BIO – Evan Kessick

Evan Kessick
MBE Discipline Manager
Belcan

• Joined Belcan in 2023 as MBE Discipline Manager
• Helping organizations bridge strategy and execution to achieve digital visions
• 16+ years working in engineering and design
• Led MBD and MBE Implementation at large consumer goods OEM
• Industry Standards Involvement:
  • ASME MBE Committee Chair
  • ASME Y14/MBE Harmonization JWG Co-Chair
  • ASME Y14.41 Member
  • ASME Y14.5-2009 GDTP Senior Certified
  • Involved with the DMSC, and DEDMWG

Belcan
• 65 years of Engineering Better Outcomes
• Global Delivery Network
• 10,000 Professionals
• Annual Revenue of ~$1B
AGENDA

01. Review MBE Committee and Y14/MBE Harmonization JWG Charter
02. Why Industry Standards Matter and MBE Committee Role
03. Understand the Role the Harmonization WG Plays
04. Y14/MBE Harmonization WG Overview
05. How To Get Involved!
ASME Committee Overview
Model-Based Enterprise (MBE) Committee

Y14 Committees
- Y14.5
- Y14.47

MBE Committee

Recommendations

Y14/MBE Harmonization JWG

Recommendations
Model-Based Enterprise (MBE) Committee

Charter:
Develop standards or related products that provide rules, guidance, and examples for the creation, use and reuse of model-based datasets, data models, and related topics within a Model-Based Enterprise.

Model-Based Enterprise (MBE):
An organization that uses digital methodologies as the foundation to enable deployment of products from concept to disposal.

Y14.47-2023: Model Organization Practices

Product Lifecycle Traceability
Model-Based Enterprise (MBE) Committee

Charter:
Develop standards or related products that provide rules, guidance, and examples for the creation, use and reuse of model-based datasets, data models, and related topics within a Model-Based Enterprise.

Y14.47-2023: Model Organization Practices
Model-Based Enterprise (MBE):
An organization that uses digital methodologies as the foundation to enable deployment of products from concept to disposal

Model-Based Enterprise (MBE)
Model-Based Enterprise (MBE) Committee

Charter:
Develop standards or related products that provide rules, guidance, and examples for the creation, use and reuse of model-based datasets, data models, and related topics within a Model-Based Enterprise.

Focus Areas:
- Identify model-based datasets across the enterprise
  - Identify the origin of creation, reuse, and augmentation
- Identify the common information exchange to perform product lifecycle standards work
  - Identify and digitally connect the information exchange between enterprise domains
- Identify interoperability challenges of model-based datasets and technical data
  - Internal OEM Focus, Supply-Chain (External) Focus
- Manage gaps and concerns between existing standards affecting MBE/MBD adoption
- Manage model-based datasets, linkages, and dataflow between enterprise domains
- Establish Industry Standardization, Governance, and Rules for common Information Exchange
Model-Based Enterprise (MBE) Committee

Charter:
Develop standards or related products that provide rules, guidance, and examples for the creation, use and reuse of model-based datasets, data models, and related topics within a Model-Based Enterprise.

Leadership:
Chair: Evan Kessick
Vice Chair: Mark Morreale
Technical Secretary: Open for Nom.

Members:
9 members and Looking to Grow

Meetings:
Virtual Meetings: Bi-Weekly TBD
In-Person: ASME April 30th 1-4pm MST

Focus Areas:
- Identify model-based datasets across the enterprise
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Model-Based Enterprise (MBE)
Y14 & MBE Harmonization Joint Working Group

Y14 Committees
- Y14.5
- Y14.47

Y14.41

Y14.8

MBE Committee

Y14/MBE Harmonization JWG

Recommendations

Recommendations
Y14 & MBE Harmonization Joint Working Group

Charter:
Collect MBD/MBE concerns and ideas in relation to the current Y14 standards and where said standards need to be adapted to meet the emerging needs of Model Based Enterprise activities. Ensure MBE and Y14 harmonization, supporting the creation and the interoperability of MBD.

(Established: March 2022)

How:

• Develop ASME Y14 Recommendations
• Develop ASME MBE Recommendations
• Develop White Papers:
  • Best practices
  • Industry and Standards Gap Analysis
  • Industry awareness of activities
  • How to best implement harmonized Y14 or MBE
Y14 & MBE Harmonization Joint Working Group

Charter:
Collect MBD/MBE concerns and ideas in relation to the current Y14 standards and where said standards need to be adapted to meet the emerging needs of Model Based Enterprise activities. Ensure MBE and Y14 harmonization, supporting the creation and the interoperability of MBD.

(Established: March 2022)

Leadership:
Co-Chair Y14: Ashley Schmidt
Co-Chair MBE: Evan Kessick
Technical Secretary: Dan Feighery

Members:
Y14: 10 Members
MBE: 10 Members

Meetings:
Monthly OPEN Meetings: April 24th
In-Person: ASME April 29th 9-5pm MST

How:
• Develop ASME Y14 Recommendations
• Develop ASME MBE Recommendations
• Develop White Papers:
  • Best practices
  • Industry and Standards Gap Analysis
  • Industry awareness of activities
  • How to best implement harmonized Y14 or MBE
Review MBE Committee and Y14/MBE Harmonization JWG Charter

Why Industry Standards Matter and MBE Committee Role

Understand the Role the Harmonization WG Plays

Y14/MBE Harmonization WG Overview

How To Get Involved!
Why Industry Standards Matter?

Product Definition Without Industry Standards

- Non-functional Product Definition
- No Datum System (Implied Datums)
- Ambiguous Requirements

Product Definition (2D Drawing)

Interpretation Across the Supply-Chain

Global Supply-Chain

- Multiple Languages
- Multiple Interpretation
- Multiple Inspection Methods

Part Acceptance?

Reginal Supply-chain

- Supplier A
- Supplier B
- Supplier C
- Supplier D
- Supplier E

Why Industry Standards Matter?
Why Industry Standards Matter?

Product Definition With Industry Standards

- Functional Product Definition
- Datum System
- Clear and Understood Requirements

Interpretation Across the Supply-Chain

Global Supply-Chain

- Reginal Supply-chain
- Part Acceptance?

Product Definition (2D Drawing or MBD)

- ASME Y14.5
- ASME Y14.41
- ASME Y14.100

- Supplier A
- Supplier B
- Supplier C
- Supplier D
- Supplier E

- ASME Y14.45
- ASME Y14.100

- Global Symbolic Language
- Single Interpretation
- Single Inspection Methods
MB-X
Digital Thread

MB-Definition
- 3D Tolerance Analysis
- Simulation & Validation
- Engineering PMI/GD&T
- Bill of Characteristics
- MBD Derivative Formats
- 3D Data Package

MB-Assembly
- Assembly Models
- 3D Work Instructions

MB-Testing
- Verification by Simulation
- Validation by Simulation

MB-Manufacturing
- 3D Process Planning
- NC Programming
- Inspection Plans & Rules
- Program Creation & Execution

MB-Quality
- Service, Overhaul & Repair
- Operational Data

MB-Systems Engineering
- Requirements Engineering
- System Architecture Development

MB-Definition
- Model Based Software
- Connected Systems

Voice of Customer

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Industry Standards Landscape and MBE Committee Role

Model-Based Enterprise

Lifecycle Phase
- Product Development
- Plan, Source, Build
- Operate and Maintain

MB-Systems Engineering
- Requirements Engineering
- System Architecture Development
  - INCOSE
  - ISO 15288
  - DoDI 5000.97

MB-Definition
- Engineering PMI/GD&T
- Bill of Characteristics
  - ASME Y14.5
  - ASME Y14.5.1
  - ASME Y14.41
  - ASME Y14.8
  - ASME Y14.47
  - ASME Y14.100
  - ASME Y14.46
  - MIL-STD-31000

MB-Sustainment
- Service, Overhaul & Repair
- Operational Data

MB-Testing
- Verification by Simulation
- Validation by Simulation

MB-Quality
- Inspection Plans & Rules
- Program Creation & Execution
  - ASME Y14.43
  - ASME Y14.45
  - ASME Y14.40
  - ASME Y14.46
  - ISO 23592 (QIF)
  - ISO 9001
  - Emerging MBC ANSI Standard
  - AIAG

MB-Assembly
- Assembly Models
- 3D Work Instructions

MB-Software
- Model Based Software
- Connected Systems

MB-Manufacturing
- 3D Process Planning
- NC Programming
  - ASME Y14.43

MB-Design
- 3D Tolerance Analysis
- Simulation & Validation
  - ASME Y14.5
  - ASME Y14.41

MB-Manufacturing
- 3D Process Planning
- NC Programming

Neutral Formats
- ISO 10303 (STEP)
- ISO 14306 (JT)
- ISO 23592 (QIF)
- ISO 14379 (PRC)
Interoperability of Technical Data

A 3D Technical Data Package The complete authoritative technical description of a part comprised of artifacts that support the interoperability, traceability, and human-readability of technical data; ranging from engineering CAD data, specifications, standards, and more. -Belcan

Contains Complete Product Definition

TDP Completeness

- Fit
- Form
- Function

Support Downstream Audience

Machine/Software-Readable

Supports Interoperability

Traceability

Human-Readable

Supports Human Readability

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Why Industry Standards Matter?

-Interoperability of Product Definition Without Industry Standards-

OEM Technical Data Package

- Native CAD
- Neutral CAD
- 3D Viewable
- 2D Specifications
Why Industry Standards Matter?

-Interoperability of Product Definition Without Industry Standards-

OEM Technical Data Package

Supply-Chain Software Soup

Supply-Chain Look Across

CAD System

CAM Tools

Inspection Tools
Provide standardization, governance, and rules to perform standard lifecycle activates:

- Providing industry guidance for authoring interoperable Technical Data Packages
- Standardizing the information exchange with consumption software, systems, and tools
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05. How To Get Involved!
Charter:
Collect MBD/MBE concerns and ideas in relation to the current Y14 standards and where said standards need to be adapted to meet the emerging needs of Model Based Enterprise activities. Ensure MBE and Y14 harmonization, supporting the creation and the interoperability of MBD. Present collected concerns in recommendation format to existing standards for incorporation.
Y14/MBE Harmonization WG Role

**Industry Standards**

- ASME Y14.5: Geometric Dimensioning and Tolerancing
- ASME Y14.41: Digital Product Definition Data Practices
- ASME Y14.47: Model Organization Practices

(Example Subset of Standards)

**Model-Based Definition (MBD)**

- Human and Machine-Readable

**Model-Based Enterprise (MBE)**

- Human and Machine/Software-Consumption

Leverage Industry Standards → Standard Compliant Product Definition → Enterprise Reuse - Single Interpretation

**Y14 Standard Committees**

**Y14/MBE Harmonization Working Group**

**MBE Standard Committee**

Recommendations
Y14/MBE Harmonization WG Overview

**MBD & MBE Adoption Gaps:**

- 50+ Model-Based Gaps Have Been Identified By Group Members

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# Y14/MBE Harmonization WG Overview

MBD & MBE Adoption Gaps:

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<td>Commenting and Markups in 3D MBD</td>
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<td>Quality</td>
<td>Assigning Characteristics ID’s (and augmentations) and traceability through enterprise</td>
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<td>MBD authoring that supports a Bill of Characteristics (BOC)</td>
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<td>Inspection</td>
<td>Associating inspection results to model features</td>
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<td>Downstream users want access to inspection data</td>
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<td></td>
<td>Visual Inspection Symbology - For non-critical features</td>
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<td>Flexible part inspection/requirements in MBD. Restrained/as-installed inspection in MBD.</td>
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<td>Customer Logistics</td>
<td>Manuals are not digitally connected to product definition</td>
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<td>Documentation of hazardous materials within digital datasets</td>
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Y14/MBE Harmonization WG Overview

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User Story:
As an MBD Author, and MBD Consumer,
I want clear definition of features controlled by a feature control frame across an associated group of surfaces with common semantic requirements that clearly delineates the start and end limits for machine-readable application so that the MBD-authored design intent is clear and that the human and machine interpretation match and is non-ambiguous.
Y14/MBE Harmonization WG Overview

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User Story: As an MBD Author, I want a framework to define complex (multi-feaured) holes in my product definition data, so that I can produce an extensible machine and human readable requirement.

GAP: Multi-Featured Hole Definition

Designating Elements of Different Screw Thread Standards

Universal Framework

Non-Threaded Feature Definition

Y14/MBE Joint Working Group

Product Definition Example

- 1/2-13 UNC-2B TAP THRU
- 500 x 90°
- 27/64 DRILL (5/32) THRU HOLE
- \( \phi \ 0.10 \) A B C

Visual Response
## In-Flight Model-Based Gaps

### Active Gaps

| Pattern Syntax Authoring in MBD  
| (Between Symbol, From-To Symbol) | Evan Kessick |
| Multi-Featured Hole Definition  
| (i.e., Spotface, Threads, Counterbore, countersink) | Dan Feighery |
| Improved Definition and Interoperability of a Feature of Size w/ and w/o Draft | Andrew Pierce |
| Commenting and Markups in 3D MBD | Mark Morreale |

### Gap Chart Framework

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<th><em>GAP NAME</em> – GAP Chart</th>
<th>Y14/MBE Harmonization WG</th>
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<td>Problem Statement(s) (shortcomings)/User Story</td>
<td>Industry Standard(s) and Section(s), and/or lack of Standardization</td>
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<td>List All Current Standards and Sections Related to the Gap, List Lack of Standardization</td>
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<tr>
<td>Y14, MBE, White Paper Recommendation(s)</td>
<td>Next Steps:</td>
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<tr>
<td>Create and/or recommend in Y14, MBE, or both, list any White Paper Recommendations</td>
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# GAP Chart Framework

**GAP NAME** – GAP Chart

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<tr>
<th>Breakout Group Attendees</th>
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<td>(Name, Company, Committee (Y14 or MBE))</td>
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## Problem Statement(s) (shortcomings)[User Story]

List All Problem Statements and Shortcomings surrounding the Gap

## Industry Standard(s) and Section(s), and/or lack of Standardization

List All Current Standards and Sections Related to the Gap, List Lack of Standardization

## Y14, MBE, White Paper Recommendation(s)

Document Recommendations to either Y14, MBE or Both. List any White Paper Recommendations.

## Next Steps:

List all Next Steps Related to Gap
3DCIC Y14/MBE Harmonization Joint WG

Model-Based Therapy (MBT) - Sponsored by ASME
Agenda

01 Review MBE Committee and Y14/MBE Harmonization JWG Charter

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03 Understand the Role the Harmonization WG Plays

04 Y14/MBE Harmonization WG Overview

05 How To Get Involved!
How To Get Involved!

Who Should Get Involved?
**All Experience Levels Wanted!**
- All Interested organization and Individuals
- Organizations that are implementing MBD/MBE
- Organization that are interested or investigating MBD/MBE
- Those who create, reuse, and consume product definition

How To Get Involved?
**Please Contact:**
- Evan Kessick: ekessick@belcan.com
- Fred Constantino: constantinof@asme.org

We Need You!

Upcoming Meetings:
Y14/MBE Harmonization Joint Working Group
- In-Person Meetings:
  - ASME Spring Committee Meetings: Denver, CO
    - Monday April 29th @9am-5pm MST
- Monthly Virtual Meetings:
  - Upcoming Virtual Meeting:
    - April 24th @1-2:30pm EST
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    - Bi-Weekly Meeting: TBD
Thank You For Participating!

QUESTIONS?