Dynamic Imaging Principle
Microbial Growth Detection in Fuels

JM Canty International

Presentation Outline

Dynamic Imaging Principle

Image Retrieval – Hardware

Image Analysis – Software

Data Outputs

Sample Case Study

Vision Based Particle Analysis Basic Principle

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

The captured images are then sent to Cantyvision Client Software for analysis, where the suspended particulate (water, microbials, gas bubbles etc.) is measured under a number of different parameters to provide size, shape and count data

Identical optics between the lab and inline system ensures consistent results

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

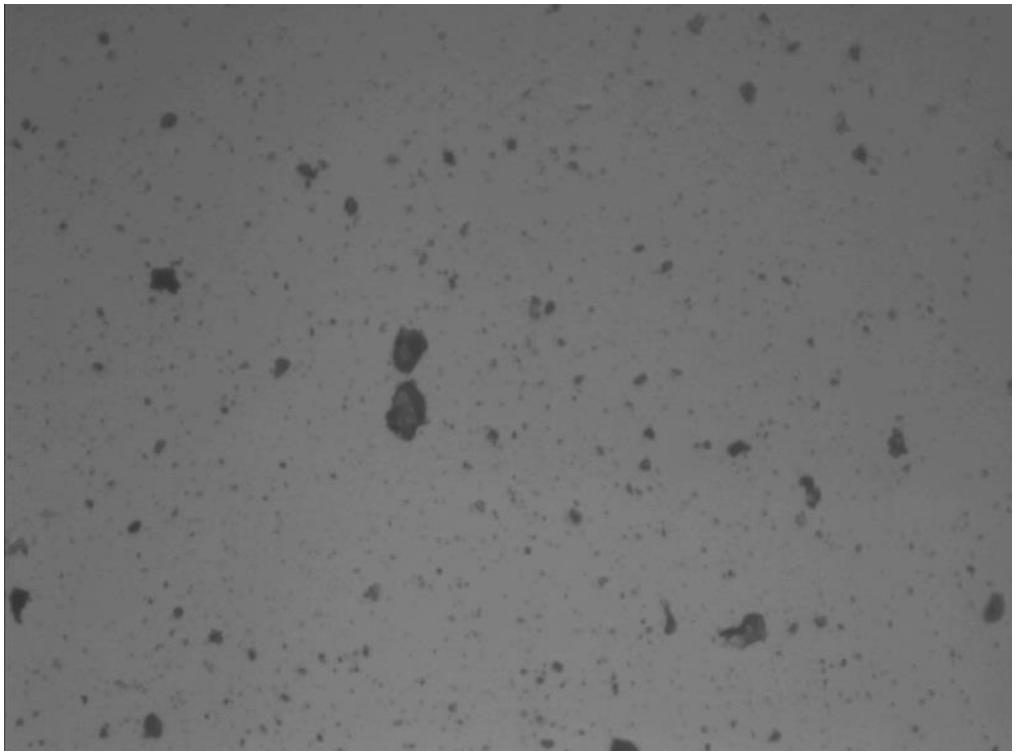
Gigabit Ethernet technology for optimum image retrieval

1600 x 1200 Pixel Array configurable to 0.20µm per Pixel Resolution

1/100,000s Shutter Speed

Particle / Droplet Size to 0.7µm

Simple RJ45 Network Connection to Control PC



Sand in Water

Image Retrieval – Hardware – Fused Glass Flow Path

- Fusion of glass to metal – one piece construction
- Critical to our vision based technique
- Pressures to 600 BAR, Temp -200 to 300ºC

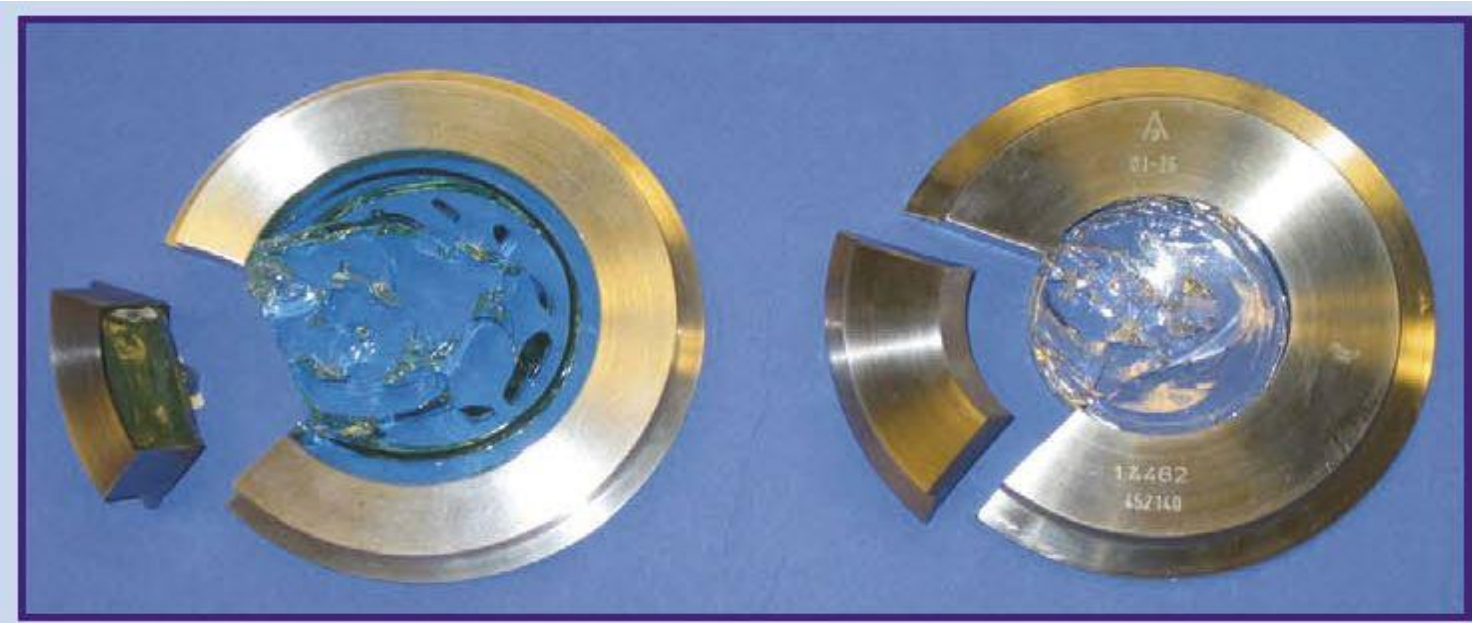
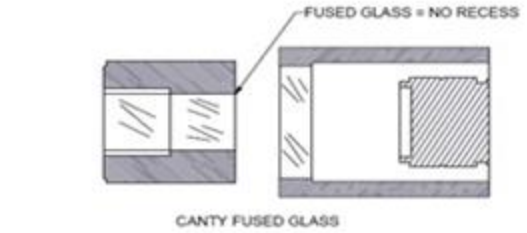
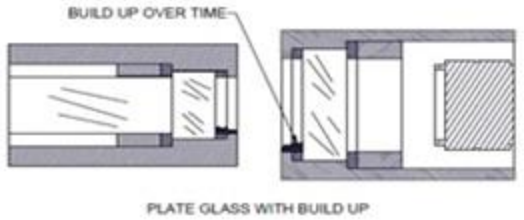


Image Retrieval – Hardware – Fused Glass Flow Path

Importance of fused glass technology

- Hermetically sealed one piece construction means no recesses or gaps where product can adhere to and start to build up
- Spray Ring option included as standard
- Adjustable Gap Size dependent on sample present





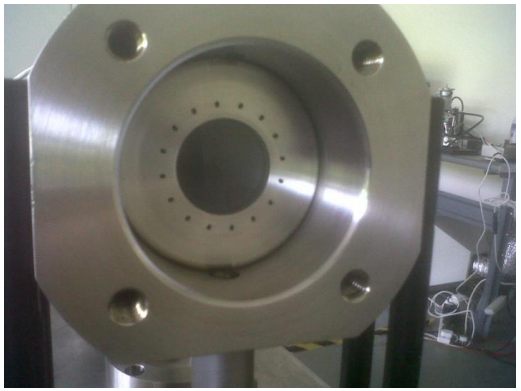
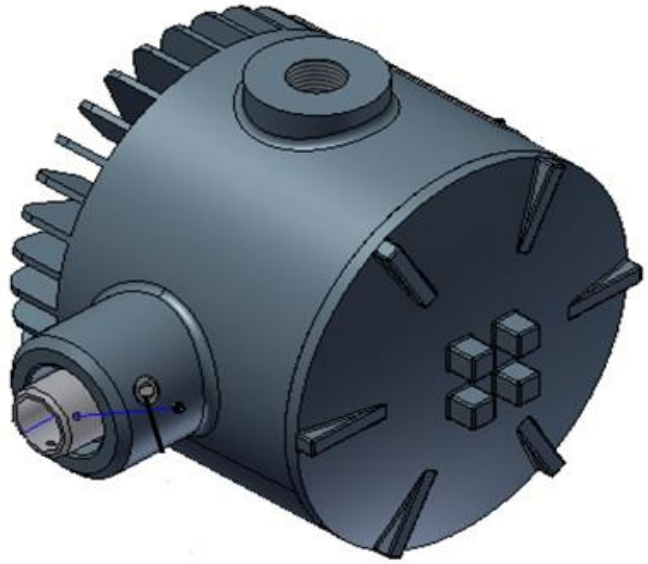


Image Retrieval – Hardware – Lighting System

High flow rates inline require an increased shutter speed and so an increased amount of light to capture particulate in “freeze frame” in order to perform software analysis

Flow speeds up to 2.75m/s (dependent on light transmission through fluid)

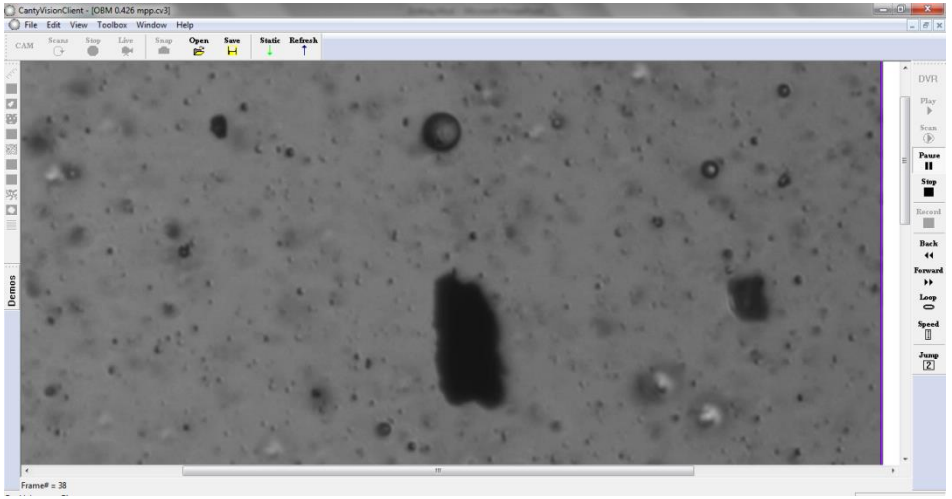
Pipe Line Size	Max Flow Rate
1"	83 l/m
2"	335 l/m
3"	750 l/m
4"	1340 l/m
6"	3000 l/m
8"	5300 l/m



JM Canty's Vision Based Technique

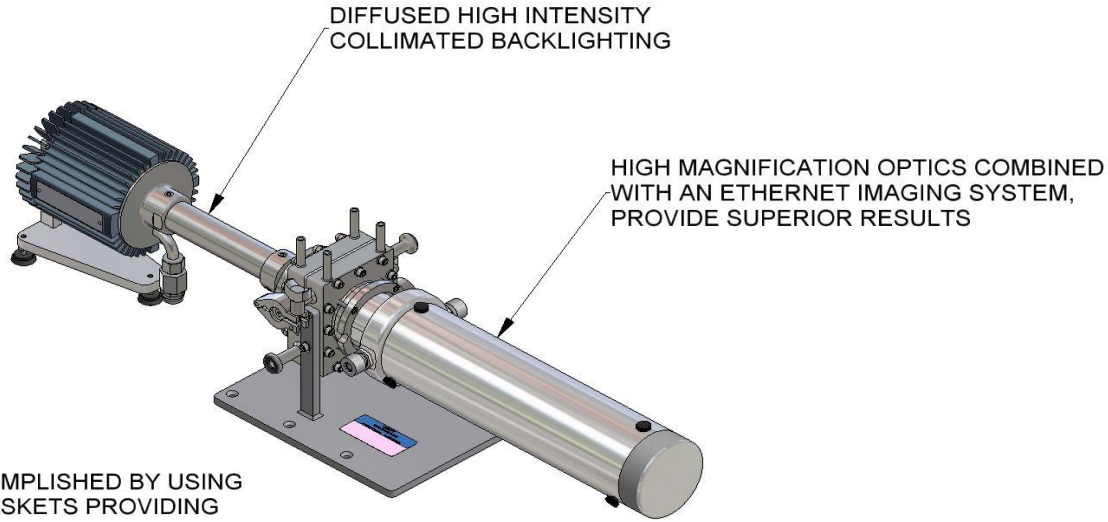
- Various systems depending on application retrieve live images from the process

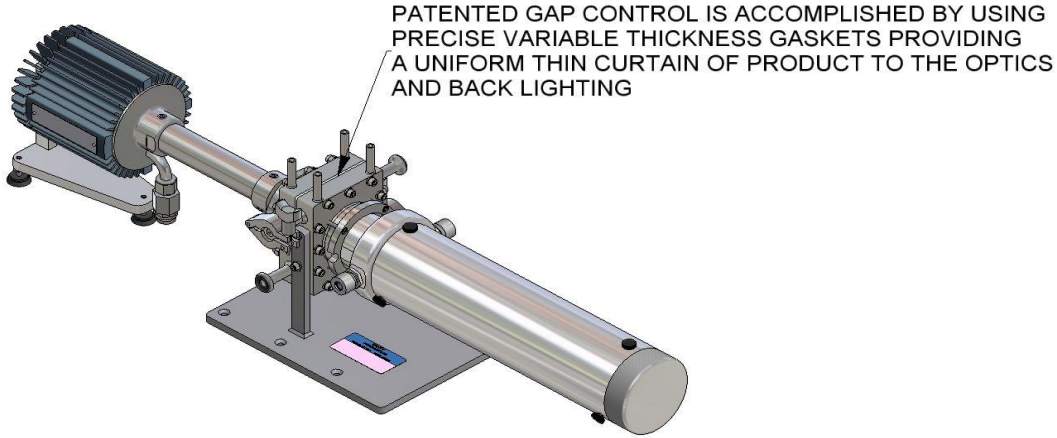
  - Tru-Flow
  - Inflow
  - Particle Probe



Tru-Flow Portable / Lab System

- Lighting
- Camera
- Flow Gap





Tru-Flow Portable / Lab System

Portable system that can be easily transported to different measurement points

The Inflow (pipelines up to 22”) works on the same principle as the Tru-Flow

- Lighting
- Camera
- Flow Gap

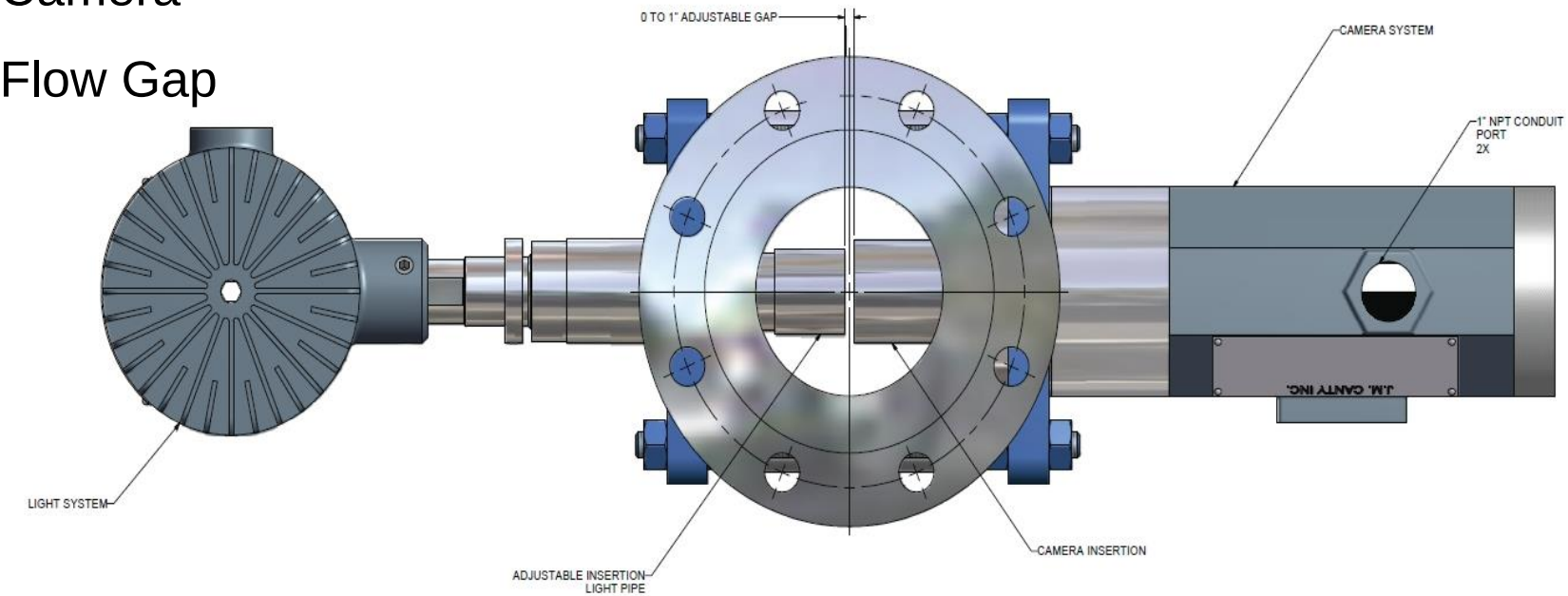
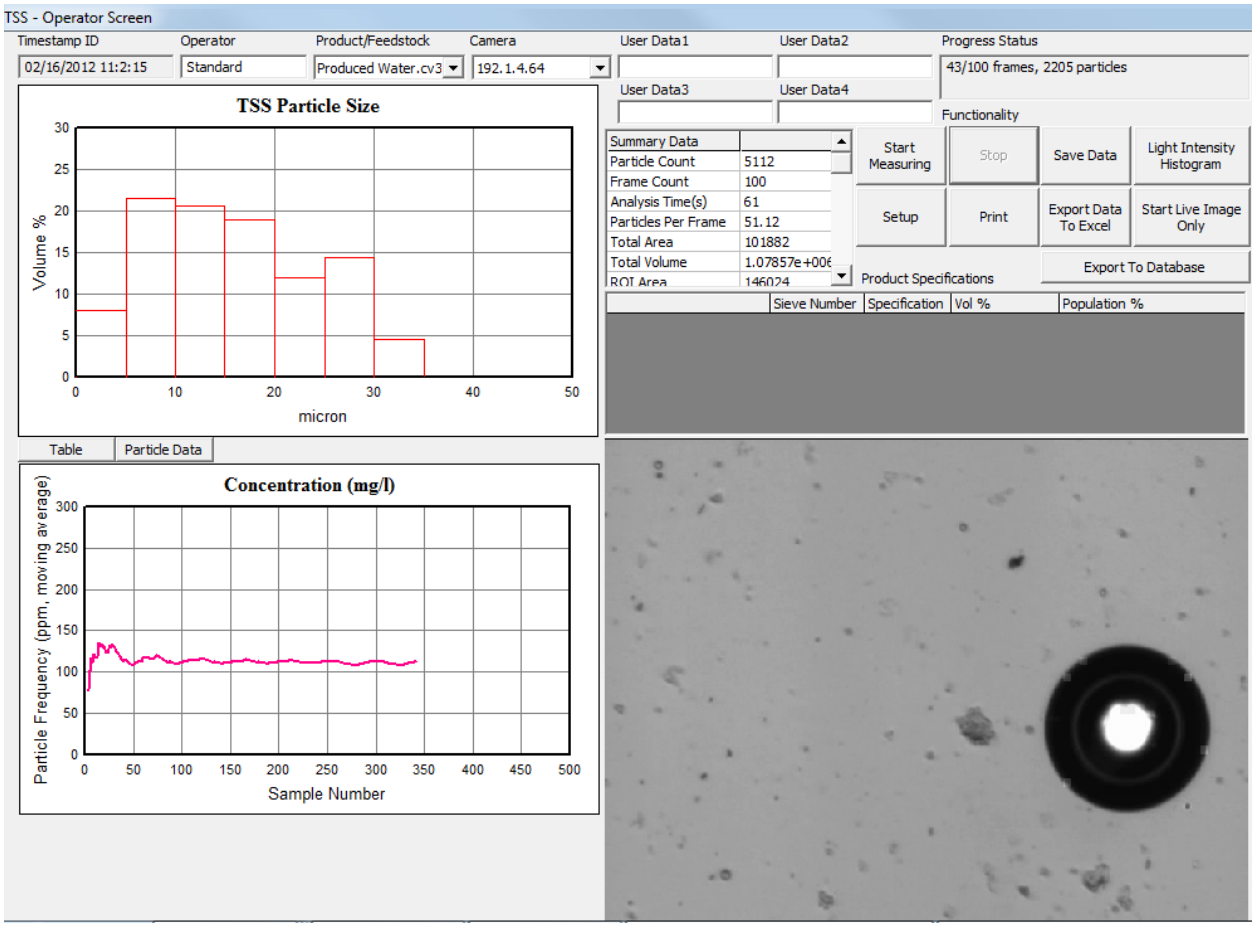


Image Analysis – Cantyvision Software – Operator Screen

Puts information and configuration in an easy to read format fore ease of operator control

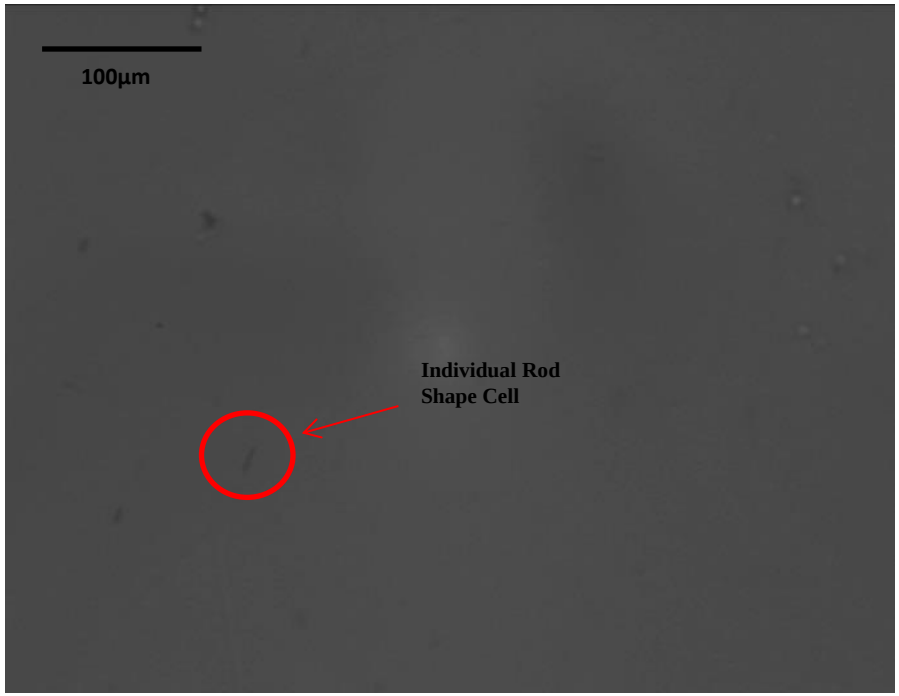
Graphical outputs of particle size distribution and concentration

Configurable calculation for client specific products

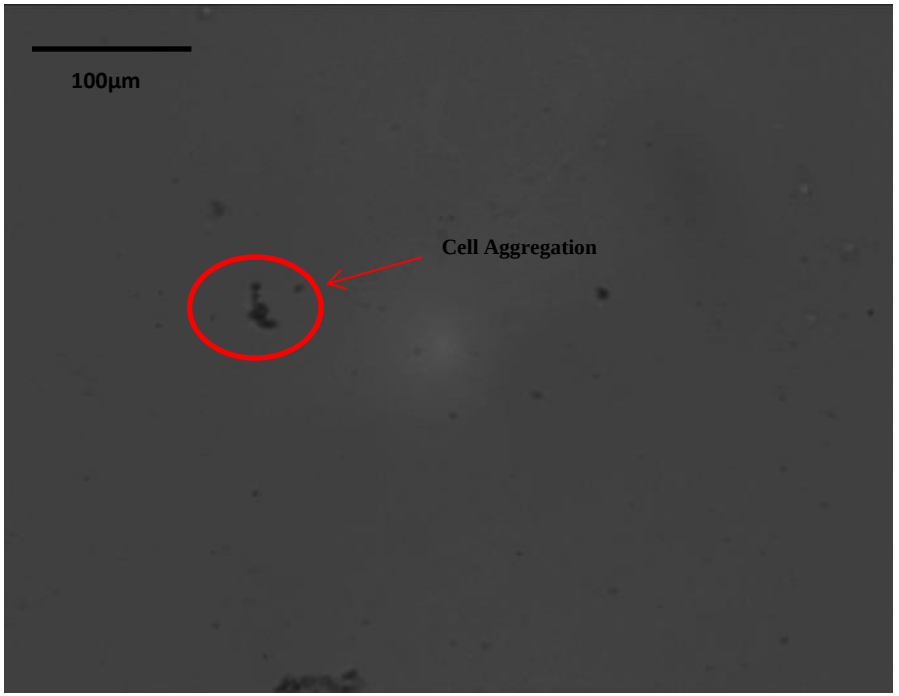


Case Study : Microbial Detection Studies

A strain of bacteria of varying cell density (10^2 cells per ml to 10^5 per ml) were analysed utilising the dynamic imaging based technique

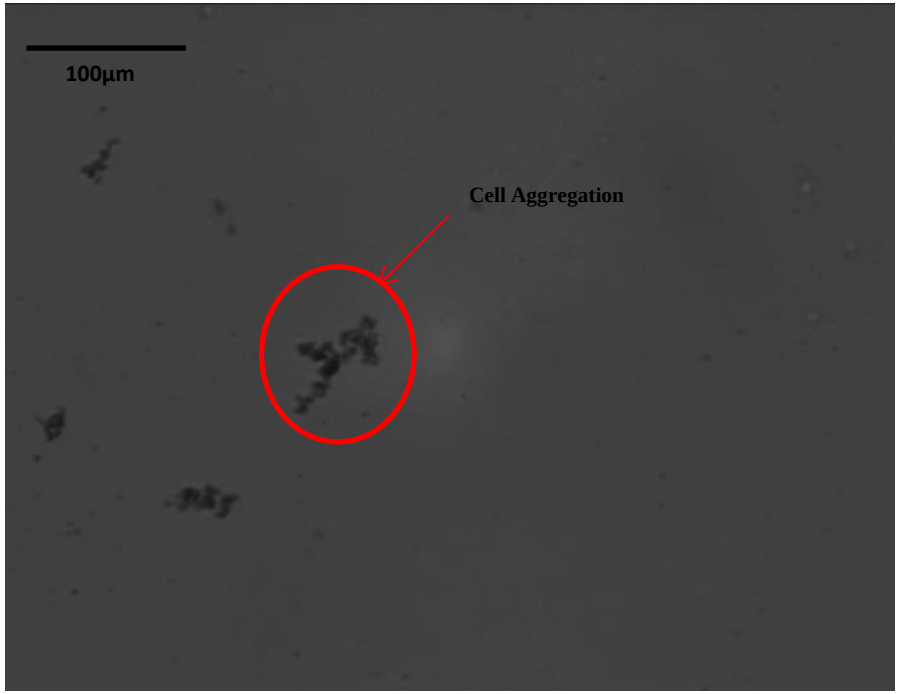


Cell Density 10^2 cells/ml

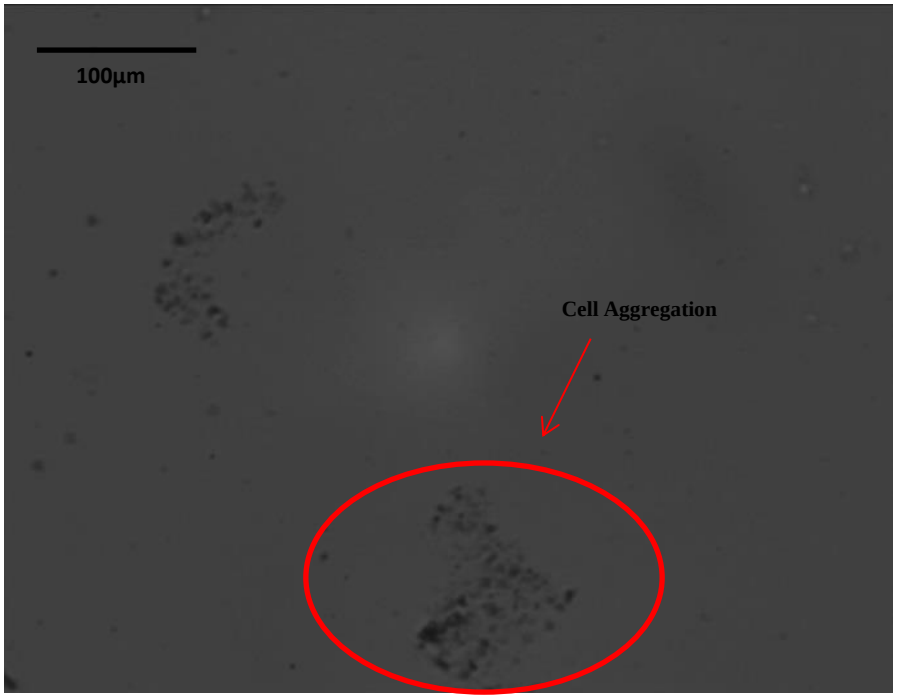


Cell Density 10^3 cells/ml

Case Study : Microbial Detection Studies

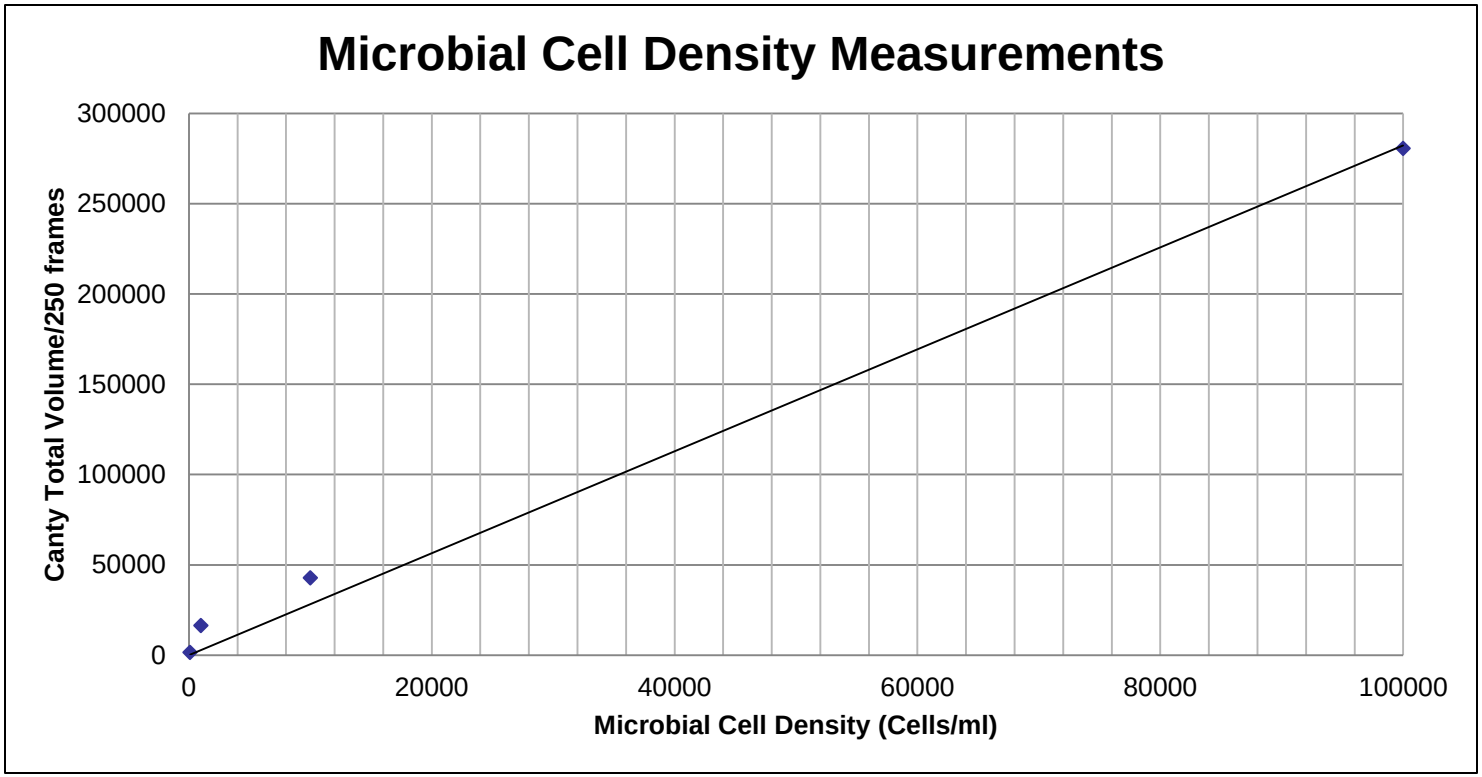


Cell Density 10^4 cells/ml



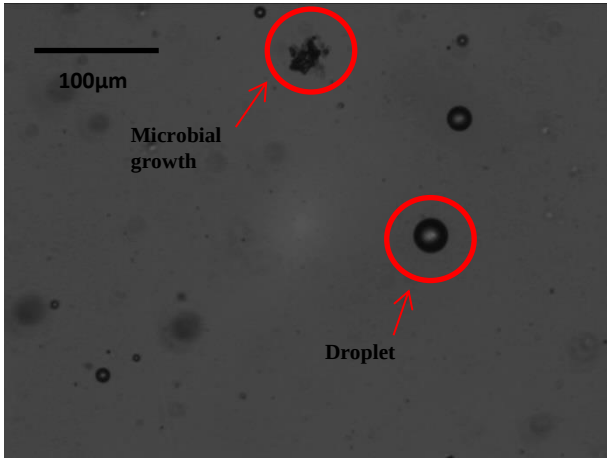
Cell Density 10^5 cells/ml

Case Study : Microbial Detection Studies



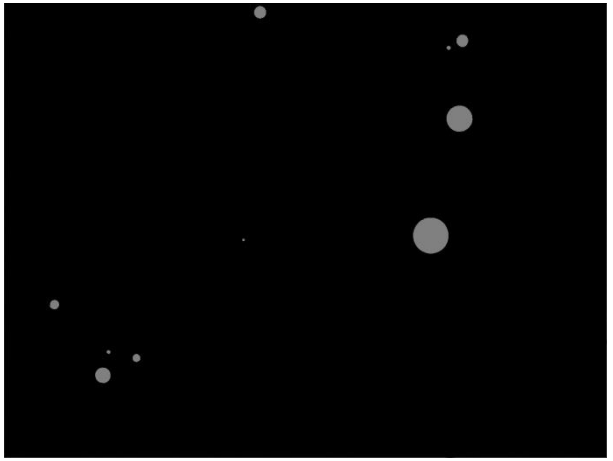
Case Study : Preliminary Microbial Detection Studies

Detection and Differentiation of both Microbial Growth and Free Water



Microbial Detection

Droplet Detection



Summary

- Size measurement down to 0.7 microns
- Count and Size
- Real time measurement
- Visual verification
- Simultaneous detection of both microbial growth and free water
- Inline and Laboratory systems optically identically allowing for consistency between results

Questions & Answers

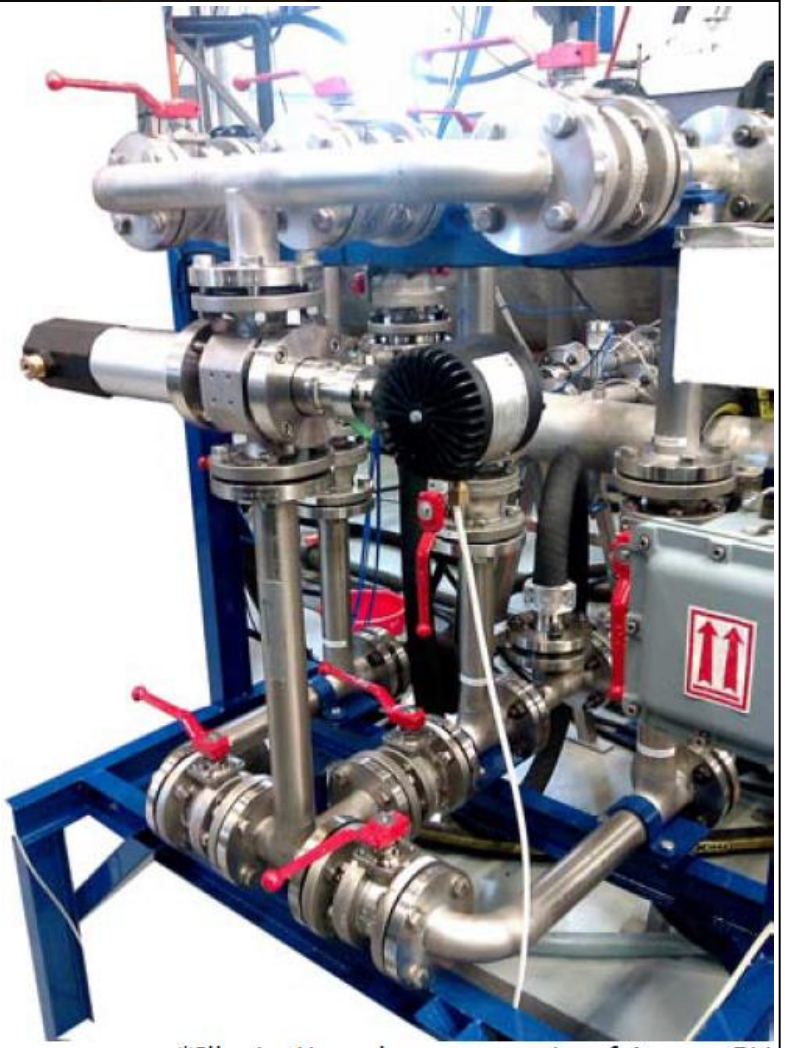


*Illustration above property of Ascom BV