AIM TSC
DPM Ad Hoc

A Revised Quality Measurement Method for DPM
Agenda

- Background: what are the problems with ISO15415 & AS9132
- AIM DPM Quality Guideline Summary
- Realities of DPM that Application Standards must consider when writing a standard
- Recommendations for Application Standards
Background: the problem

- Good DPM marks are getting failing grades under today’s ISO/IEC 15415 and AS9132 method
  - “Good” as determined by visual inspection and reader performance
- Typical failure modes:
  - Symbol Contrast
  - Print growth
  - Unconnected Dots in the ‘L’
  - Sub-optimal illumination
AIM DPM Summary

- Marking method independent
- Incorporates necessary lighting options to address all material and surface characteristics
- Provides very good correlation between the quality of mark and readability from commercial off the shelf DPM readers
- Specialty readers and verification solutions will be needed for a small percentage of parts due to part characteristics
Summary of AIM DPM
What did we do?

1) Adopted the appropriate illumination techniques for DPM
   - Low angle lighting (30Q = all 4 sides, 30T = 2 sides)
   - Diffuse on axis lighting (90)degrees)
   - Diffuse off axis lighting (D)
Summary of AIM DPM
What did we do?

2) Applied a different method for creating the binary image
Summary of AIM DPM
What did we do?

3) Applied a different method for setting the image contrast
   • Image on left is ISO 15415 method and image on right is AIM DPM method
Application
Group Decisions

- Consider Different Mark & Reading Situations
  - Category 0: Paper only
  - Category 1: Flat DPM parts
  - Category 2: Flat DPM parts + round parts
  - Category 3: Specialty Parts Require specialized reading solutions

- Cat 0: Any 2D Reader
- Cat 1: Any DPM Reader
- Cat 2: DPM Readers that provide “D” lighting
- Cat 3: Proprietary / customer reading solution

- What are the range of X dimensions
- What is the minimum acceptable grade level?
Recommendations

- All Marking Methods
  - Minimum Grade: 1.0
  - Minimum X dimension: no change
  - Lighting: /(30|90|D)/(Q|V|H)
    - Allows all lighting option
    - 30 degree lighting can be from all sides, N/S or E/W

- Specialty Parts where COTS Readers Don’t Apply
  - Use specialty reading equipment with proprietary decode, Unused Error Correction, Grid Non Uniformity, Axial Uniformity or AS9132
Conclusions

- The DPM verification technology issues have been addressed.
- Applications standards need to reference AIM DPM guideline and choose appropriate categories.
- Draft of an AIM spec on DPM quality is ready for public review.
AIM DPM Quality Guideline

P&W Review Draft
Issues

- Based on the belief that if a mark is easy to read, it must be good
- Reader algorithms are proprietary, therefore the guide is based on a less aggressive non-proprietary process
- Identified as a DPM Guide, but actually appears still to be targeted toward “easy to read” labels and data plates
- Off axis lighting very limited, 30 degree 2 or 4 directional only
- Camera system must be “oriented” to image: no tolerance provided
Issues

- No traceable “standard” for calibration of Verification System to a known standard (NIST/ISO)
- Category 0 parts (labels) have no place in a DPM Standard (in my opinion)
- Per B1.4, Category 3 parts are likely to read easily with purposely built scanners, and yet fail (or not even decode) with the verifier. Therefore use AS9132??
- Verifier should be grading mark “quality” rather than how easy it is to read.
Conclusions

- The document, as written, is better than anything we had previous
- A traceable “standard” for calibration needs to be developed
- More work needs to be done for DPM applications
- Needs to be “robust” enough to use as a process control tool (or some variation of)