

# Pressure Die Castings Nozzle Repeatability Measurements

August 2008

***“..any sufficiently advanced technology is indistinguishable from magic.” Arthur C. Clark***

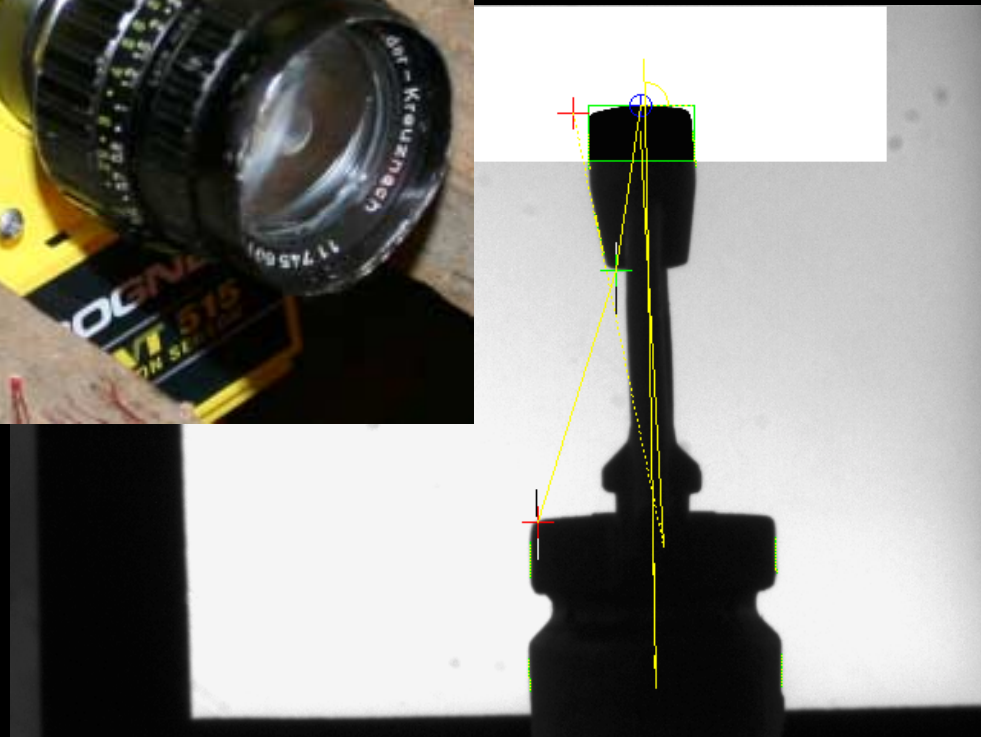
**WORLD CLASS,**

**Background:** The ability to obtain accurate measurements can be checked by measuring the same object numerous times, replacing the item to be measured each time on the measurement frame.

**Requirement:** Please check each of the measurements obtained and confirm if the values obtained provide sufficient accuracy? If the variance between values obtained is smaller than the accuracy required, then the proposed system can be used.

# Electronic Imaging Fundamentals

Acquire  
Process  
Identify  
Analyze  
Report

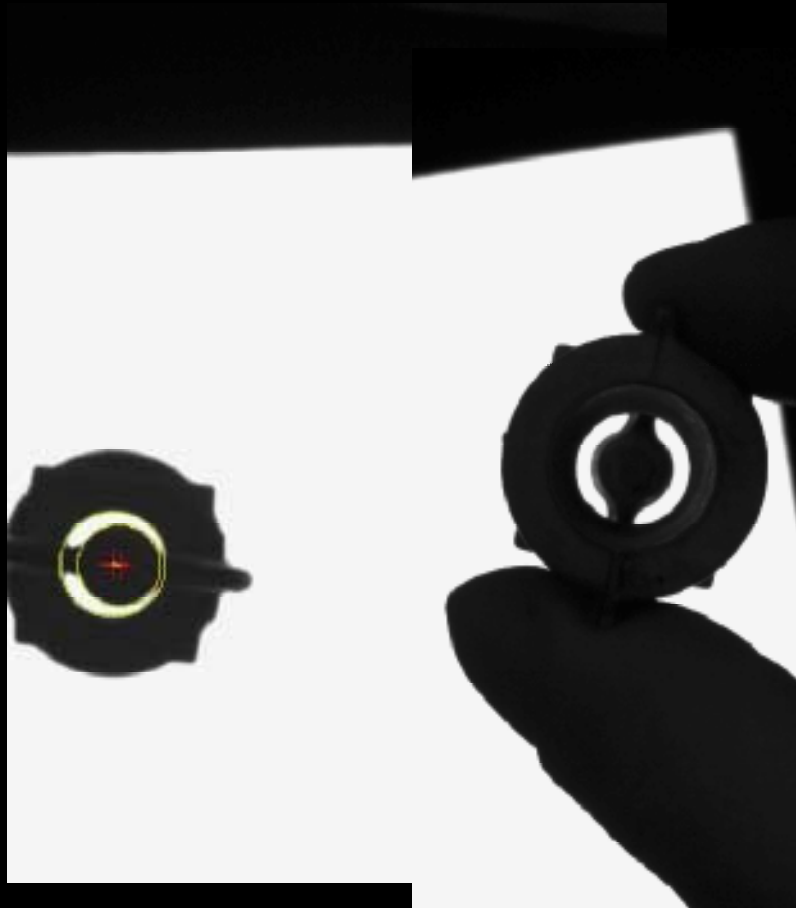


# Acquiring the Image

- ◆ Back lighting mostly utilized
- ◆ Front lighting is required for specific measurements, including text.



## ◆ Backlighting



## ◆ Ring Light



# Software Setup

The screenshot displays the DVT Intellect 1.5i software interface. The main window shows a video display of a mechanical part with a red bounding box and blue measurement lines. The interface includes a menu bar, a toolbar, a toolbox on the left, and a result table at the bottom.

**Toolbox:**

- Preprocessing
- Positioning
- Clipping
- Measurement
  - Measure Along Line
  - Measure in Area
  - Measure in Circle
  - Measure with Points and Lines
- Identification
- Flaw Detection
- Script
- Application Specific

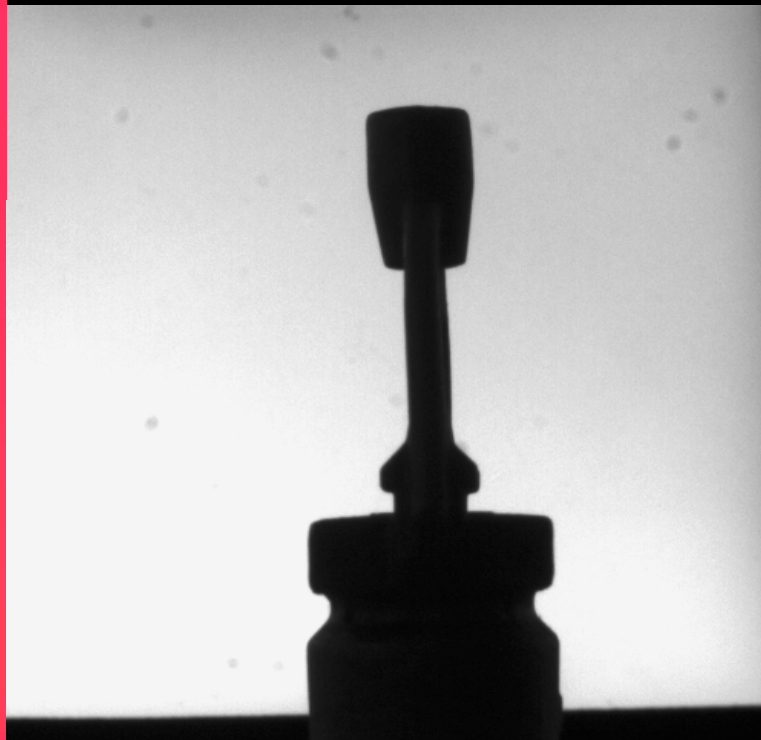
**Result Table - Product3:**

Name	Method	Output
Inspection Trigger		
Image Acquisition		
Preload	Product	Position = (413.800 Pixels, 52.000 Pixels), Measure Offset = (180.000000 Pixels, 51.000
Base	Measure...	Width = 71.467 Pixels, Angle = 86.147 degrees, Straightness = 0.215 Pixels, Contrast =
Inspection Results		

The bottom status bar shows the system tray with the date and time: 09:23 AM.

# Calibration

- ◆ The values presented are pixels, not millimetres at this stage.





- ◆ The required point of measurement can be modified at a later period

The screenshot displays the DVT Intellect 1.5i DVT 515 Demo software interface. The main window shows a 3D model of a mechanical part with various measurement tools overlaid. The 'Properties' panel on the left shows the 'Tool: Baseline Properties' with 'General Properties' and 'Settings' sections. The 'Result Table - Product3' panel at the bottom right displays a table of measurement results.

Measure	Method	Output
<input checked="" type="checkbox"/> SpargerFlat	Plane...	Width = 160.199 Pixels, Angle = 89.804 degrees, Straightness = 0.404 Pixels, Contrast...
<input checked="" type="checkbox"/> MFT_base	Plane...	Width = 104.512 Pixels, Angle = 89.796 degrees, Straightness = 0.212 Pixels, Contrast...
<input checked="" type="checkbox"/> HeadWindow	Plane Di...	Distance = 166.432 Pixels, Line Point (X, Y) = (386.56, 252.76) Pixels, Angle = 93.7. 931.
<input checked="" type="checkbox"/> Filtered	Plane...	Position = (427.000 Pixels, 45.000 Pixels), Minimum Offset = (1.71.000000 Pixels, 64.000...
<input checked="" type="checkbox"/> DeflectorBaseBottom	Point...	Distance = 36.147 Pixels, X = 411.000 Pixels, Y = 173.147 Pixels, Angle = 8.031 degrees
<input checked="" type="checkbox"/> Base	Plane...	Width = 88.874 Pixels, Angle = 88.720 degrees, Straightness = 0.138 Pixels, Contrast =
<input checked="" type="checkbox"/> SpotHeight	Point...	Distance = 36.413 Pixels, X = 362.000 Pixels, Y = 312.412 Pixels, Angle = -18.798 degr...

### Nozzle Repeatability Measurements

#### Sideways

	Ideal	1	2	3	4	5	6	7	8	9	10	Average	pix/mm	StdDev (pix)	StdDev (mm)	Max Err (pix)	Max Err (mm)
Meas # Name																	
1 Boss Width	9.5	68.85	68.74	68.7	68.85	68.75	68.62	68.76	68.75	68.7	68.75	68.747	7.23653	0.068321137	.00944	0.23	.03178
3 Spanner Flat Width <sup>1</sup>	21.2	160.24	160.67	160	161.6	161.99	162.9	160.78	160.58	164.6	160	161.334	7.61009	1.476476286	.19402	4.6	.60446
6 Window Height <sup>1,2</sup>	21.7	171.35	173.5	172	172.7	171.7	172.4	173.2	172.63	171.35	173.3	172.413	7.9453	0.792759596	.09978	2.15	.27060
7 Defl Boss Length	13.7	107.18	108.2	109.18	108.2	109.18	108.19	108.19	108.19	109.17	108.2	108.386	7.91139	0.628635206	.07946	2	.25280
8 Defl Boss Angle		8.8	9	8.4	8.63	8.3	8.3	9.2	9.09	8.89	8.9	8.751		0.327802447	.00000	0.9	
11 Arm Angle		90.47	89.9	91	90.9	91.8	90.8	90.4	90.86	90.48	91.3	90.791		0.525386539	.00000	1.9	

<sup>1</sup>- Correct lens and mounting will correct this

<sup>2</sup>- Diagram calls shows measurement from this angle, but better measurement could be achieved from front

#### Front

	Ideal	1	2	3	4	5	6	7	8	9	10	Average	pix/mm	StdDev (pix)	StdDev (mm)	Max Err (pix)	Max Err (mm)
4 NPT Boss width	22.5	164.35	164.3	164.25	164.5	164.45	164.3	164.3	164.3	164.6	164.3	164.358	7.30481	0.108893475	.01491	0.35	.04791
5 Window Width	18	135.96	136.3		136.1	136.1	136.14	136.13	136.1	136.04	136.2	136.03	7.55722	0.094926872	.01256	0.34	.04489
6 Window Height	21.7	157.85	158.73	158	158.6	157.71	157.82	158.55	157.86	157.6	157.3	158.02	7.28203	0.476171071	.06539	1.43	.19637
7 Defl Boss length	13.7	106.4	106.5	106.4	106.3	106.35	106.35	106.35	106.4	106.43	106.4	106.43	7.76861	0.049988888	.00643	0.17	.02188