

"In theory, there is no difference
between theory and practice.

But, in practice, there is."

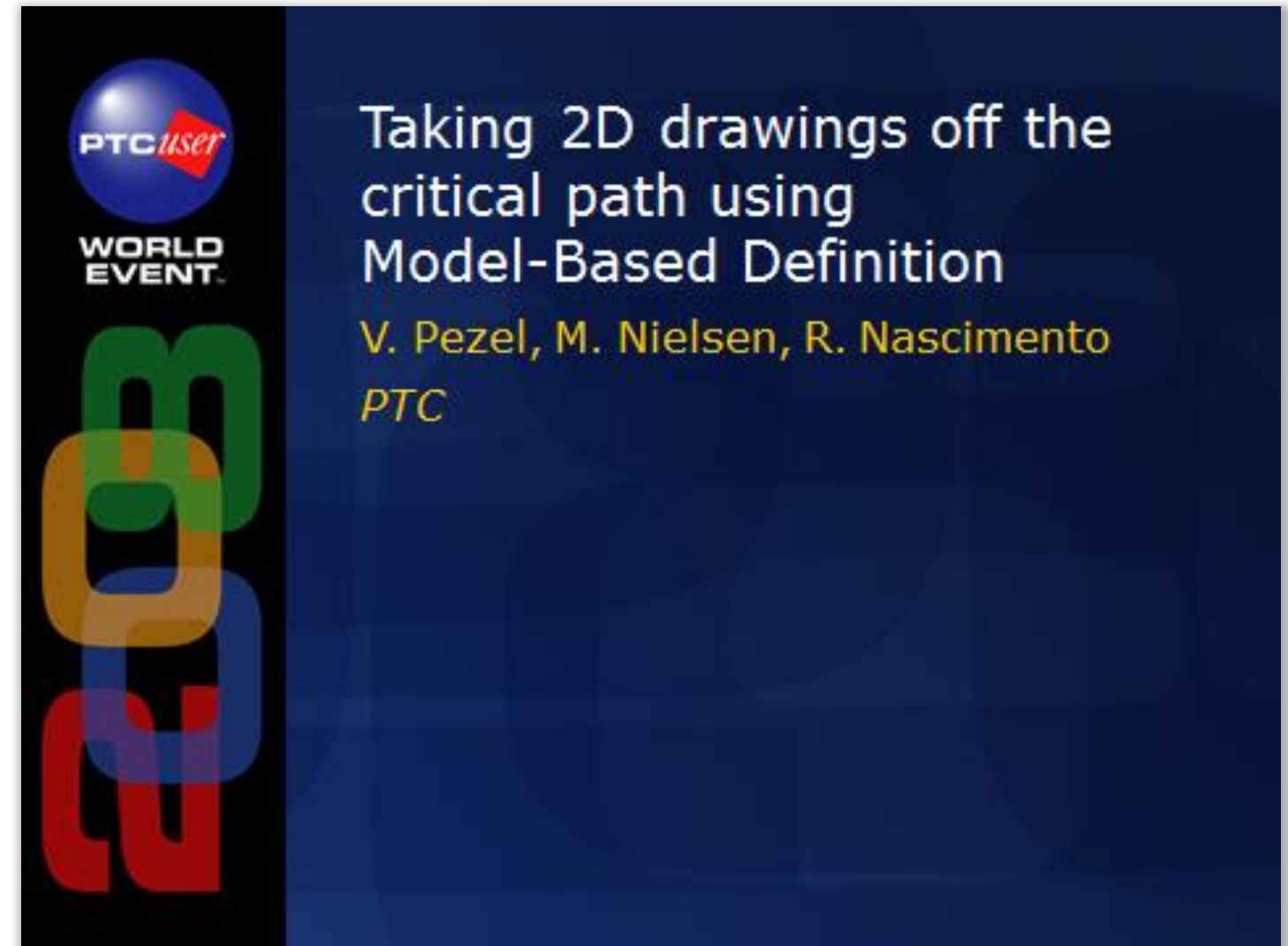
-Jan L. A. van de Snepscheut

1. Your company is in full production with MBD processes...
 - Realizing business value from MBD across the organization
2. Your company is in partial production with MBD processes...
 - Realizing some business value from MBD in some areas of the organization, but not all
3. Your company is doing funded pilot projects with MBD processes...
 - Value proposition is articulated, processes are defined and a pilot is underway to confirm the business value
4. Your company is actively developing MBD processes and planning implementation...
 - Value proposition is articulated, but detailed processes are still being defined – aiming toward a pilot
5. Your company is considering MBD, but not actively pursuing it yet...
 - See the potential business value in MBD, but value proposition is not developed for your company situation
6. Your company is curious to learn more about MBD...
 - Want to learn what is the potential business value for MBD
7. You're here because you couldn't find a more interesting session to attend at this time...

MBD session at PTC/User 2008...

~100 attendees...

- 1. Full production:
 - 2. Partial production:
 - 3. Funded pilot projects:
 - 4. Actively investigating: ~5%
 - 5. Considering, but not active: ~20%
 - 6. Curious about MBD:
 - 7. Killing time in the session:
- ~2%
- ~75%

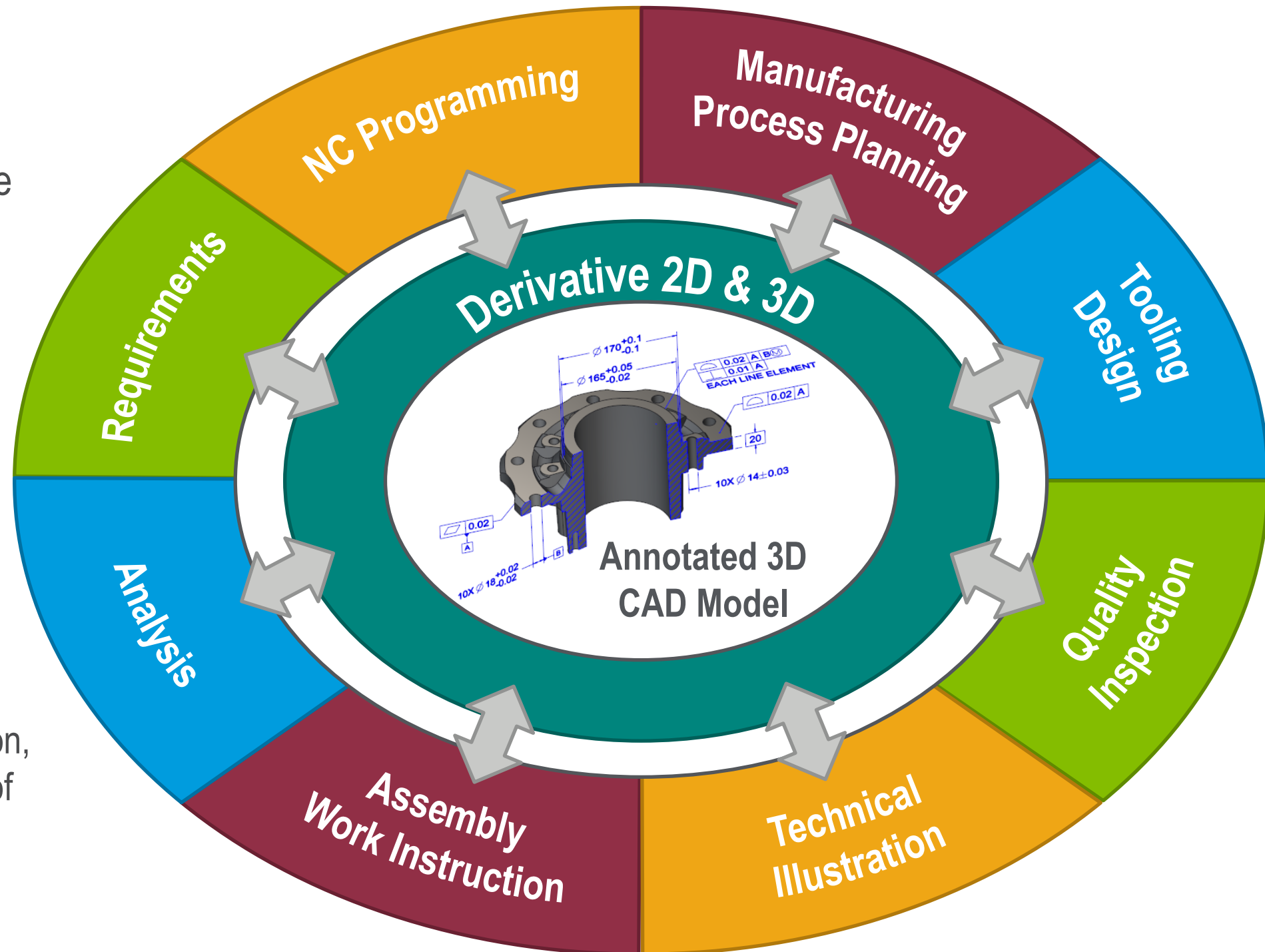


- **Model Based Definition:**

- An annotated model and its associated data elements that define the product in a manner that can be used effectively without a drawing graphic sheet.

- **Model Based Enterprise:**

- An organization that uses model-based definitions for the purpose of commission, operation, service, and decommission of a product.



Common terms for logical progression from drawing-centric to model-based

Drawing Centric

2D Master Drawing – 3D model not verified or configuration controlled

Model Centric

2D Master Drawing w/ associative 3D model
(Model is verified and configuration controlled)

Model Based Definition

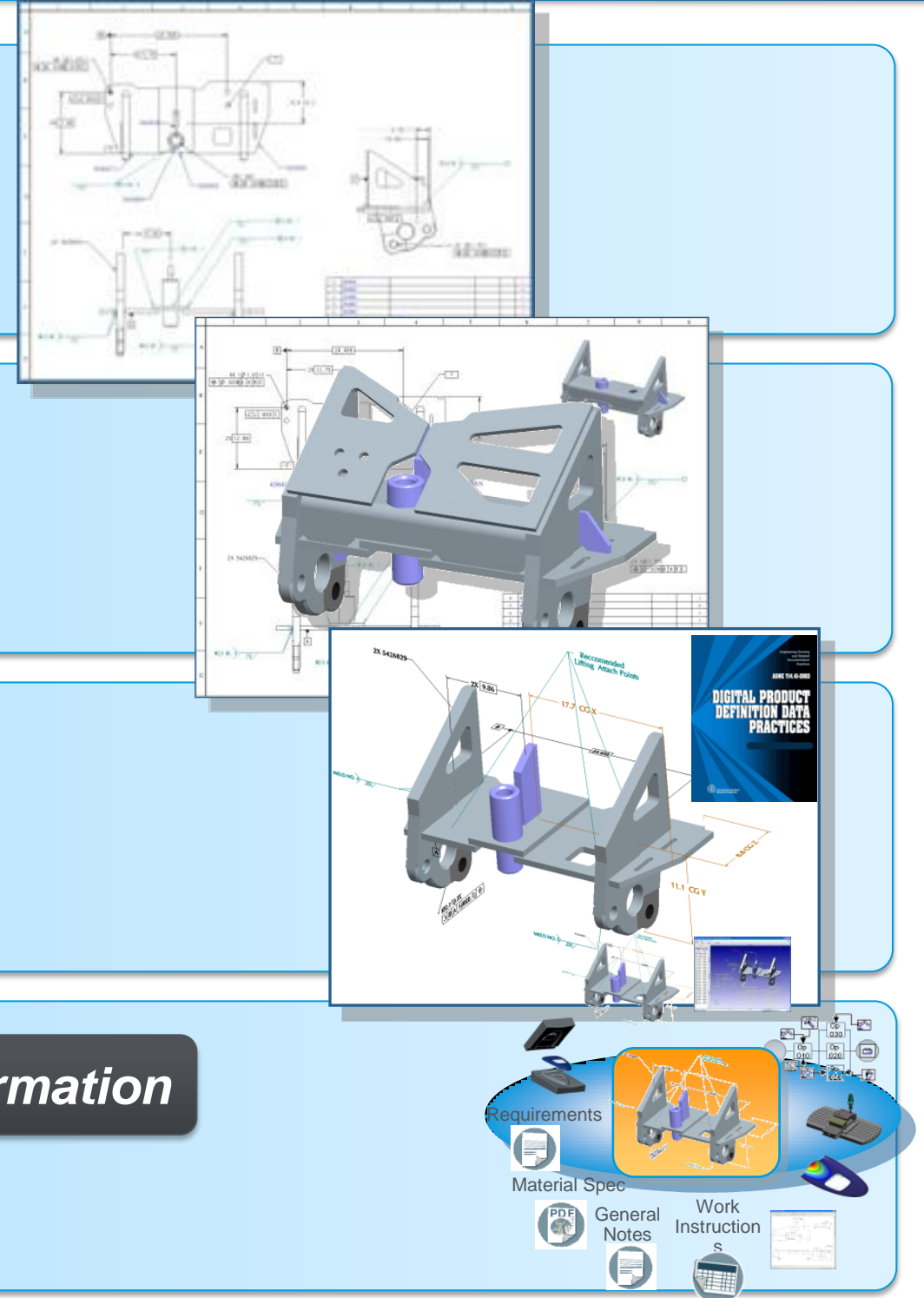
CAD Data Only

3D Master CAD Model with 3D annotations –
2D drawings, if needed, derived from model

Model Based Enterprise

All Product Information

3D Master CAD Model with 3D annotations –
Fully leveraged by the Enterprise



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Drawing
Authority

Model
Authority

Probably the biggest shift in how product development is done to occur within our lifetimes...

Pencil / paper drafting → 2D CAD drafting

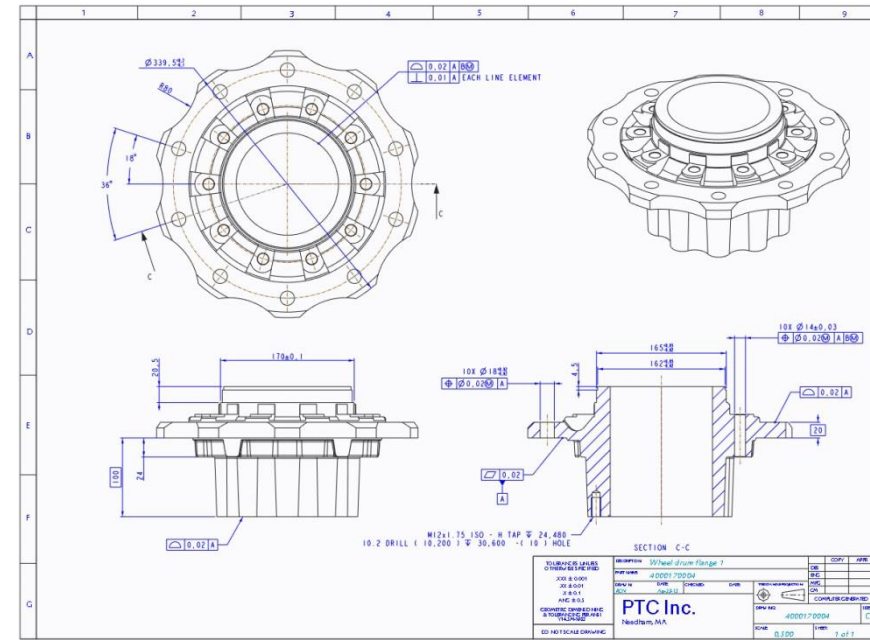
ENGINEERING DEPARTMENT



How they do their work is changed



2D CAD Drawing



Output stays the same

Probably the biggest shift in how product development is done to occur within our lifetimes...

2D CAD drafting → 3D CAD modeling + 2D CAD detailing

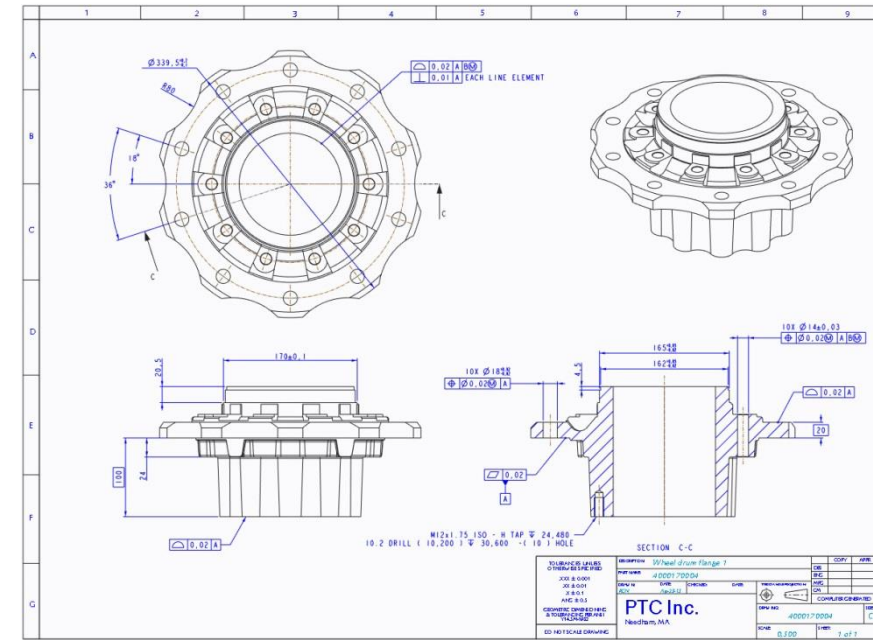
ENGINEERING DEPARTMENT



How they do their work is changed again



2D CAD Drawing



Output stays the same

Probably the biggest shift in how product development is done to occur within our lifetimes...

3D CAD modeling + 2D CAD detailing → 3D Model Based Definition

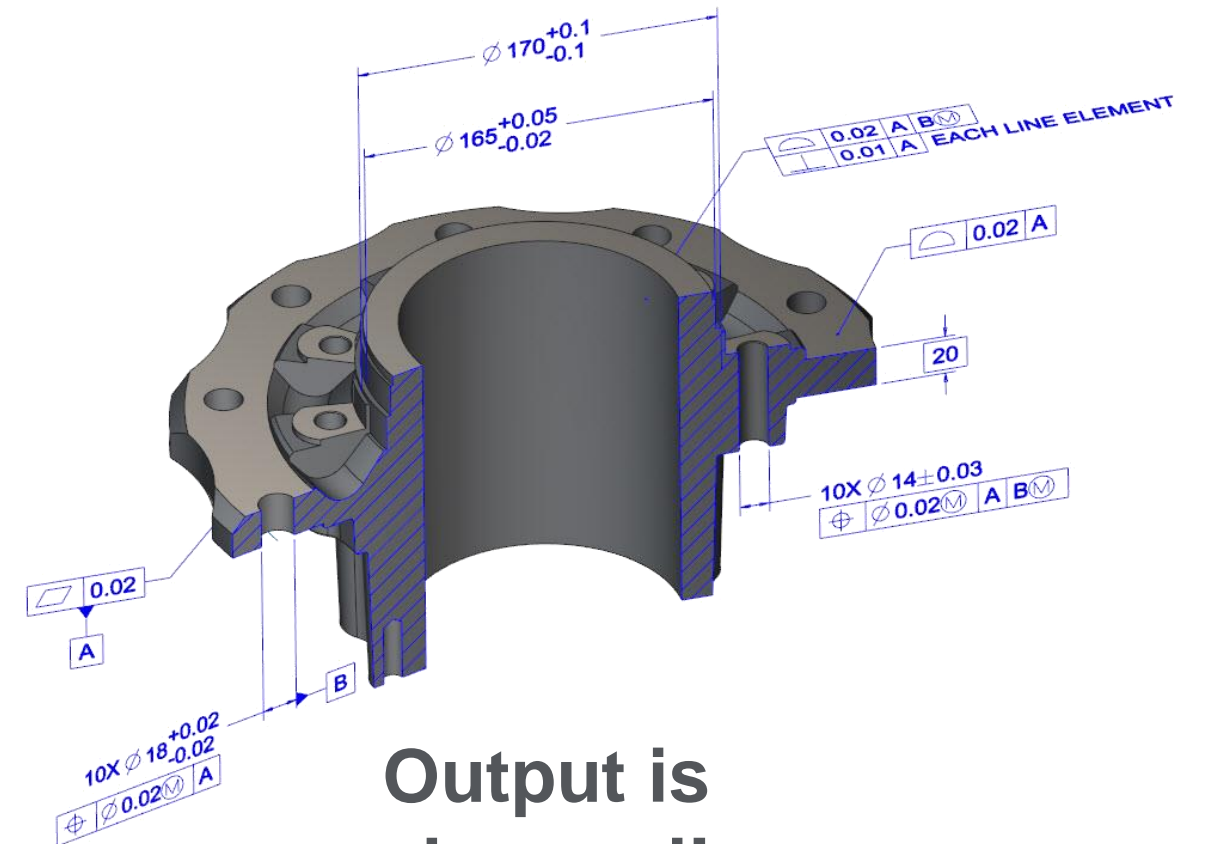
ENGINEERING DEPARTMENT



How they do their work is changed again



3D MBD Model

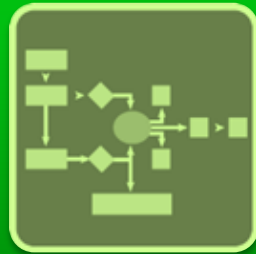


Output is changed!



Value Management

- Alignment to business goals (Value Opportunities, Metrics)
- Planning the transition to MBD / MBE (Roadmap)



Process

- Focus on the process – Flow of information from author to consumer
- Develop working practices for authors and consumers of the MBD dataset



Technology

- Choose tools that support each step in the entire process
- Also consider how the data flows between process steps

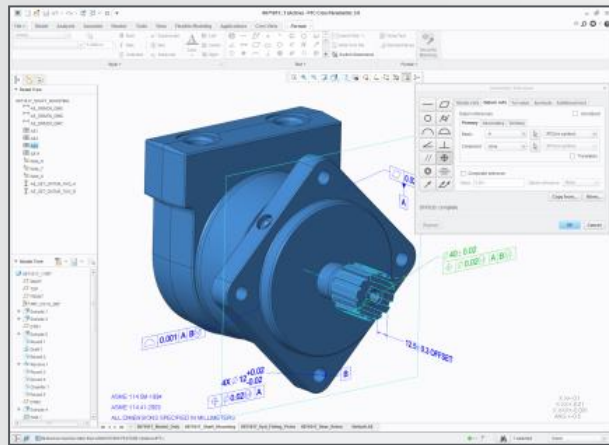


Adoption

- Adoption management – authors and consumers
- Education on working practices and technology functionality

Create

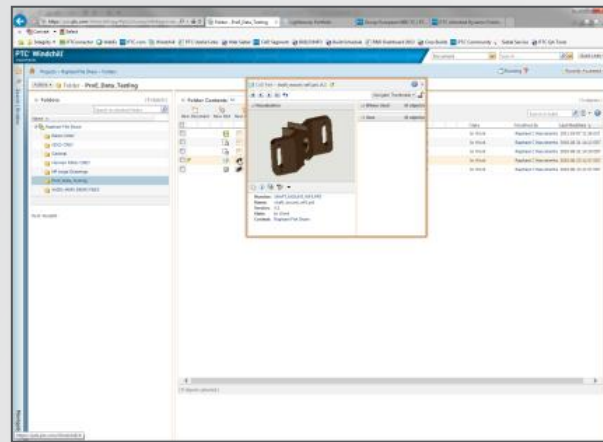
CAD Data
Authoring



PTC Creo Parametric

Manage & Control

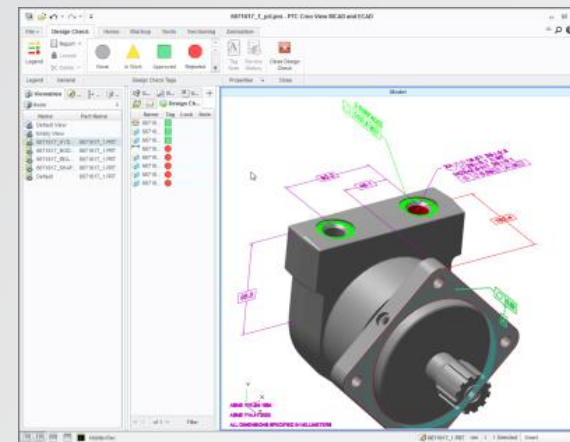
Product Lifecycle
Management



PTC Windchill
PDMLink

View & Markup

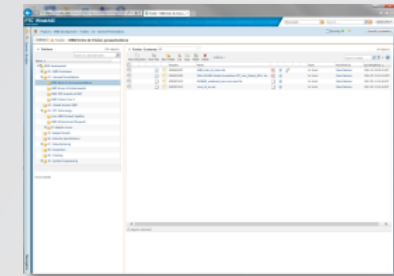
Enterprise
Viewing



PTC Creo View

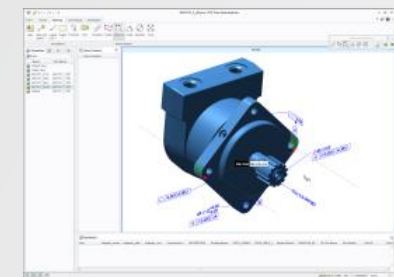
Share & Deliver

Collaboration



PTC Windchill
ProjectLink

Free Viewing

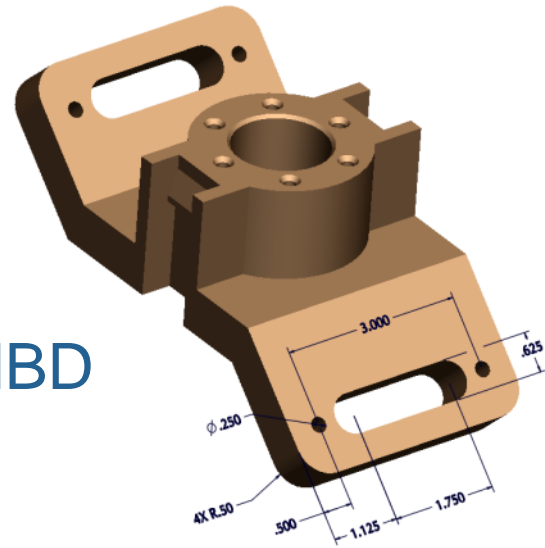


PTC Creo View
Express

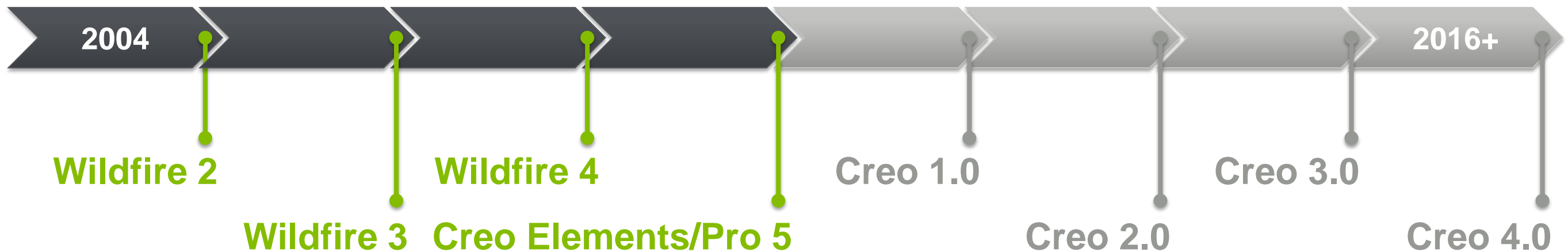
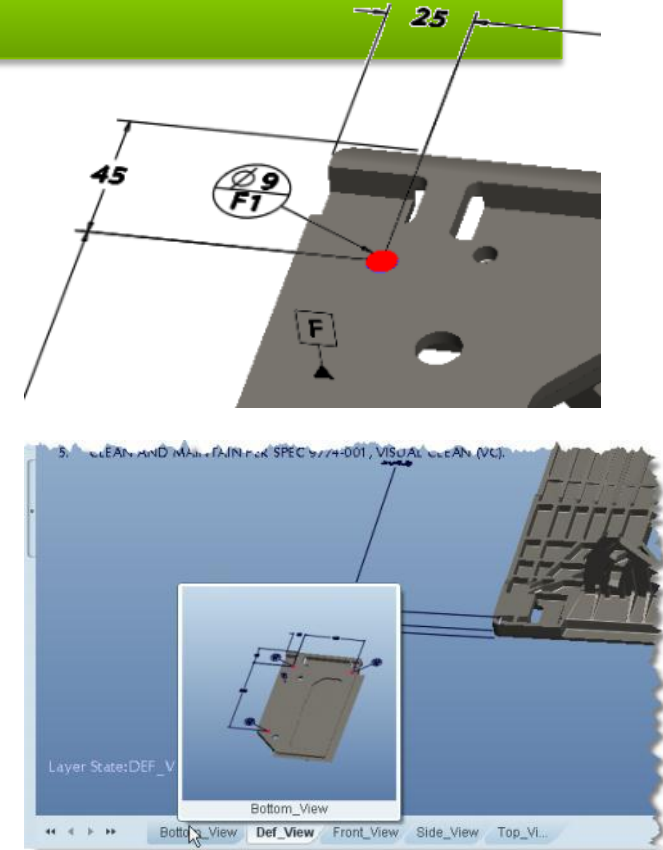
PTC Creo Support for MBD

Wildfire 2.0 through Creo Elements/Pro 5.0

- Initial support for 3D model annotations
 - Notes, Symbols, Surface Finishes, GTOL, Driven Dimensions
- Laid the foundation for MBD capability

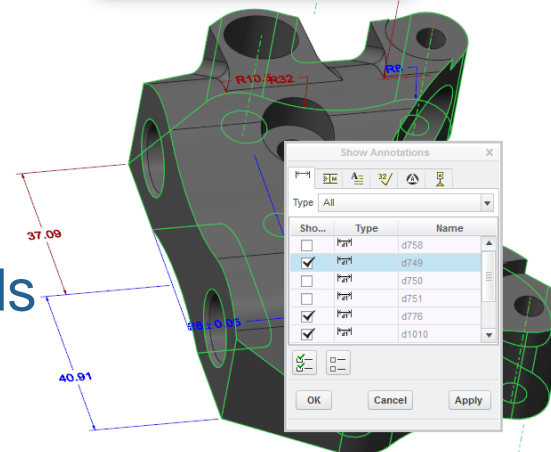
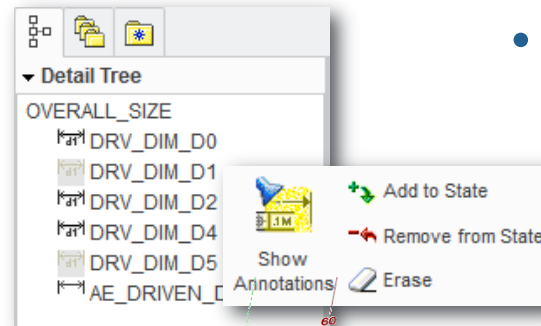


- New annotation types
 - Driving dimensions, hole notes, weld symbols, datum targets
- Flexible annotation planes
 - Named orientations, planes, flat to screen
- Named layer states in view manager
- Tabs for combination states

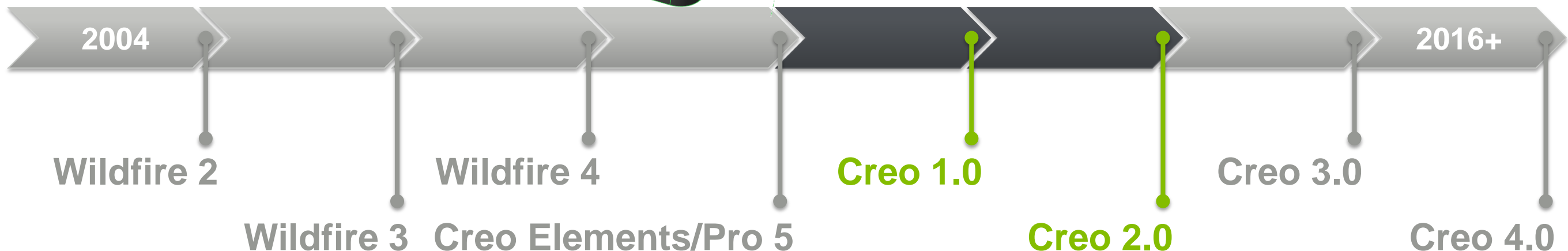
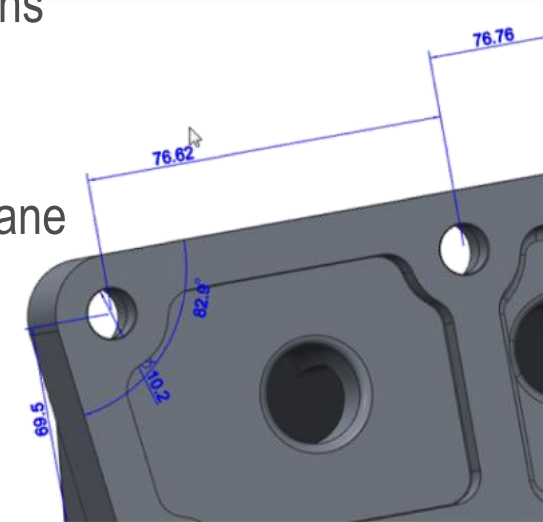


PTC Creo 1.0 & PTC Creo 2.0

- New dedicated annotation environment!
- Assign annotations to Combination States
 - Listed in Detail Tree
- New Show Annotations tool
 - Consistent with 2D detailing
- Support for 3D drawing standards
 - 3D Detail options



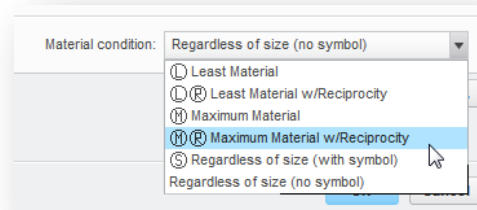
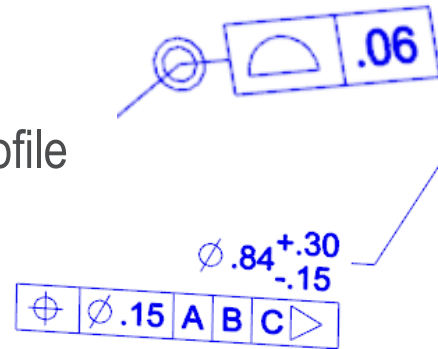
- Dynamic positioning of dimensions
 - Drag dimensions where you want them
 - Snap dimension text to the center
 - Snap alignment of adjacent dimensions
- Additional dimension references
 - Edges perpendicular to annotation plane
 - Vertex references



PTC Creo 3.0

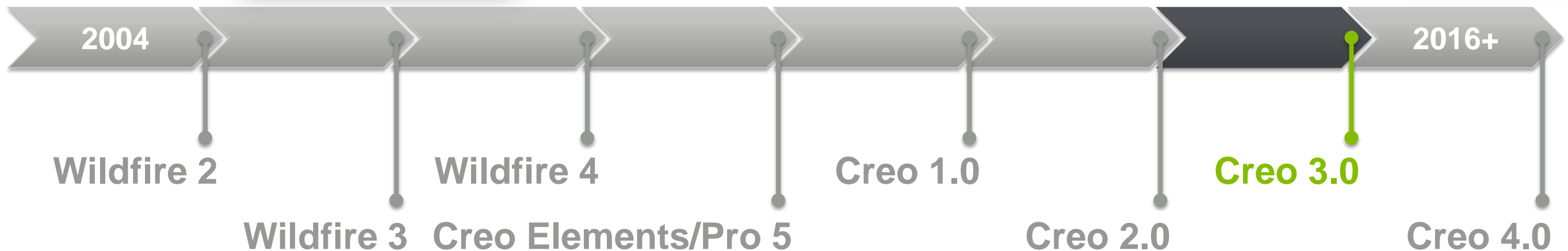
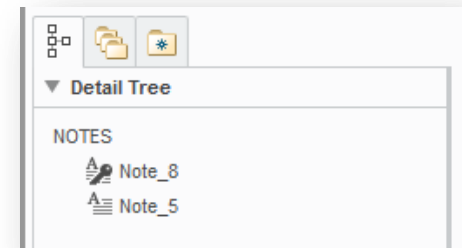
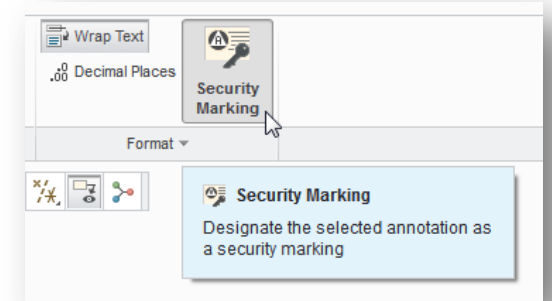
- **GTOL Enhancements**

- ASME Y14.5-2009
 - All Over modifier for surface profile
 - Translation modifier for datums
- ISO
 - Additional text improvements
 - Reciprocity modifier for datums



- **Security Markings for 3D Annotations**

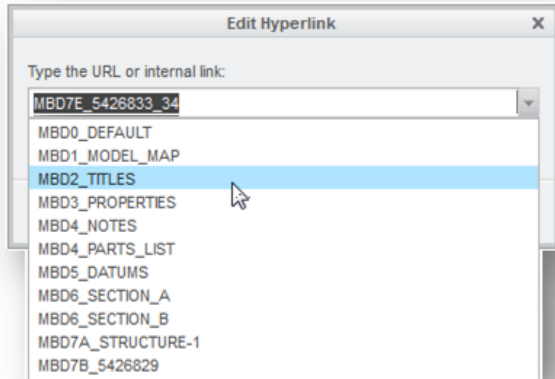
- Support for ASME Y14.41-2003
- Notes and Symbols placed Flat to Screen can be designated as Security Marking
- These annotations will be added to all combination states
- They will be permanently visible when published to PTC Creo View



PTC Creo 3.0

- **Hyperlinks to Combination States**

- Note annotations may contain hyperlink to combination state
- Click the note and the model switches to the designated combination state

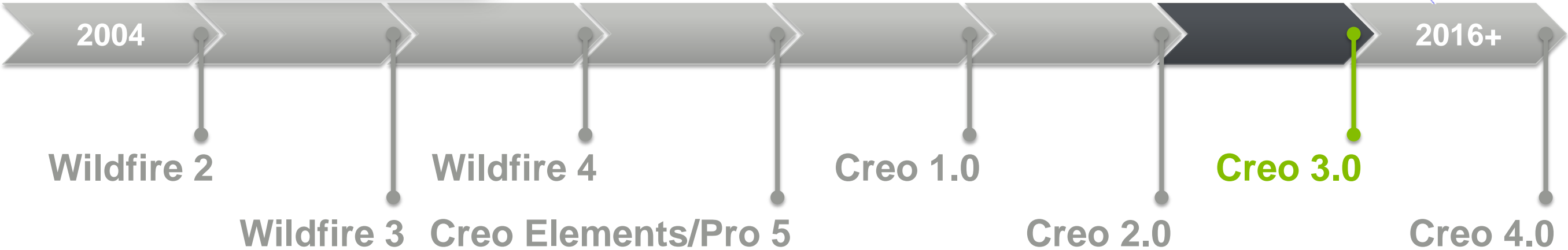


- **Symbols in 3D Notes**

- Ability to call out symbols in 3D notes
- Use standard syntax:
 - &sym(NAME)

NOTES:

1. DIMENSIONING AND TOLERANCING IN ACCORDANCE WITH ASME Y14.5M-1994
2. ASTM SI 10 APPLIES. ANNEX B SHALL BE USED IN CONVERTING AND ROUNDING OFF 1 INCH = 25.4 mm APPLIES
3. UNLESS OTHERWISE SPECIFIED: TOLERANCE ON IMPLIED 90 DEGREE ANGLES TO BE ±2 DEGREES.
4. REMOVE ALL BURRS AND SHARP EDGES.
5. ALL INTERIOR SHARP CORNERS R 0.3 MAX. UNLESS OTHERWISE SPECIFIED
6. NOTED PROFILE APPLIES UNLESS OTHERWISE SPECIFIED
7. MARK PART WITH PART NUMBER: PER STD-998-EN



Improve Authoring of 3D Annotated Models

- Standards Support and Workflow improvements
- Semantic GD&T Architecture
- Semantic Validation of GD&T

Expand capabilities of Combination States

- Supplemental Geometry
- Appearance States

Improve creation of derivative 3D formats

- STEP AP242 (Semantic PMI)
- Creo View

Improve creation of derivative 2D artifacts

- Combination State Printing
- Associative Combination State Drawing Views

ASME Y14.5-2009
ASME Y14.41-2012

ISO 1101:2012
ISO 5459:2011
+ others...

Dimensioning and Tolerancing
Engineering Drawing Documentation Practices
AN INTERNATIONAL STANDARD
ASME Y14.5-2009
[Revision of ASME Y14.5M-1994 (E2004)]

Digital Product Definition Data Practices
Engineering Drawing and Related Documentation Practices
AN AMERICAN NATIONAL STANDARD
ASME Y14.41-2012
[Revision of ASME Y14.41-2003 (E2008)]

INTERNATIONAL STANDARD
ISO 1101
Geometrical product specifications (GPS) — Geometrical tolerancing — Datums and datum systems
Second edition
2011-08-15
Publication number
ISO 1101:2011

4X $\varnothing 10.15^{+0.15}_0$

\varnothing	0.25 (M)	A	B
\varnothing	0.15 (M)	A	B
\varnothing	0.08 (M)	A	

$\varnothing 5$ A

A A1, 2, 3

0.1 A

R

3X $\varnothing 6 \pm 0.1$

\varnothing	0.5 (M)	A [z,u,v]	B [x,y]	C [w]
---------------	---------	-----------	---------	-------

X
Y
Z

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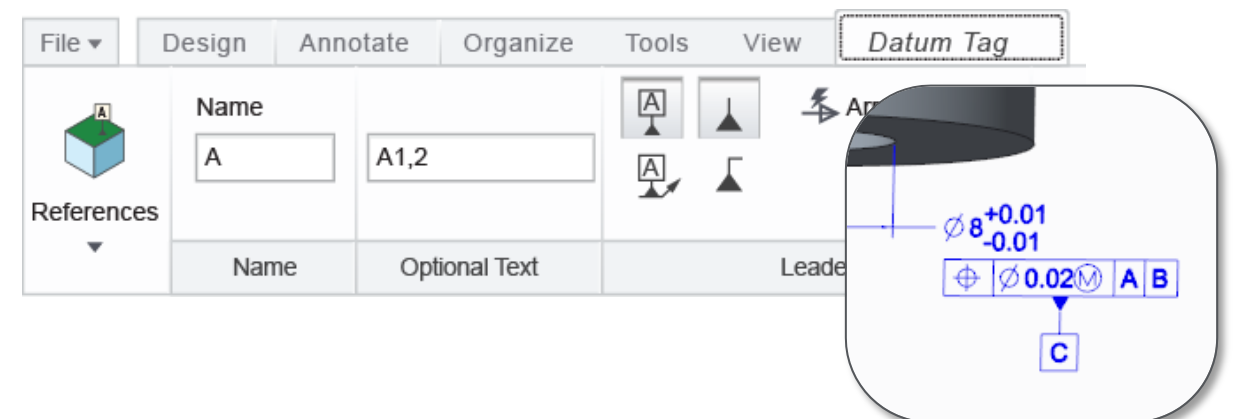
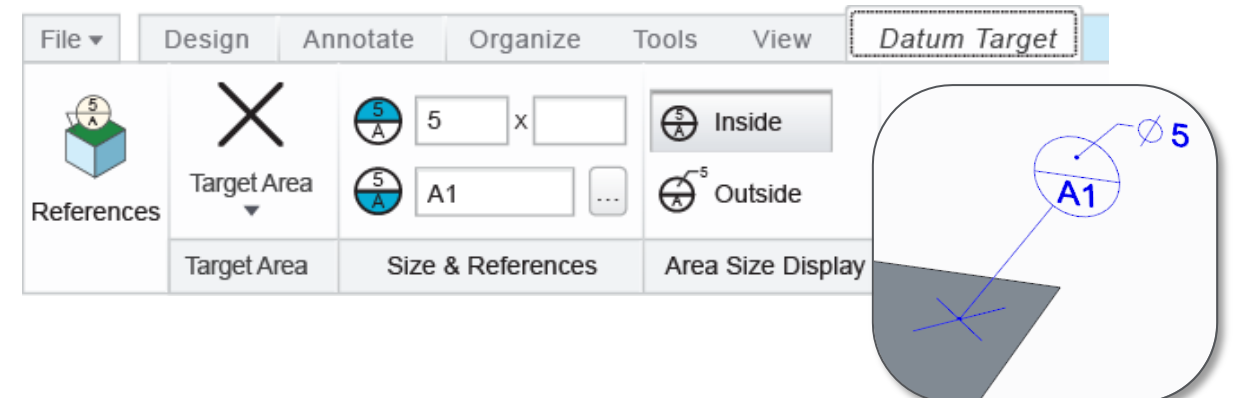
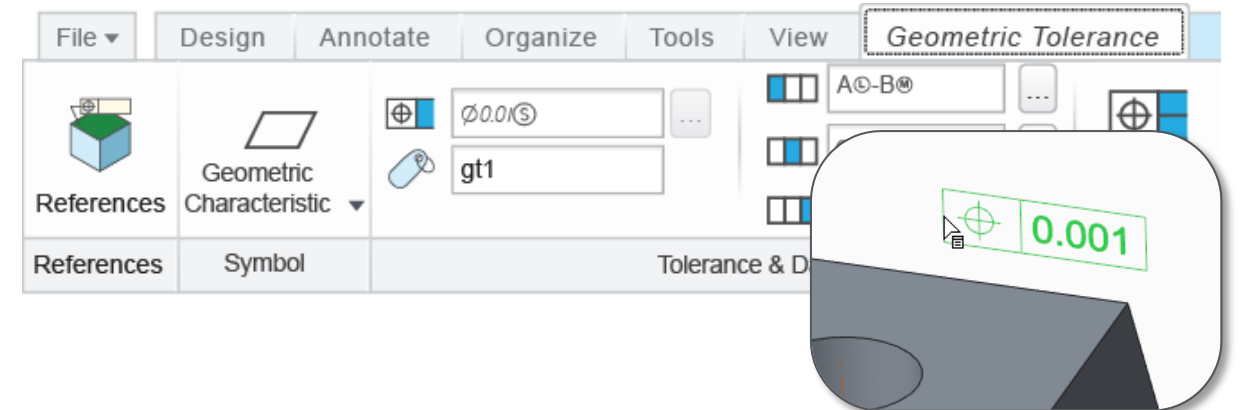
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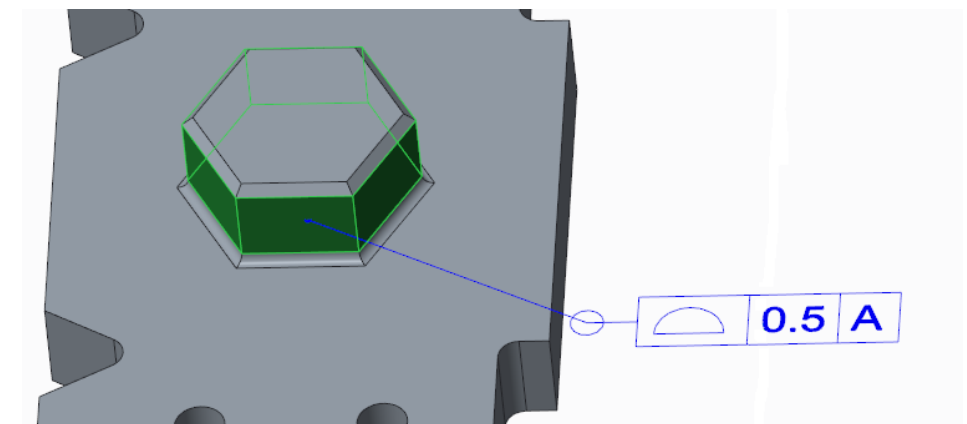
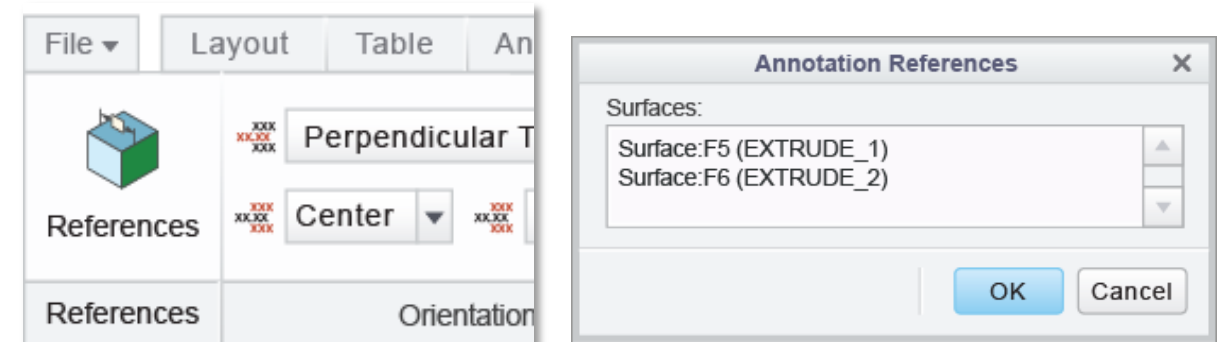
- STEP AP242 (Semantic PMI)
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Improve creation of derivative 2D artifacts

- Combination State Printing
- Associative Combination State Drawing Views

Fully semantic GD&T to support:

- Proper query-response highlight per ASME and ISO standards
- Facilitate semantic 3D derivative objects:
 - STEP AP 242
 - PTC Creo View
 - Other 3rd party formats



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- PTC is proud to be partnering with Sigmetrix to provide full semantic validation of GD&T in PTC Creo models
- We will provide tools to:
 - Guide users in the creation of semantically correct GD&T in the models
 - Validate that the GD&T complies with applicable ASME and ISO standards
 - Validate that the GD&T fully constrains the model geometry

Improve Authoring of 3D Annotated Models

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- Semantic Validation of GD&T

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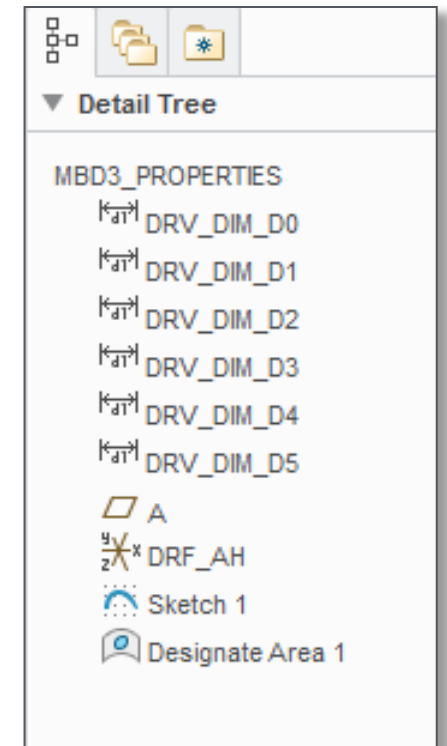
- STEP AP242 (Semantic PMI)
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Improve creation of derivative 2D artifacts

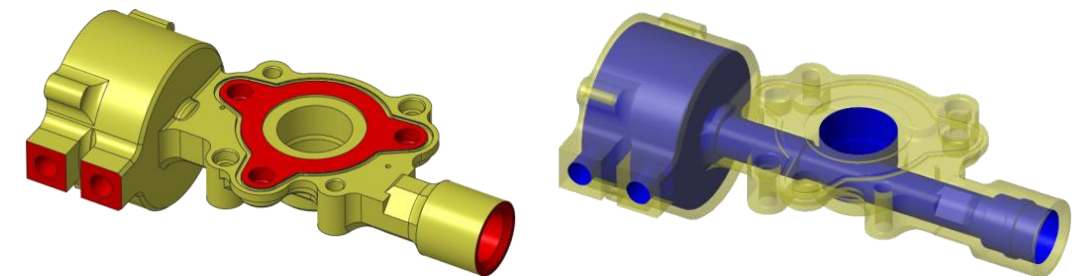
- Combination State Printing
- Associative Combination State Drawing Views

- Control visibility of supplemental geometry by combination state

- Planes
- Axes
- Points
- Csys
- Curves
- Surfaces



- Multiple appearance states in a model
 - Associate with combination states



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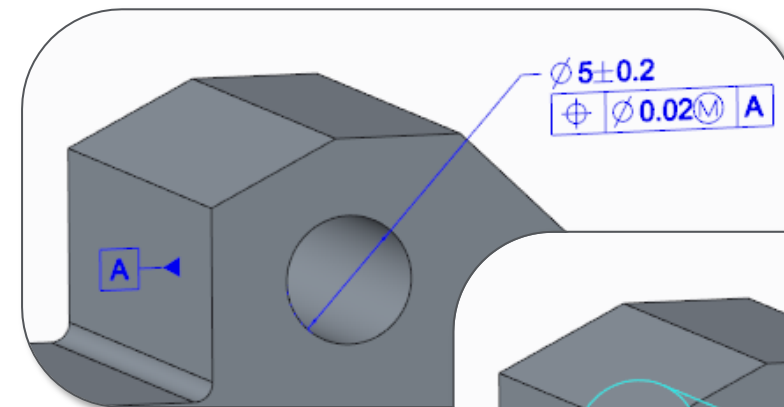
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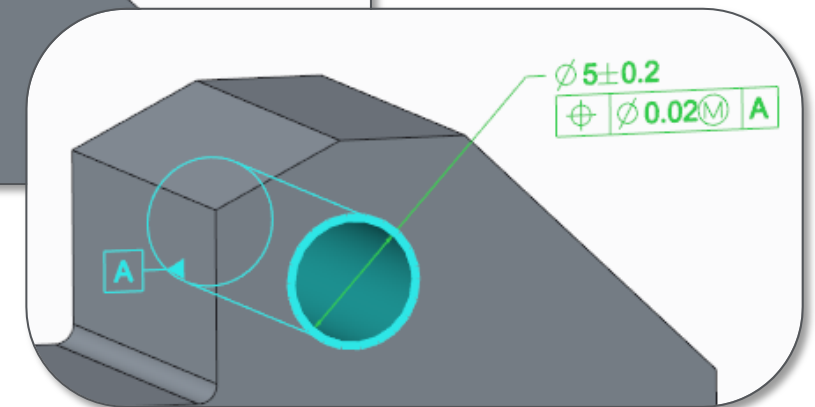
- **STEP AP242**

- 3D exact representation of geometry
- Graphical and Semantic PMI
- Applicability:
 - Long term archival of 3D annotated models
 - Exchange of 3D model data with other applications

Graphical PMI



Semantic PMI



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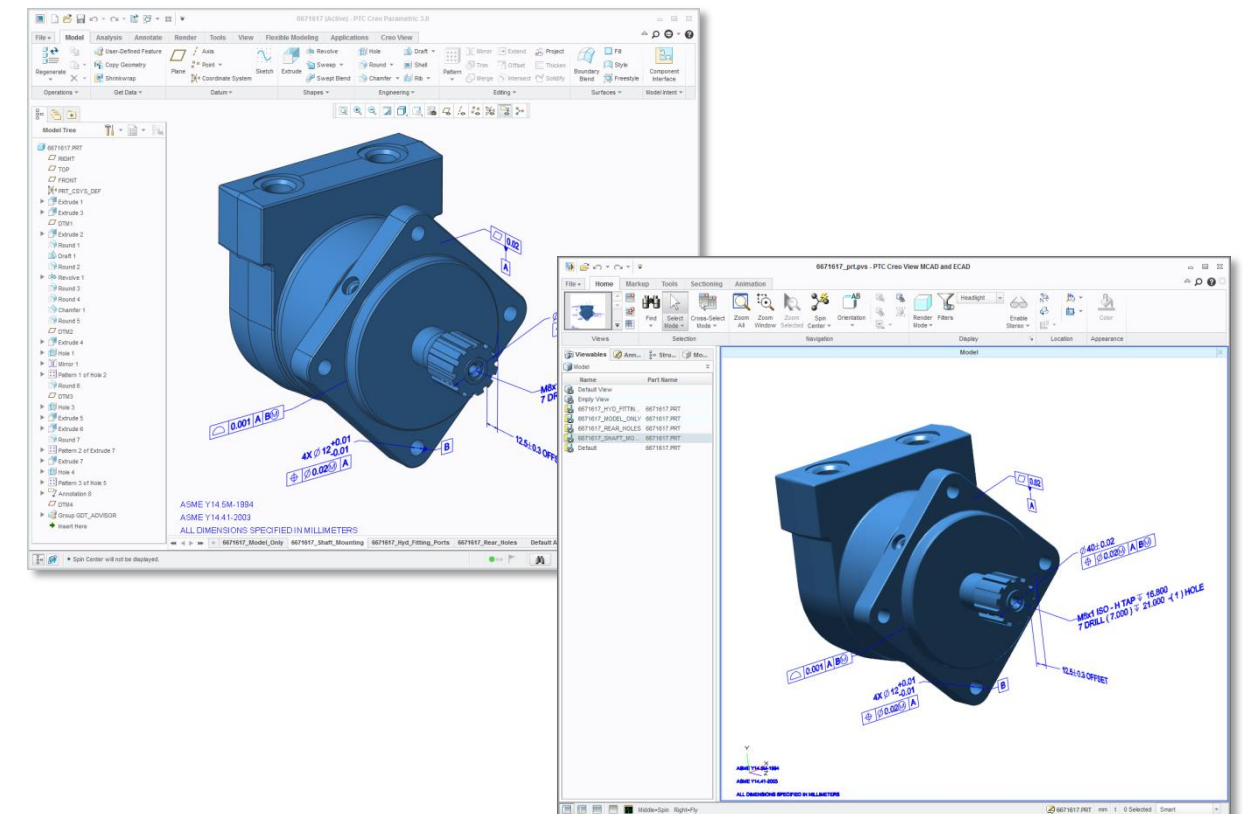
- STEP AP242 (Semantic PMI)
- PTC Creo View

Improve creation of derivative 2D artifacts

- Combination State Printing
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• Creo View

- Guaranteed identical annotations (PMI)
- Support for new combination state capabilities
- Consistent semantic query behavior



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- **Combination State Printing**
 - One combination state on each page
 - Include border (format) for each page



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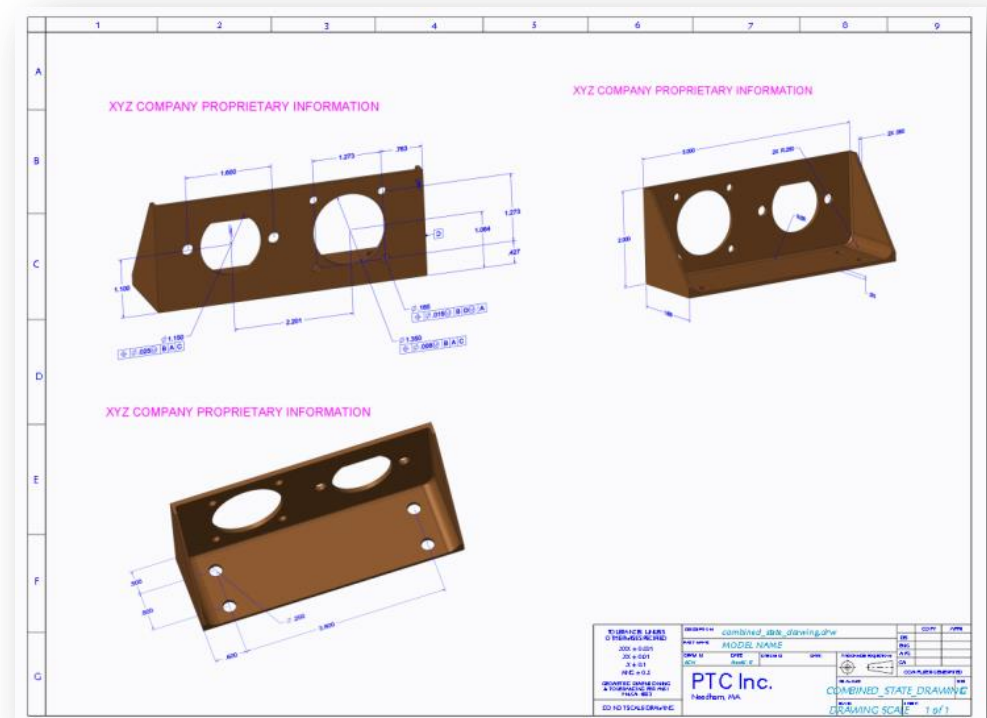
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Improve creation of derivative 2D artifacts

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- **Associative Combination State Drawing Views**

- New type of drawing view
- Exact representation of the combination state from 3D
- Read only in the drawing



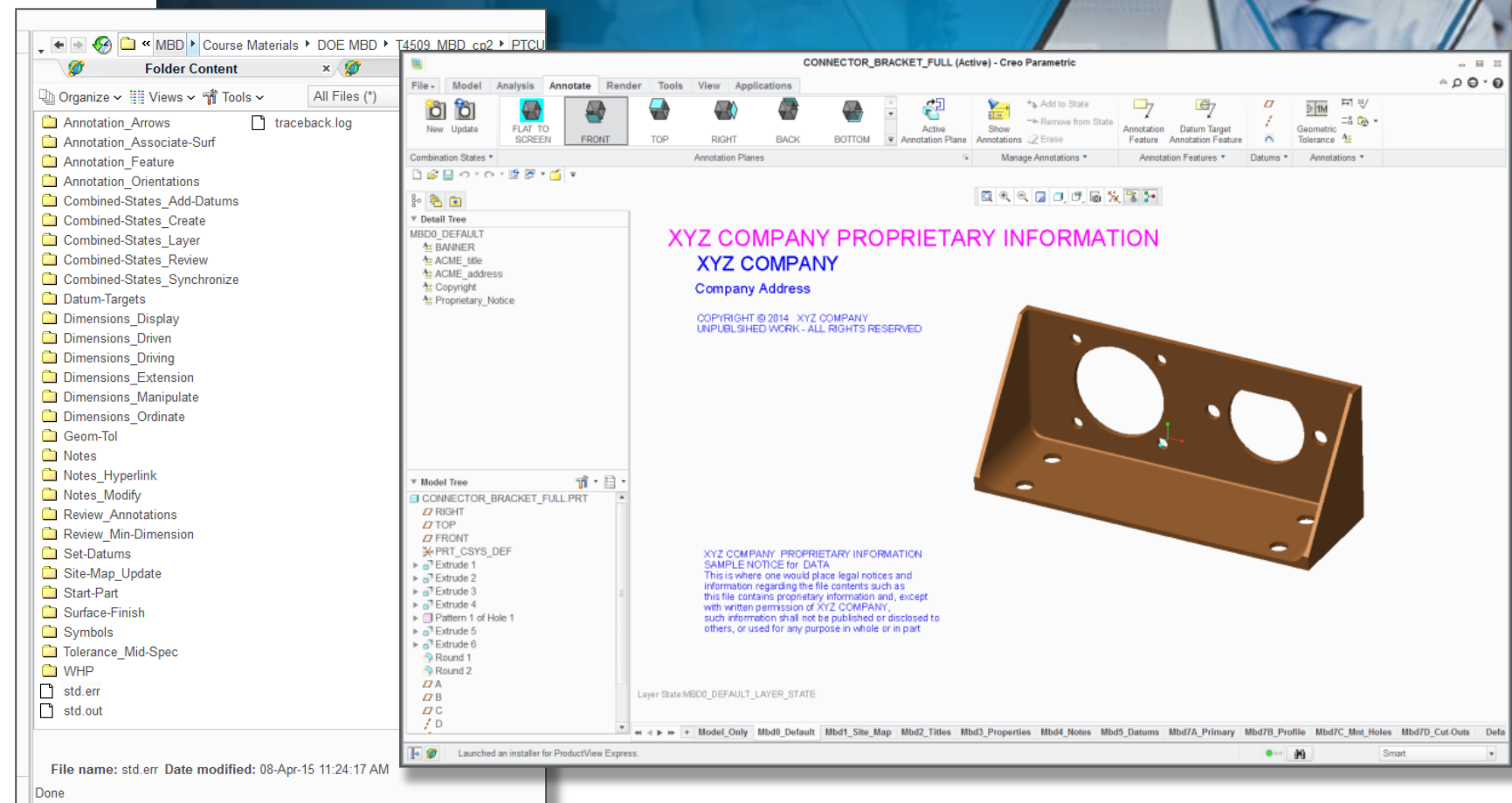
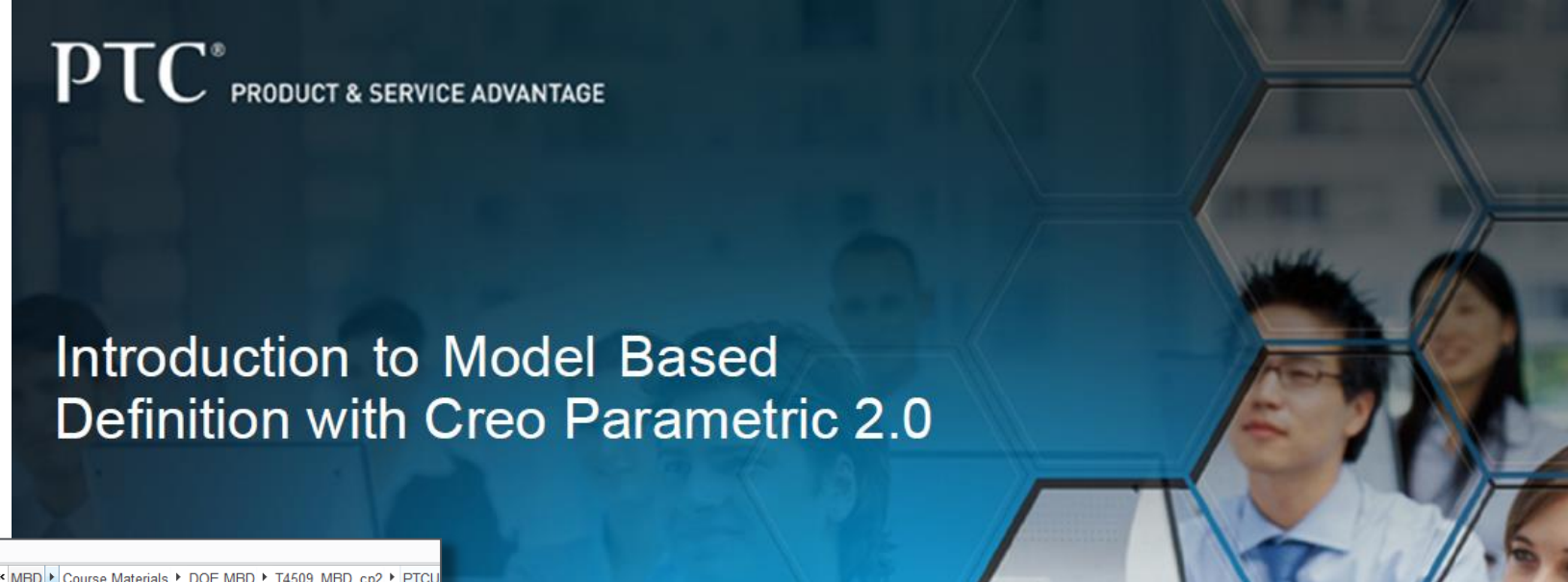
Resources

PTC University: Instructor Led Training

- Full Day of Training with PTC Expert
- Generic MBD Schema
- PTC Sample Data
- Lots of Hands On

Training Agenda

- Module 1: Introduction to Model Based Definition
- Module 2: Preparing Models for Annotation Features
- Module 3: Creating Annotation Features
- Module 4: Modifying Annotation Elements
- Module 5: Completing Combination States
- Module 6: Publishing for Technical Data Packages



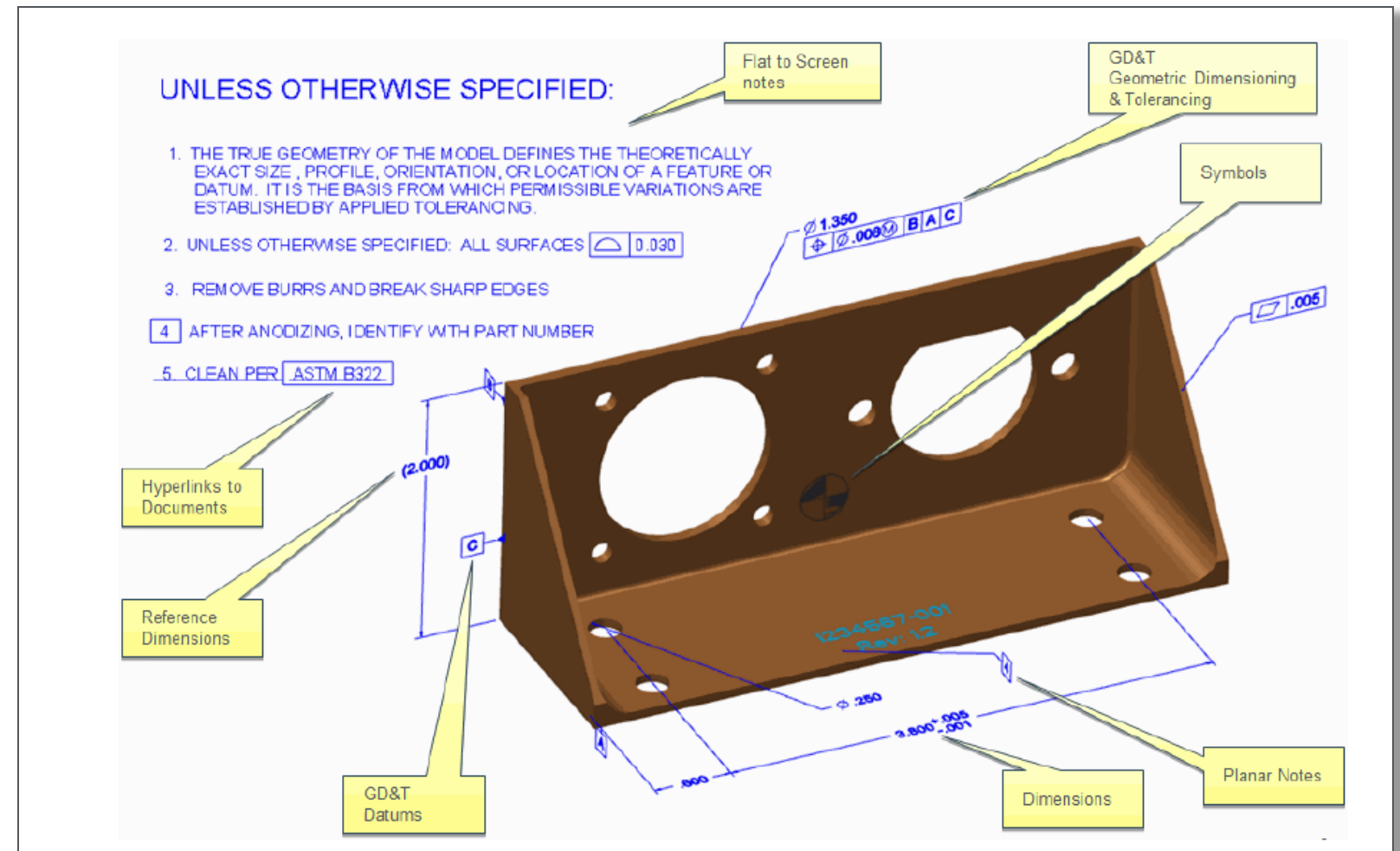
PTC University: Best Practice Academy

- **PTC is Developing a Scalable Best Practice Academy Offering**

- ILT Course (Introduction to MBD with PTC Creo Parametric 2.0)
- MBD Workshop – Preparation, Schema, & Start Part Development
- Web Based Training

- **Provide Options for:**

- Number of Live Participants:
 - Instructor Led Training
 - Workshop & Mentoring
- MBD eLearning Content
 - Included for Live Participants
 - Annual Subscriptions
 - Possible Additional Users



<http://portal.ptcuser.org/>

- Deeper level of participation
 - Direct interaction with PTC Product Managers, and other key PTC personnel
 - Influence PTC software plans and specifications
 - Evaluate software before the F000 release
 - Regular information exchange with other Technical Committee members
- Face to face meetings twice per year
 - Following PTC Live event in June
 - At PTC Headquarters in January
- Conference calls / webcasts
- Formal process for joining the TC



<https://www.ptcusercommunity.com/groups/model-based-enterprise-mbe/overview>

- Online web-based community platform
- Share Experiences:
 - Discussions
 - Blog posts
 - Videos
 - Ask questions
 - Create polls
- Open Group:
 - Anyone on the PTC community can join and participate

The screenshot displays the PTC Community website interface. At the top, the 'PTC® Community' logo is on the left, and the 'PTC® | PTC user' logo is on the right. Below the header is a navigation bar with tabs for 'PTC Creo', 'PTC Mathcad', 'PTC Windchill', 'PTC Integrity', 'PTC Arbortext', 'Academic', 'PTC Live', and 'Browse'. A search bar is located on the right side of the navigation bar. The main content area is titled 'All Places > Model Based Enterprise (MBE)'. The group header features a blue background with a technical drawing of a mechanical part on the left. The title 'Model Based Enterprise (MBE)' is centered, with a 'Following in 1 stream' button on the right. Below the title are navigation tabs: 'Overview', 'All Content', 'Discussions', 'People', and 'Reports'. On the right side of the header are 'Actions', 'About', 'Share', and 'Manage' options. The main content area is divided into three columns. The left column, 'Group Overview', shows a technical drawing of a mechanical part with dimensions: $10X \pm 0.03$, 20 , and $0.02 A$. Below the drawing is a description: 'This is a group with open membership and is intended for sharing information about Model Based Enterprise (MBE) and Model Based Definition (MBD). Owned by: Raphael Nascimento'. The middle column, 'Ask Model Based Enterprise (MBE)', contains a text input field labeled 'Type your question' and an 'Ask it' button. Below this is a section for 'Recent Activity' with the text 'No recent activity'. The right column, 'Actions', lists various options: 'Start a discussion', 'Write a document', 'Upload a file', 'Write a blog post', 'Create a poll', 'Create a status update', 'Invite people to join this group', 'Group feeds', 'Create a product idea', and 'Create a video'. A 'Filter' dropdown is located below the 'Recent Activity' section. At the bottom right, there is a 'Popular Content' section.

Raphael Nascimento – PTC Creo Product Manager

- Email:
 - rnascimento@ptc.com
- PTC Community Profile:
 - <https://www.ptcusercommunity.com/people/RaphaelCNascimento>
- LinkedIn:
 - <https://www.linkedin.com/in/raphaelcnascimento>



- Your feedback is valuable
- Don't miss out on the chance to provide your feedback
- Gain a chance to win an instant prize!
- Complete your session evaluation now

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