Honeywell's Dolphin™ 7800 EDA with 2DTG's DPM Decoder: Performance Evaluation

Contents

1. Objective

The objective of this study was to evaluate performance of the **Honeywell's Dolphin 7800 (D7800)** Enterprise Digital Assistant (EDA)**,** upgraded with **icEveryCode™ DPM Decoder.**

4 devices were selected for this study:

1.1 **Honeywell's Dolphin 7800ER (Extended Range) EDA,** upgraded with the **icEveryCode™ DPM Decoder** (DPM decoding software) by 2DTG.
1.2 **Honeywell's Dolphin 7800ER EDA** with original decoding software (without DPM Decoder).
1.3 **DataMan 7500LR** Scanner by **Cognex Corp** – specialized DPM Scanner.
1.4 **Xenon 1900HD by Honeywell Corp.,** upgraded with the **icEveryCode™ DPM Decoder** (DPM decoding software) by 2DTG.

Both DataMan 7500LR and Xenon 1900HD are not directly comparable to D7800LR – they were chosen for reference purpose only. Xenon 1900HD has the same Adaptus 6.0 Imager, but high resolution (High Density) version. DataMan 7500LR, on the other hand, is also long range reader (as D7800ER), but has special "DPM illumination" (unlike D7800).

2. Test Scope

Three performance parameters were measured on the sample set of DPM marks – Set #1 – the same set that was used in the previous study "Xenon 1900 Scanner with icEveryCode™ DPM Decoder vs. DataMan 7500, DS3408 and Mobile Hawk":

Decode Rate or **Success Rate -** defined as a ratio equal to the percentage of the successful decoding within the given set of samples.

Operating Range - industries require DPM readers to be capable to decode DPM marks at the distance up to 7- 8 inches for the 20-40 mils symbols.

Decode time - defined as the full time required for successful decoding: from starting to aim at the symbol until it is decoded.

Two **Images Profiles** have been created by 2DTG for DPM measurements – "Fast" and "Robust". "Fast" profile means that one decode cycle would take ~ 300 ms for mid-size DPM symbol, while "Robust" mode could take ~ 600-700 ms for the same image. In most cases "Fast" mode is sufficient for reliable decoding. Only "Fast" mode was used in this study.

3. Test Procedure

3.1. Samples

DPM samples selected for the test represent "typical" materials (steel, duralumin, plastic, etc.), surfaces (cast, polished, etc.) and types of DPM marks (Dot Peen, Laser etching, ink jet). Some of the samples have been chosen intentionally challenging. Though the spectrum of the samples was broad enough, most of them came from automotive industry.

Set #1
Set contains 22 Data Matrix DPM samples: laser etched - 11, Dot penned - 10, Ink jetted - 1. Module size is ranging from 6.5 to 38 mil. Sample images - as captured by Xenon1900 - are shown in the Exhibit 1.

3.2. Definitions

All decode results fall under the 3 categories:

- **"Stable Decoding"** – meaning that decoding was successful from the first try – no lighting or distance adjustment, or aiming angle optimization was required.
- **"Conditional Decoding"** - decoding was successful, but some adjustments had to be made during the image capturing process:
  - For D7800 and Xenon 1900 image capture has to be performed under the certain angle to the surface (from 45 to 65 degrees) to avoid direct light reflection from the substrate. "Optimal" value of this angle as well as distance from the target depends both on surface

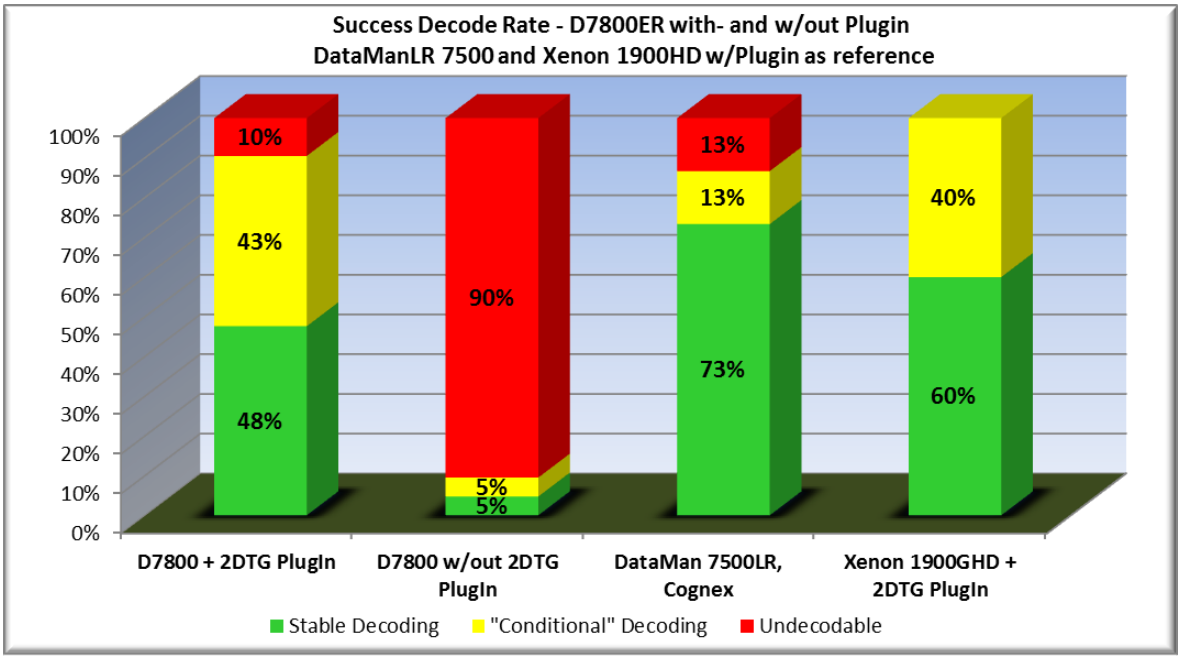
condition and ambient light. Accordingly, this "optimal" angle and distance has to be worked out by operator experimentally and capture time depends on operator experience.
    - For DataMan 7500 "angle adjustment" is less important as it has built-in illumination system providing diffuse-like lighting.
- **"Undecodable"**

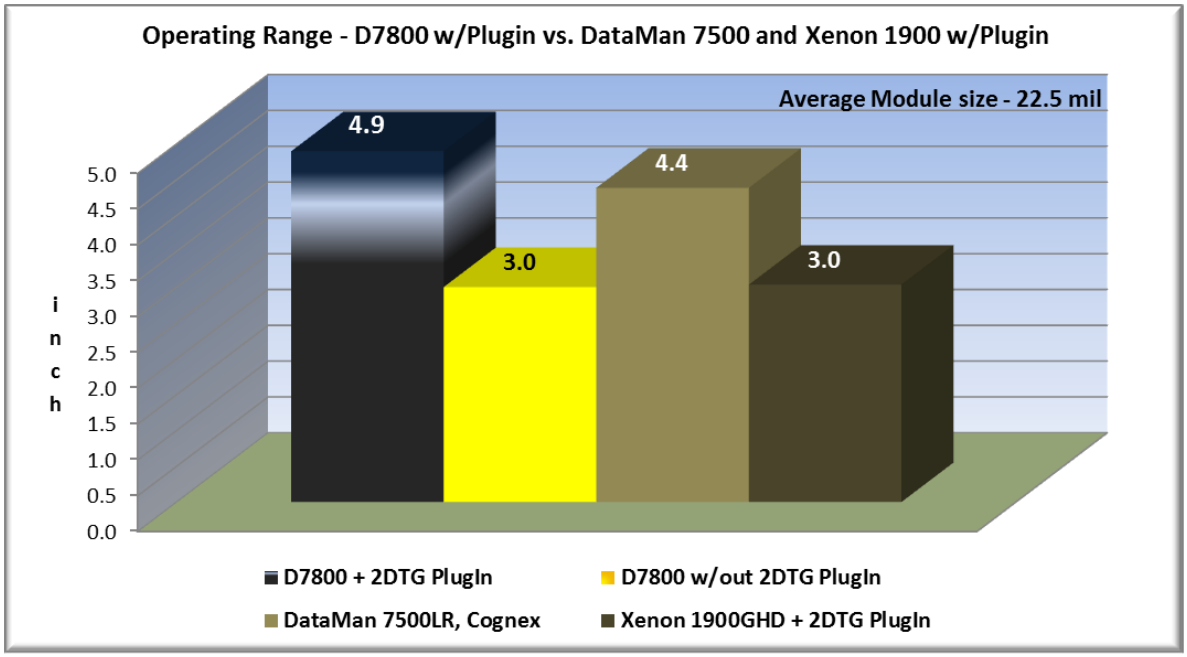
The time stamp for the **"Stable Decoding"** we considered to be up to 2 sec; for the **"Conditional Decoding"** – up to 5 sec; and for **"Undecodable"** – more than 5 sec.

Operating Range was calculated as the difference between the maximum and minimum **Reading Distance.**

4. Test Results

Side-by-side comparison of the Success Decode Rate for D7800ER with- and without 2DTG's Plugin is demonstrated by the diagram below (Xenon 1900HD and DataMan 7500LR are shown for as references):





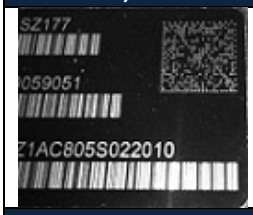
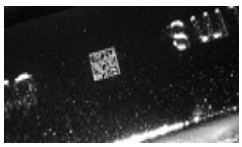
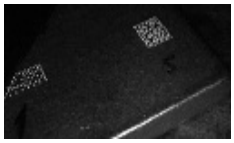
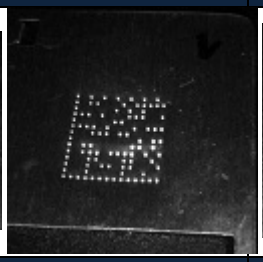
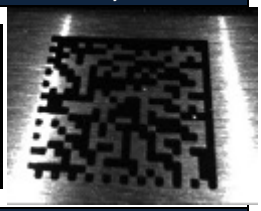
5. Conclusion

D7800, upgraded with DPM Decoder, demonstrates very "reasonable" DPM performance – **Success Decode Rate** – similar to the one demonstrated by specialized DPM Reader DataMan 7500 by Cognex Corp.

"High Density" type of imager (for D7800) is preferable for DPM applications since it provides higher resolution. However, Imager's operating range is more dependant on the samples quality than a type of imager.

Since D7800 lacks special (diffuse) illumination, time required to find the correct image capturing angle might be slightly higher than for specialized DPM scanner, but in reality this complication is more about operator proficiency than predicament.

6. Exhibit 1. SET #1 Samples

1 Painted Al 26x26; 15 mil	2 Intel chip 18x18; 10 mil	3 Chrome-plated Steel 18x18; 9 mil	4 Chrome-plated Steel 18x18; 9 mil	5 Zinc-plated Steel 18x18; 9 mil
				
6 **Zinc-plated Steel** **18x18; 9 mil**	**7** **Milled Al** **8x32; 20 mil**	**8** **Milled Al** **18x18; 14 mil**	**9** **Milled Al** **18x18; 28 mil**	**10** **Cast Duralumin** **18x18; 22 mil**
				
11 **Cast Steel** **16x16; 31 mil**	**12** **Curved polished Steel** **18x18; 20 mil**	**13** **Painted Steel** **22x22; 25 mil**	**14** **Curved polished Steel** **14x14; 31 mil**	**15** **Polished Steel** **12x12; 7 mil**
				
16 **Fluoroplastic** **14x14; 13 mil**	**17** **Celeron Chip** **18x18; 6.5 mil**	**18** **Mirror-like Steel** **14x14; 13 mil**	**19** **Painted Steel** **26x26; 30 mil**	**20** **Polished Steel** **22x22; 28 mil**
				
21 **Painted Metal** **64x64; 38 mil**	**22** **Cast Duralumin** **26x26; 24 mil**