Semantic PMI

Enhancing standards for seamless collaboration

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Semantic PMI – Enhancing standards for seamless collaboration Use cases and information needs



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Semantic PMI – Enhancing standards for seamless collaboration Use cases and information needs

PMI

"Annotations and attributes that are associated with a 3D CAD model and its geometry features, is software interpretable and can be displayed for human interpretation. "

> ISO/DIS 16792:2020(E) Technical product documentation – Digital product definition data practices



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Semantic PMI – Enhancing standards for seamless collaboration Current solution 3D Master



- Which data are required for subsequent processes?
- How must the design data be structured?
- How are the data transferred to the subsequent systems?
- How can the design data be imported into the subsequent system?

Data must be human- and machine-readable



Semantic PMI – Enhancing standards for seamless collaboration Problem Statement

- Today, the use of PMI in subsequent processes is usually based on proprietary formats (NX, Creo)
- Latest neutral CAD format standards
 - not supported by CAD importers in processing tools (i. e. CMM)
 - not fully supporting lastest GPS standards
- Multiple year gap between GPS standardization, CAD system implementation, CAD neutral format standardization and CAD translators implementation, CAD system deployment

Today	+1 year	+2 years	+3 years
GPS Standardization			
	CAD system implementation		
	Deployment Planning		CAD system industry deployment
	CAD neutral format standardization	CAD neutral format implementation	
			CAD translator deployment



Semantic PMI – Enhancing standards for seamless collaboration Aspects of PMI Semantics

luman-readable (texts, symbol)	Machine-readable	Machine-readable		
What GPS ISO standards define	What neutral CA	What neutral CAD format standards define		
	PMI Type			
7x Ø8,6 ±0,1 @ PMI Geometry Associativity Ø0.4422 A B C Ø0.050 A				
► PMI Con ► Ø2.75 M A BM CM	ntent Structure DimensionText[%d]. DimensionText[%d]. width.measurement DimensionText[%d]. width.name	FCF\w\$\wØ2.75@\wA\wB@\wC@ Text.Item[%d].Outline. Text.Item[%d].Outline.		



Semantic PMI: Enhancing standards for seamless collaboration PMI Content Structure Representation in JT and STEP



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Semantic PMI – Enhancing standards for seamless collaboration Important PMI information provided as non-semantic text



Semantic PMI: Enhancing standards for seamless collaboration Incomplete PMI Content Structures require

Semantic Structure

9



Flat List of Attributes



No reliable way back

Interpretation

Repair

Re-engineering





Semantic PMI: Enhancing standards for seamless collaboration Schema-based semantics for Surface Finish (ISO 21920)

PMI Semantics as defined in ISO GPS



Geometric Tolerance Structure

Possible Machine-readable representation using XML Schema

- Represents structure & logic
- Allows validation
- Can be used inside and outside CAD





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Semantic PMI: Enhancing standards for seamless collaboration The "Model" in Model-Based Definition is not only the CAD Model



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Semantic PMI: Enhancing standards for seamless collaboration Representation can be separate, but combined viewing is key

Annotated CAD Model

12

Associated Data Elements



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2D Drawing is replaced by the Digital Data Package (DDP), not the CAD model



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Semantic PMI: Enhancing standards for seamless collaboration Summary and Outlook

- Sequential cascade of GPS standardization, implementation and corporate deployment leads to multi-year delays in industrializing Geometric Product Specification (GPS).
- Neutral CAD formats JT and STEP compromise on PMI semantics and require lossy re-interpretation.
- Additional schema can help bridge the gaps in timeline and quality. This allows companies to industrialize latest ISO GPS specifications right when they get released.
- 2D Drawings cannot be replaced by 3D CAD models only.
- The Digital Data Package (DDP) includes both annotated CAD models and associated data elements



Let's get started