

White Paper

Evaluation on Effects of Gloss and Bar Code Scanning

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Content

The attached report details efforts to analyze under controlled conditions the affects of substrate gloss on the scan of barcode labels. The testing was divided into several distinct activities as follows: Materials Selection; label substrate and ribbon selection, Label Printing; printer selection (burn and speed settings), label format Barcode Verification and Barcode Scanning.

Materials Selection

Label Substrate

Fourteen thermal transfer printable material substrates were selected including white gloss polyester, white matte polyester, silver gloss polyester, silver matte polyester and one white paper material. The materials represent four materials suppliers.

Ribbon Selection

Two thermal transfer ribbons were selected one wax resin and one resin. The ribbon / substrate combination was selected based on expected compatibility and print quality output.

Label Printing

Printer

The printer used was the Zebra 170 XI. Burn and speed settings varied based on the ribbon used and the visual print quality achieved.

Label Format

The label format (AIAG standard) included the printing of several linear barcodes printed using 3 of 9-barcode symbology as well as text information. For testing purposes the barcode below the word Loftware was used for verification and scanning.

Barcode Verification

Verification

Donna Keller at PSC (now owned by Hand Held Products) in Webster, NY using the Quick Check PC 600 Bar Code Verifier conducted the verification testing of all printed labels. Each label was tested three times against the ANSI scan rating characteristics. All label materials identified A through N achieved Ansi grade "A" scan ratings. This indicated that we were starting from a level playing field as the labels were of similar (same) print quality.

Barcode Scanning

Bill Sullivan at PSC in Webster, NY using the PSC LD8232 scanner (far focus only) conducted the barcode scan testing of all printed and verified labels. A label of each substrate material was applied to a corrugated box which passed on a conveyor belt moving at 100 FPM with the scanner mounted overhead at a distance from the belt of 35". Two labels of each material were applied to two separate boxes for each material substrate. (The result being two labels of each material were independently tested.) The scanner was mounted at two different angles in relation to the belt, 30 and 45 degrees. The scan width was set for 35". The scanner was set to default conditions for this testing.

Test Results

45-Degree Angle

At the 45-degree angle 11 of 14 label materials achieved 100% scans. The remaining 3 label materials achieved 0% scan ratings.

30-Degree Angle

At the 30 degree angle 11 of 14 label materials achieved 100% scans. One of the materials, which did not scan at the 45-degree angle, scanned only 15% of the time at the 30-degree angle. Two other materials, which scanned 100% of the time at the 45-degree angle, scanned only 95% of the time at the 30-degree angle.

Conclusion

We find the test to be inconclusive in providing a definitive relation between gloss level of materials and subsequent bar code scanning. The silver substrate materials (both low gloss and very high gloss) showed scanning difficulty at the 45-degree angle. The white substrate materials (both low gloss and high gloss) scanned very well under both the 30-degree and 45-degree conditions. Based on the above, it seems additional testing of the effects of scanning angle and substrate color are appropriate.

A matrix detailing the label substrates identified as A through N with brief description, gloss levels, burn and speed settings and % successful scans is below.

Label ID	Label Color	Gloss Level	ANSI Rating	Symbol Contrast	Read Rate at 45 Degrees	Read Rate at 30 Degrees
A	White	11.6	A	75%	100%	100%
B	White	7.6	A	72%	100%	100%
C	White	31.5	A	70%	100%	100%
D	White	19.1	A	72%	100%	100%
E	White	3.7	A	74%	100%	100%
F	White	23.3	A	75%	100%	95%
G	White	5.4	A	82%	100%	100%
H	Silver	11.9	A	74%	0%	15%
I	White	103.4	A	73%	100%	100%
J	White	32	A	71%	100%	95%
K	White	103	A	73%	100%	100%
L	Silver	149.9	A	80%	0%	100%
M	White	81.2	A	81%	100%	100%
N	Silver	100.2	A	74%	0%	100%