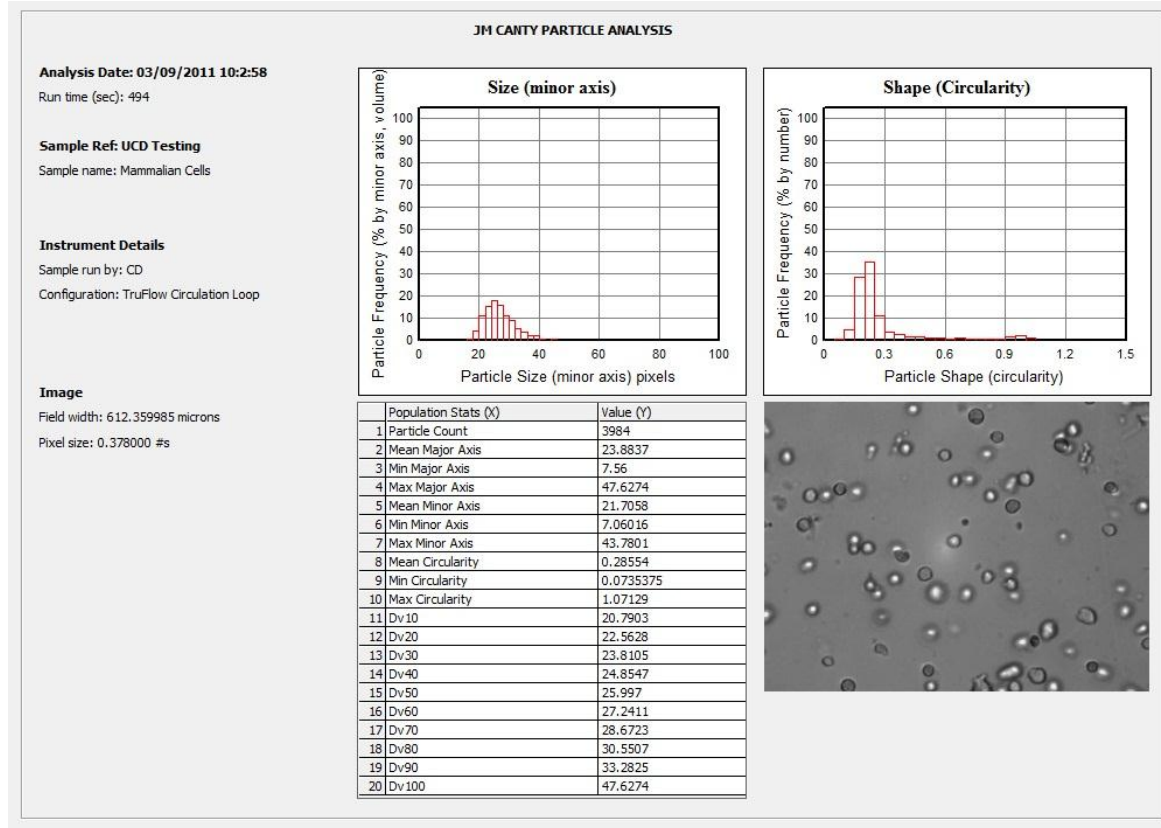


Image Analysis – Software –Cantvision Client

The Cantyvision software outputs an automated summary report with user defined data displayed for that particular batch / run

Control outputs from the software are available through OPC or 4-20mA

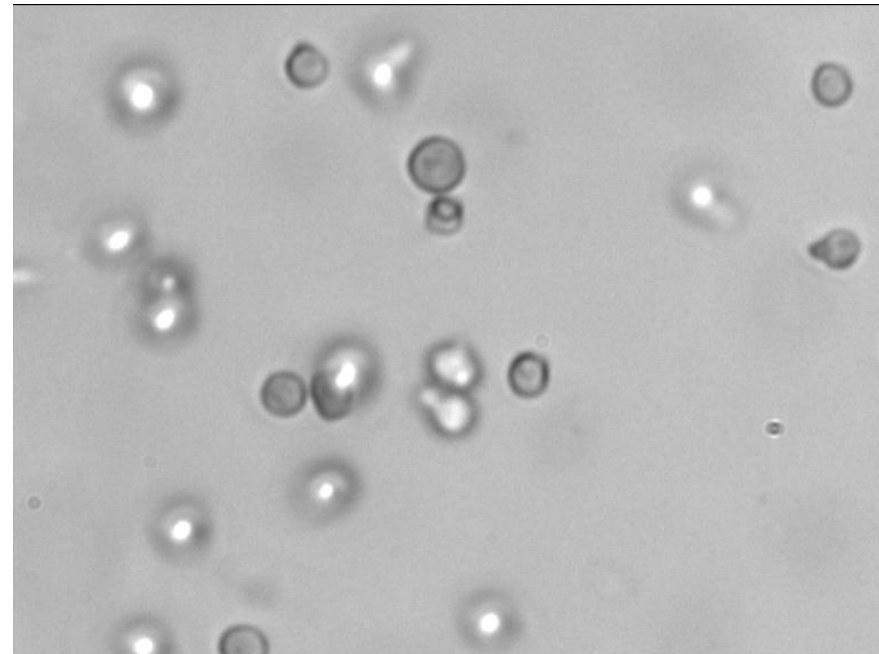


Mammalian Cells Analysis through Dynamic Imaging

Image Capture

Hardware parameters have been determined to allow for optimum image retrieval

A range of cell densities up to 9×10^6 cells per millilitre have been tested with the system



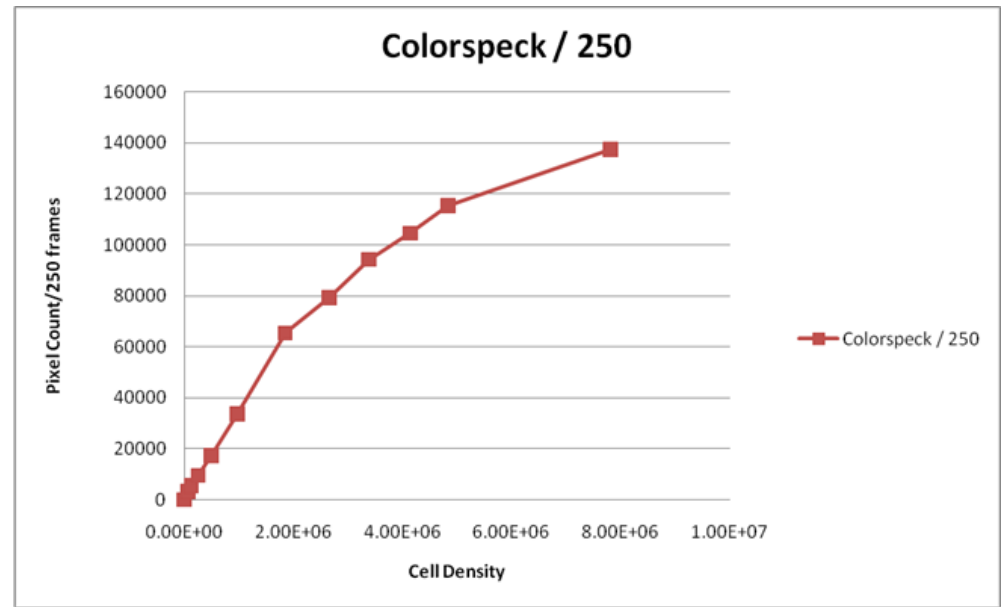
Mammalian Cells Analysis through Dynamic Imaging

Cell Concentration Determination

The various cell density videos were then analysed and it was determined that there was a correlation between pixel count over a set number of frames, and the known cell density.

It was found that no saturation point was reached for the cell densities tested up to 9×10^6 cells per millilitre

The pixel count can be outputted as a cell density

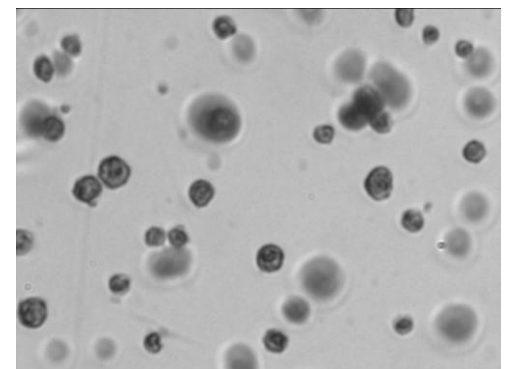
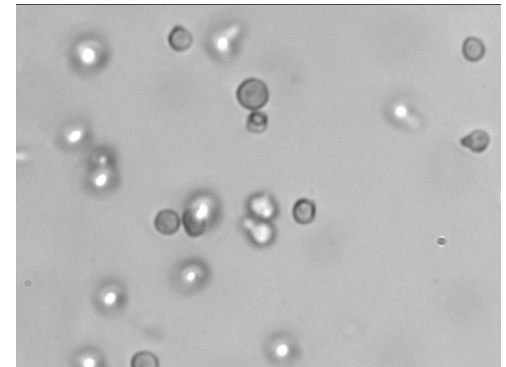


Mammalian Cells Analysis through Dynamic Imaging

Cell Viability Determination

Visually with the human eye, the difference between viable and non-viable cells can be seen relatively easily

The software performs the same recognition as the human eye based on colour, size and shape parameter filters within the software



This concludes the Presentation!

Thanks for choosing CANTY!

For Further Information please visit

www.jmcanty.com.