Visualizing the 3D Model-Based Definition by a non technical member of the workforce

AGENDA

1200 - Introduction of the panel
1205 - Overview of the DLA project Initial Commercial CAD Viewer Evaluation for 3D TDPs
1220 - The need to view native CAD data
1230 - How the 3D Viewable is used and key factors to be resolved
1240 - The conflict between Semantic and Displayed PMI
1250 - Questions
1300 - Last thoughts

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Why we are here

This workshop will address the ability to visualize 3D Technical Data by a Product Data Specialist or other non technical member of the workforce. From the perspective of MIL-STD-31000 the technology of choice to present the 3D Model-Based Technical Data Package is through the use of a 3D PRC view with PMI annotated using planar graphics embedded in a PDF file. Alternative presentation methods include WebGL in accordance with HTML5 protocols, and JT. The problem is there are still a great many cases when the DLA Product Data Specialist is presented with CAD data in its proprietary non standard format. In order to visualize this data DLA has resorted to no cost viewers. This can require the installation of several packages on government owned assets. Many of which do not have an “authority to operate”. Even those that do need to undergo lengthy approval processes to allow temporary installation. During a TDP pilot project with DLA the technical data was created using CREO and the 3D TDP in PDF was unavailable. This required the DLA Product Data Specialist to use a proprietary CAD viewer and prompted a question about the availability and functionality of commercial solutions that could present the most commonly encountered CAD formats. Thus the “Initial Commercial CAD Viewer Evaluation for 3D TDPs” project was commissioned by DLA.

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Meet the Panel

Jill Clark - LMI Senior Consultant, Acquisition

Jill has been a consultant with LMI for nearly eight years leading several projects in support of DLA's technical data management (tDNA™) and digital engineering transformation. Working with DLA to enhance process and capabilities to procure Class IX parts using 3D models/data Jill is responsible for all of the 3D Technical Data projects including the 3D CAD Viewer Evaluation.

Dick Tiano – ATI, Senior Program Manager

Dick Tiano is a Senior Program Manager with ATI having over five decades of manufacturing experience and the use of 3D Model-Based technical data. Working with the DLA as they prepare for integrated use of 3D PDF, JT and HTML5 that will be provided by the various DoD services and OEM's for use in the cataloging, provisioning and sustainment processes Dick has led the operations of many Technical Data R&D activities, prototypes, and pilots.

Jennifer Herron - Action Engineering, Chief Executive Officer

Jennifer Herron is the CEO of Action Engineering specializing in guiding organizations through their transformation into a Model-Based Enterprise using Model-Based Definition and is the author of Re-Use Your CAD: The Model-Based CAD Handbook. An expert in multiple CAD packages she serves on many standards committees including the Digital Metrology Standards Consortium Board of Directors and American Society of Mechanical Engineers.

Ben Kassel - LMI, Senior Consultant, Mechanical Engineer

Ben Kassel is a Digital Engineering Senior Consultant at LMI and guest researcher at the NIST Engineering Laboratory in the areas of Digital Engineering and the Digital Thread enabled Model-Based Definition. Ben is proud to say he served NAVSEA for almost 37 years using, developing, and implementing Computer-aided Design technology at the David Taylor Model Basin and the NAVSEA 05 Computer-Aided Engineering Division.

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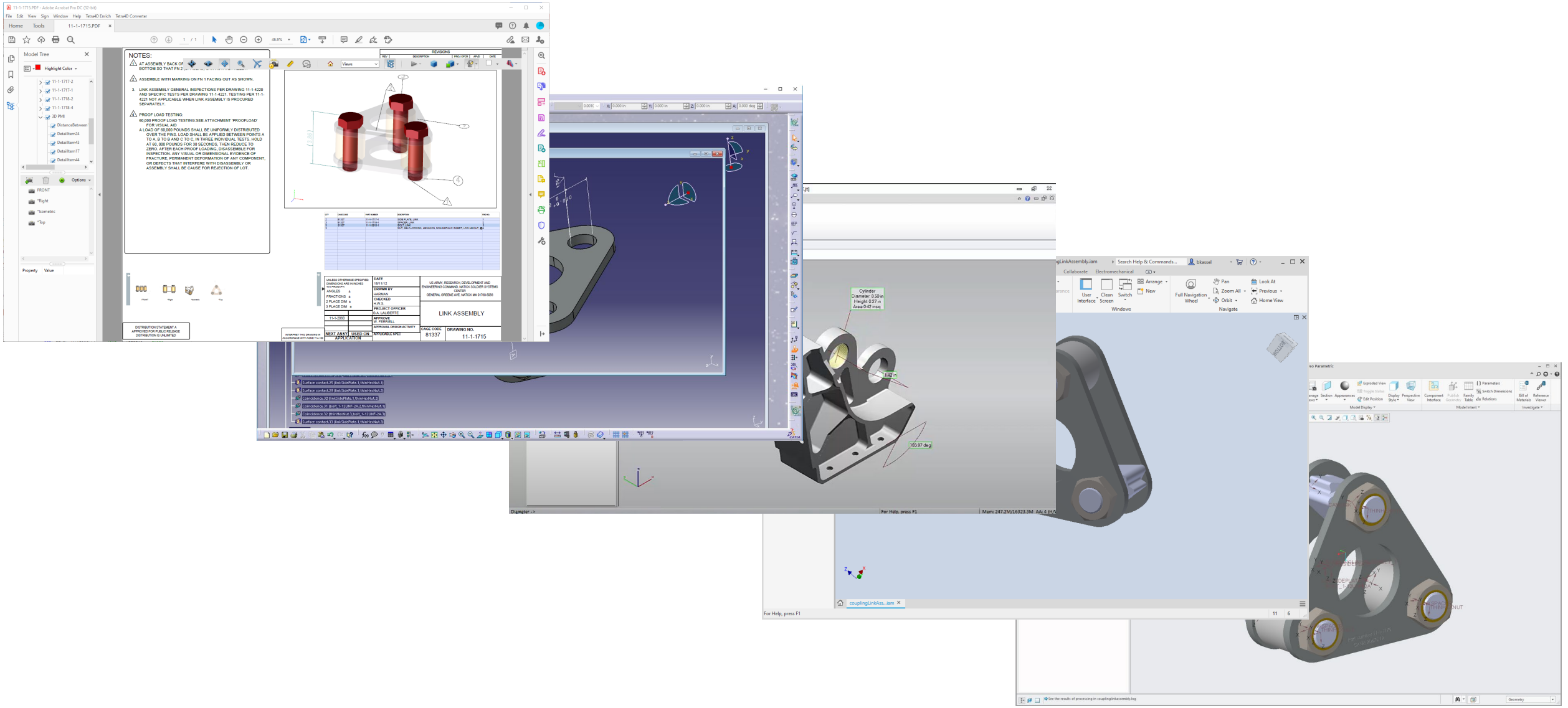
Initial Commercial CAD Viewer Evaluation for 3D TDPs



Why this study was performed

This task is to gather the resources and requirements required to compare and contrast commercial viewers

- Perform market research to identify viewers.
- Identify viewers or sets of viewers that are likely to meet the requirements and acquire sufficient licenses to evaluate their capabilities.
- Obtain sample TDPs that can be used for demonstration and evaluation purposes.
- Compare and contrast selected viewer sets and document the costs and benefits.

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Requirements at the 50,000 foot level

Necessary

- Means of validating a file works and is of the part claimed:
  - That the file can be opened and is uncorrupted.
  - The viewer should display the part in a way that allows the user to easily recognize what is being viewed.
- Remains within specific budget constraints
- Means of opening 2D file for comparison
  - The viewer should be able to quickly validate the 3D file against any provided 2D drawings.
- Ensure data is secure
  - The viewer should neither be a liability to DLA system security or be at potential risk of releasing proprietary files viewed

Preferred

- Means of viewing meta-data
  - Annotations, material data, part information
- Means of measuring the part
  - Quality control and information for shipping and packaging
- Viewable Bill Of Materials (BOM)
  - Exportable BOM preferred
- Ability to export to other formats
  - Translate files for use downstream. Note: translations can propagate inaccuracies therefore the translation is not an authoritative source of truth
- Ability to add notes and annotations

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Metrics at the 50,000 foot level

- Rating of UI Layout on a scale of 1-10, such features such as the following:
  - Taskbar functions
  - Feature tree/controls
  - Clarity of Icons
  - Overall Experience
- View model attributes (y/n):
  - Material information
  - Cage code
  - Part number
  - Others
- File Selection UI (Rating 1-10)
- Ease of Installation
  - Download hurdles
  - Responsiveness of vendor

- **Can the viewer view the following (y/n):**
  - Part
  - Assembly
  - Drawing
- **Can the viewer create/add the following (y/n):**
  - Zoom/detailed views for drawings
  - Cross sections
  - Assemblies
  - Dimensions
    - Linear
    - Radial (diameter and radius)
    - Angular
  - GD&T
  - Datums/References
    - Point
    - Plane

- **Can the viewer do the following (y/n):**
  - Change/select units
  - Zoom
  - Rotate
  - Pan
  - Hide parts
  - Change transparency of part/assembly
  - Isolate components in an assembly
  - Save viewpoint controls
- **Can the viewer export the following (y/n):**
  - Other file formats
  - Bill of Material (BOM)
  - Drawing from model
  - Exploded view of assemblies

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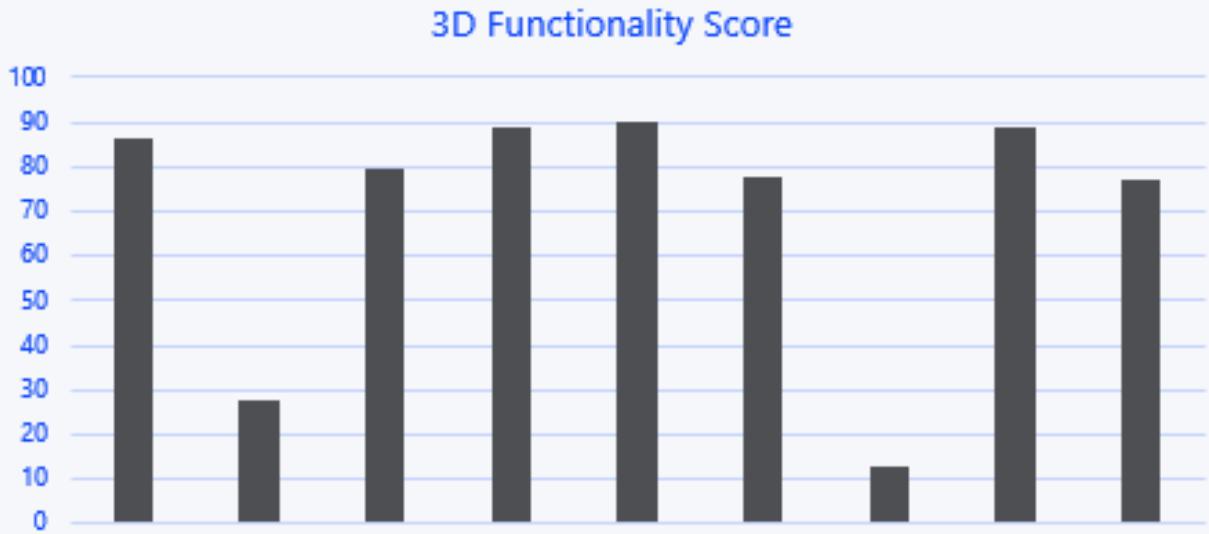
Many viewers provide similar levels of functionality

- Graph displays weighted aggregate of just 3D functionality
- Score consists of tool functions per viewable formats
- Graph will change as functionality weights are adjusted



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How the 3D Viewable is used and key factors to be resolved

FOUNDER & CEO

Jennifer Herron

EXPERTISE

- MBD and MBE Solution Architecture
- MBD Pilot Planning
- MBD Modeling Standards and Best Practices
- Multi-CAD MBD Authoring and Publishing
- Multi-CAD MBD and GD&T Coaching
- Strategic MBD and MBE Implementation Coaching
- MBD Supply Chain Readiness Coaching

CREDENTIALS

- Board Member, Digital Metrology Standards Consortium (DMSC)
- Vice-Chair, MBE ASME Committee
- Member, ASME IAB
- Member AIAG TDP Working Group
- Certified Scrum Product Owner®
- Engineer in Training (EIT), Missouri
- Certified SolidWorks Associate
- Patent for Toroidal Propulsion and Steering System (Snake)

PUBLICATIONS

- *Re-Use Your CAD: The Model-Based CAD Handbook* - 2nd Ed. & 1st Ed.
- Industry Blogs

QUOTE

If you are going to CHANGE the results of your business, you have to change the WAY you do business.

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How the 3D Viewable is used and key factors to be resolved

Action Engineering enables **digital transformations**.

We **empower** model-based **visionaries** to make radical improvements by **championing people** with our technical expertise, inspiration, and grit.

We're building a **resilient** future centered on connected, **trusted** models and an uplifted **workforce**.

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How the 3D Viewable is used and key factors to be resolved

Our Team

FOUNDER & CEO

Jennifer Herron

SOCIAL SCIENTIST COACH

Rhiannon Gallagher

TECHNOLOGY COACH

Ryan Gelotte

PRODUCT COACH

Pamela Gillaspie

MBD TRAINER

Dan Feighery

OPERATIONS

Michelle Nordwald

COMMUNICATIONS

Kate Hubbard

EXECUTION

Duane

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How the 3D Viewable is used and key factors to be resolved

ACTION ENGINEERING

Action Training Services

Author Workshops

- MBD and GD&T
- Customized or Standard
- CAD-Specific or Agnostic
- Virtual or In-person

Consumer Workshops

- MBD and GD&T
- Customized or Standard
- Mentorship-based, Task-driven, Role Specific

Author & Consumer Videos

- Short and Topical Modules
- CAD How-Tos
- Available through OSCAR

Author & Consumer Reference Cards

- MBD, GD&T, CAD, Derivatives
- Customized or Standard
- Available through OSCAR

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How the 3D Viewable is used and key factors to be resolved

Different Cohorts Need Different Training Methods

Authors

- Include theory, history
- Lecture style with some hands-on
- Assume computer skills, CAD familiarity
- Workshops, videos

Practitioners

- Combine lecture and hands-on
- Just-in-time
- Assume computer skills
- Don't assume CAD skills
- Workshops, videos, reference cards

Consumers

- Task-based
- Just-in-time
- Include computer confidence-building
- Mentorship style
- Short Workshops, Videos, Reference Cards

Conversers

- Need theory, history for context
- Succinct presentations
- Hands-on not needed
- Focus on benefits, not execution details
- Short presentations, videos

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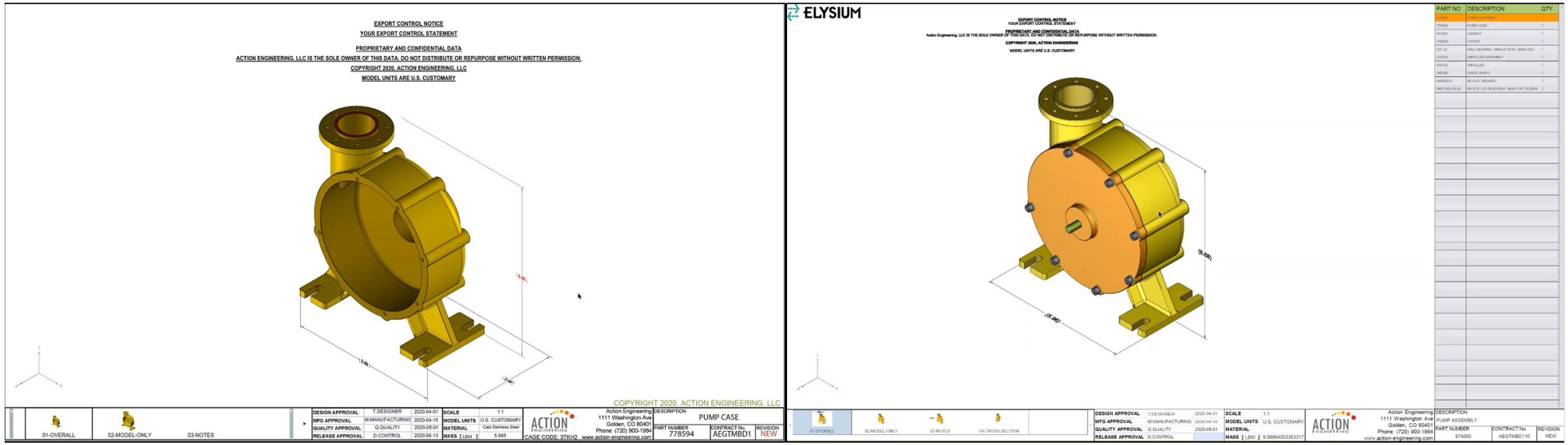
How the 3D Viewable is used and key factors to be resolved

3D Viewables for Parts and Assemblies



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How the 3D Viewable is used and key factors to be resolved

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Action Engineering

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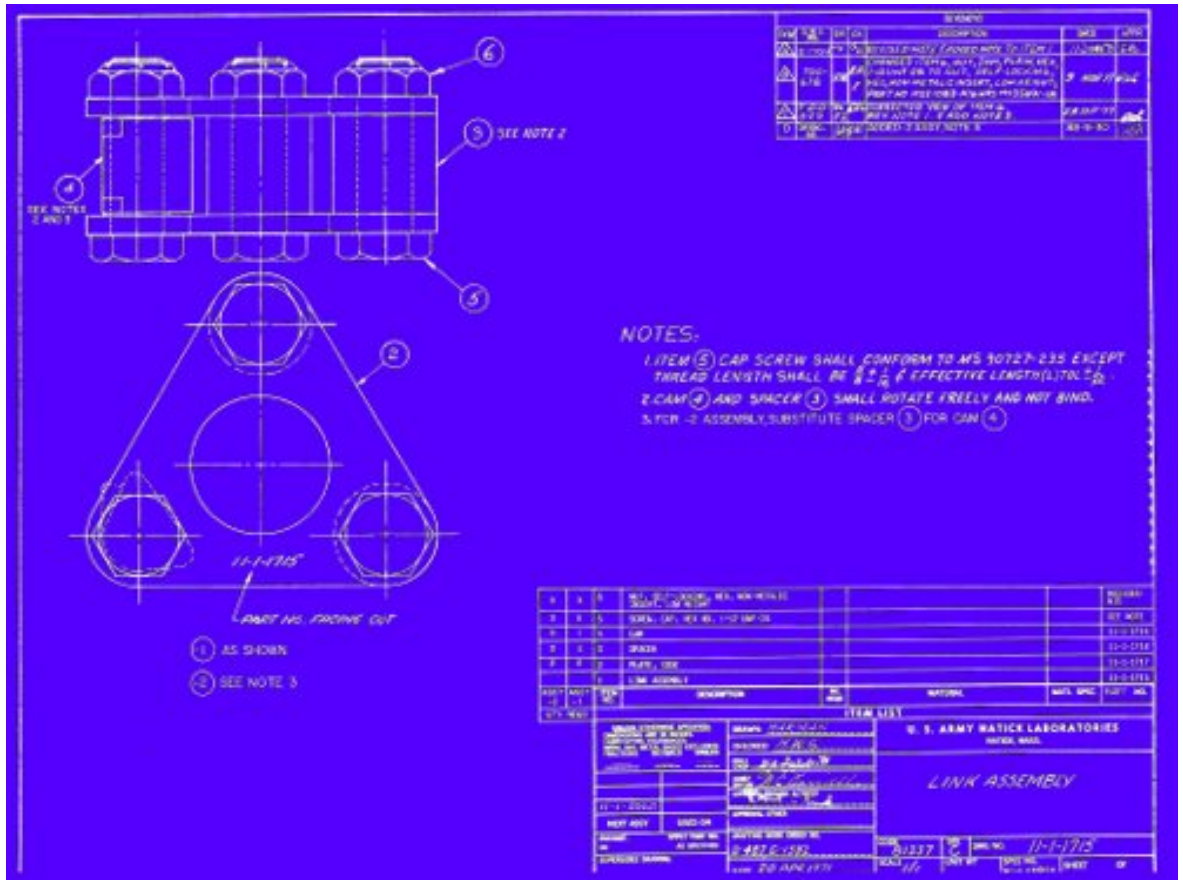
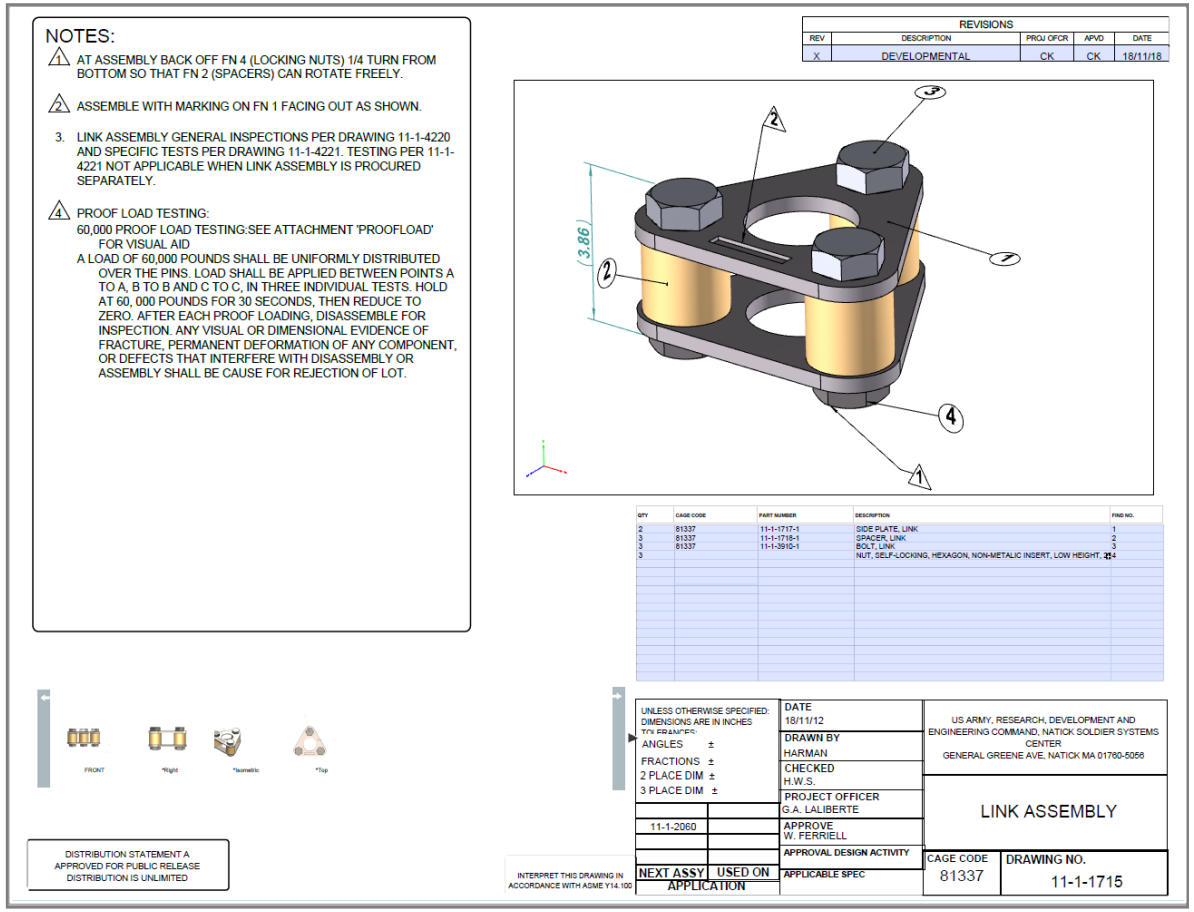
The conflict between Semantic and Displayed PMI

Yes blueprints were actually really blue



All you need is a little
Potassium Ferricyanide and Ferric Ammonium Citrate



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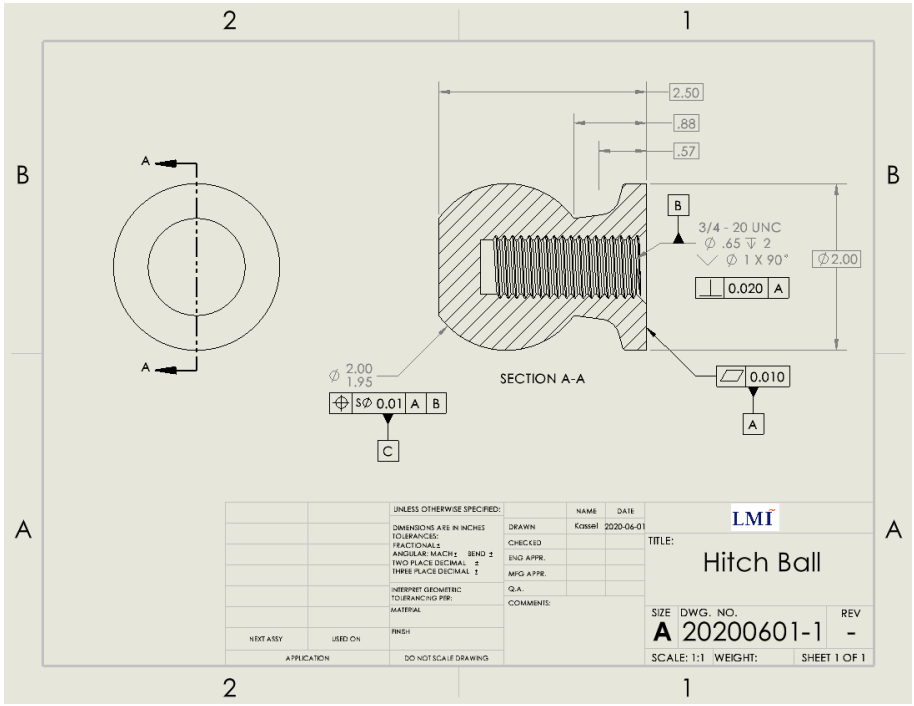
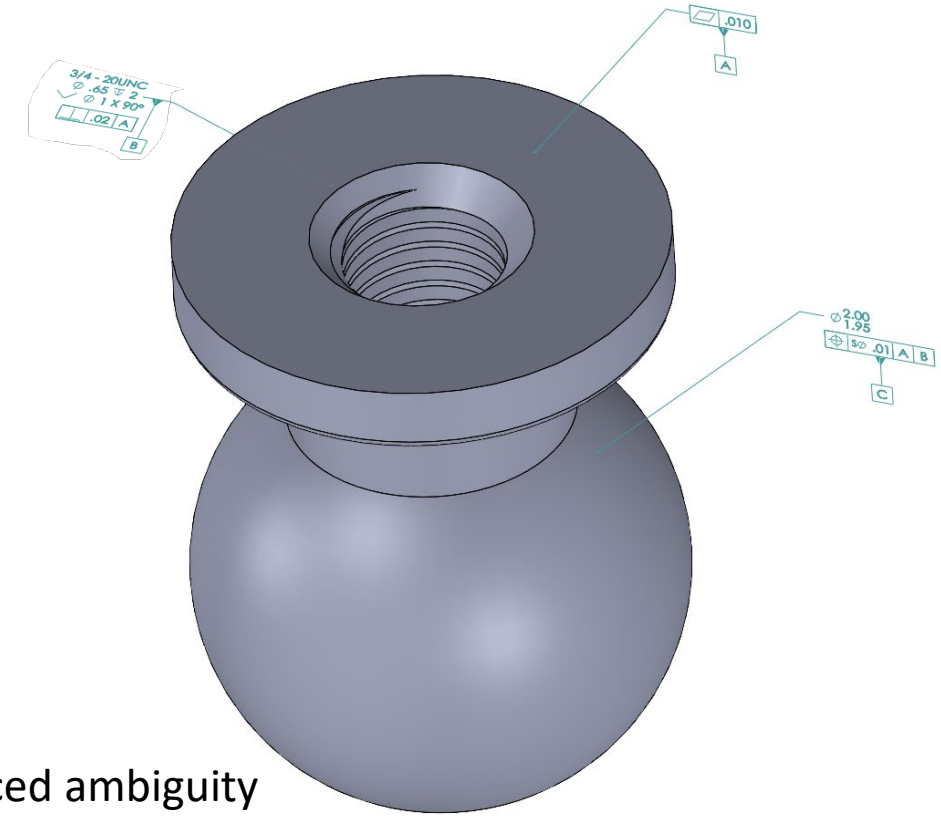
The conflict between Semantic and Displayed PMI

- Design in instead of documenting the functional definition
- Enabling Data Analytics
- Enabling Machine to Machine communications
- Eliminate Duplicative Efforts
- Greatly reduce the effort to document the product model
- Significantly increase information re-use!



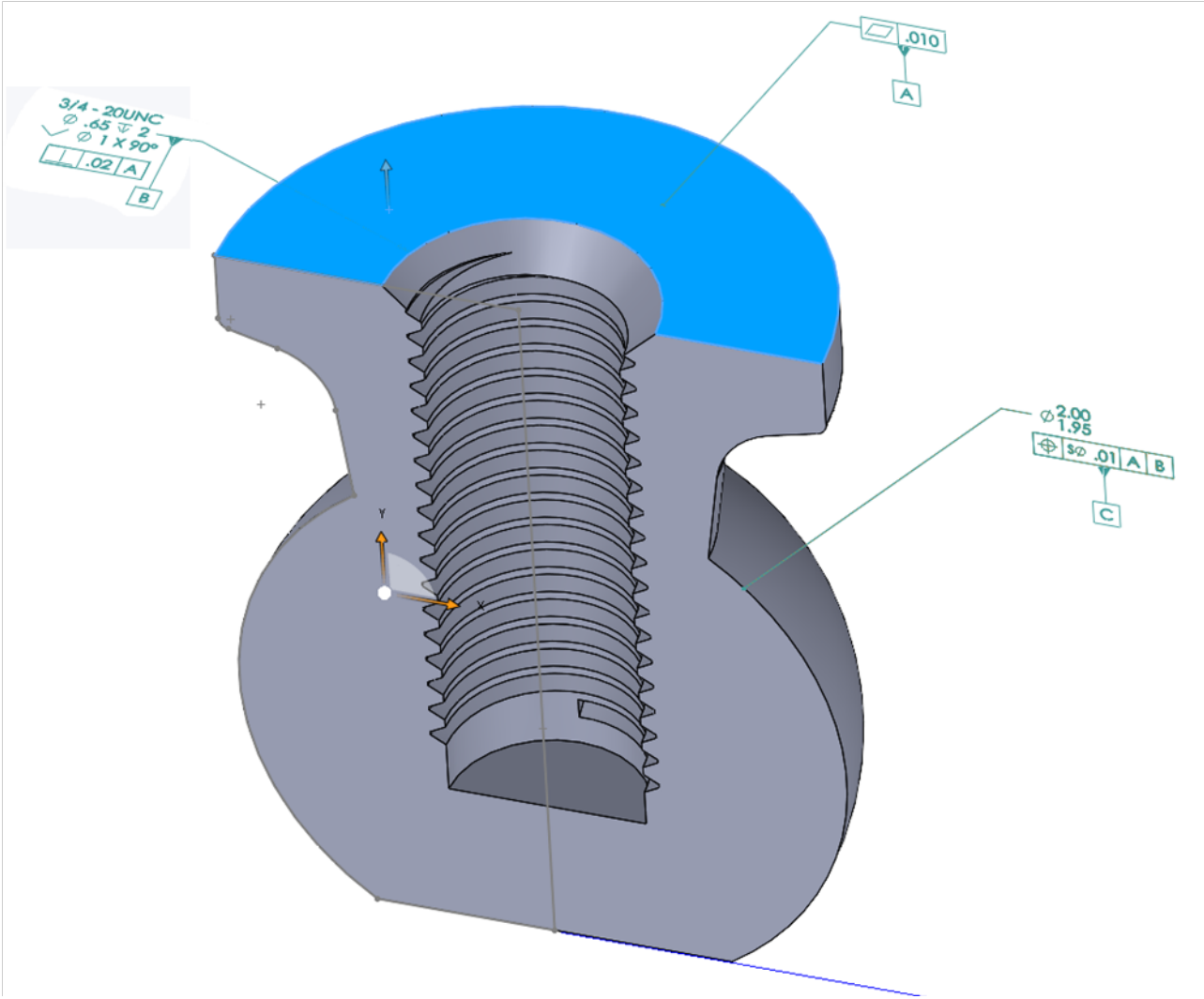


- Reduced ambiguity
- Consistency from design to build to inspect
- Separate content from presentation
- Improved adherence to a structured data model
- Increased association to other model elements
- Enables Multiple Product Structure

Why 3D Model-Based Definition

MBD can provide insight into Design Intent

- A is the primary surface and it has to be flat. The design intent is the hitch will not wobble on the ball mount.
- B is a threaded hole and needs to be perpendicular to the primary surface. The design intent is when the bolt is tightened the hitch will sit flat on the ball mount.
- C is the surface of the ball and needs to be located with respect to the mounting surface and the threaded hole. The design intent is the hitch ball is in alignment.



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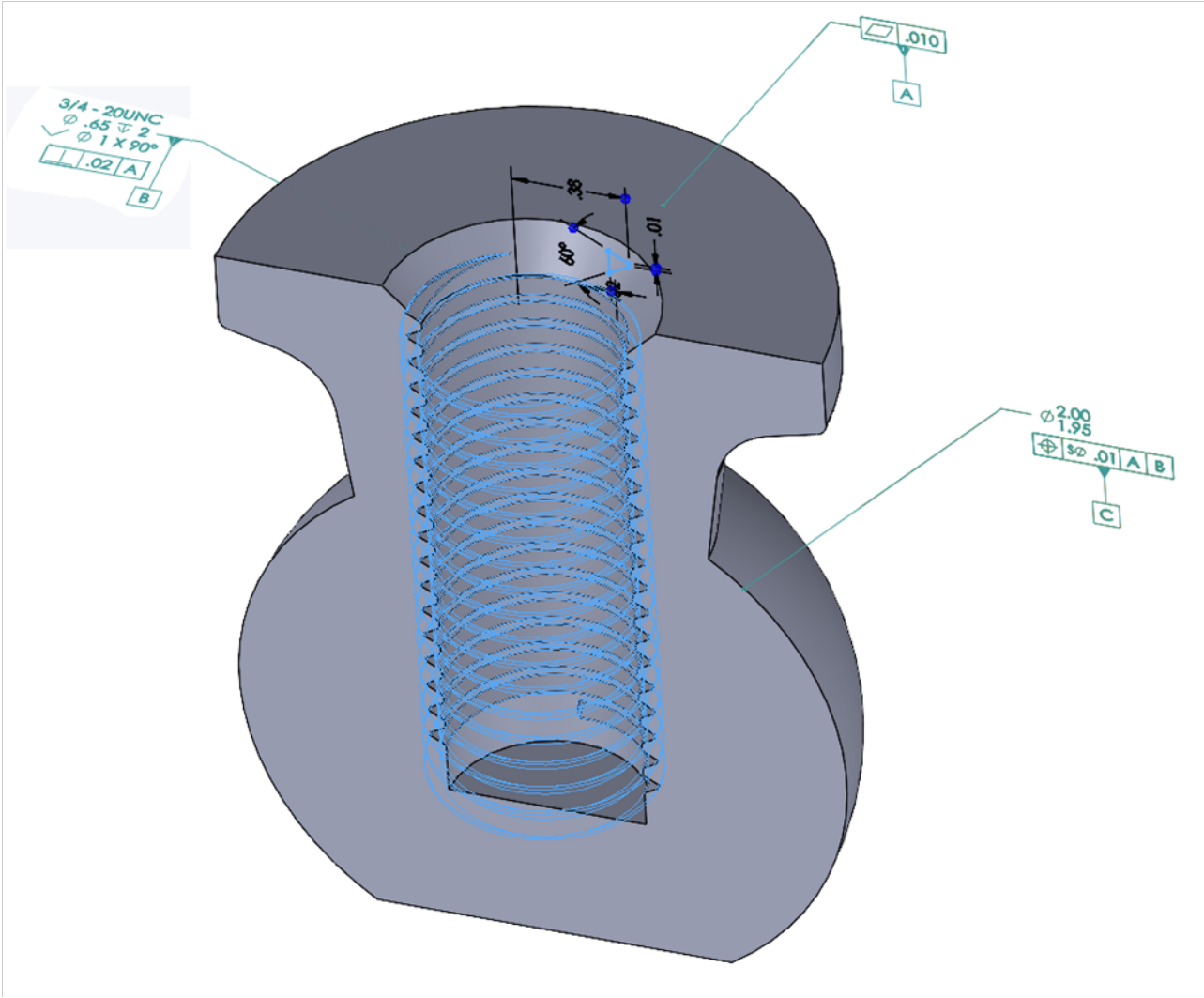

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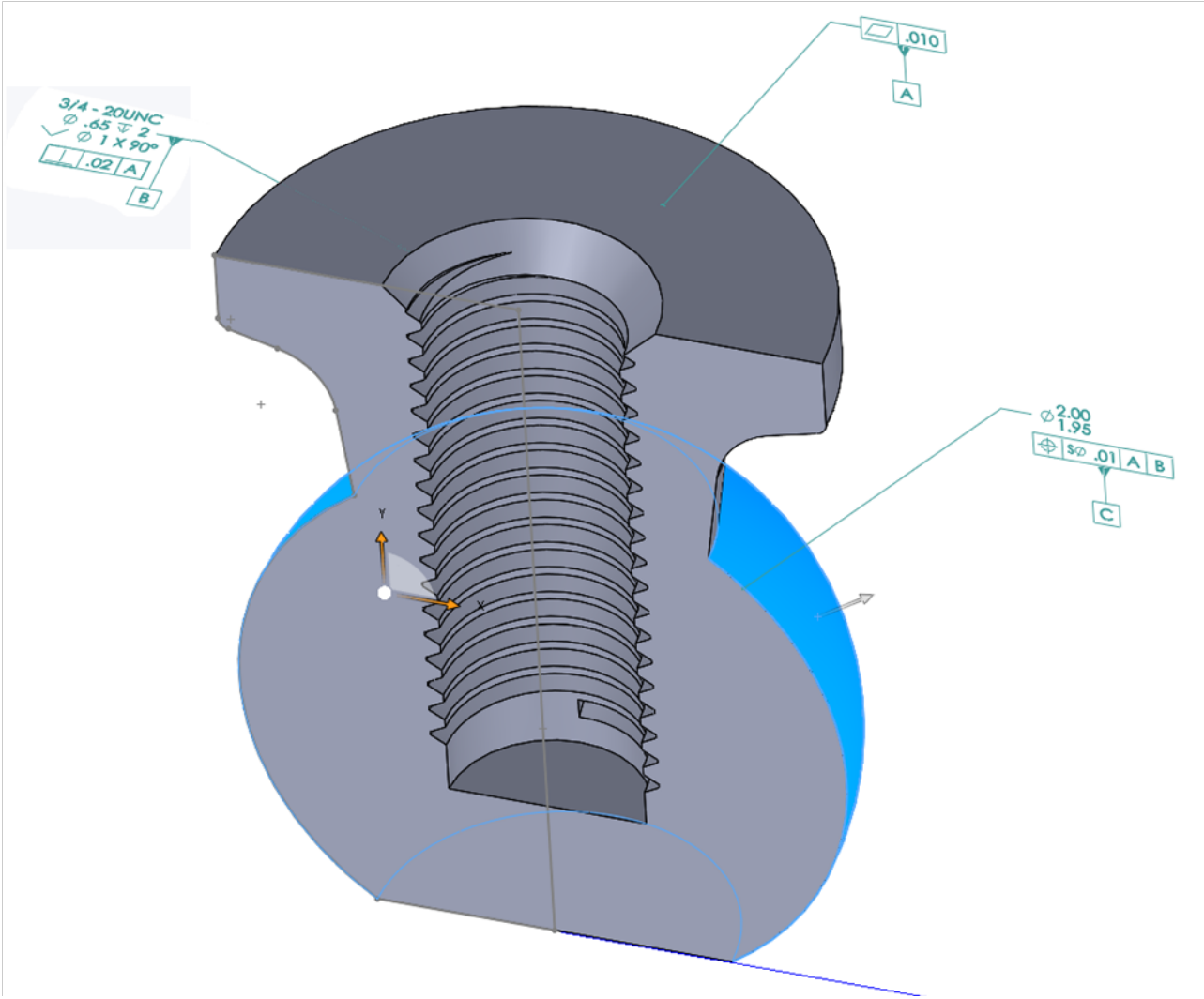

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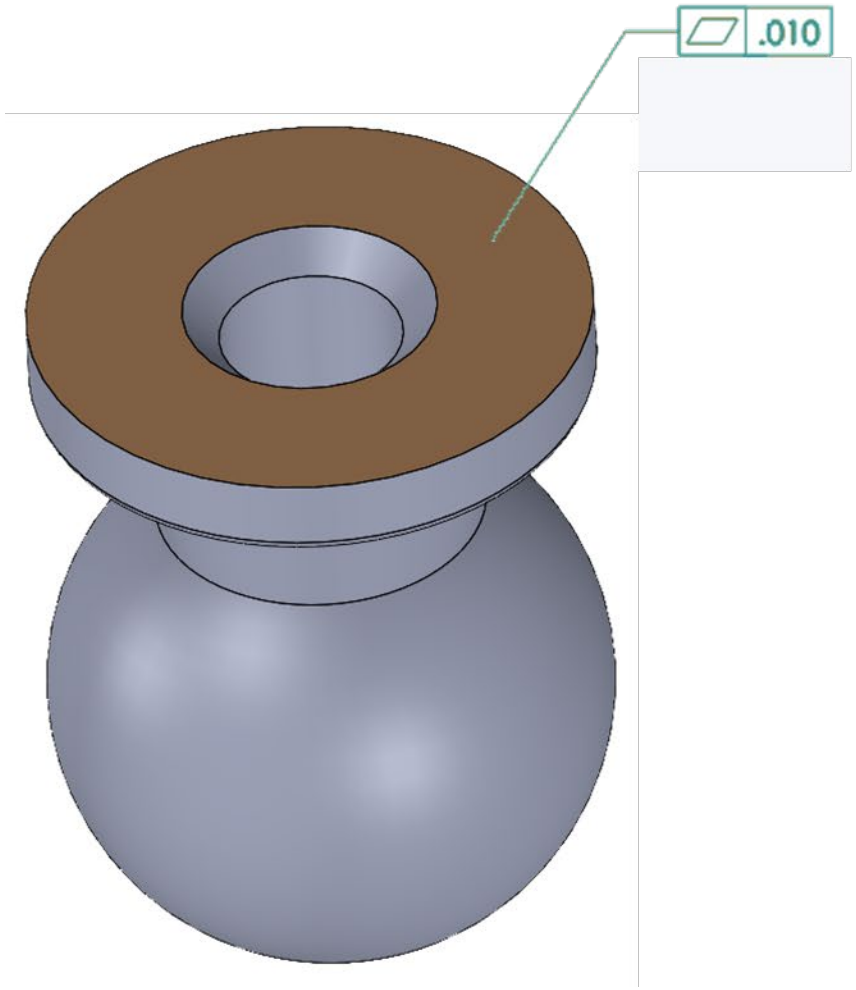
Semantic and Displayed PMI

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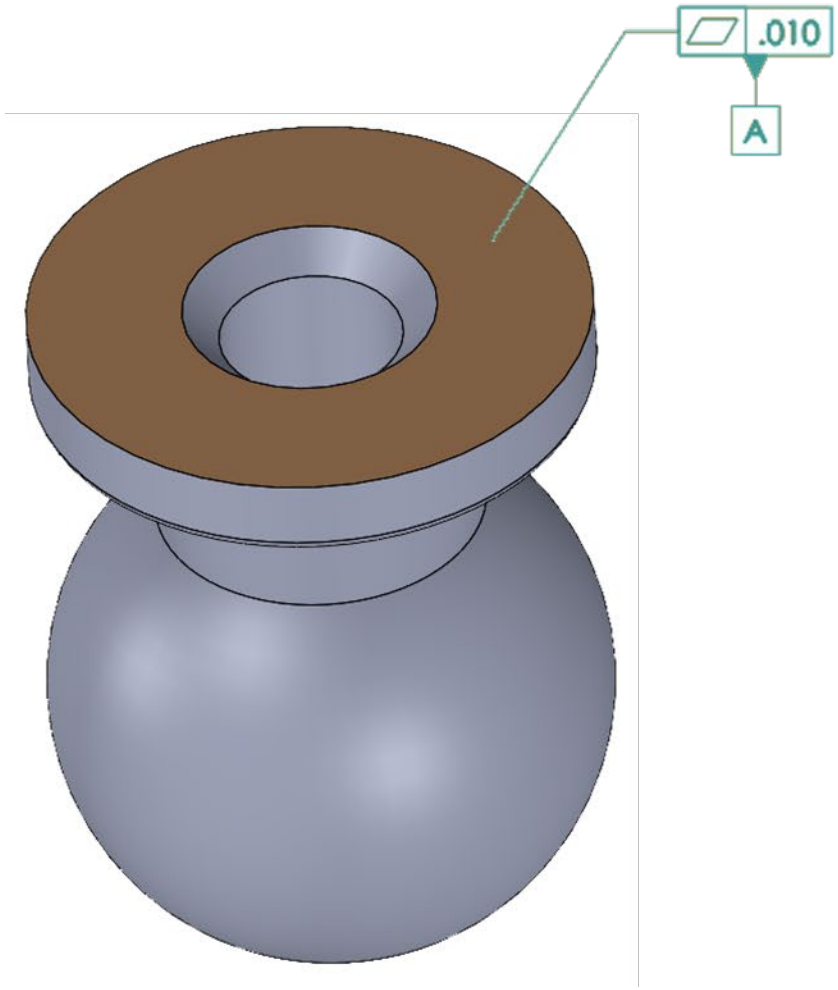
Semantic and Displayed PMI

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Whats next

See you back here at 2:00 for DEDMWG