



AeroSpace and Defence
Industries Association of Europe

AIA - ASD interoperability coordination confcal 18th of October 2017

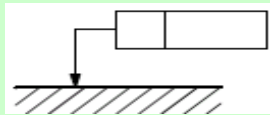
Issues for the differences of PMIs between US ASME and ISO standards

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Potential areas of future collaboration

Geometric Dimensioning and Tolerancing

Main GD&T are common between the 2 standards:



Run - out



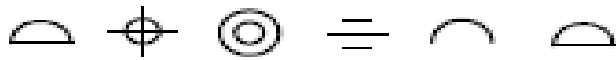
Form tolerance



Orientation tolerance



Local tolerance



Requirement, condition,...



...

Example of GD&T only defined by ISO



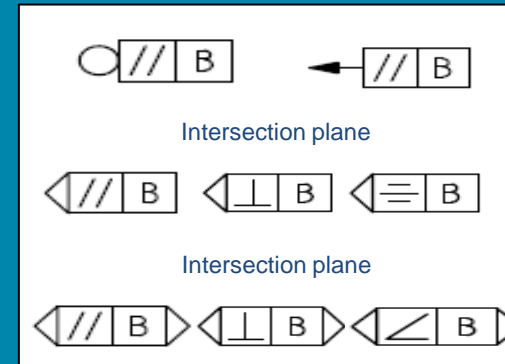
Reciprocity requirement



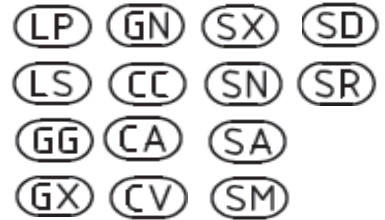
Envelope requirement



Median feature



modifier for a linear size



Example of symbol only defined by ASME



Drill Depth



Counterbore



Countersunk



Spotface

Example of GDT&T Not completely equivalent

ISO Unequally Disposed Tolerance Zone

UZ

ASME Unequal Bilateral Tolerance Zone

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Input for the preparation of a report identifying the main differences of GD&T & symbols between ASME and ISO standards

CATIA semantic PMI - RP4.0.4 implementation issues

Standard	CATIA semantic PMI RP4.0.4 implementation issues	STEP export	STEP import
ISO & ASME	Dimensional location thickness between circular cross-section features	NO	NA
ISO & ASME	Ⓟ dimension	NO as dimension YES as projection_zone_definition entity	NA
ISO & ASME	Thread dimension	NO	NA
ISO	[CF] modifier	YES	YES but invalid status
ISO	[PT], [SL], [PL] modifiers	YES	YES but invalid status
ISO & ASME	[MD] (resp. MAJOR DIA), [LD] (resp. MINOR DIA) modifiers:		
	1- For datum feature	NO	NA
	2- For datum system	NA	NO
ISO	Ⓟ in datum system	YES	YES valid status if defined in projection_zone_definition entity YES invalid status if not defined in projection_zone_definition entity
ISO & ASME	Circular curve datum target for sphere datum feature	YES with double definition (A2PL3D + geometric_representation_item entities)	YES valid status if defined using geometric_representation_item entity YES invalid status if not defined using geometric_representation_item entity
ISO & ASME	Ⓟ with different extension lengths	NO	NA
ISO & ASME	LE (resp. Each element), LE radial (resp. Each radial element) modifiers	YES	YES but invalid status
ISO	Intersection plane, orientation plane indicators	NO	NA

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Input for the preparation of a report identifying the main differences of GD&T & symbols between ASME and ISO standards

Semantic PMI will be based increasingly on the links to

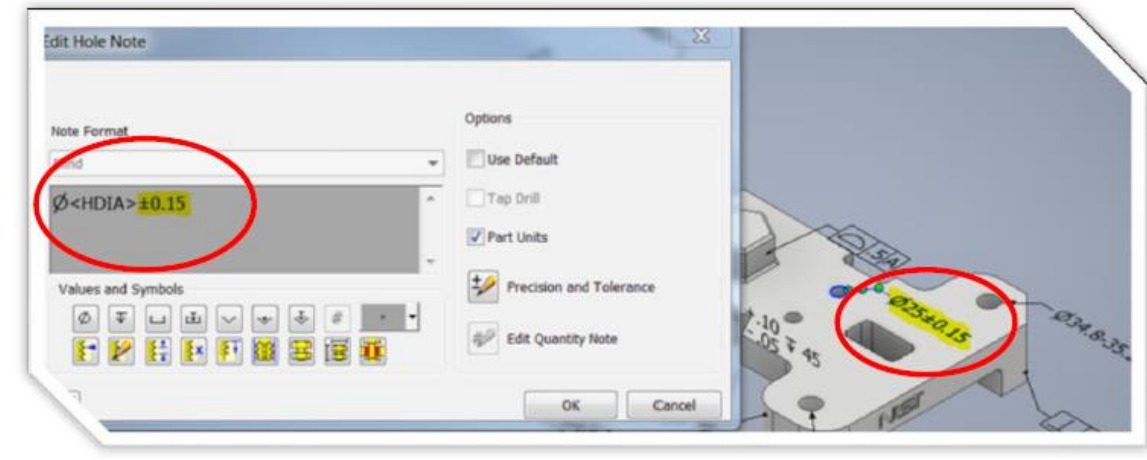
- 3D manufacturing features,
- and possibly 3D inspection features

: Need to ensure that the American & ISO standards for design and manufacturing are aligned for semantic PMI associated to manufacturing features:

- Machining features (drilling, turning, milling, electro erosion, etc)
- Additive Manufacturing features
- Etc.

Issues Found by Inventor

- Feature-based PMI vs Geometry-based PMI
 - Cannot regenerate annotation from STEP PMI since it uses feature based MBD
- Users missing semantic information



- Additional costs
 - In the development & maintenance of the standards with duplication of contents
 - In the use of standards CAD-CAM STEP interfaces for the OEM and suppliers
 - Airframe manufacturers (US, Europe) ⇔ Engine manufacturers (US, Europe)
- Additional time and costs to have the COTS CAD-CAM standards interfaces supporting 3D PMI semantic interoperability for 2 similar but different standards
- Additional time and costs for the dev. of public test cases for 2 similar standards to be used by the CAx Implementer Forum
NIST test case: same test cases prepared in the 3 main CAD system native formats)



Back up slides

Geometric Dimensioning and Tolerancing

AIA – ASD
coordination confcal
18 Jan 2017

- Functional requirements for next 5 years
- Short term:
 - Preparation of a report identification the main differences for GD&T and symbols between ASME and ISO standards
 - Consolidation of the identification of drawbacks for such differences
 - Proposal of an action plan to decrease / mitigate the risk
- Mid term:
 - Periodic coordination for Identification of projects for development of new GD&T or 3D Symbols for A&D
 - Support of action of coordination of harmonization between ASME standards and ISO standards for GD&T and 3D symbols
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