

Rhopoint ID Application Notes

QUANTIFYING THE OPTICAL PROPERTIES OF PET BOTTLES



Overview

Injection blow moulding, a high speed, large quantity production process, is used for the manufacture of plastic packaging bottles. In this process a polymer (typically PET) is injected into a blow mould to be inflated and cooled.



To ensure consistent quality of the finished product, the accurate control of operating parameters must be ensured. Should problems occur it is essential they are identified quickly to prevent wastage.

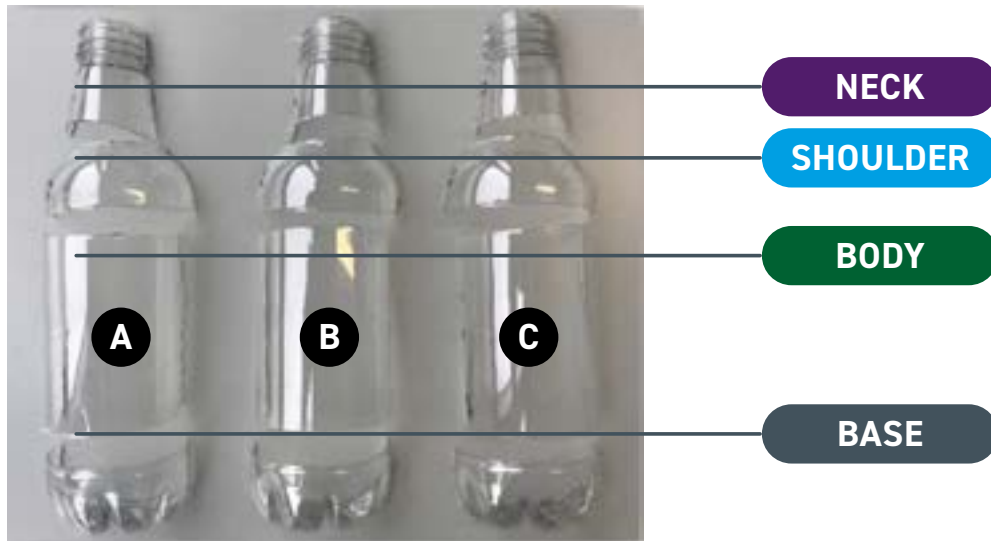
Typical problems can include:

- Orange peel and texturing on external wall surfaces
- Mould lines or marks
- Contamination
- Haze caused by surface roughness and bulk scatter

Using the Rhopoint ID it is possible to identify these problems in order to correct in process failures.

OTHER APPLICATION NOTES:

- Surface roughness and bulk scatter
- Distance Haze
- Abraded Samples



STEP 1: Three different customer supplied PET bottle samples were tested. Visually, they were all considered to be low haze with a “water white” appearance. Each bottle (A,B and C) was cut into 4 sections, labelled: Neck | Shoulder | Body | Base for measurement on the Rhopoint ID-L.

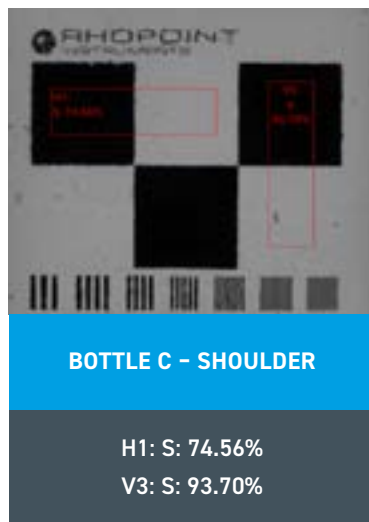
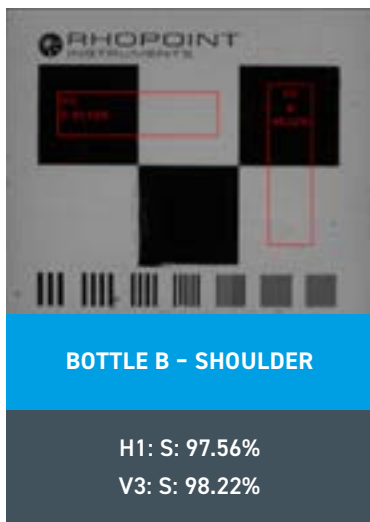
On closer inspection, the parts from bottle C were visually grainy, generally lower in sharpness and contained visible lines in the material that suggested anisotropy.



STEP 2: As the Rhopoint ID is vertically oriented, sample mounting was very easy, no adaptor or sample holding device was required. The cut samples were simply positioned onto the graticule and a measurement made.

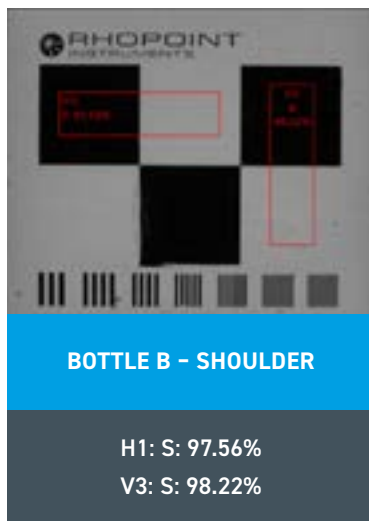


The images and data that follow was taken directly from the Rhopoint ID. Being a camera-based system it has the unique ability to provide detailed images of the measured sample that are very useful to verify problems in the quality of the material.



Sample and Part	Sharpness Anistrophy	Sharpness	Sharpness Horizontal	Sharpness Vertical	Visible Transmission	Haze	Haze Horizontal	Haze Vertical
A - NECK	9.5%	9.0	94.0	85.9	85.7	3.4	2.9	3.9
A - SHOULDER	1.9%	95.2	94.4	96.2	87.3	3.2	3.7	2.6
A - BODY	0.9%	90.8	91.2	90.4	85.6	4.5	4.9	4.1
A - AVERAGE	4.1%	92.0	93.2	90.8	86.2	3.7	3.8	3.5
B - NECK	5.4%	92.1	94.5	89.7	86.3	5.2	5.0	5.4
B - SHOULDER	2.2%	94.9	93.5	95.6	87.0	3.1	3.6	2.7
B - BODY	1.6%	95.5	96.3	94.7	86.0	3.0	3.3	2.7
B - AVERAGE	3.1%	94.1	94.7	93.3	86.4	3.8	4.0	3.6
C - NECK	7.0%	87.4	90.4	84.5	85.9	5.0	4.1	5.8
C - SHOULDER	6.0%	87.3	84.5	89.9	86.5	3.3	3.8	2.8
C - BODY	6.1%	86.2	88.7	83.6	85.8	4.8	5.1	4.5
C - AVERAGE	6.4%	87.0	87.9	86.0	86.1	4.4	4.3	4.4

Measurement analysis **Bottle B** SHOULDER

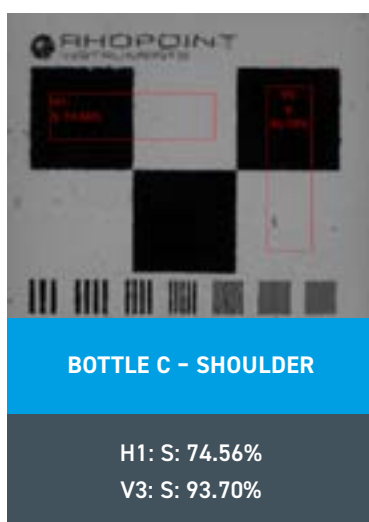


B-Shoulder – best quality

- **Low Haze** – bottle is perceived as having a “water white” appearance.
- **High Sharpness** – objects viewed through the material appear sharp and clear
- **Low Sharpness Anisotropy** – there is no directional micro-texture visible in the material

Sample and Part	Sharpness Anistropy	Sharpness	Sharpness Horizontal	Sharpness Vertical	Visible Transmission	Haze	Haze Horizontal	Haze Vertical
B - SHOULDER	2.2%	94.9	93.5	95.6	87.0	3.1	3.6	2.7

Measurement analysis **Bottle C** SHOULDER



C-Shoulder – lower quality

- **Low Haze** – bottle is perceived as having a “water white” appearance.
- **Lower Sharpness** compared to other samples – on closer inspection a micro-texture was visible in the material.
- **Sharpness Anisotropy** – higher than the other samples, a slight direction.

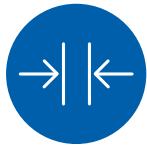
Sample and Part	Sharpness Anistropy	Sharpness	Sharpness Horizontal	Sharpness Vertical	Visible Transmission	Haze	Haze Horizontal	Haze Vertical
C - SHOULDER	6.0%	87.3	84.5	89.9	86.5	3.3	3.8	2.8

Features of the Rhopoint ID



No moving parts

Eliminates risk of mechanical failure



Stand-alone instrument

Small footprint reduces space required in laboratory



Lightweight

Easy to move in the laboratory or production line



Resistant and durable

Made from durable, recyclable materials



Touch screen

Single measurement time of 2 seconds to measure ALL parameters (up to 15 seconds on a comparable sphere instrument)

Large mounting area

Minimal sample preparation required possible to measure non flat samples without bending or deforming.

Fully sealed optics

Ideal for measuring liquid samples and solid materials impervious to damage through accidental spillage

KEY FEATURES

- ✓ Measurement of 3D formed shapes
- ✓ Measurement of anisotropy, defects and surface related texture
- ✓ Simple sample mounting. Fast, accurate and repeatable measurement
- ✓ Allows identification of in-process failures during manufacture
- ✓ Simple sample mounting. Fast, accurate and repeatable measurement
- ✓ Minimal sample preparation required, no need to bend or deform the sample for measurement
- ✓ Measured data and images allow visual confirmation of potential surface issues
- ✓ Extensive information available for detection and analysis

[FULL PRODUCT DETAILS](#)

[VIEW DATA SHEET](#)