

*Safety  
Management  
Services, Inc.*



# GoDetect - ESD<sup>TM</sup>



Clint Guymon, PhD, PE  
ETUG Conference  
October 25-26, 2011

# Outline

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- GoDetect-ESD™ Developed
- GoDetect-ESD™ features
  - Test time significantly reduced
  - Operator subjectivity eliminated
  - High-speed test videos recorded and stored
  - Quantified reaction results documented
  - Test data can yields machine variability or drift
  - Reaction probability summary and material drift
- Demonstration

# GoDetect-ESD<sup>TM</sup> Key Parameters

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- Image analysis and statistical comparison
  - Brightness
  - Buoyancy
  - Shape
  - Uniformity
- Background shots taken prior to sample trials

# Test Time Significantly Reduced

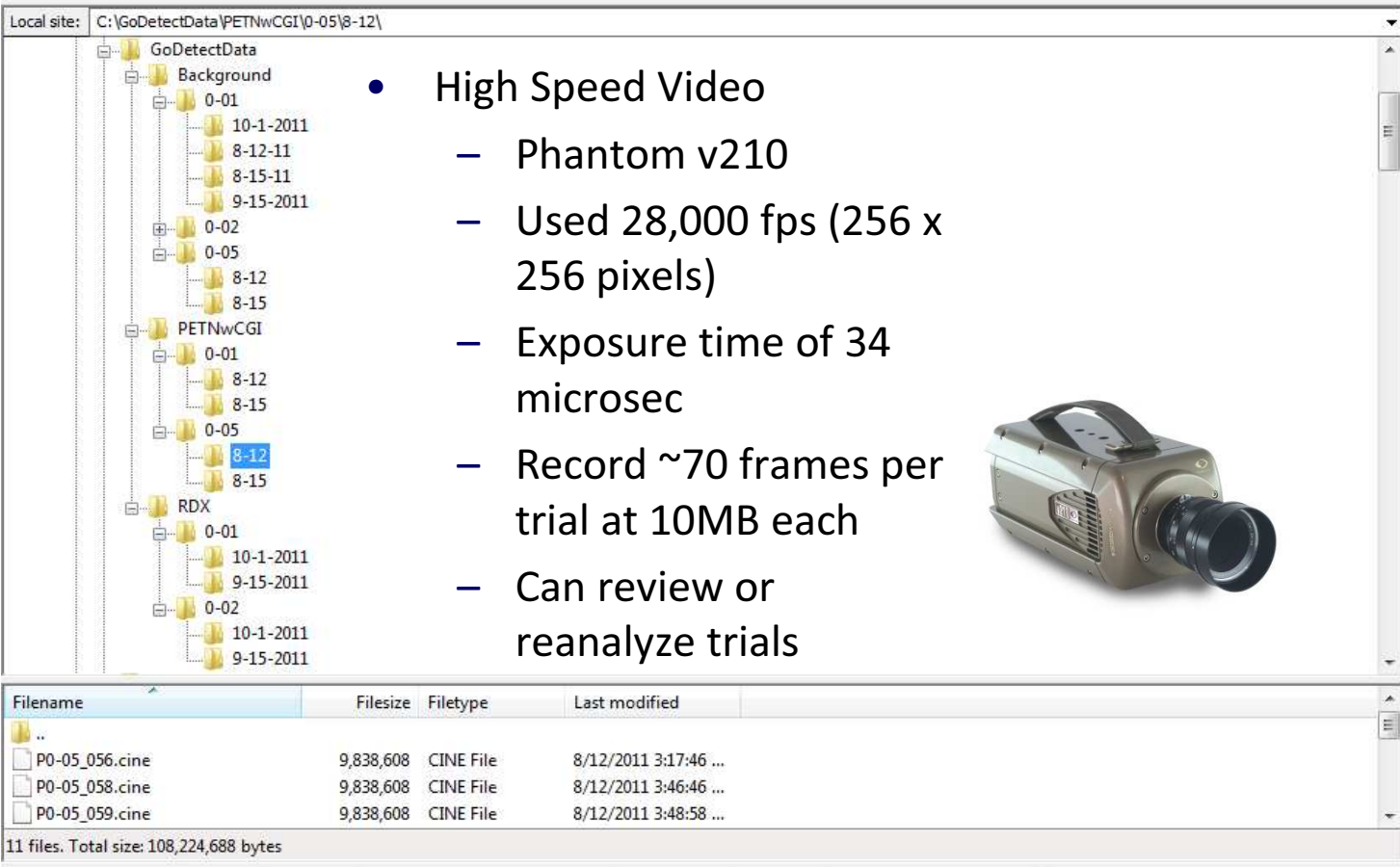
- Additional Test Time Issue:
  - Operator indecisiveness
  - Additional trails for operator calibration
  - Long analysis time from other methods of detection
- Resolution:
  - GoDetect-ESD™ eliminates indecisiveness and need for associated additional tests
  - Rapid determination with GoDetect-ESD™
  - With GoDetect-ESD™, our lab completed 3 PROBITS (>60 trials each PROBIT) in 6 hours including setup and cleanup
  - GoDetect-ESD™ can result in a 2-3 fold reduction in test time

# Operator Subjectivity Eliminated

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- Issue:
  - ESD reaction detection by an operator can be very difficult
- Resolution:
  - GoDetect-ESD™ allows for rapid reaction detection with click of a button
  - Operator not responsible for reaction detection
  - Go No-Go determined by statistical differences from the background combined variables

# Runs Recorded and Stored



- High Speed Video
  - Phantom v210
  - Used 28,000 fps (256 x 256 pixels)
  - Exposure time of 34 microsec
  - Record ~70 frames per trial at 10MB each
  - Can review or reanalyze trials

Filename	Filesize	Filetype	Last modified
..			
P0-05_056.cine	9,838,608	CINE File	8/12/2011 3:17:46 ...
P0-05_058.cine	9,838,608	CINE File	8/12/2011 3:46:46 ...
P0-05_059.cine	9,838,608	CINE File	8/12/2011 3:48:58 ...

11 files. Total size: 108,224,688 bytes



# GoDetect-ESD™ Quantified Results

```
C:\GoDetectData\Background\0-05\8-12-BGSummary
Brightness, Buoyancy, Shape, Uniformity Mean and Stdev
98.678548      63.553000      223.308191      1.180700
16.332355      71.724075      159.768077      0.245012
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_056.cine      185.186085      -394.843312      565.049448      2.763180      20.285576      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_058.cine      126.955056      -70.402482      250.695481      2.459901      8.991359      No-Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_059.cine      130.633553      -351.501392      1047.796541      2.221147      17.150413      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_060.cine      129.466093      -395.176925      1045.067996      2.506378      18.834944      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_061.cine      78.940935      -599.354190      688.970851      1.159199      10.860829      No-Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_062.cine      65.541095      -254.414279      201.624513      1.639866      4.142593      No-Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_063.cine      159.033890      -219.697343      396.979080      2.257629      13.127045      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_064.cine      158.987928      25.566066      1517.619424      3.190308      20.525528      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_065.cine      258.817714      -289.711087      1848.000556      2.179412      28.975591      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_066.cine      128.790175      -458.173246      720.676211      2.187536      16.340149      Go
C:\GoDetectData\PETNwCGI\0-05\8-12\P0-05_067.cine      154.428131      -53.887090      602.606463      2.480809      12.731196      Go
8 of 11 runs are Go's
```

- Example PETN output
- Indicators quantified and recorded
- No. of Go's and No-Go's summarized
- Type I and Type II error can be calculated

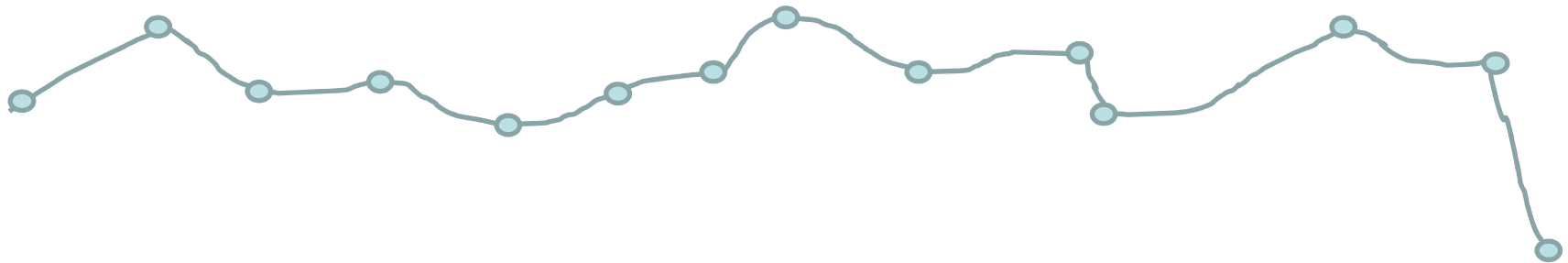
# Machine Variability or Drift

File, Brightness, Bouyancy, Shape, Uniformity				
C:\GoDetectData\Background\0-01\8-12-11\B0-01_000.cine	29.595738	28.904107	73.349997	0.881330
C:\GoDetectData\Background\0-01\8-12-11\B0-01_001.cine	32.775581	72.741704	110.432189	0.662567
C:\GoDetectData\Background\0-01\8-12-11\B0-01_002.cine	26.478700	43.578213	28.603599	0.553401
C:\GoDetectData\Background\0-01\8-12-11\B0-01_003.cine	25.287835	41.190313	91.917328	0.546710
C:\GoDetectData\Background\0-01\8-12-11\B0-01_004.cine	30.237287	62.030229	62.894896	0.591111
C:\GoDetectData\Background\0-01\8-12-11\B0-01_005.cine	29.507701	23.412370	29.943354	0.559972
C:\GoDetectData\Background\0-01\8-12-11\B0-01_006.cine	30.746635	37.142419	132.107523	0.625975
C:\GoDetectData\Background\0-01\8-12-11\B0-01_007.cine	26.250103	50.320522	64.987466	0.539465
C:\GoDetectData\Background\0-01\8-12-11\B0-01_008.cine	32.685409	52.618367	54.773874	0.651746
C:\GoDetectData\Background\0-01\8-12-11\B0-01_009.cine	29.355463	50.710821	40.765916	0.625282
C:\GoDetectData\Background\0-01\8-12-11\B0-01_010.cine	36.902832	45.564383	75.889094	0.451690
C:\GoDetectData\Background\0-01\8-12-11\B0-01_011.cine	33.673105	63.267735	68.322048	0.660461
C:\GoDetectData\Background\0-01\8-12-11\B0-01_012.cine	34.374554	70.571167	88.279497	0.723440
C:\GoDetectData\Background\0-01\8-12-11\B0-01_013.cine	48.716017	96.836349	211.383045	0.862183
C:\GoDetectData\Background\0-01\8-12-11\B0-01_014.cine	31.195236	62.376723	43.873344	0.636197
C:\GoDetectData\Background\0-01\8-12-11\B0-01_015.cine	31.284952	55.179352	28.432359	0.642057
C:\GoDetectData\Background\0-01\8-12-11\B0-01_016.cine	39.387629	59.637564	58.131196	0.595607
C:\GoDetectData\Background\0-01\8-12-11\B0-01_017.cine	23.201726	16.728312	87.163673	0.518700
C:\GoDetectData\Background\0-01\8-12-11\B0-01_018.cine	35.872188	36.860219	48.014402	0.674021
C:\GoDetectData\Background\0-01\8-12-11\B0-01_019.cine	33.329236	35.843765	66.717040	0.657473
C:\GoDetectData\Background\0-01\8-12-11\B0-01_020.cine	32.163612	57.651770	39.690889	0.681627
C:\GoDetectData\Background\0-01\8-12-11\B0-01_021.cine	35.163556	58.005566	52.867583	0.565988
C:\GoDetectData\Background\0-01\8-12-11\B0-01_022.cine	20.170432	12.817703	84.727899	0.473595
C:\GoDetectData\Background\0-01\8-12-11\B0-01_023.cine	16.829085	25.377949	44.581607	0.417882
C:\GoDetectData\Background\0-01\8-12-11\B0-01_024.cine	32.390469	52.523674	60.883856	0.558507

- Background trials recorded, quantified and filed
- Summary files (see above) can be analyzed over time

## Reaction Probability Summary and Material Drift

- Trial results are recorded, quantified and filed
- Repeated measures of a material over time would yield data to quantify variability or drift



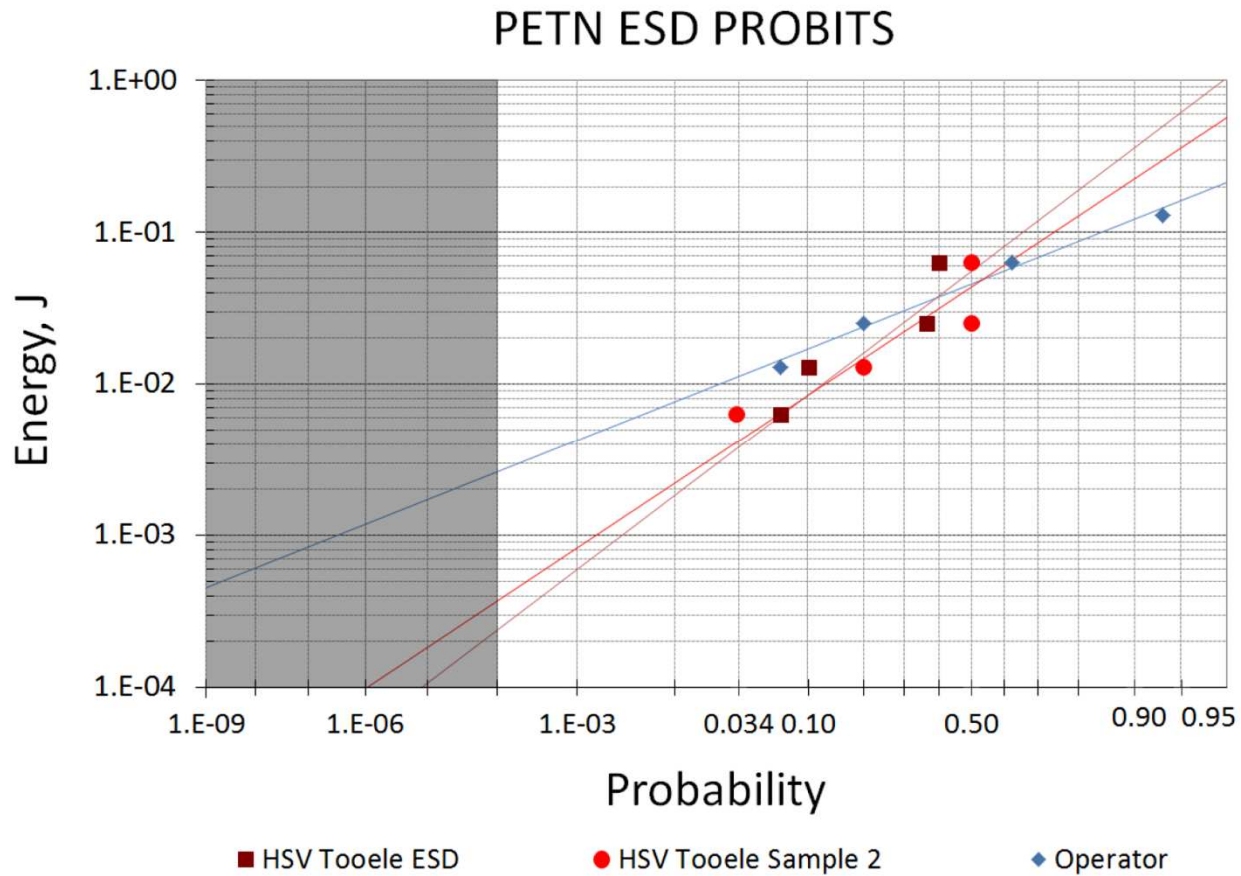
# Software Demonstration

The screenshot displays the GoDetect - ESD software interface. At the top, there is a menu bar with options: File, Edit, View, Project, Operate, Tools, Window, Help. Below the menu bar, the software title "GoDetect - ESD" is visible. The interface is divided into several sections:

- Setup:** Contains fields for "Trial Cine File(s)", "Baseline Data (Energy and Date Specific)", and "Results File (Energy and Date Specific)".
- Trial Results:** Shows a "Go (Green) / No-Go (Red)" indicator (a green bar), "File 11 of 11", a "Warning: If the value at right is < 15, there's a problem in how the video was acquired", and a "Trial Value" of 16.34.
- Output:** A table with columns: Brightness, Buoyancy, Shape, and Uniformity. The values are: Brightness: 128.790, Buoyancy: -458.173, Shape: 720.676, Uniformity: 2.188.
- Signal Images:** Three images labeled "1st Sig. Image", "2nd Sig. Image", and "3rd Sig. Image" showing blue and white signal patterns.
- Progress Bar:** A small window titled "Processing...Please Wait" with a progress bar at 100%.
- Sig. Parameter:** A vertical axis on the right with a scale from -4.0 to 6.0 and a box plot.

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# Example Results



# Summary

- GoDetect-ESD™ is available
  - High-speed test videos recorded and stored
  - Quantified reaction results documented
  - Operator subjectivity eliminated
  - Test time significantly reduced
  - GoDetect is user friendly
  - All information present to calculate results of GoDetect ESD Analysis
- GoDetect-ESD™ Analysis is available
  - Summary of machine variability or drift
  - Reaction probability summary and material drift
  - Type I and Type II errors summarized