SASIG
3D-MBE Workgroup

April 14th 2016

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AIAG & SASIG MBE Workgroup
SASIG is a global consortium of automotive standards organizations.
# 3D-MBE Working Group

<table>
<thead>
<tr>
<th>Vision</th>
<th>• Move the automotive industry to 3D Model Based Enterprise (3D-MBE)</th>
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<tbody>
<tr>
<td>Mission</td>
<td>• To Promote the implementation of the 3D-MBD model to enable</td>
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<td>seamless sharing of Product information within the extended</td>
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<td>enterprise and the Automotive industry</td>
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<td>Scope</td>
<td>• 3D Model Based Design Penetration (AIAG)</td>
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<td>o Drawing Elimination, Virtual Validation, 3D Work Instructions</td>
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<td>• 3D Model Based Design Obstacle Elimination (JAMA)</td>
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<td>o Die Engineering, Spot Welding, Inspection, Service Manuals</td>
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<td>• 3D Model Based Design Exchange (GALIA)</td>
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<td>Deliverables</td>
<td>3D-MBE White Paper</td>
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<td></td>
<td>• Introduction to 3D-MBE</td>
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<td>• Survey Results</td>
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<td>• Maturity Index / Self Assessment</td>
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<td>• Best practices guideline to achieve 3D-MBE maturity</td>
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<td>• 3D-MBE Functional Requirements derived from the 3D-MBE initial 5</td>
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<td>use cases</td>
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To Promote the implementation of the 3D-MBD Model to enable seamless sharing of Product information within the extended enterprise and the Automotive industry
MBE Workgroup Participants

- AIAG – 15+ active members (OEMs, Tier1s & Software Providers)
- JAMA – OEMs, Suppliers and Software Vendors (50+)
- GALIA – PSA & Renault, Faurecia, Valeo, Continental
What is the role of a Drawing?

**Current State**

- CAD 3D Model
- Design
- Supplier
- Interference
- Machining
- Inspection
- Meetings
- Assembly
- Supplier

**Future State**

- CAD 3D Model
- Design
- Supplier
- Interference
- Machining
- Inspection
- Meetings
- Assembly
- Supplier

Too big of a jump

All major Automotive Companies have been trying for the past 10 years to implement full 3D.
Drawing Automation Need

Drawing generation from 3D GD&T models is perceived as duplicate work, which hinders the move to a Model Based Environment. Model Based environment adds significant improvements to collaboration and GD&T Quality.
How to Bridge the Gap in the Short Term?

Develop a simplified/automatic drawing creation process/tools.

- Full 3D
- 3D + Automatic 2D
- 3D + 2D
How to Bridge the Gap in the Long Term?

Drawing Free Product Documentation in a “Container”
That captures geometrical, technological and organizational (previously drawing) data of the product
MBE Self Assessment Tool

Model Based Enterprise Roadmap

MBE is an integrated and collaborative environment, founded on 3D product definition shared across the enterprise, enabling rapid, seamless, and affordable deployment of products from concept to disposal.

Criteria

- Product & Supplemental Geometry
- Dimensions
- Supplemental Geometry
- Basic Dimensions
- Zona A
- Parts Geometry
- 2D Drawing Centric
- 3D Drawing Centric
- Multi 3D Model Centric
- 2D & 3D Model Centric

Level

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<tr>
<th>Level</th>
<th>Description</th>
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<tr>
<td>L1</td>
<td>Part &amp; Supplemental geometry information obtained solely from drawing.</td>
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<tr>
<td>L2</td>
<td>Product &amp; Supplemental Geometry may exist in the 3D model but is not verified or configuration controlled.</td>
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<tr>
<td>L3</td>
<td>2D Master Drawing – 3D model not verified or configuration controlled.</td>
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<td>L4</td>
<td>3D Master CAD Model with 3D annotations – 2D drawings by exception.</td>
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<tr>
<td>L1</td>
<td>3D Master CAD Model with 3D annotations – Fully leveraged by the enterprise.</td>
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<tr>
<td>L2</td>
<td>The 3D model may include dimensions, and if so, both representations must be in agreement. When all product definition is contained on the drawing, it must be noted.</td>
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Drawing Authority

Model Authority
1. Introduction
   - What is 3D-MBE?
2. Background
   - History, workgroup scope, objectives
3. Current State of 3D-MBE in the Automotive Industry
   - Where we are
   - Survey results & observation summary
4. Future State
   - Where we are going
5. Usage & Benefits
   - Benefits & ROI (Return on Investment)
6. Transition to 3D-MBE
   - Maturity model & “how to move to next level”
   - Automatic 2D & Drawing Free Container
7. 3D-MBD Functional Requirements
   - Explanation & observations summary of CAD and Translator functional requirements
     activity - 5 use cases
8. Path to 3D-MBE
   - The How
   - Enablers & Roadblocks
9. Conclusion/Summary
An OEM study validated a 50 % man-hour reduction using 3D Annotated Models.
Virtual verification QSR/DSE  (Compare a scanned part to 3D GD&T model)  Higher priority for profile and position based callout in GD&T compare

Virtual verification can significantly reduce PPAP cost and be a powerful tool in 6 sigma studies.
Model Based Dimensional Analysis

“ROBUST DESIGN”
Product Development Based
Driven by:
Engineering Defined & Validated GD&T

Benefits:
Proactive DFMA Strategy
Enables Build Anywhere
Reduces Late Changes

Challenges:
Release Cycle Extension

Manage Variation as an element of the Product Definition

“VARIATION MGT”
Process Engineering Based
Driven by:
Manufacturing Updated GD&T

Benefits:
Process Driven Approach
Closer to the Build Issues

Challenges:
Less Iteration Flexibility

Manage Variation as an element of the Manufacturing Process Definition

“FUNCTIONAL BUILD”
Plant Quality Based
Driven by:
Part Measurements

Benefits:
Based on Actual Variation

Challenges:
Reactive not Proactive

Manage Variation as an element of the Launch and Build Quality Process
Technical Data Package
Release to Release GD&T Compare

New Annotations
Old Annotations

Supplier BOM Package
MBE Implementation: Important points to be considered

**Gain Leadership Commitment & Support**
(Clear Goals & Objectives)

**Leadership Support** to overcome resistance to unfamiliar practices and procedures
Guiding Coalition with clear vision and strategy is a must. Implementation of MBE is best accomplished using familiar problem solving and continuous improvement tools such as, Six Sigma methods, DMAIC (Define, Measure, Analyze, Improve, and Control), PDCA (Plan-Do-Check-Act).
As new MBE processes and tools are developed, training must be made available to people who will be impacted.
The benefits of effective communication and collaboration are significant because they help to increase the momentum for change, provide a forum where MBE teams learn together, capture and share lessons learned and provide a forum for suggestions to eliminate barriers.
The MBE transition is a journey, and not a destination. Successful transitions build upon incremental successes through consistent and continuous implementation. Teams should create and follow control plans that can be used to maintain the progress that has been made.

**Consistent & Continuous Implementation**
(Drive Future State)

**Change the Cultural**
(Think 3D and not 2D)
(Clear Vision)

**Continuous Communication & Collaboration**
(Implement Best Practices)

**Develop Capable Internals & External Processes**
(Efficiency Improvements)

**Provide Training to Improve Employee Skills**
(Capabilities & Expectations)

**Develop & Implement New Technologies**
(Implement Common Tools)