The Pull of the Digital Thread on Independent Part Suppliers

GLOBAL PRODUCT DATA

INTEROPERABILITY

SUMMIT 2025

John McCullough, Kubotek Kosmos

Presenters Bio

John Wright McCullough

General Manager Marketing, Kubotek Kosmos

- BSME
- 30-year MCAD background
  - Baystate Technologies, Software Developer
  - CADKEY, Reseller Channel Management
  - Kubotek, Product Management
  - Onshape, Quality Assurance

Kubotek Kosmos

Modeling & Translation Kernel ::: 3D Framework

SDK - cloud-ready, high-performance
Geometry, PMI, graphics, & CAD translation
Licensed to other engineering software developers

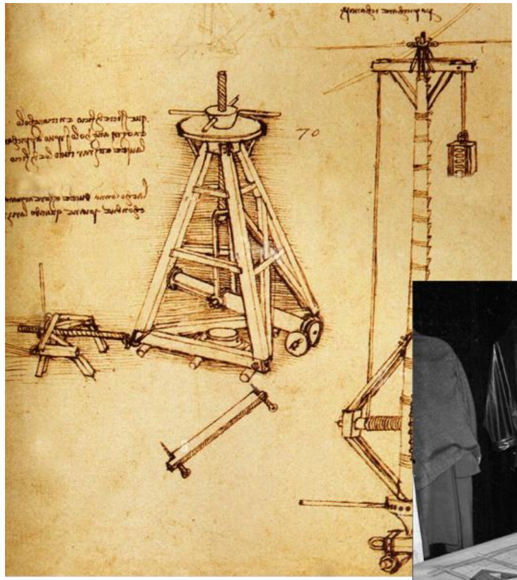
MBD File Utilities ::: Validate & Revision

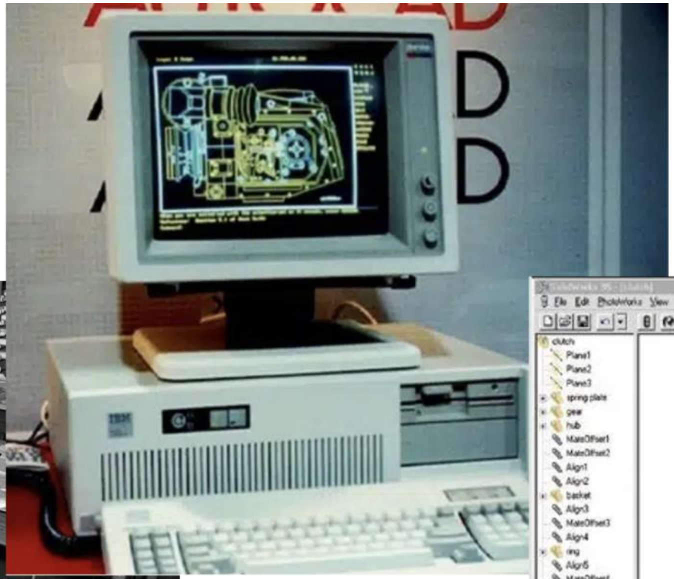
Specialized multi-device utilities focused on A&D manufacturing (built on 3D Framework)

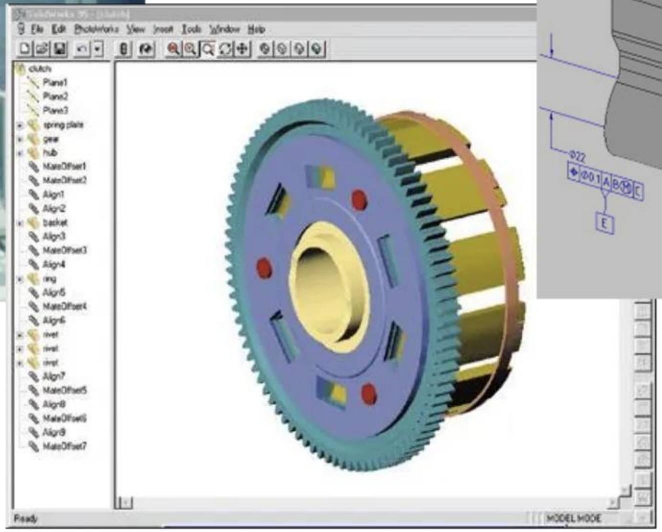
Direct CAD ::: KeyCreator

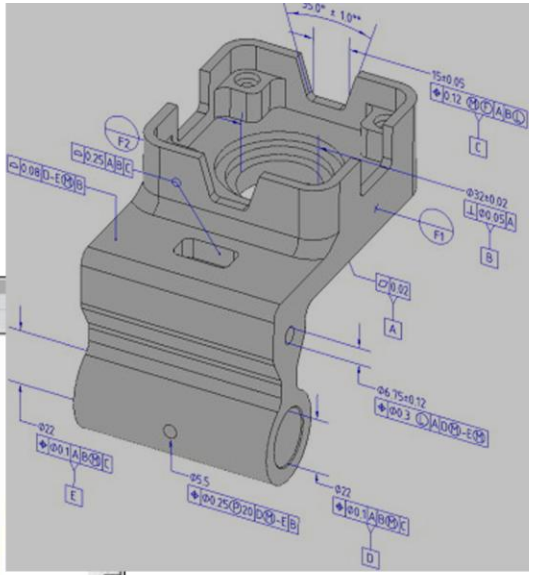
3D CAD favored in manufacturing & concept design (3D Framework translators)

Digital Transformation Continues









Outline

- **Pentagon MBE Push**
  - Priorities
  - Supply chain challenges
- **Supplier Pull to MBE**
  - Path to maturity
  - Recommendations
  - Hidden challenges

Pentagon Manufacturing Priorities

- **Grow Defense Industrial Base**
  - Supplier competition
  - Domestic production
- **Cybersecurity**
- **Dramatic efficiency increase**
  - MBE
  - Traceable digital thread
  - Data interoperability

Federal Assistance

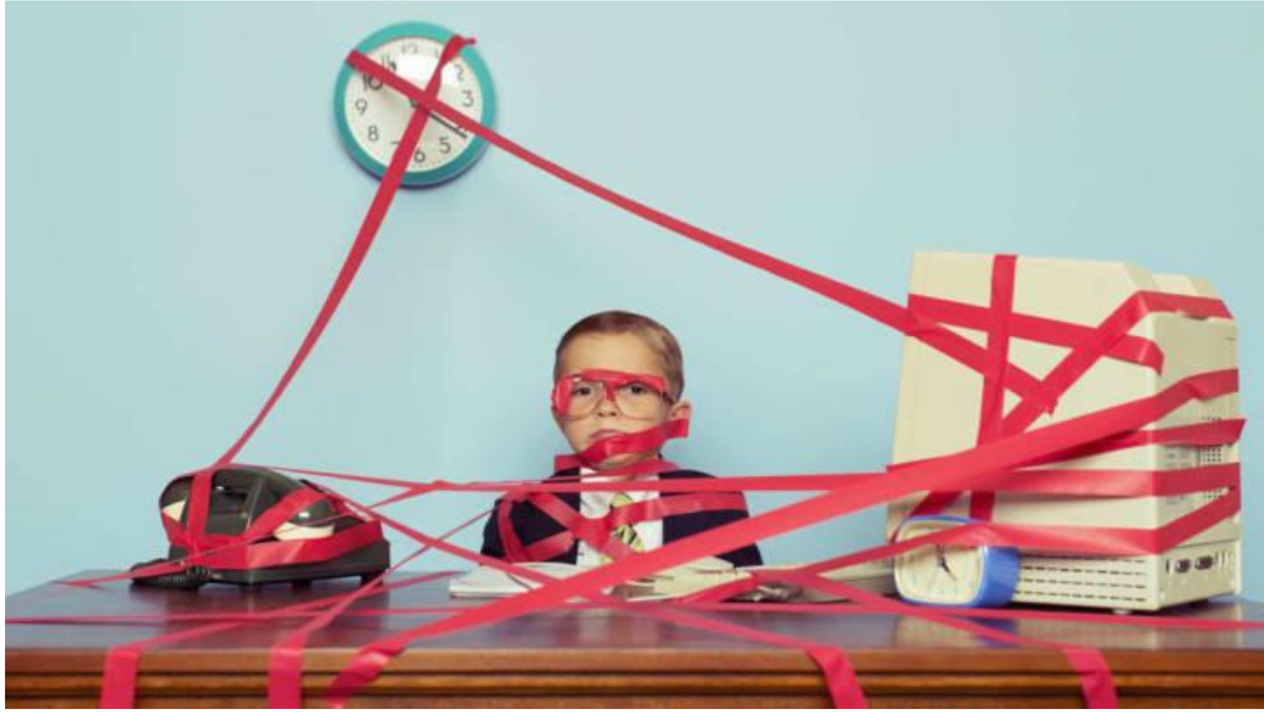
- **Procurement Technical Assistance Program (1985)**
- **NIST: MEP (1988)**
  - Public/private, Dept of Commerce
- **Defense Innovation Unit (2017)**
- **DOD OSBP: APEX Accelerators (2020)**
  - Requirements/standards guidance
  - Suitability assessments, opportunity matching
  - Procurement/proposals
- **Federal Acquisition Regulation overhaul (April 2025 EO)**

DIB Still Shrinking

- **Over the last decade**
  - 27% decrease in Pentagon vendors
  - 43% drop in awards to small businesses
- **Over the last five years**
  - US mfg businesses # grown by 13%

Shrinkage Factors

- **Consolidation**
- **Certifications and process upgrades**
  - CMMC
  - MBE
- **Inconsistent demand, slow awards**
- **Red tape**
- **SME "log jam"**
- **System complexity and IP**



Independent Supplier Worldview

- **Respond to opportunity**
  - Diverse customer base
  - Flexibility & service
- **Process specialization**
- **Profitable jobs**
  - Accurate bidding
  - Skilled & focused staff
  - Appropriate systems/equipment
  - Fast turn-around
- **No PDM**
  - Short-term relationships

DIB MBE Revolution – Pull vs Push

- **Conclusions**
  - NIST MEP funding is potentially critical “pull”
  - Focus MBE on supplier process improvement

“The future of product development is model-based”

Navigating the Transition to a Model-Based Enterprise, 2022, Deloitte Development LLC

MBE Maturity Index (ASME)

Level Name	Drawing-Centric	Drawing Model-Centric	Validated Model-Centric	Formalized Model-Based Definition	Trusted Model-Based Definition	Integrated Model-Based Enterprise	Extended Model-Based Enterprise
Level Identifier	L0	L1	L2	L3	L4	L5	L6
Level Theme	-2D Drawings Only; -Disconnected	-2D Drawings & STEP Derived from 3D Models; -Drawings Managed, Disconnected from Models	-2D Drawings & Equivalent Derivatives from Validated 3D Models; -Drawings Managed, Disconnected from Models	-3D Models with Semantic PMI Added; -Producing 3D Interactive Viewable (3DIV) -Managed as Part-Centric	-Digital Model-Based Definition (MBD) , Certified & Authorized; -Managed & Sourced as Part-Centric	-Enterprise Integrated from Trusted Digital Product Definition Dataset; -Process Data Managed with Part-Centric	-Enterprise Extended with Optimized Capabilities and Extended Partners
Authorized Definition	-2D Drawing	-2D Drawing	- 2D Drawings w/ Support Models	-Drawings w/ Support MBD	- 3D MBD w/ Support Drawing	-3D MBD Dataset	-3D MBD Dataset
Artifact Management	-File-Sharing	-Document-Centric PDM	-Document-Centric PDM	-Part-Centric PDM	-Part-Centric Lifecycle PDM	-Enterprise Part-Centric PDM	-Extended Part-Centric PDM

Eliminating Drawings - Recommendations

- **Culture shift**
  - Goal is not L5 overnight
- **Focus on productivity and thread**
  - Eliminate manual data re-entry
  - GD&T training
- **Consider thread-safe alternatives**
  - Saved Views (Captures)
  - Supplemental geometry & annotations

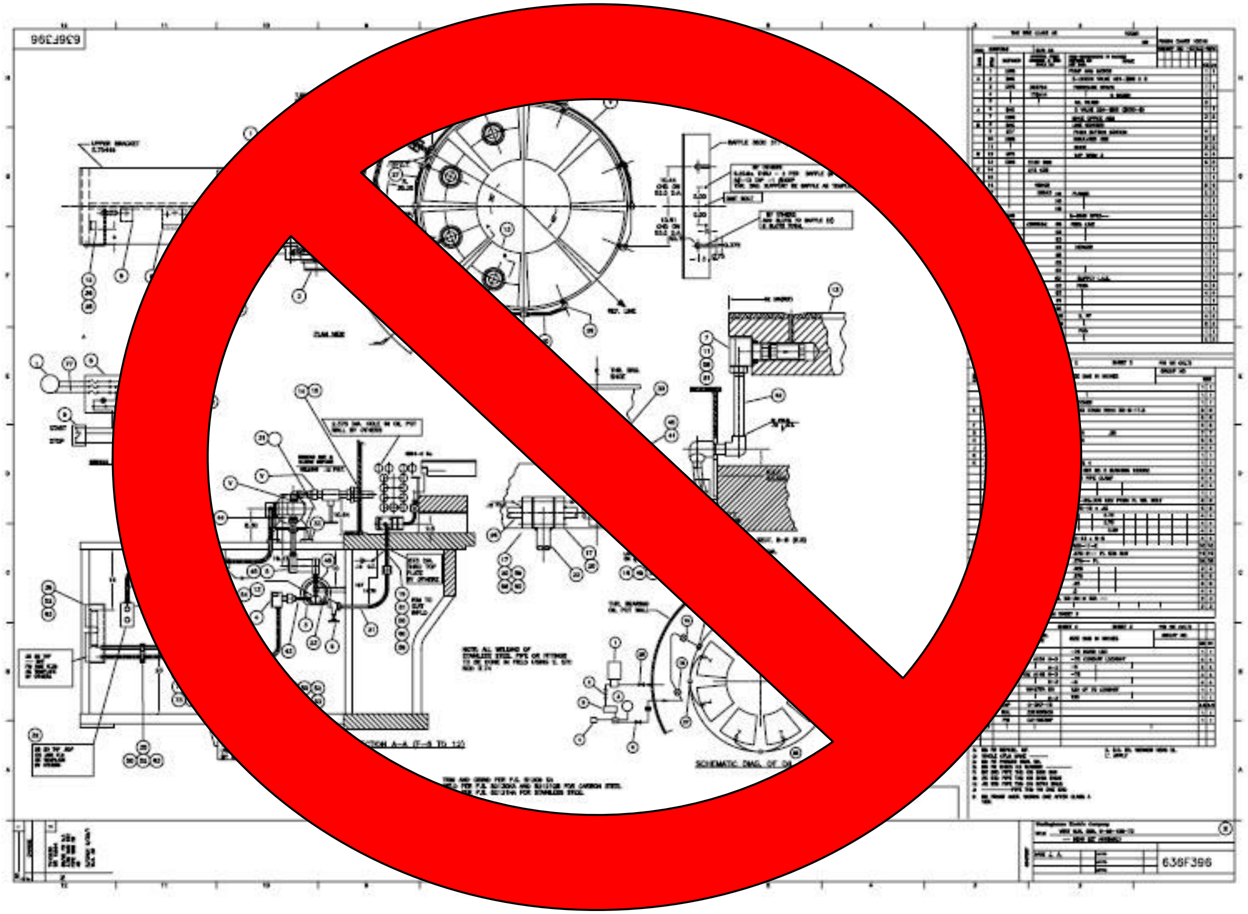


Image courtesy of PaintingValley.com

Supplemental Views

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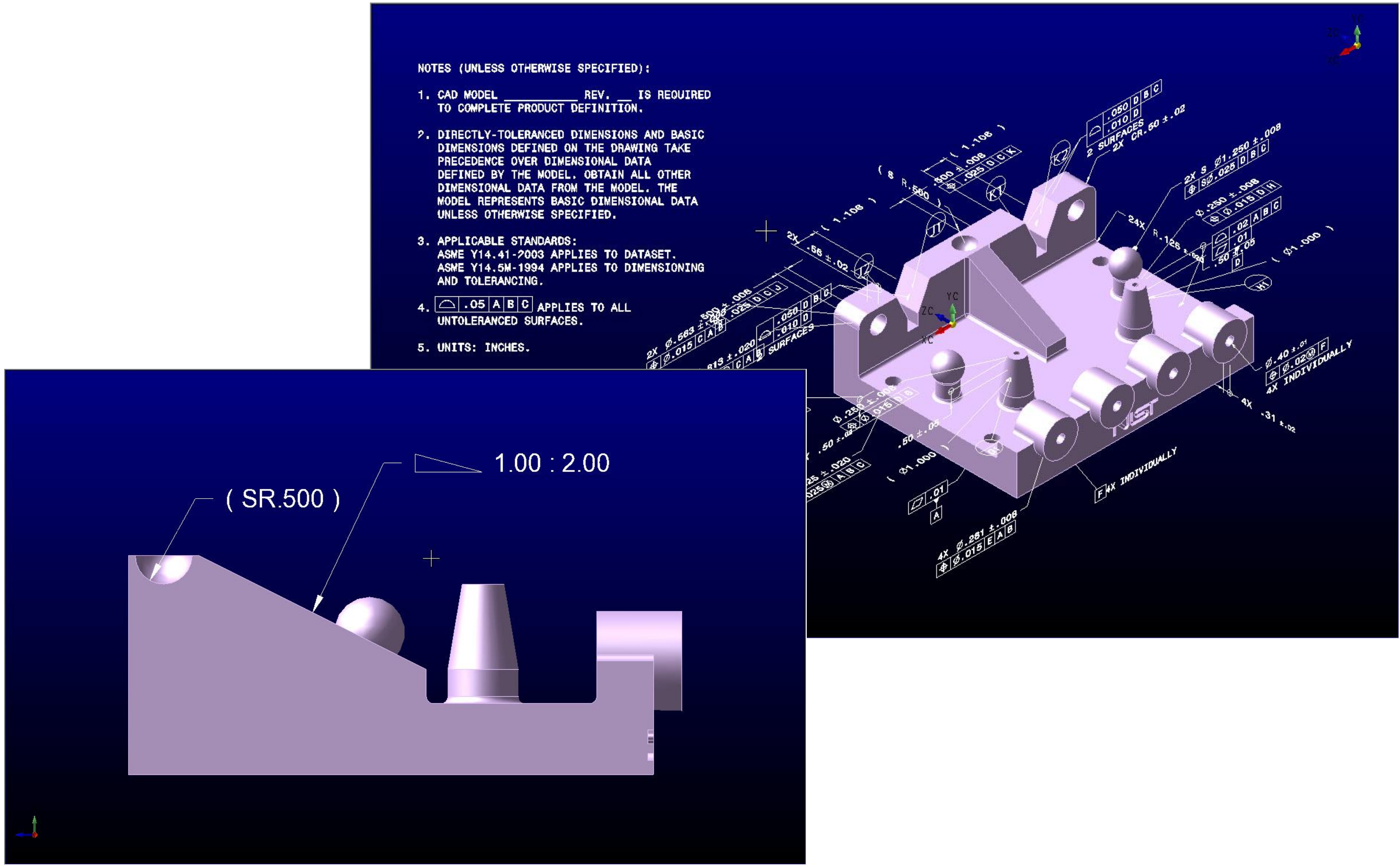
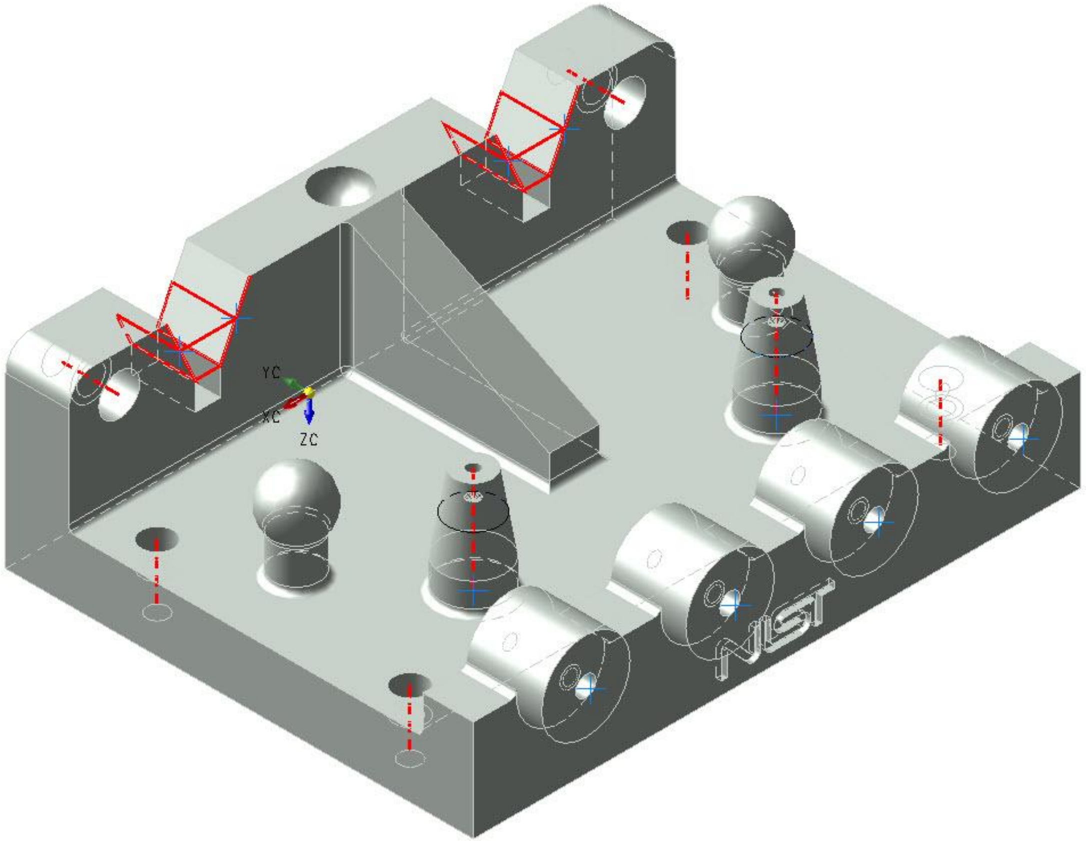
- **Ortho & Sectional Views**
  - STEP AP242
  - QIF



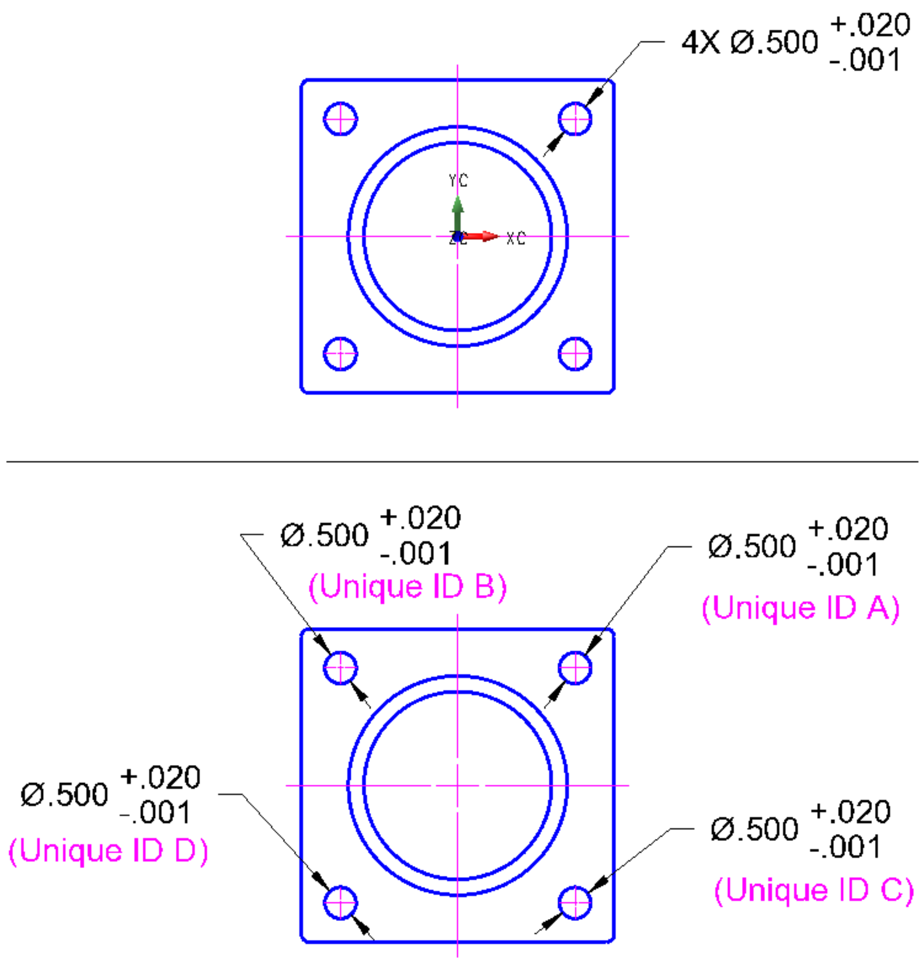
Supplemental Entities

- **Geometry**
  - Axial centerlines
  - Mid-planes
  - Points
- **Annotations**
  - Associative links



Hidden Challenges - 1/4

- **Pattern tolerances**
  - “Only a problem for inspection”



Pattern Tolerance Sample Code

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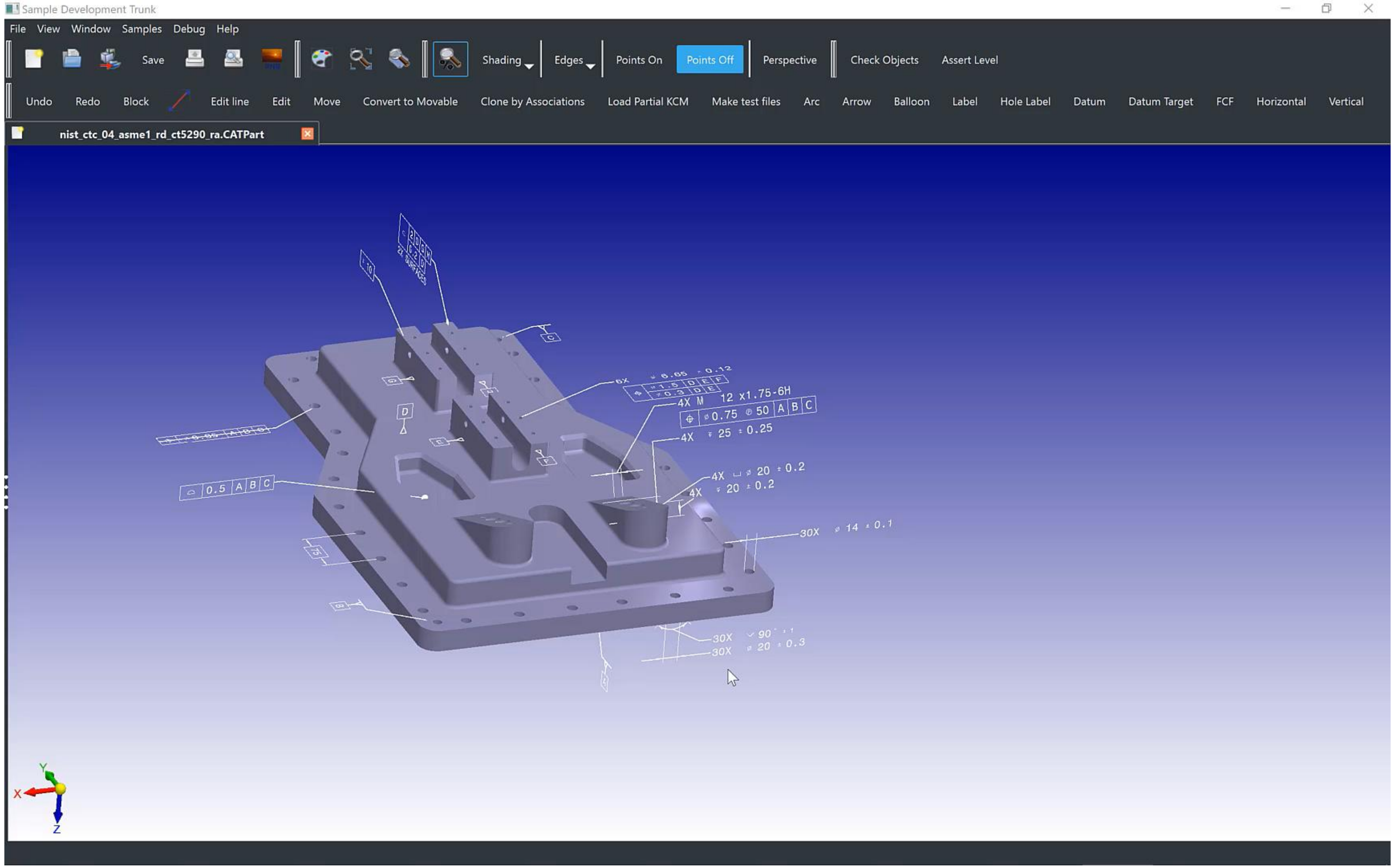
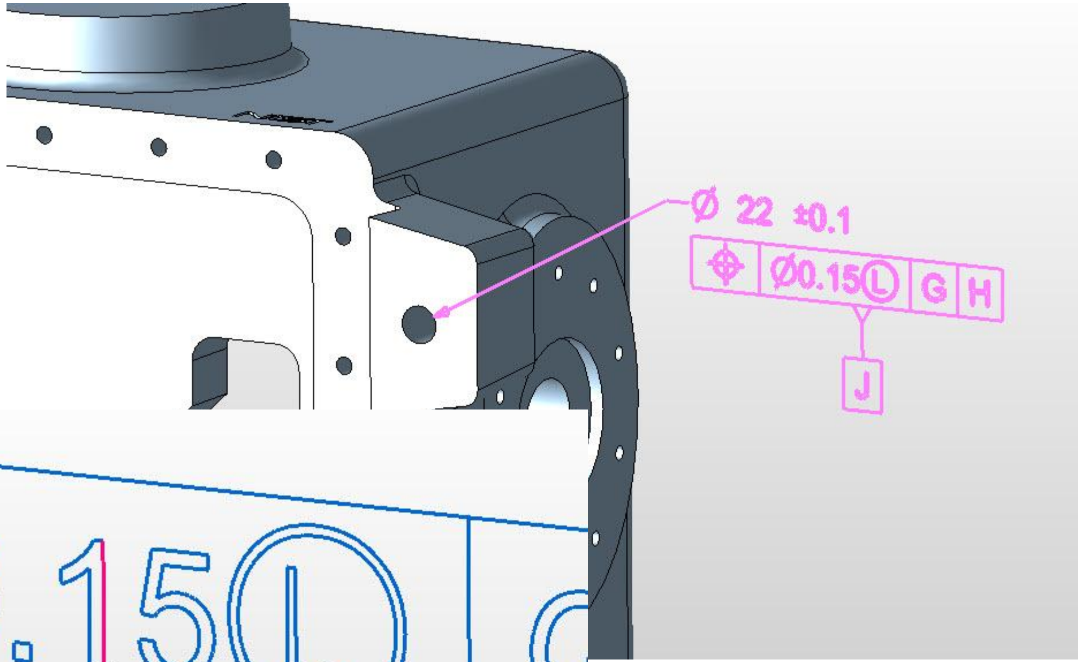
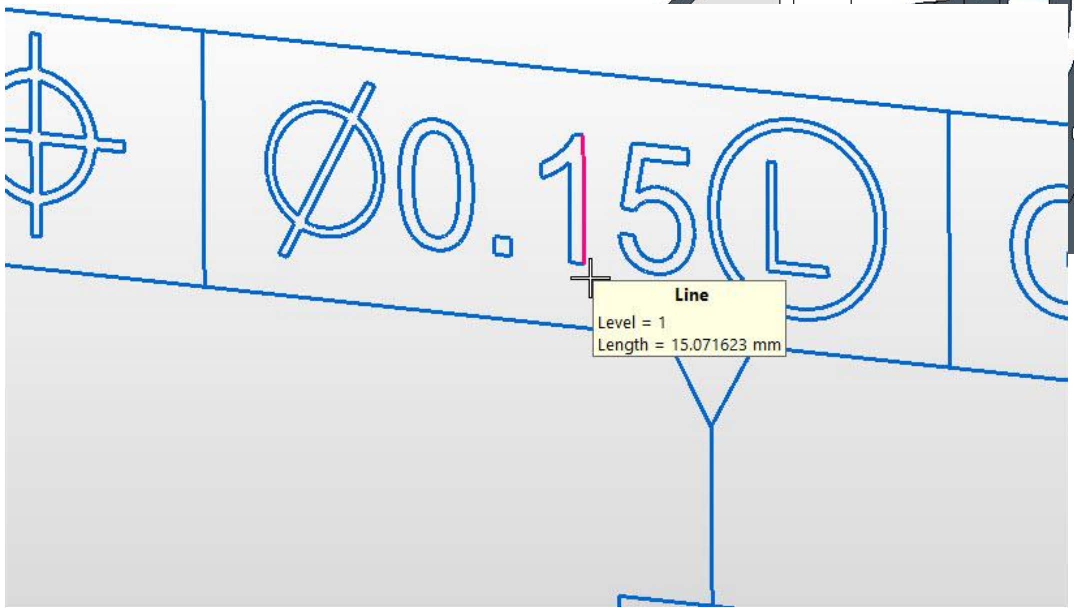


Hidden Challenges - 2/4

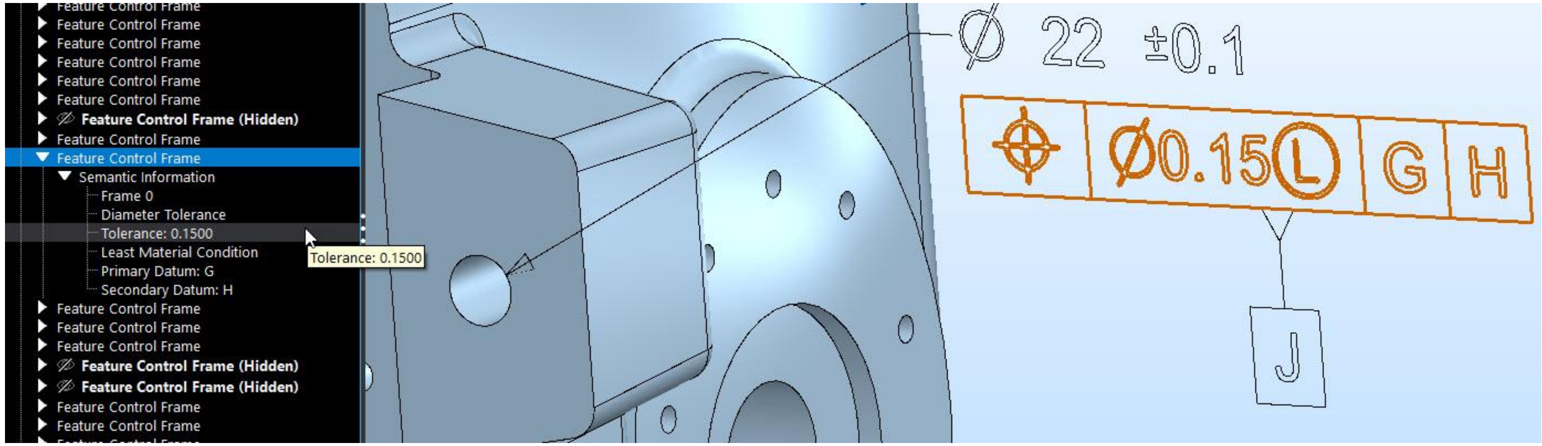
- **Graphical vs semantic tolerances**
  - “Looks” the same
  - Human-readable geometry

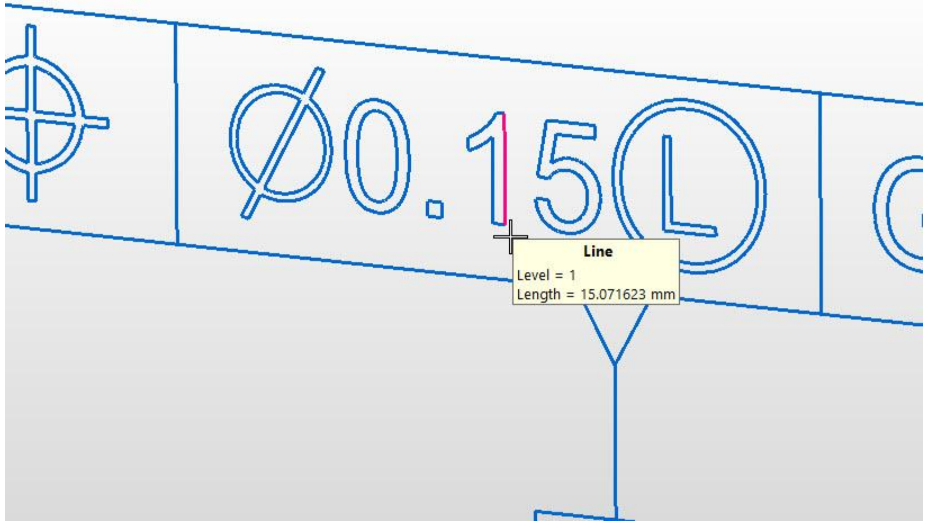




Hidden Challenges - 3/4

- **Different "viewers"**
  - Different result?



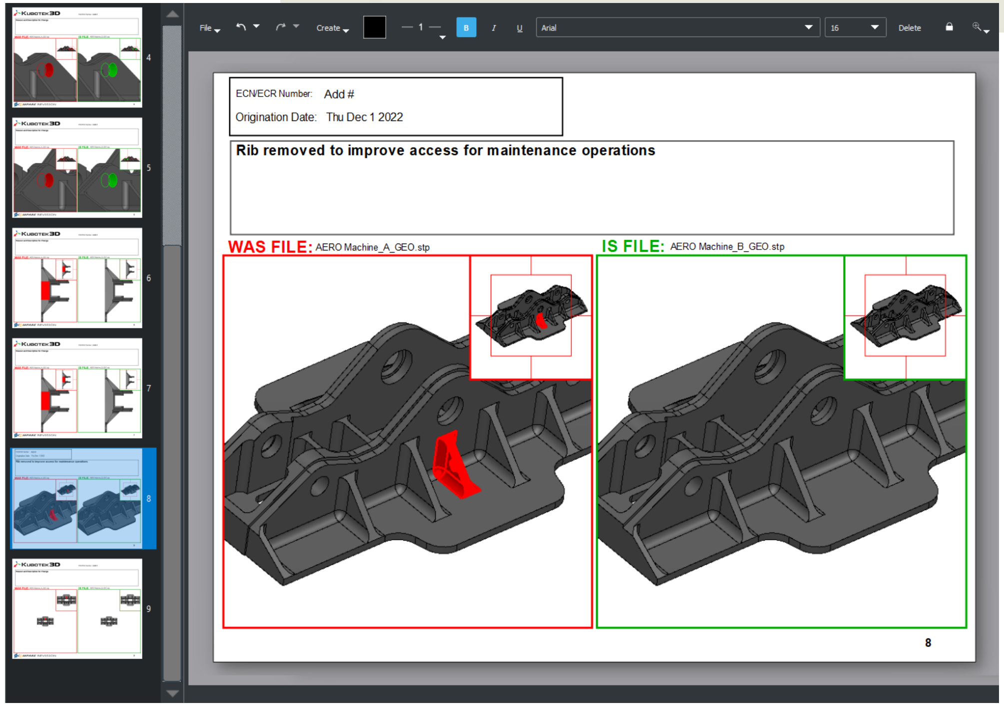


Hidden Challenges - 4/4

- **MBD revision history**
  - Stored in PLM

1

REVISIONS			
REV.	DESCRIPTION	DATE	APPROVED
2	Added Fillets	02/18/2021	ADM
3	Added dimensions to drawings	02/18/2021	ADM
4	Added a hole to part	02/18/2021	ADM
5	Added additional notes	02/18/2021	ADM



Questions

John Wright McCullough

General Manager, Marketing

LinkedIn profile:

GPDIS Vendor Fair:

Booth #24