

CANTY
PROCESS TECHNOLOGY

VISION WITHOUT LIMITS

Particle Analysis

Liquid – Slurries - Suspensions

jmcanty.com



Introduction

Canty

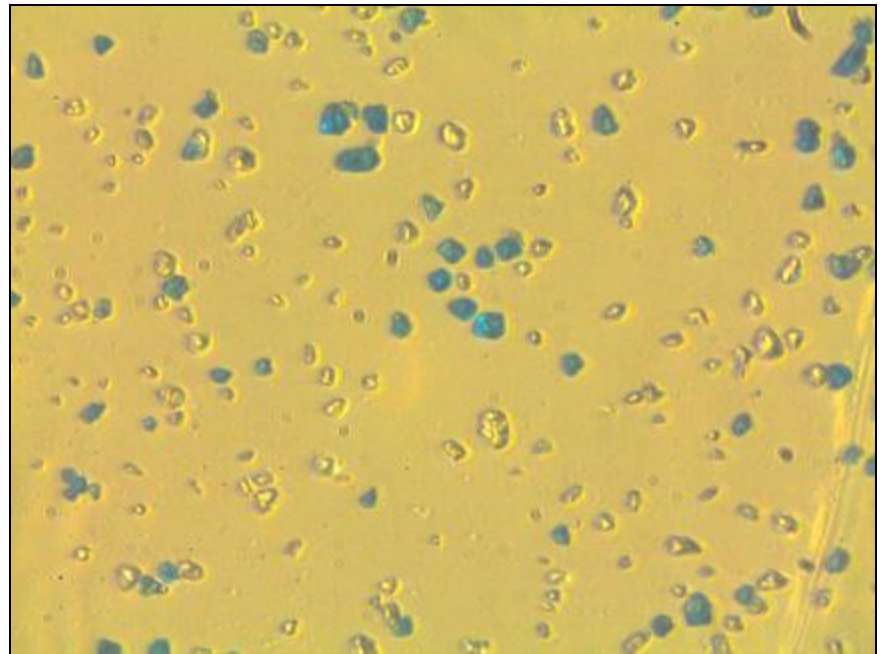
Established in 1969, Canty first produced lighting for hyperbaric chambers. Canty has since evolved into a multifaceted company that produces products such as process lighting, sight glasses, closure systems, process cameras, and particle analyzing units.

Particle Sizing

Canty's Particle Sizing systems allow for two dimensional analysis to **determine size, shape, and color analysis.**

Applications

- Cell Growth
- Polymers
- Crystal Growth
- Cells
- Gels
- Color Analysis
- Black Speck detection
- And many more!



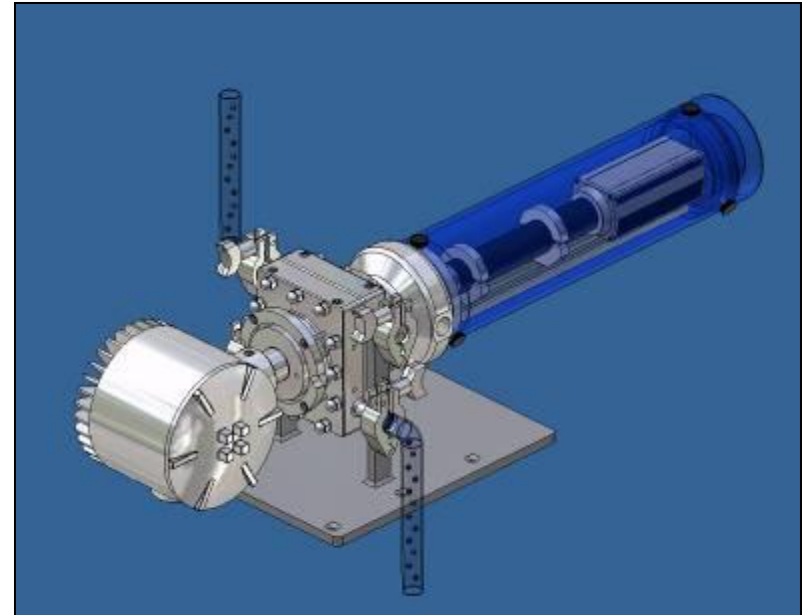
Crystals from Ink Toner

Particle Analysis

System Introduction

PARTICLE SIZE

The Canty Vision System provides the most powerful method available for particle analysis. As all particles have shape, it is impossible for a single mode instrument, such as a laser, to measure the size of different particles. The Canty Vision System allows the operator to see the process and make intelligent selections of how best to gather accurate data. The Canty Vision System also has the distinct advantage of not requiring frequent recalibration.



Particle Sizing

Hardware

In-line Analysis

A Canty Vision System Camera and Light remotely monitor product under actual process conditions. Both Camera and Light are sealed from process behind a hermetic fused glass seal, safely separating electronics from the process. WP, IP, EXP, and FP ratings available.

Real Time Video

The resulting real time video is digitally transmitted and analyzed using CantyVisionClient™ software.

In-Line or Sampling

Various models are available for either in-line or sampling applications.



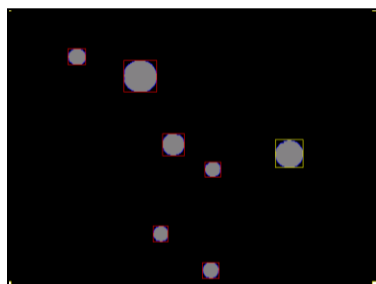
Particle Analysis

Software



Image Collection:

Particles are sent through the flowcell body, back-lit with a high output Canty Light. The particle images are collected in real time by the CCD camera. The image is then digitally transmitted to a PC with CantyVisionClient™ software for analysis.

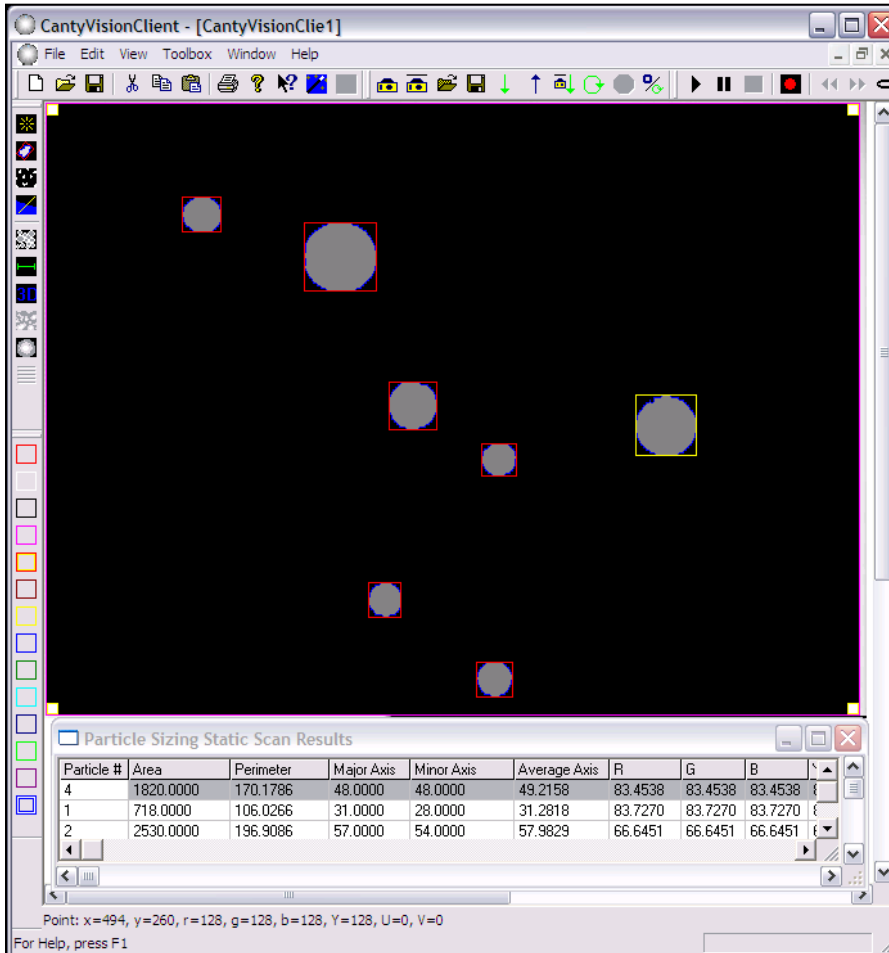


Binary Images:

The image is then broken down into individual pixels. The color difference between the particles and the background allows CantyVisionClient™ software to determine the parameter of the particle, as well as the major axis, minor axis, area, and other characteristics about the particles dimensions.

Particle Analysis

Software



The screenshot displays the CautyVisionClient software interface. The main window shows a dark background with several particles highlighted by colored bounding boxes (red, blue, yellow). A table at the bottom of the window displays the results of a particle sizing static scan.

Particle #	Area	Perimeter	Major Axis	Minor Axis	Average Axis	R	G	B
4	1820.0000	170.1786	48.0000	48.0000	49.2158	83.4538	83.4538	83.4538
1	718.0000	106.0266	31.0000	28.0000	31.2818	83.7270	83.7270	83.7270
2	2530.0000	196.9086	57.0000	54.0000	57.9829	66.6451	66.6451	66.6451

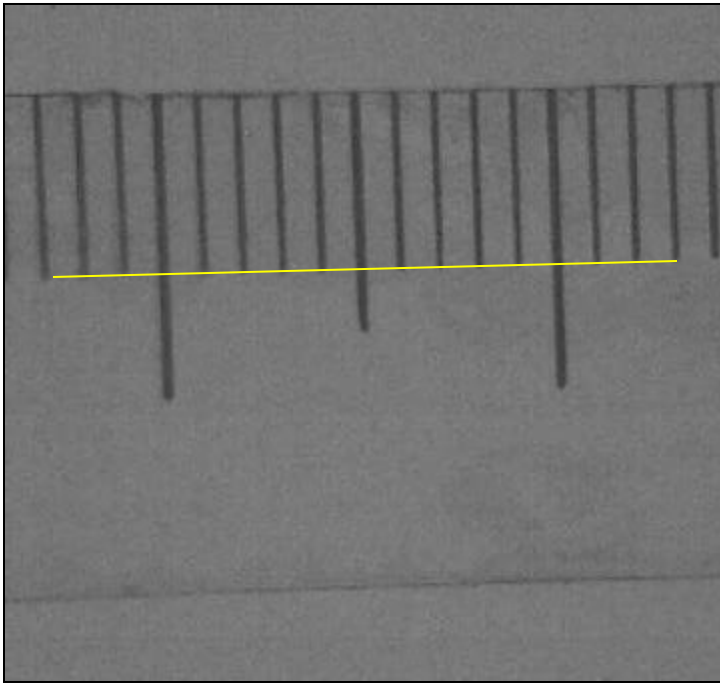
Point: x=494, y=260, r=128, g=128, b=128, Y=128, U=0, V=0
For Help, press F1

Analysis:

Once the software determines the particles size and shape, the software can perform further analysis on the individual particles. The analysis includes particle filters to enable users to determine when particles are dissimilar or nonconforming to the entire distribution of particles.

Particle Analysis

Calibration



CantyVision Client software establishes its calibration by referencing known points in the field of view. Such a known point could be a scale or grid. The user then draws a line from one known point to another with the software.

CantyVision then determines the length of the line just drawn in pixels. The known length is then correlated to the pixel length to establish the pixel scale factor.

Example:

Known length = 16mm = 16000 microns

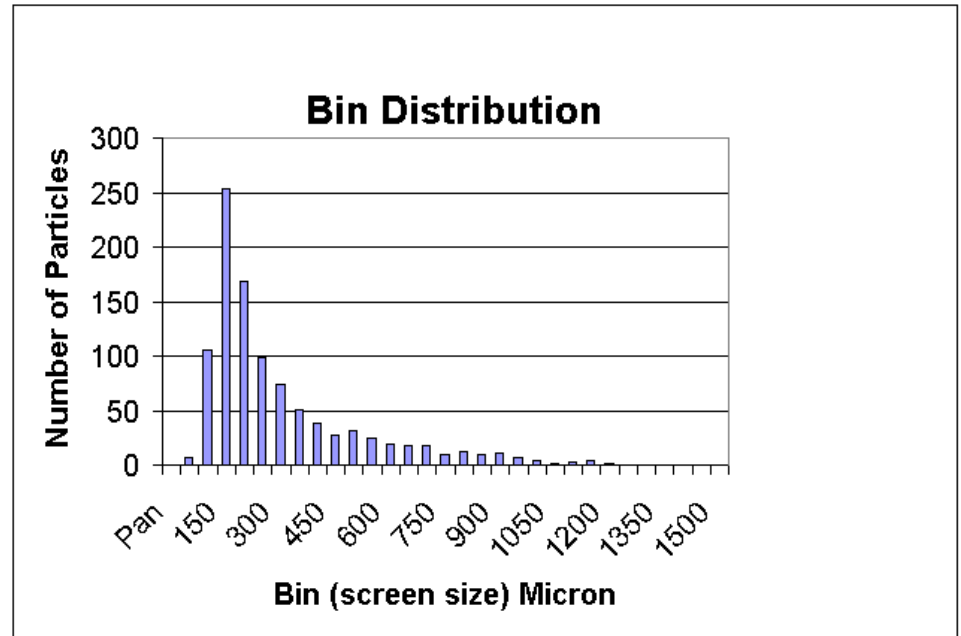
CVC Line length = 1000 pixels

Pixel Scale Factor = 16 microns per pixel

Particle Analysis

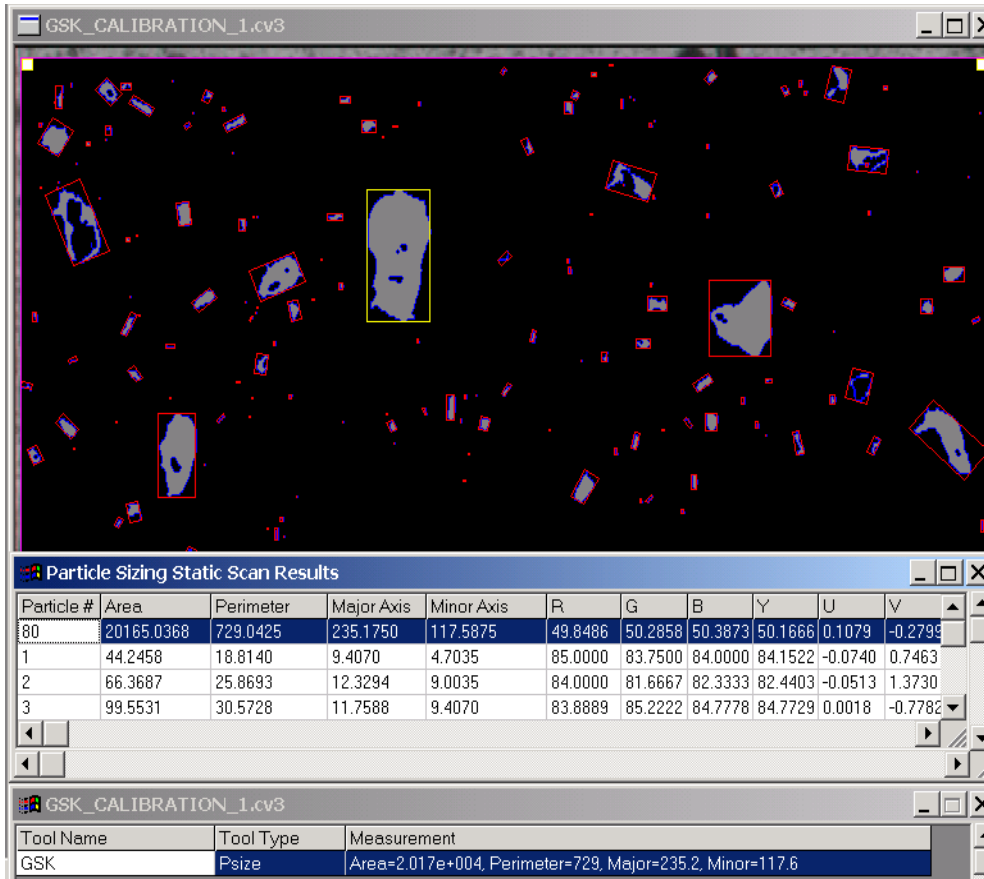
Output Data/Process Control

- Displays
 - Graphs
 - Bin Analysis
 - Tables
- Output Signals
 - 4-20mA
 - Digital
- ...ETHERNET



Particle Analysis

Visual Verification



- Key Advantage
 - Operators View Process in Real Time
 - Suspect data can be verified by viewing images
- R & D
 - Recording Files (AVI & MPEG4)
 - Images (BMP)
 - Data (.TXT .CSV .XLS)
 - All data has File name and time stamp



Particle Analysis

On-Line Measurement

- Reduce Lab Samples
- Repeatable/Accurate
- Improve Quality
- Response Time
- Learn Process

The Canty Light

Hardware



There are three keys to imaging technology. They are **LIGHTING**, **LIGHTING**, and **LIGHTING!**

The CANTY LIGHT

Canty Lights makes image microcopy possible! The reliability and uniformity of the Canty lighting system allows for each particle to be consistently measured. The interior of the flow cell is uniformly illuminated to allow analysis of the particles by the camera system.

Camera System

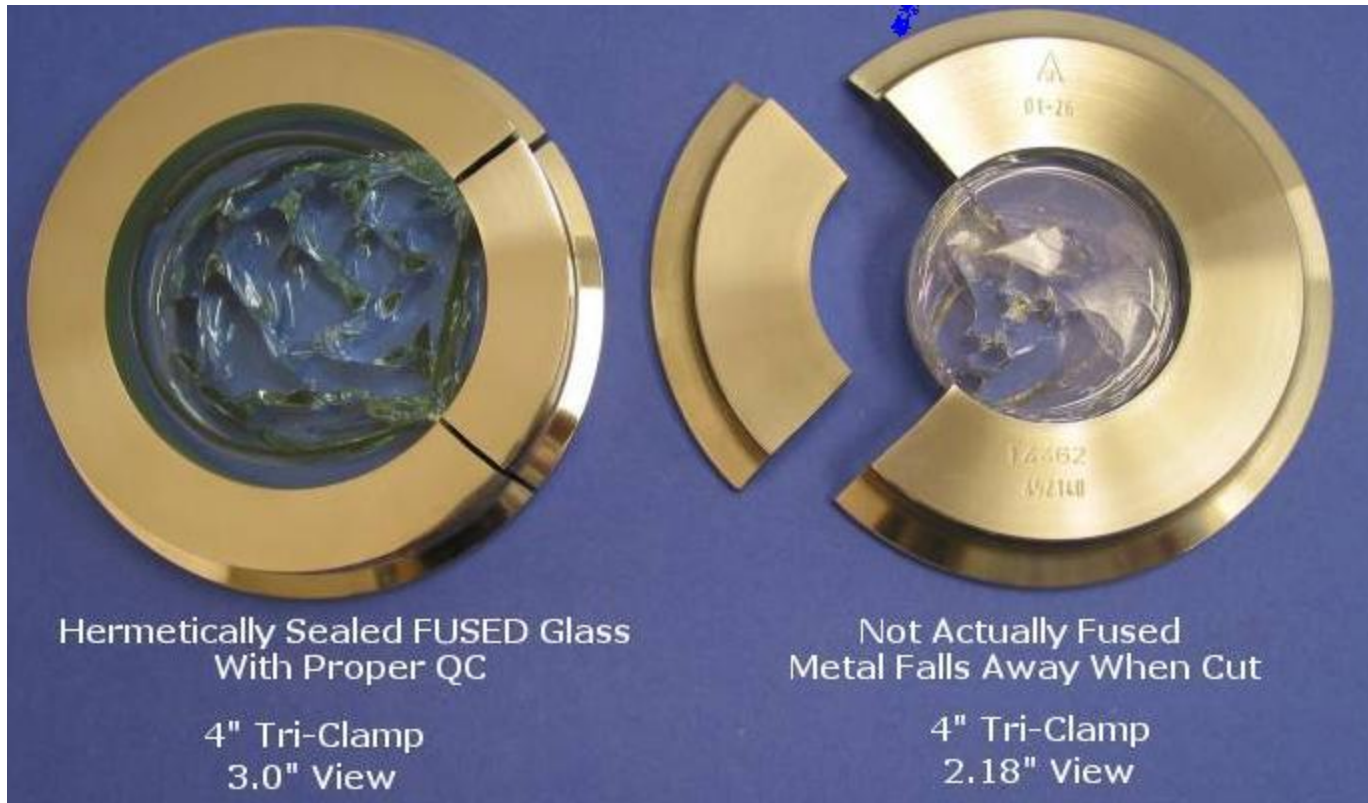
Hardware



Canty offers industrial hardened camera systems that feature Canty's patented Fuseview technology.

Canty also offers camera systems with Ethernet connectivity. The ability to have Ethernet connectivity to the camera creates flexibility compared to analog cameras and allows for network wide monitoring of the process.

Canty Fuseview



Fuseview

How it works



"TO MAKE A FUSEVIEW YOU BRING THE GLASS UP TO IT'S MOLTEN POINT WHERE IT FLOWS TO THE WALL OF THE METAL. AT THAT POINT THE GLASS FUSES OR BONDS TO THE METAL. THEN WE SLOWLY COOL THE FUSEVIEW UNTIL THE GLASS SOLIDIFIES. THE METAL HAS A HIGHER COEFFICIENT OF EXPANSION THAN THE GLASS AND THE METAL COMPRESSES ON THE GLASS. THIS SQUEEZING PRESTRESSES THE GLASS AND PUTS IT UNDER RADIAL COMPRESSION. GLASS IS STRONG IN COMPRESSION, BUT NOT TENSION AND SHEAR. WHEN THE FUSEVIEW IS PRESSURIZED THE GLASS BENDS AND RELIEVES THE COMPRESSION AND AVOIDS TENSION. THIS IS THE SAME AS IS DONE IN CONCRETE - IT IS PRESTRESSED IN COMPRESSION IN ORDER TO TAKE BENDING."

Canty Spray Ring



- Any Fluid
- Vortex Cleaning Action
- Insertion or Flush Mount
- Standard to 2500 PSI
- Various Materials
- Various Mounting Connections

Laboratory Particle Analysis

Liquids – Slurries - Suspension



Canty Microflow



Canty Macroflow

Canty offers many systems for laboratory particle sizing analysis and has been engineered to offer the user a means by which a liquid is analyzed while under varying pressures, temperatures and flow rates. The Microflow™, Macroflow™, and the Canty Glass Reactor offer sample or continuous, microscopic, non-destructive viewing and provides particle size analysis, **ranges from 1 micron and up** , with two dimensional results when used in conjunction with the CantyVisionClient™ Software.

Inline Particle Analysis

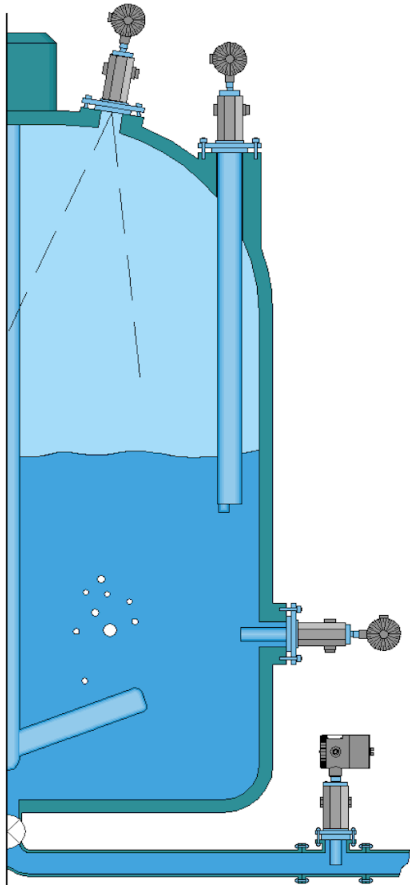
Liquids – Slurries - Suspensions



Cauty Inline Particle Sizing Advantages:

- System includes adjustable flow cell with back lighting, and camera assembly to create an optimal online particle sizing environment that can be connected to a multitude of pipelines
- 30 micron-4.8 mm Particle Size Options
- Provides Both A Real Time, In-Line Measurement And A Continuous Real Time View Of The Product
- Various Process Connection Sizes Available (Flanged, Tri-Clamp ® , TS ® Swagelok)
- Fully Cleanable Unit
- High Throughput
- Available In Both WP, IP, Explosion Proof and Flame Proof Packages

Crystallization

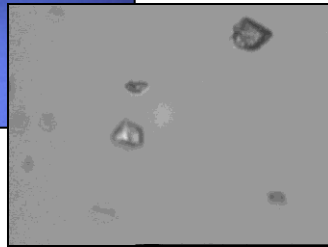


Canty CrystalScope™, Canty Inline Particle Sizing System, and Online Reactor system is a vision based system for **online** monitoring particle size in real time. These online systems includes a high speed camera with adjustable shutter speed, combining a lens configuration that offers dynamic Ethernet controlled calibration for magnification and focus settings. Whether it be particle analysis in a pipeline or in a crystallization reactor, Canty is able to return real time measurements of **particle size and shape**.



Crystallization

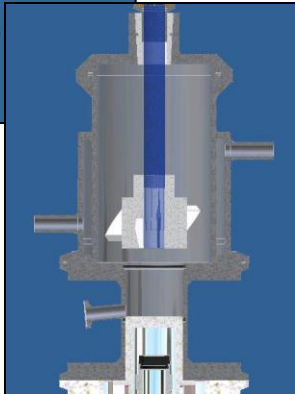
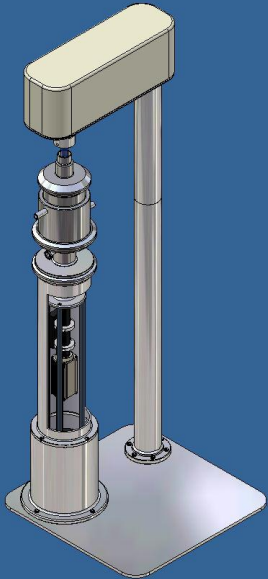
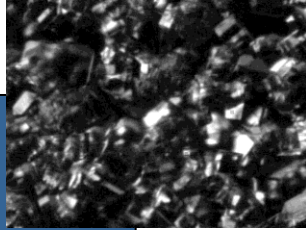
Hardware



- Real Time Crystal Size Analysis
- Standard Ethernet Control From Cauty Vector System
- Uniform Backlighting For True Shape Illumination
- Ethernet controlled Magnification For Variable Lens Settings
- Fused Glass, High Pressure/Temperature Seal From Process
- Various Outputs, 4-20mA, OPC Interface, Modbus, etc ...

Crystallization

Canty Glass Reactor



CrystalScope™ Advantages:

- Real Time Crystal Size Analysis
- Crystal Distribution By Major, Minor Diameter, Area, Perimeter

Available with Vector System.

- Crystal Size & Shape
 - Crystal Count
 - Density Of Crystals
 - Detection Of Seeding Problems
 - Automated Temperature & Vacuum Controls
- During Crystal Growth
- Increased Efficiency During Filtration

Payback

- Online Crystallization determined that the agitation in production was damaging Crystals. Reduced
- Cake detection in Nutsche filter increased product yield by 3 %
- Interface detection determined organic product loss due to gels earlier resulting in increased recovery.



Pilot test...test...test

- There is no substitution for good pilot testing at temperature ,pressure and flow to duplicate production conditions
- LAB,PILOT and PRODUCTION can all be done with the same Cauty particle analysis system



Summary

- LAB, PILOT and PRODUCTION use same methodology and identical equipment
- R & D needs to accommodate the size issues.

Global Support



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