

AIM TSC  
DPM Ad Hoc

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**A Revised Quality  
Measurement Method for  
DPM**

# Agenda

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- 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

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- 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

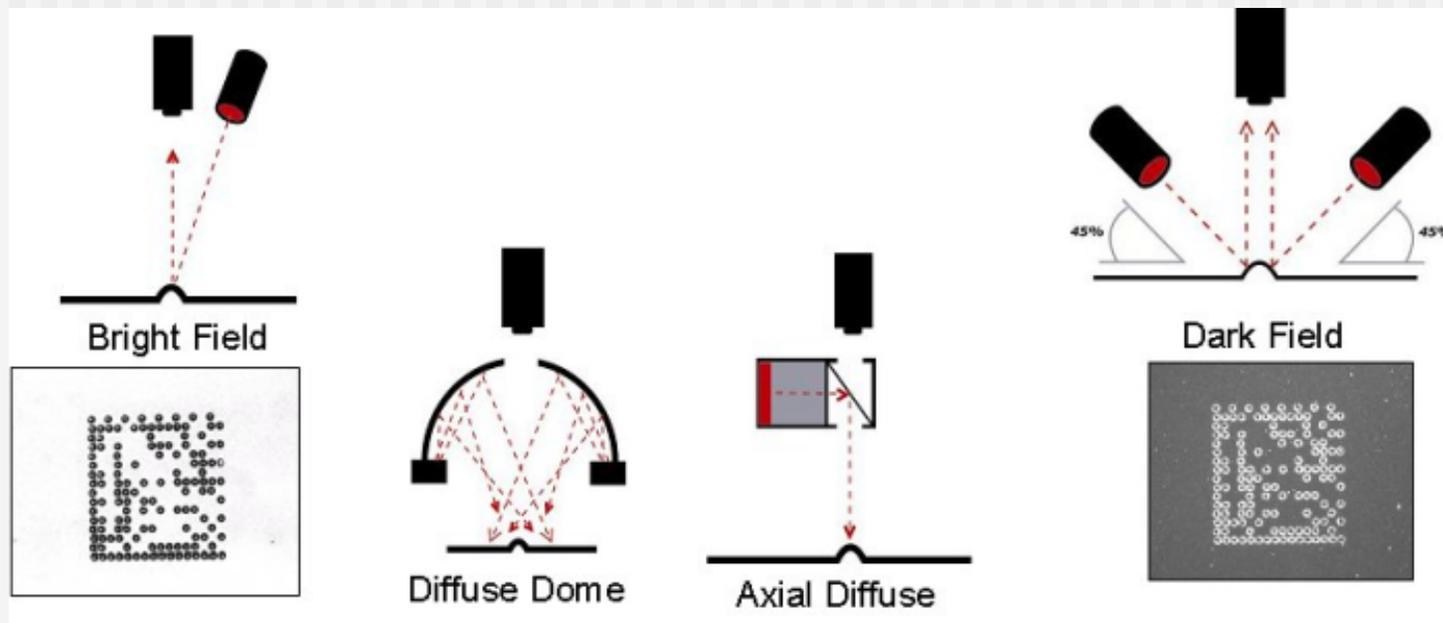
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- Marking method independent
- Incorporates necessary lighting options to address all material and surface characteristics
- Provides very good correlation between the quality of mark and readability from commercial off the shelf DPM readers
- Specialty 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?

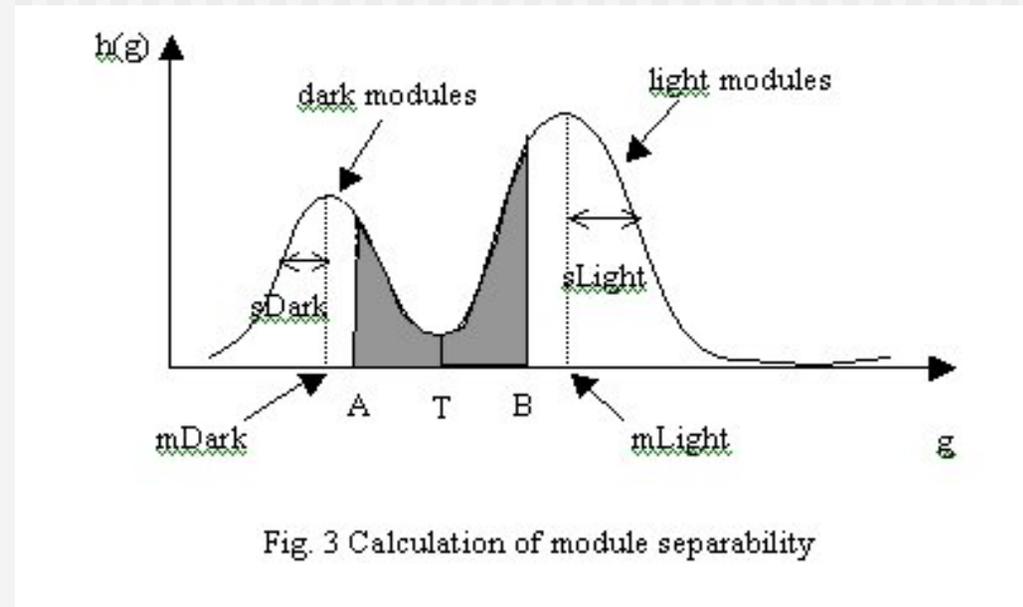
- 1) Adopted the appropriate illumination techniques for DPM
  - Low angle lighting (30Q = all 4 sides, 30T = 2 sides)
  - Diffuse on axis lighting (90)degrees)
  - Diffuse off axis lighting (D)



# Summary of AIM DPM

## What did we do?

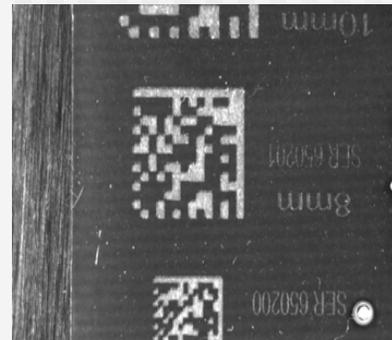
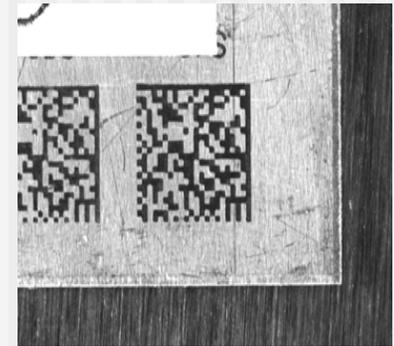
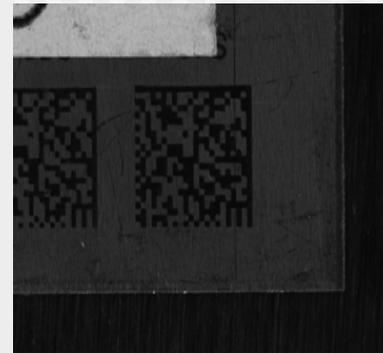
- 2) Applied a different method for creating the binary image



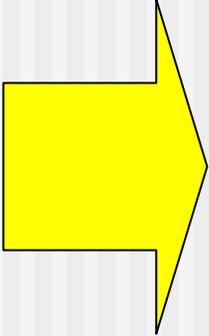
# Summary of AIM DPM

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

# Recommendations

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- 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

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P&W Review Draft





# Issues

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- 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

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- 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

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- 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)