PTC® Live Global

PTC Creo Update

PTC Creo 2.0 Flexible Modeling
PTC Creo 3.0 Outlook

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Director PTC Creo Europe

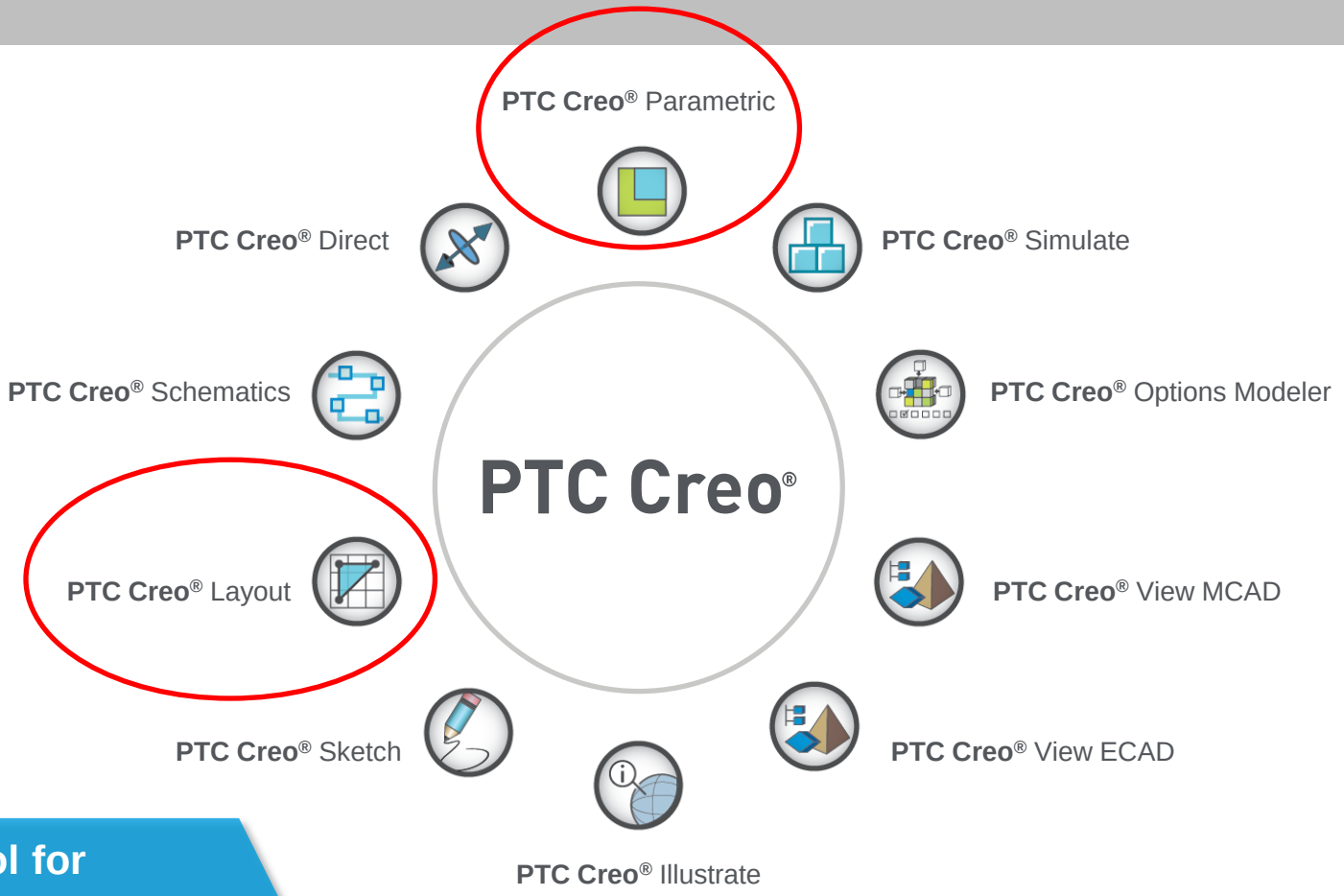
PTC User Sweden
Gothenburg , May 8th 2014

PTC Creo 2.0 Highlights

Flexible Modeling
Conceptual Design

What is PTC Creo?

a **scalable** suite of product design software

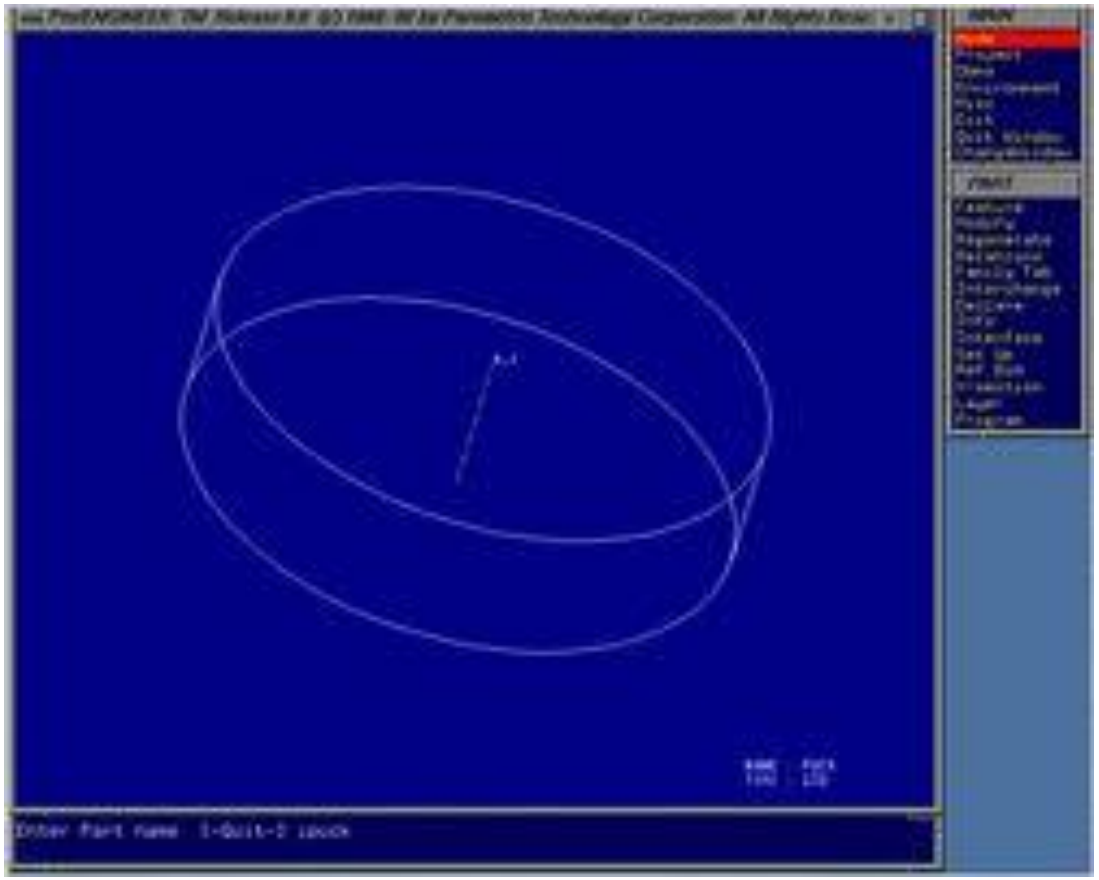


The right tool for the right job

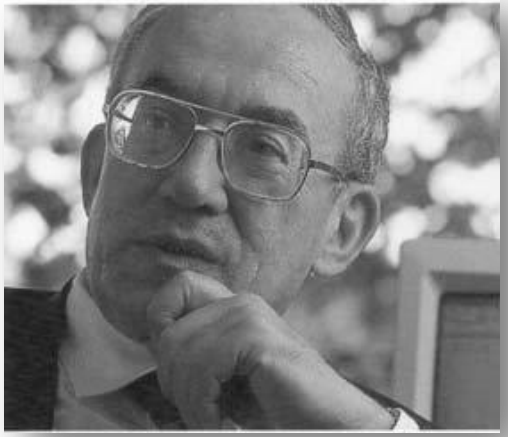
Support for both simple and complex design

Parametric Design - The CAD Revolution

1988: Pro/ENGINEER - Version 1

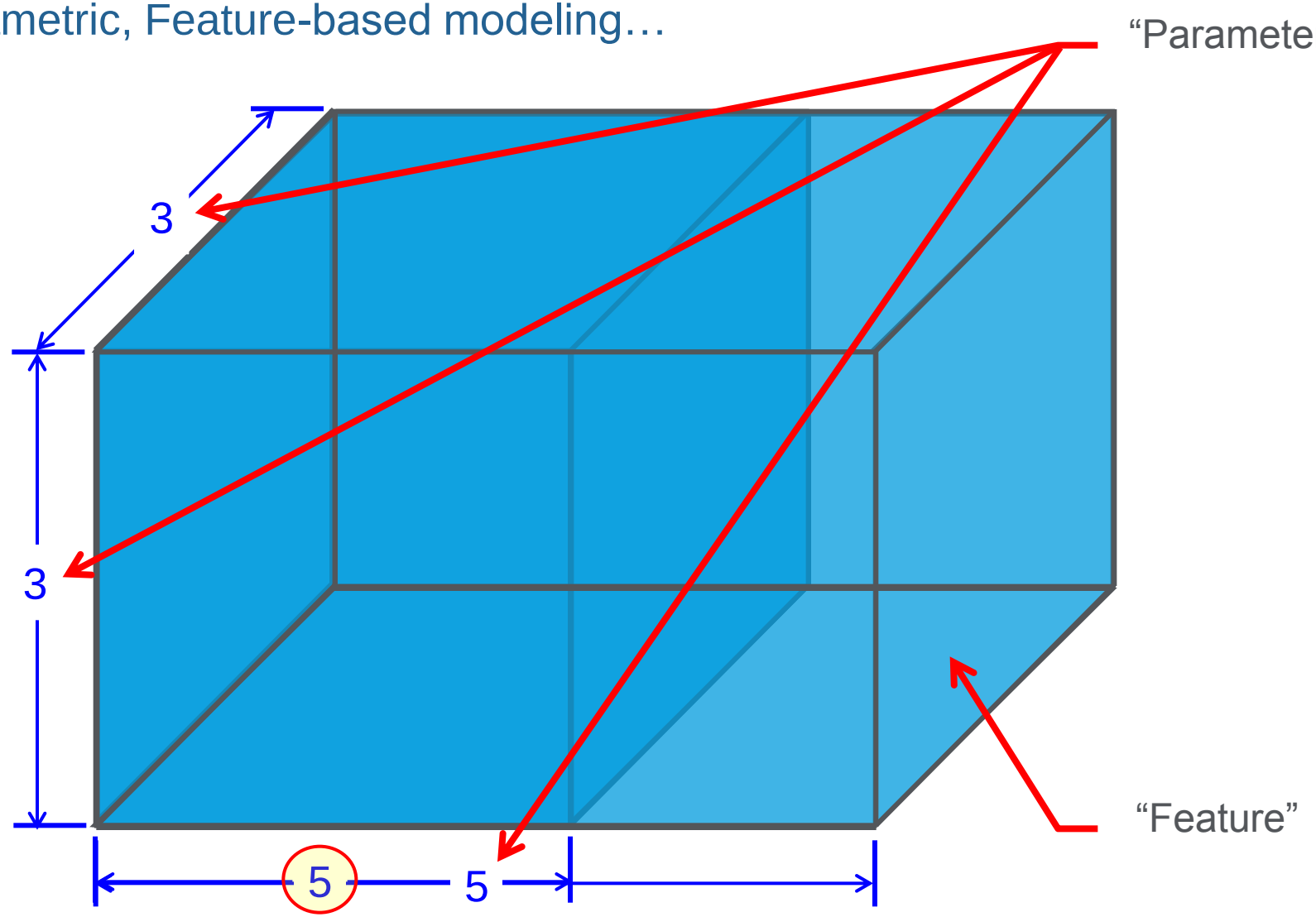


Samuel Geisberg



Samuel P. Geisberg's Vision for Parametric, Feature-based Design

- Parametric, Feature-based modeling…



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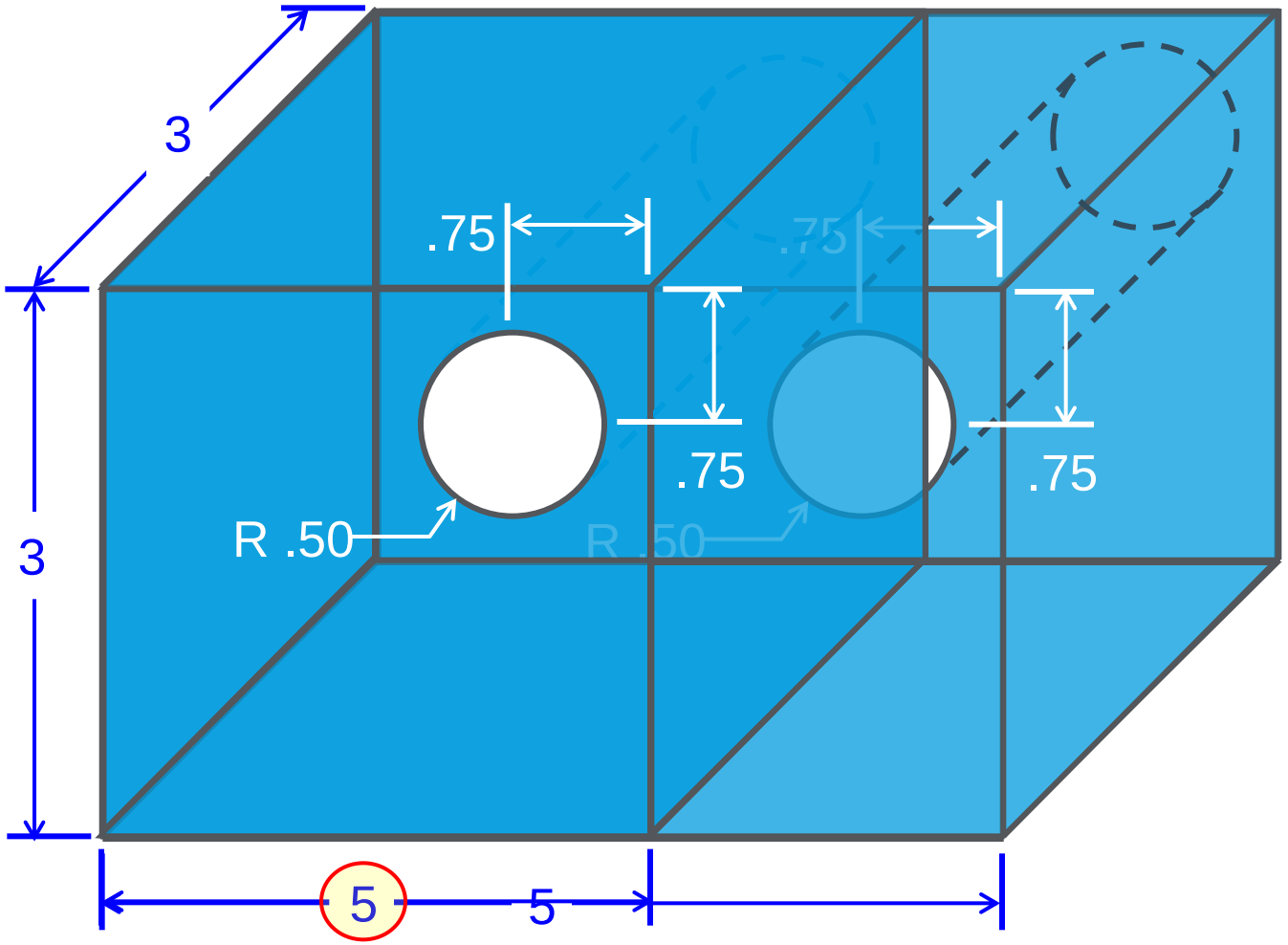
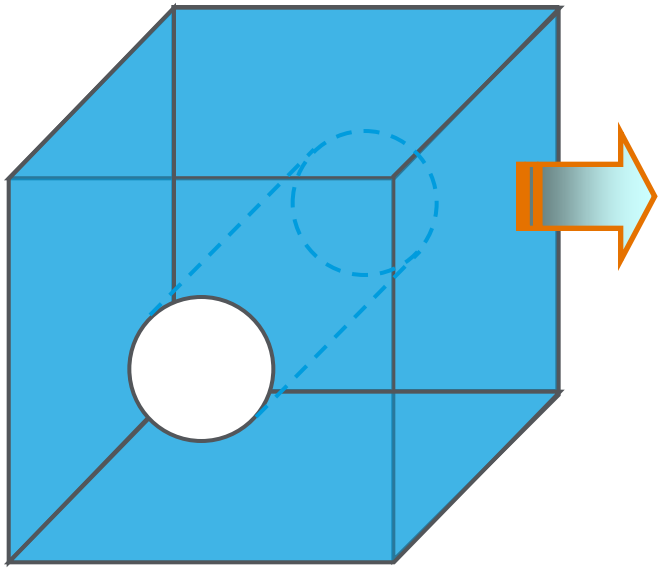
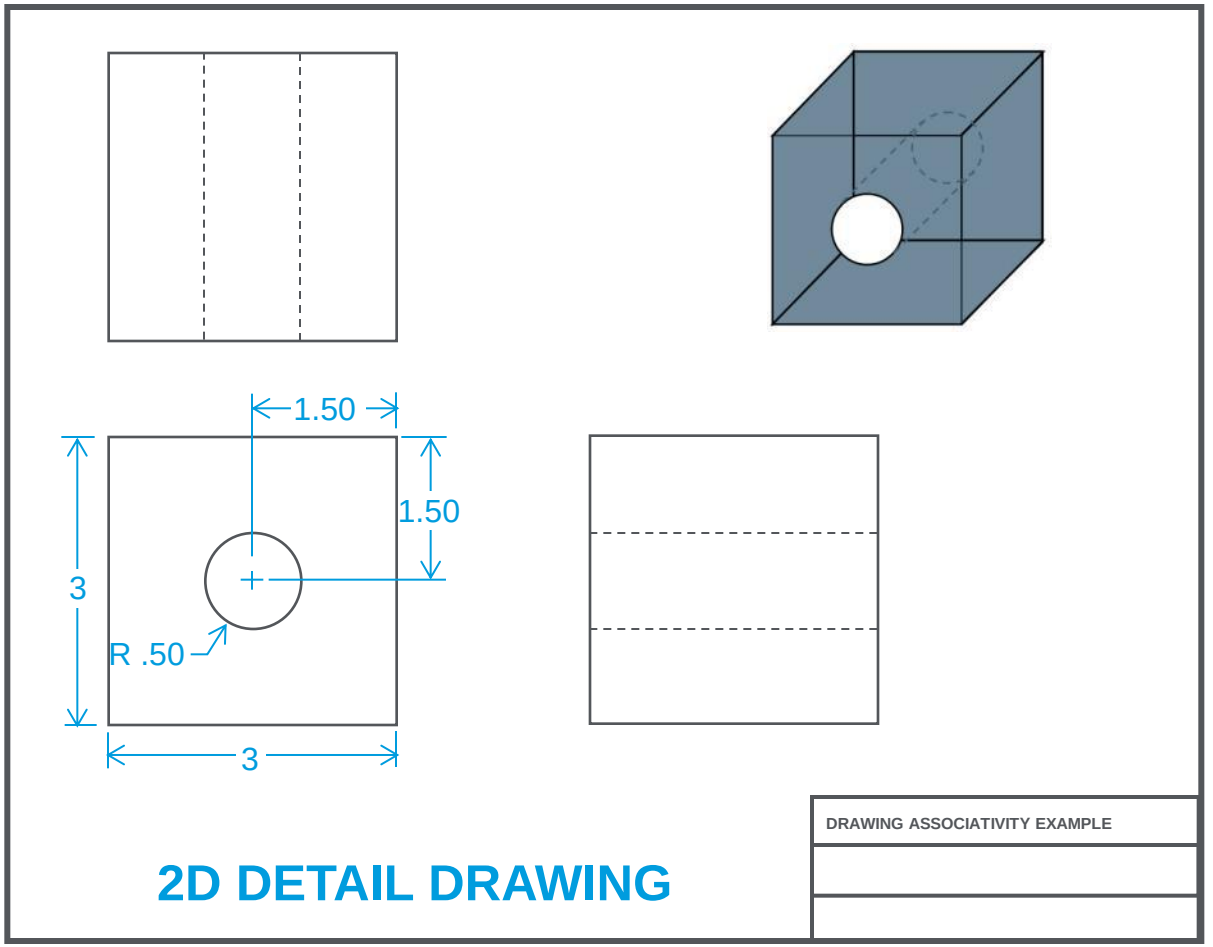


Samuel P. Geisberg's Vision of Associativity

- Associativity and change propagation…



3D MODEL



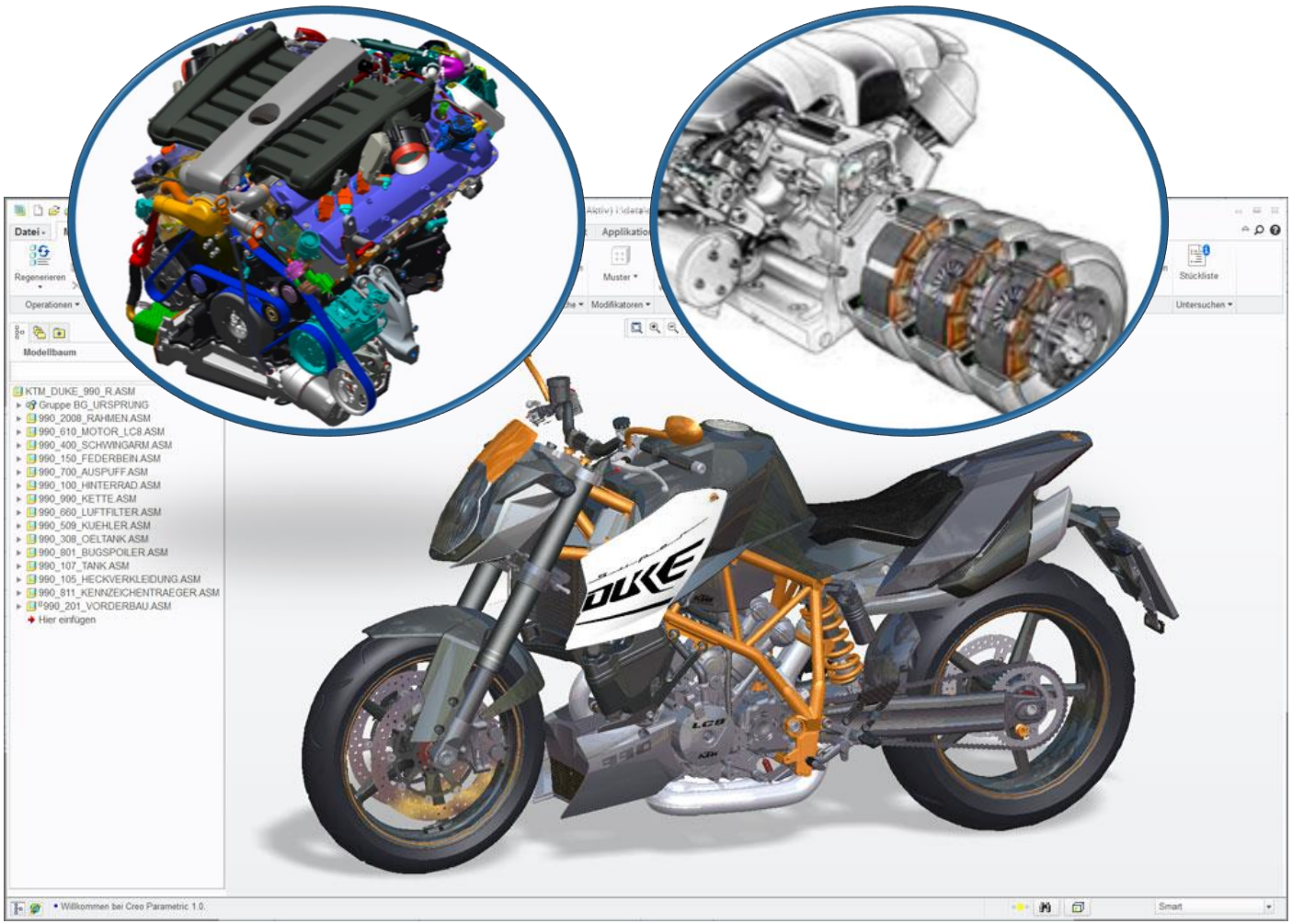
2D DETAIL DRAWING

PTC Creo – Next Generation Hybrid CAD

2011 PTC Creo

Parametric Modeling

Direct Modeling

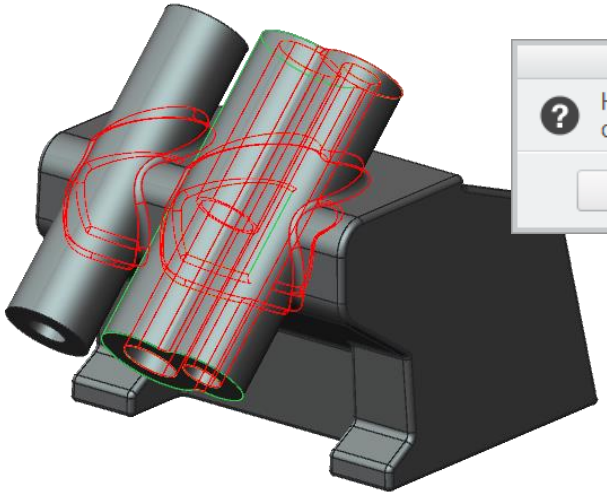


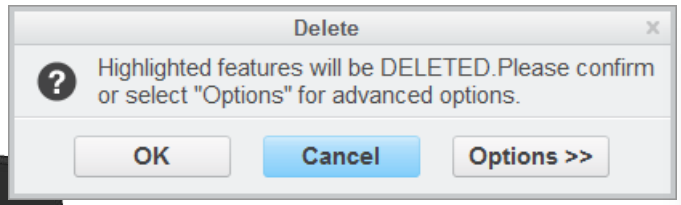
Jim Heppelmann

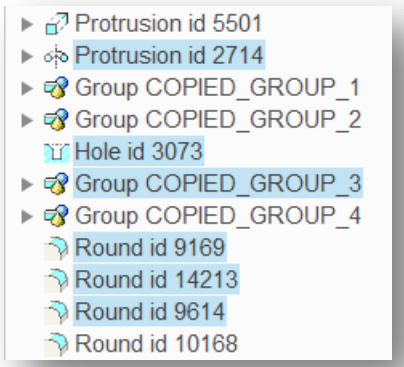
Business Challenge: Rapid Change

Flexibility:

difficult process to understand design intent and make changes to parametric geometry



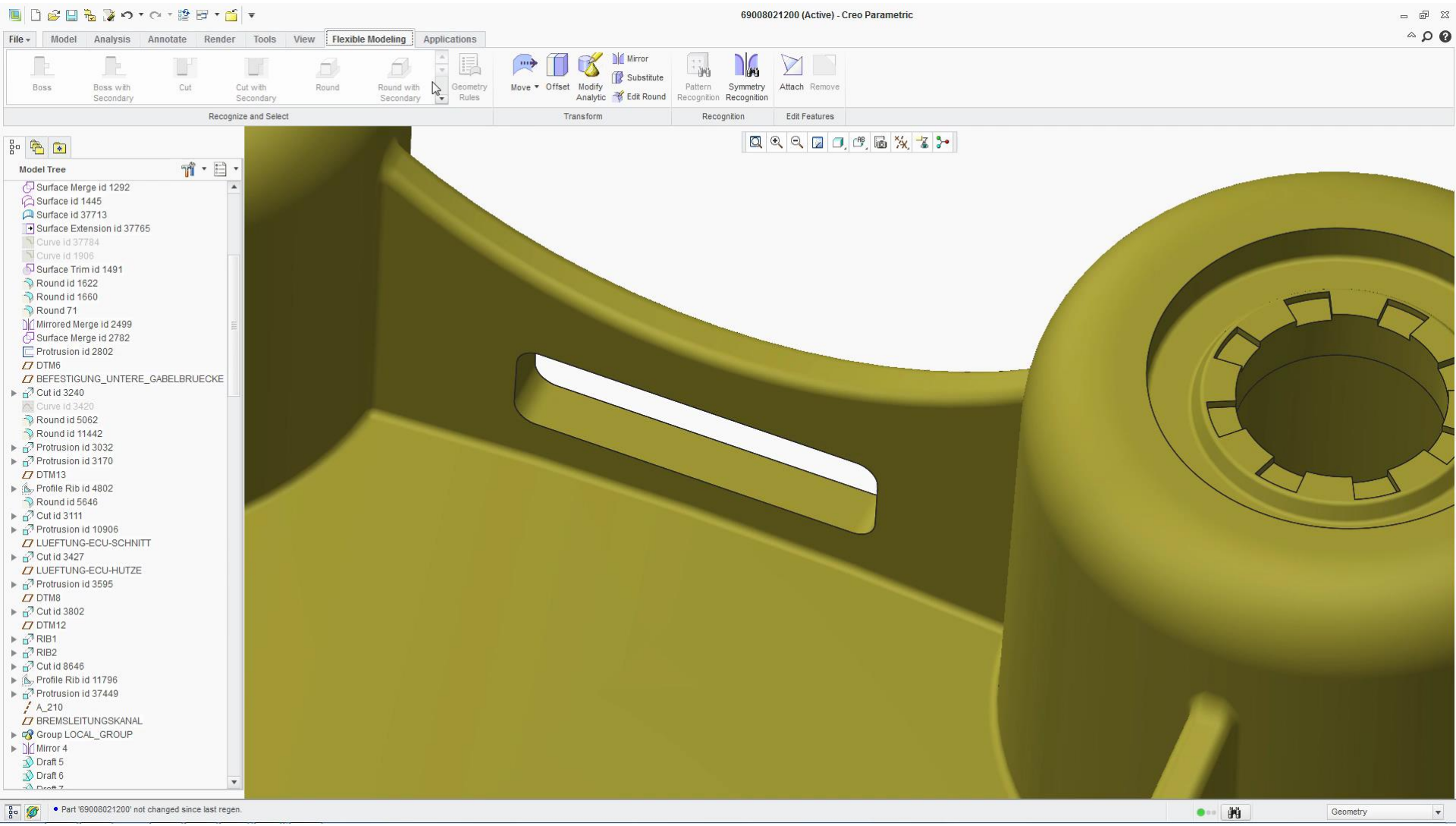




Customers require the flexibility to override design intent, constraints and relations

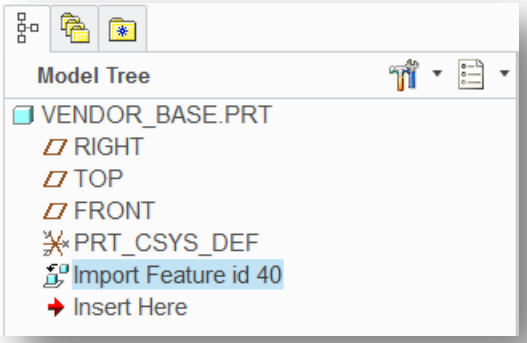
Inability to implement change limits creativity and innovation

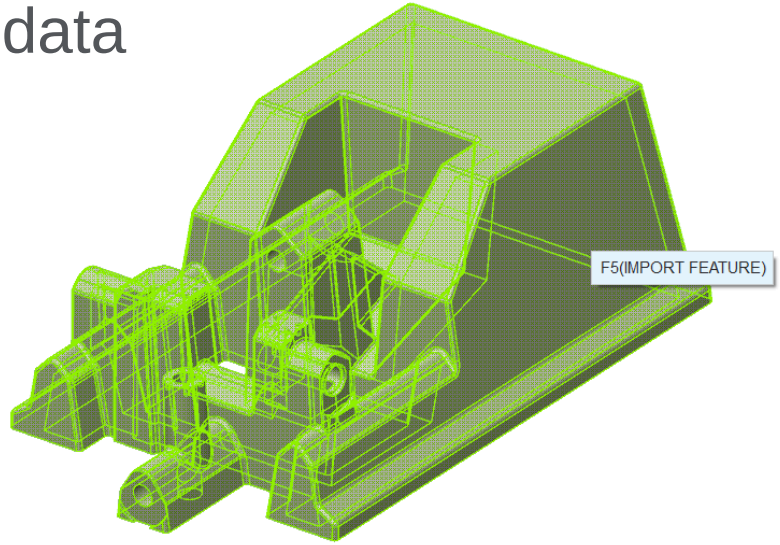
Business Challenge: Rapid Change



Flexibility:

difficult process to work with and make changes to imported and non-native CAD data

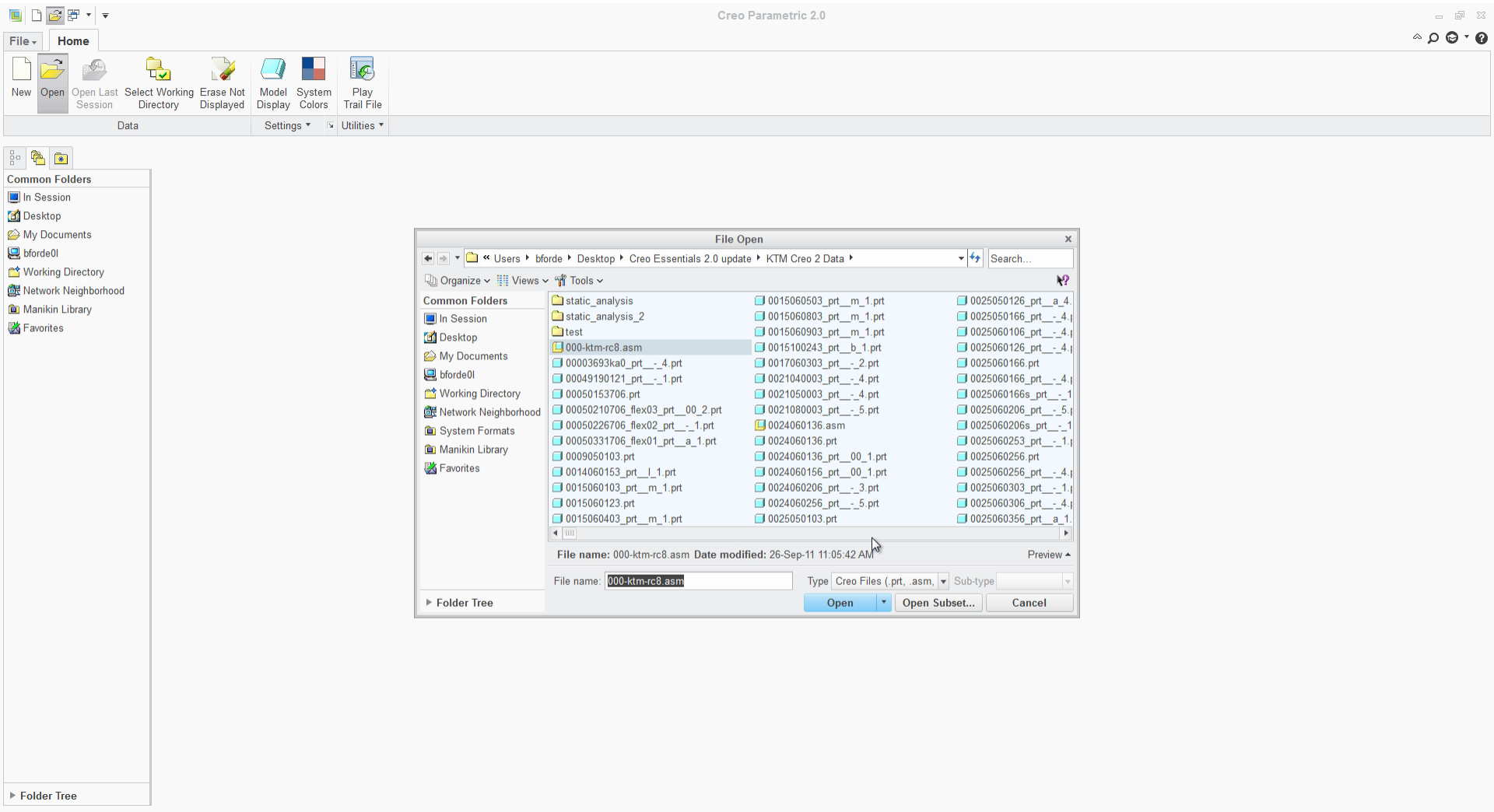




Customers require flexible modeling to work with data from any CAD source

Inability to support a heterogeneous CAD environment limits product development efficiency and productivity

Business Challenge: Multi-CAD Design/Rapid Change



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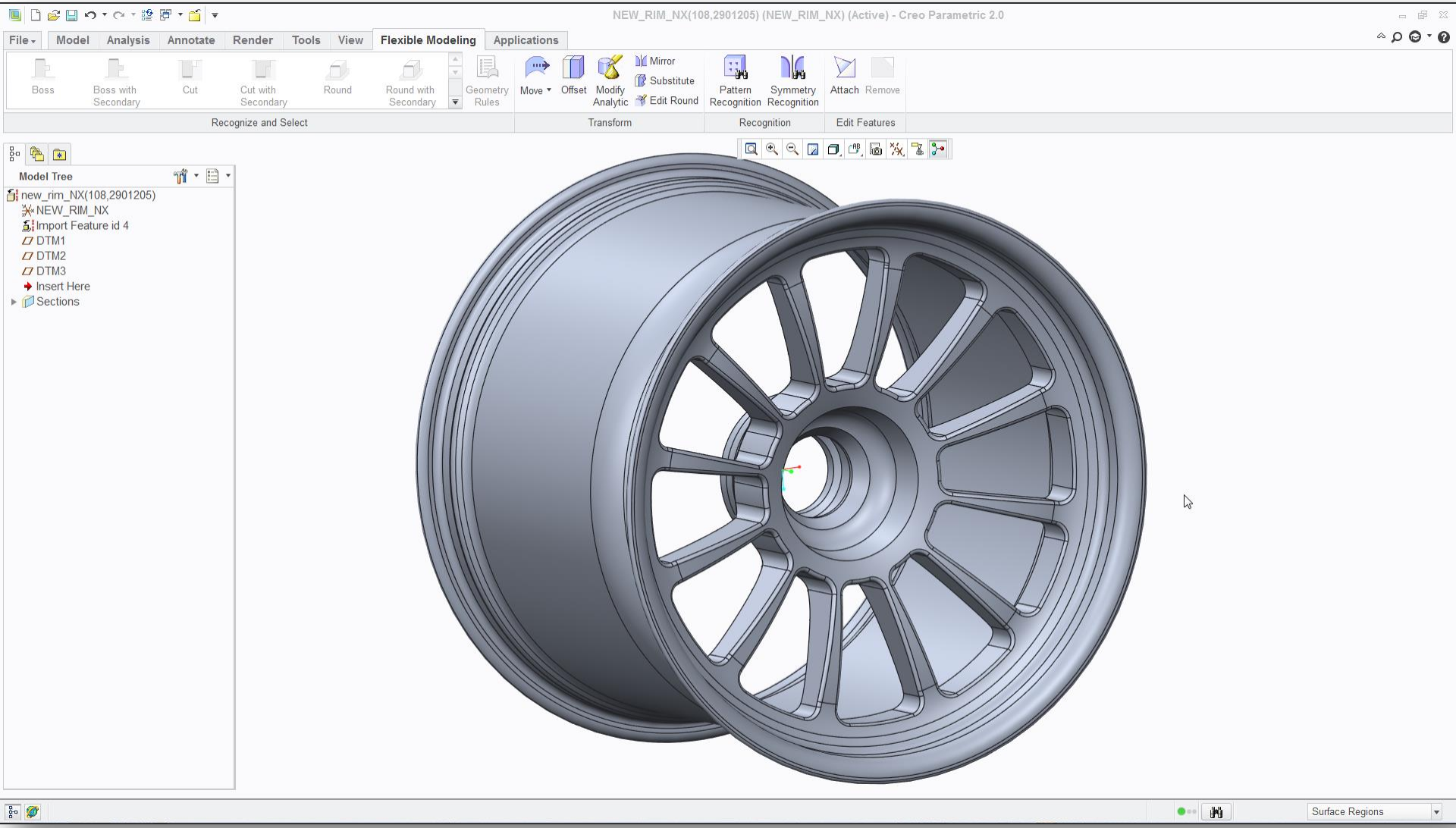


It's All About Use Cases!

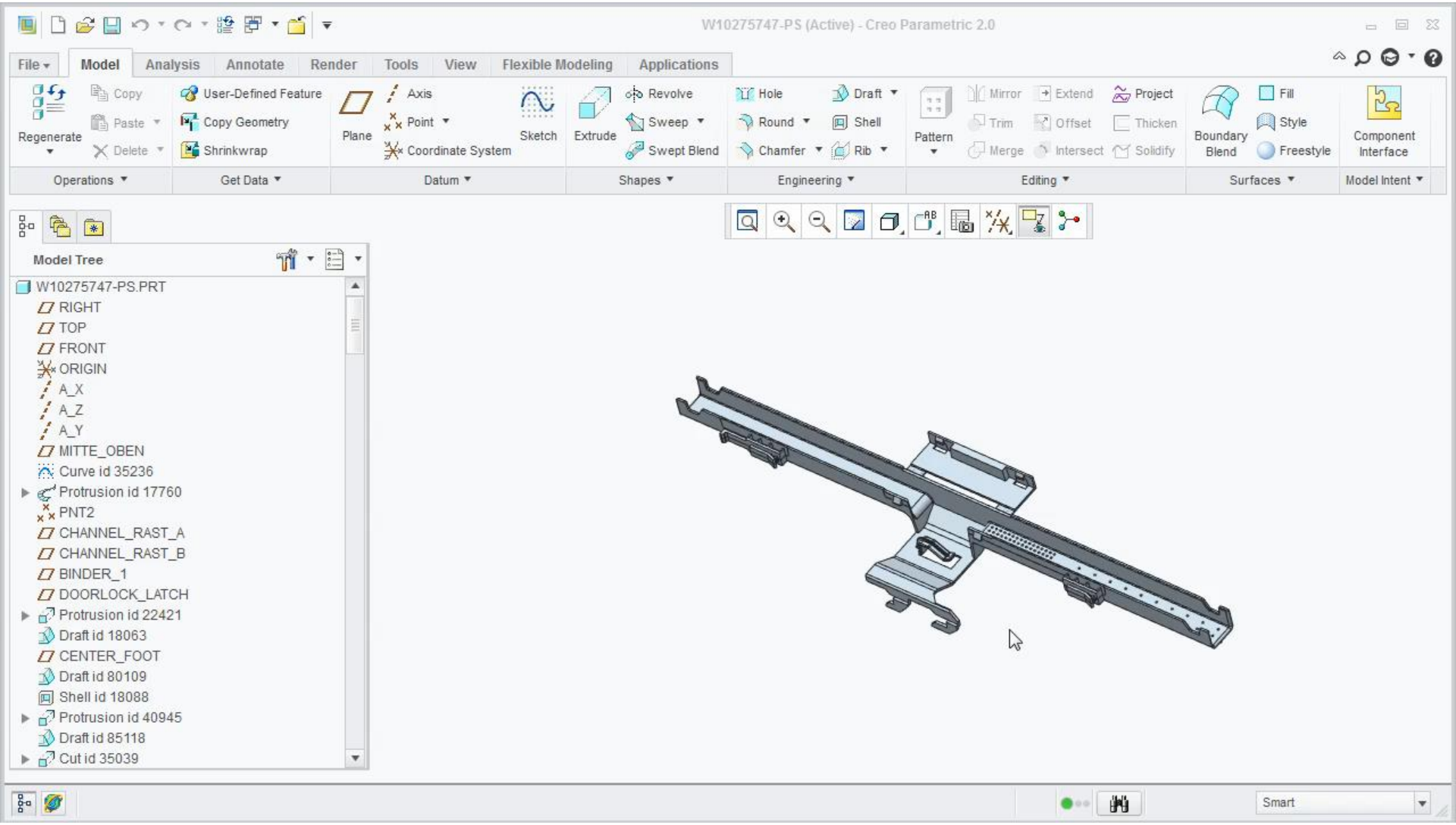
1. For Late Stage Design Changes or Rapid Change…
   - Real examples of truly obsolete design intent can be found easily in the real world…leverage them in your discussions
   - Real examples of rapid change for concept design are everywhere – FMX enables this use case in a real, compelling, unique way!

2. For Multi-CAD
   - FMX offers a unique re-parameterization and even design intelligence recognition that can be intelligently linked back to the original design via ATB.

3. For Simplification for CAE…
   - FMX offers a unique opportunity to *intelligently* connect a simplified model and the design model.
   - Our remove tool has been benchmarked against NX's and found to be superior – not by us but by Toyota.
   - Connection with inheritance technology or even ATB (to non-native CAD) makes our story unique

Simplification for CAE - Defeaturing Models

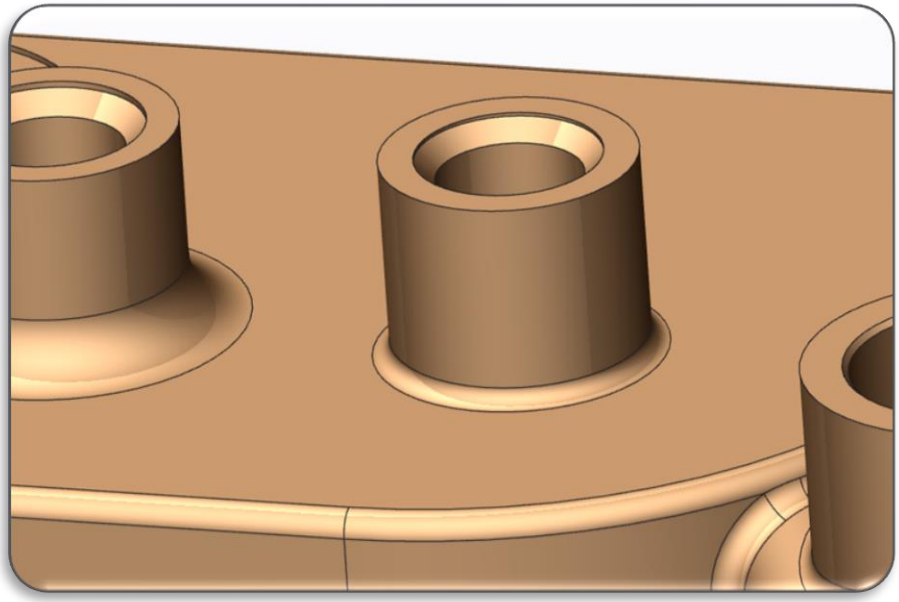
Demo in PTC Creo Flex Modeling Extension

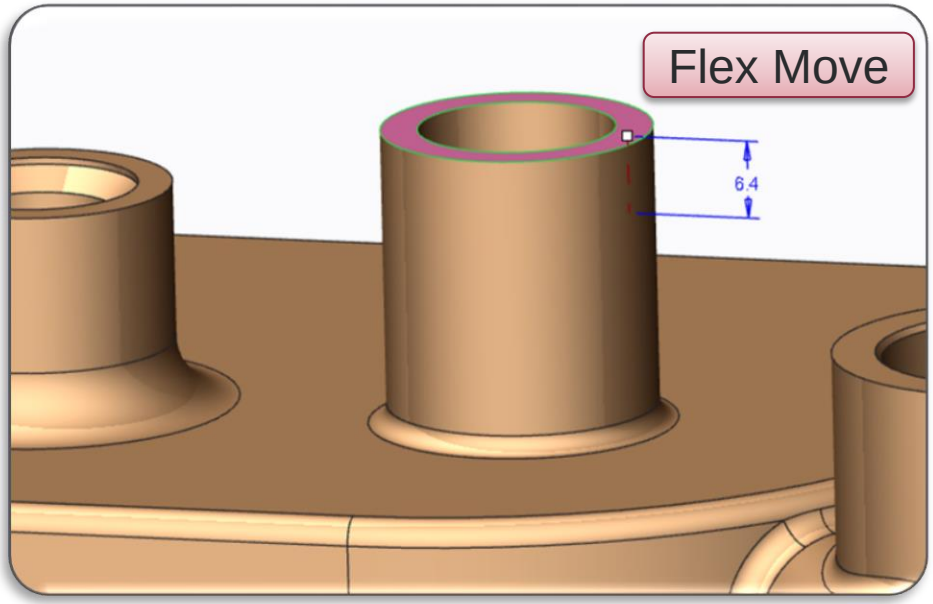


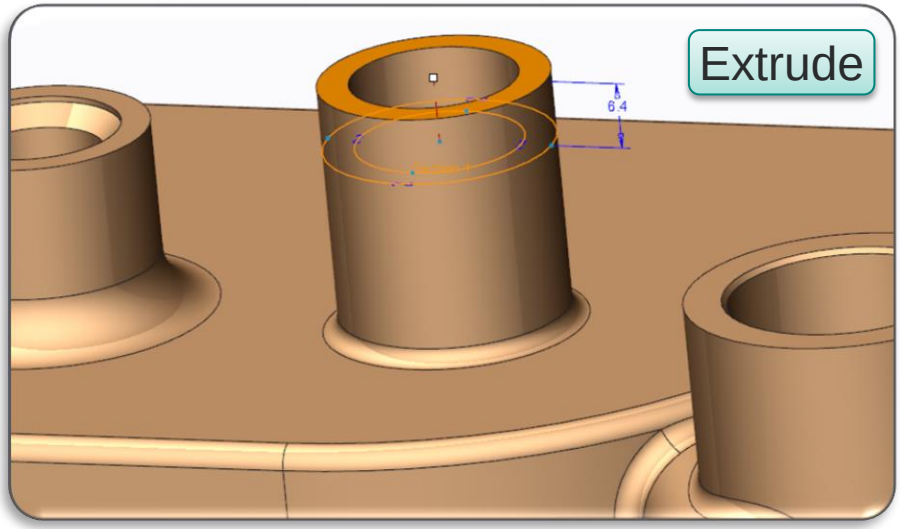
But, What About…

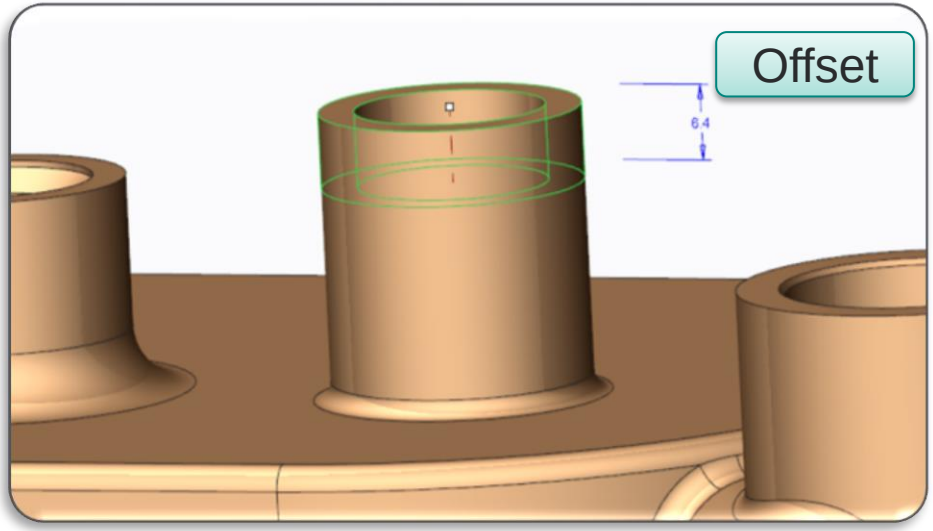
…using FMX – features as “regular” features

Flex Move…?

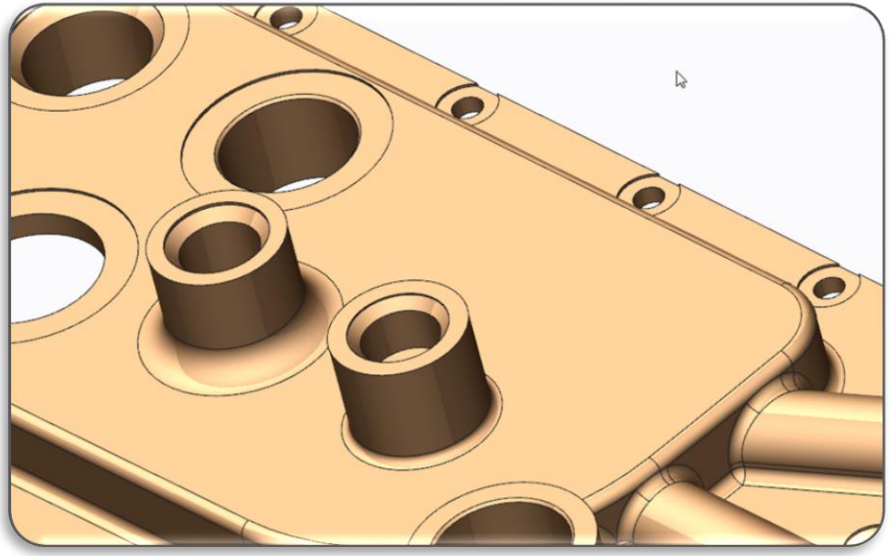


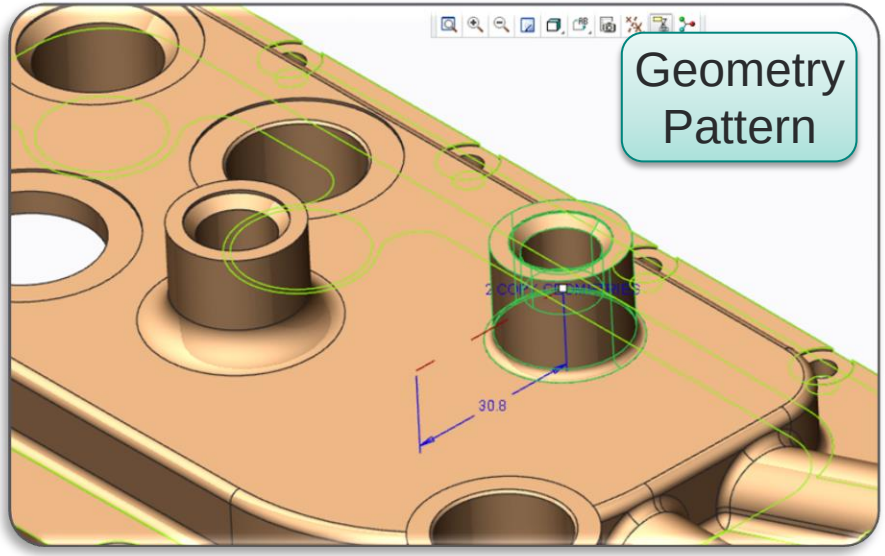


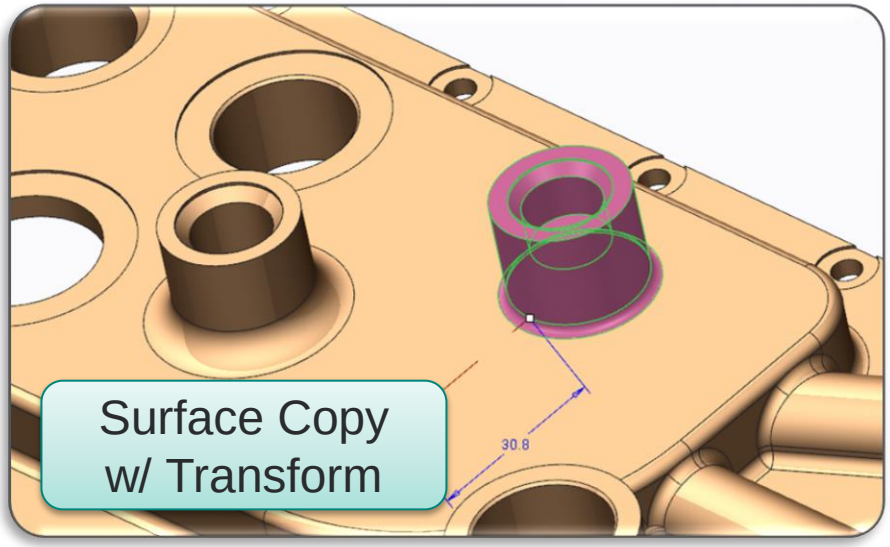


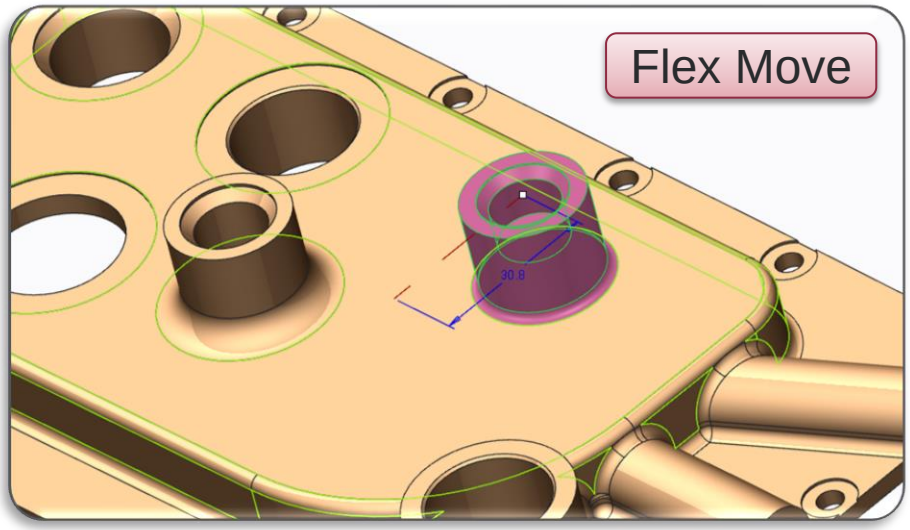


Flex Move?









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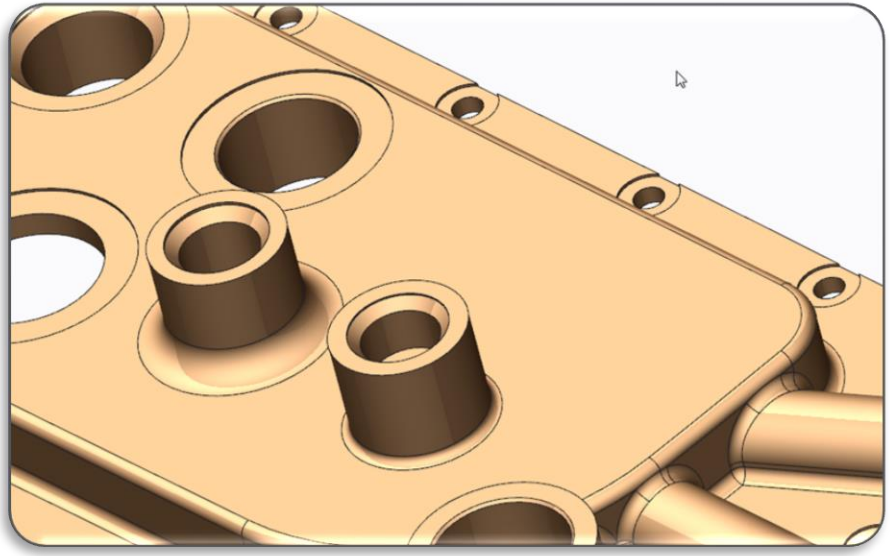
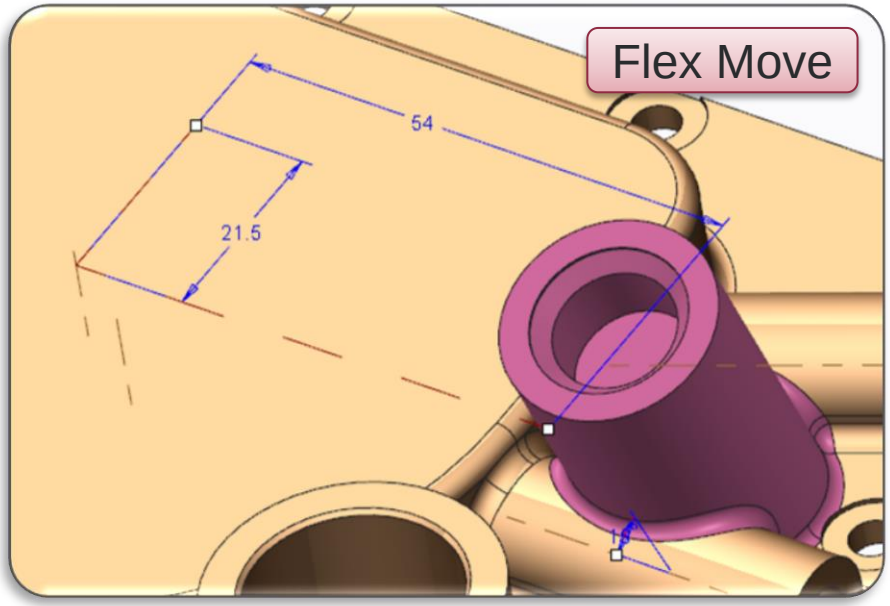
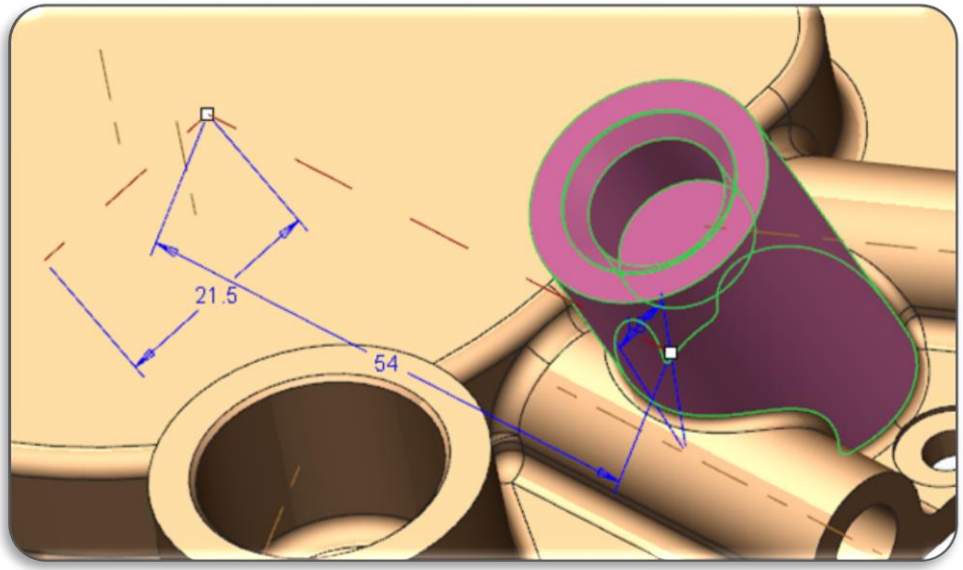
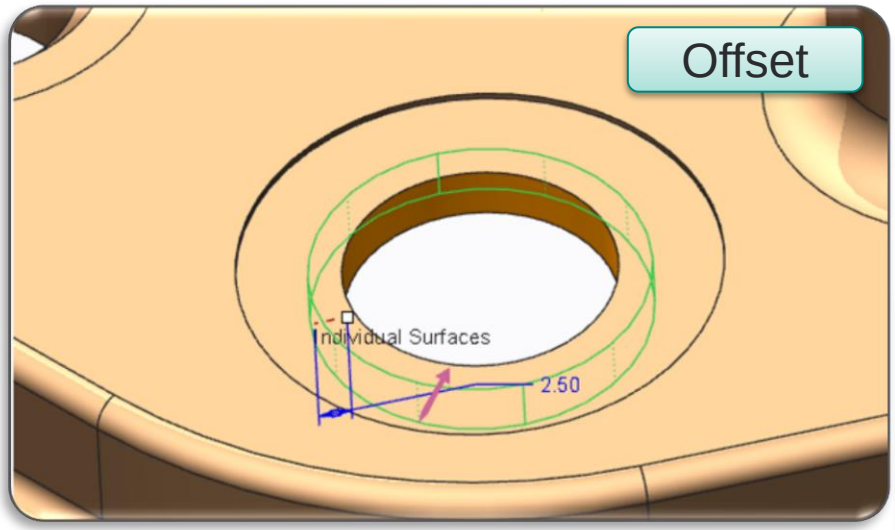


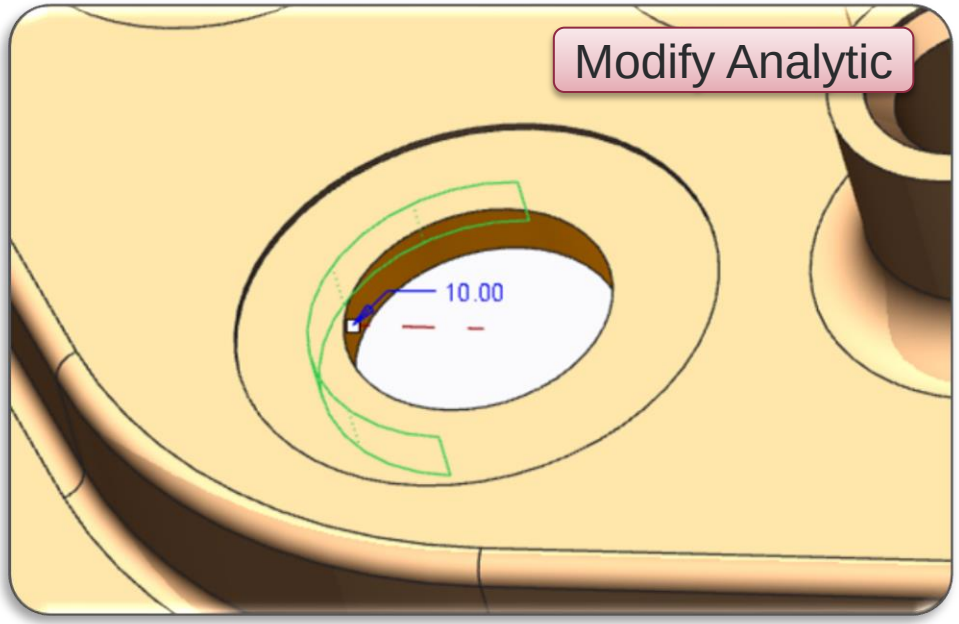


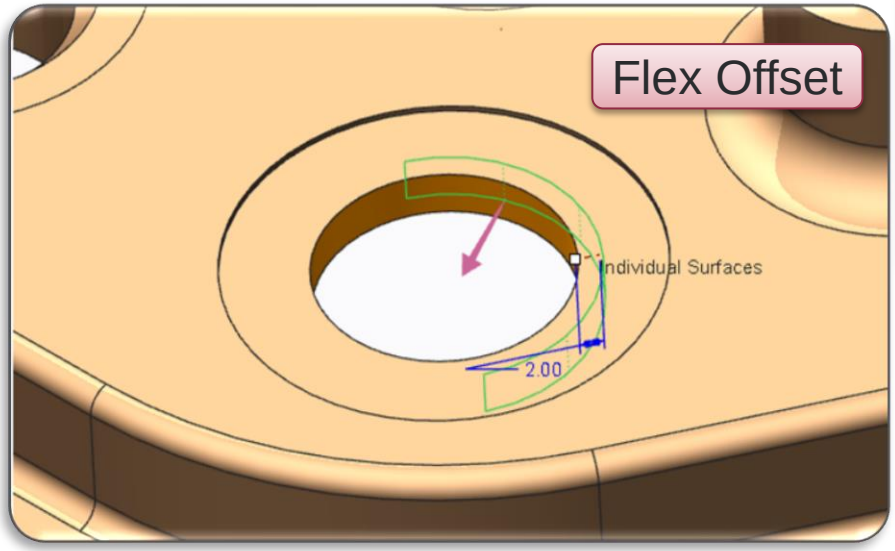
Copy, Transform, Extend, Trim, Solidify, Add Round

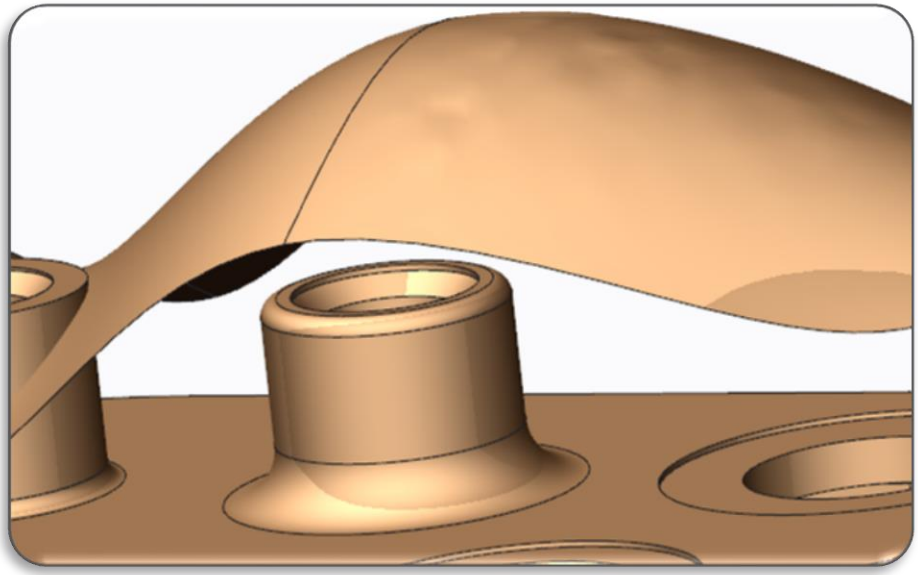


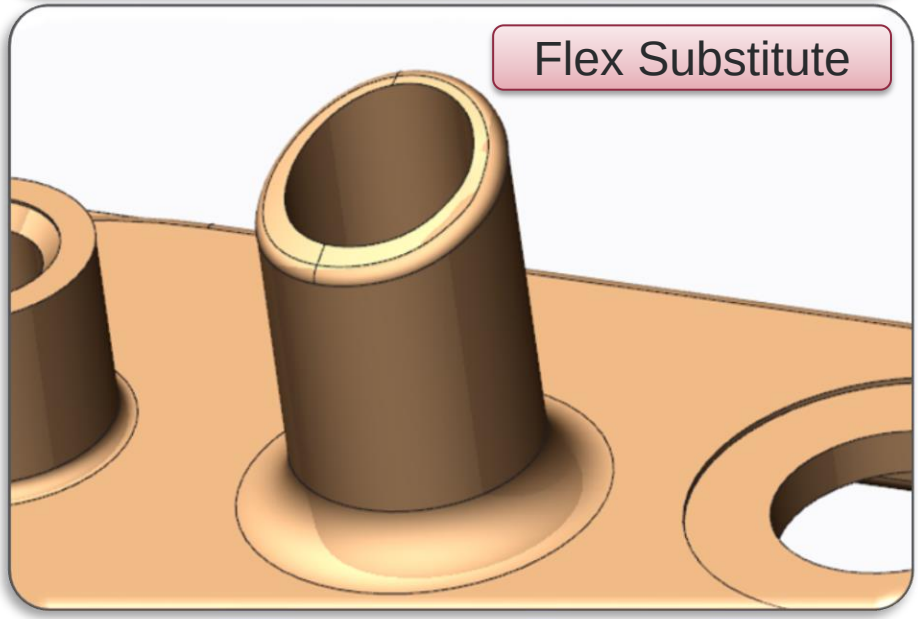
Offset?



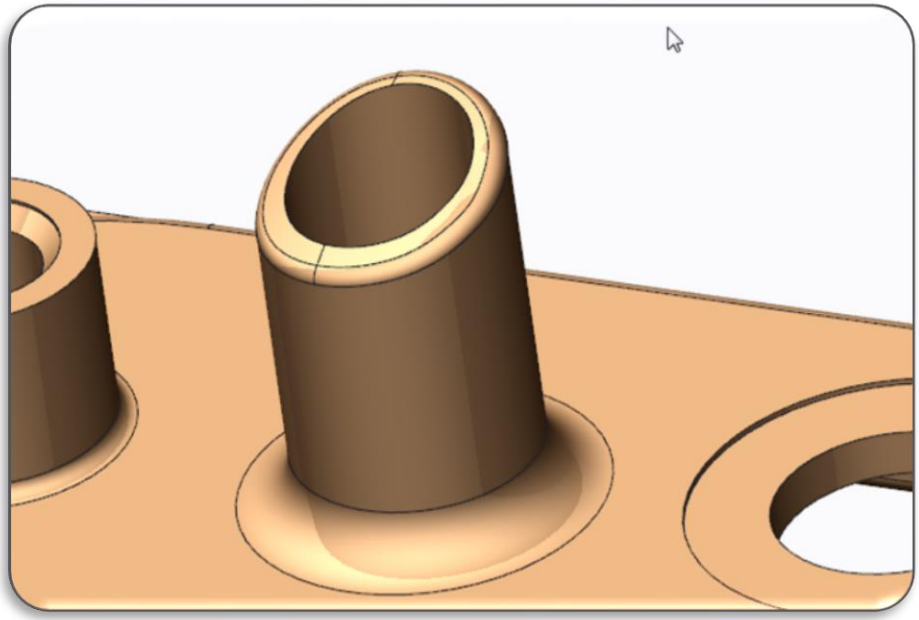






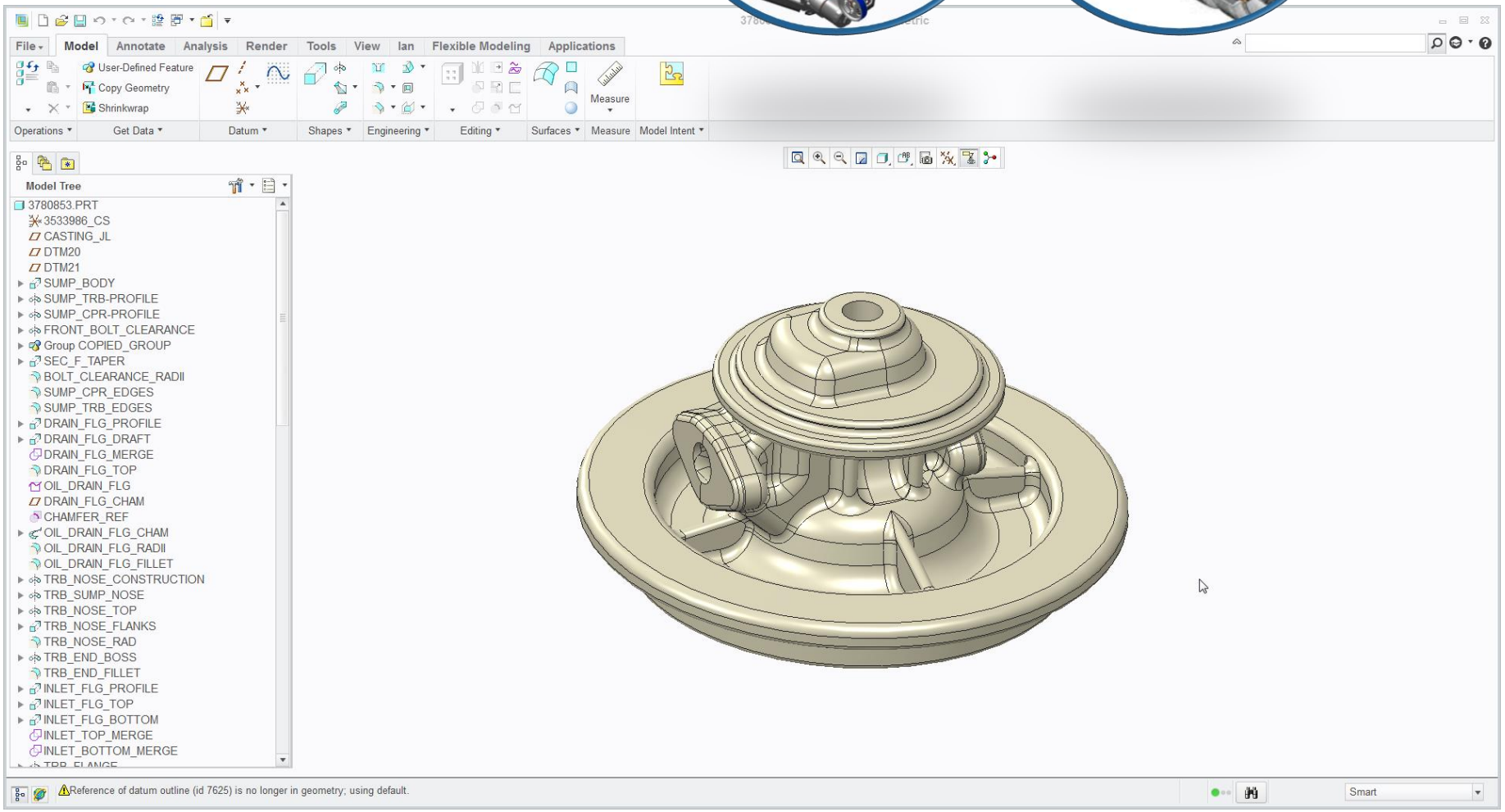


Remove, Offset w/ Substitution, Round



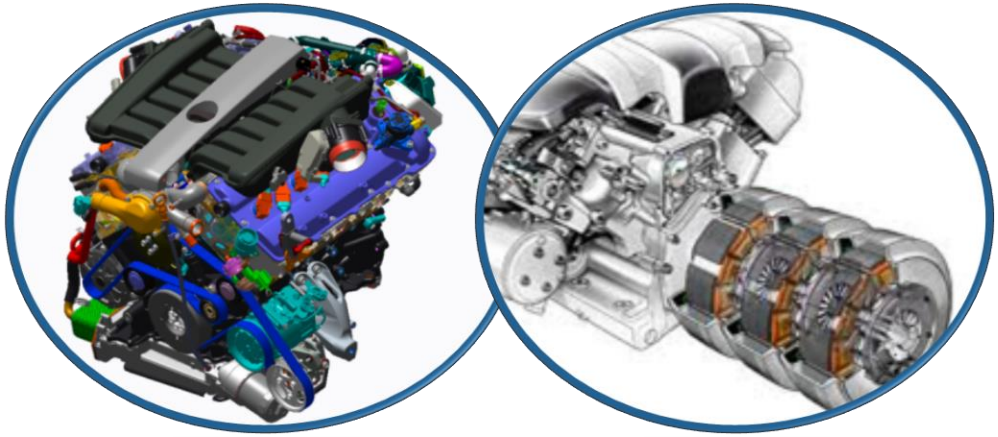
Hybrid CAD – Example #2

Rib Move



To Flex or Not to Flex…

- Remember, Flex Features they are engineered to be very robust…
  - Intelligent, regenerated, logical surface sets
  - Automatic surface extension and intersection with control
  - Automatic round removal and recreation with control
  - Automatic reference forwarding
  - Propagation through recognized patterns
- Just like any other features, Flex Modeling features can be used or abused.
- Use cases that will show real value…



Truly Obsolete Design Intent – Examples

PTC®

Impressive Results…

Scenario	Creo2 Time	Conventional Time	Comments
New inlet flange on turbine housing	4 minutes	15 minutes	Flange geometry moved in both approaches in a similar length of time but much harder to fix all the round issues in std approach
Moving rib on bearing housing	3 minutes	3 minutes	Rib moved in both cases resulting in similar round fixing issues
Remove one heat shield boss on turbine housing and relocate second	5 minutes	15 minutes	Slightly longer to delete and move boss in standard approach. Much longer to repair all rounds.
Inlet modification on compressor cover	2 minutes	180 min (estimated)	Major difference because of moving the original sketch planes for the outlet connection

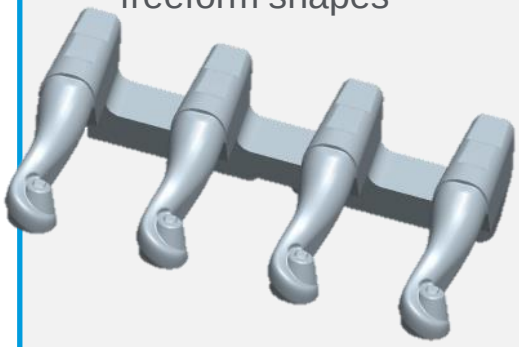
Concept Design Best Practice

PTC®

Concept Design

Aesthetic Design

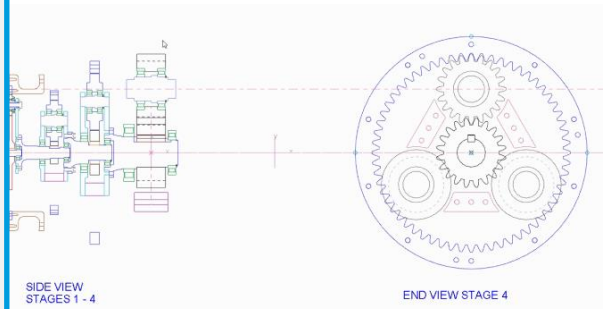
Focus on visual aspects of the design. Need to build highly pleasing freeform shapes



E.g.: Intake Manifold

2D Engineering Design

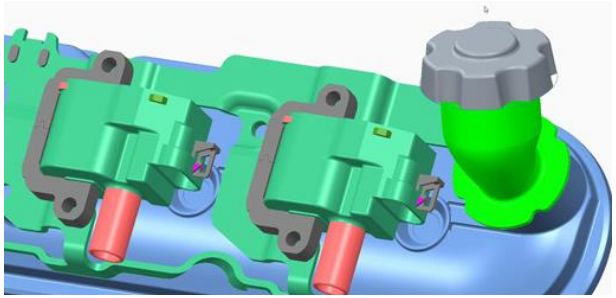
Concept design work is done in 2D before transferring to 3D



E.g.: Gearbox concept

3D Engineering Design

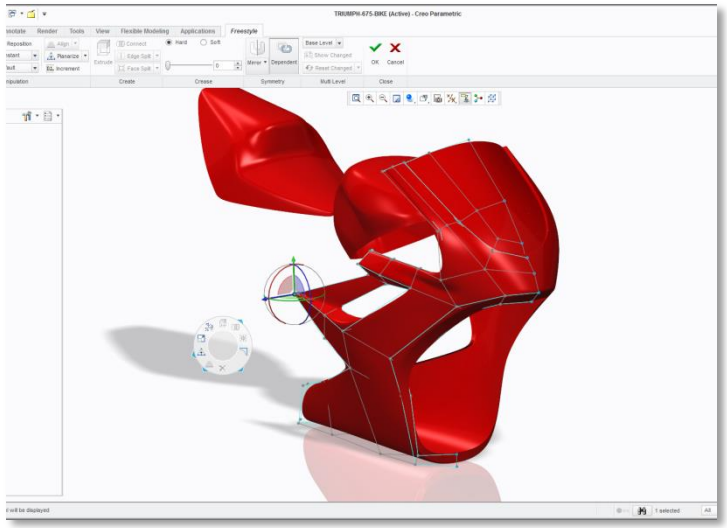
Early stage engineering concept work to rough out design ideas in 3D



Product			
	Creo Sketch	Creo Layout	Creo Direct
	Freestyle		Flexible Modeling
	ISDX		

Stylized Design: Intuitive Freestyle Modeling

10x times faster than in Pro/ENGINEER

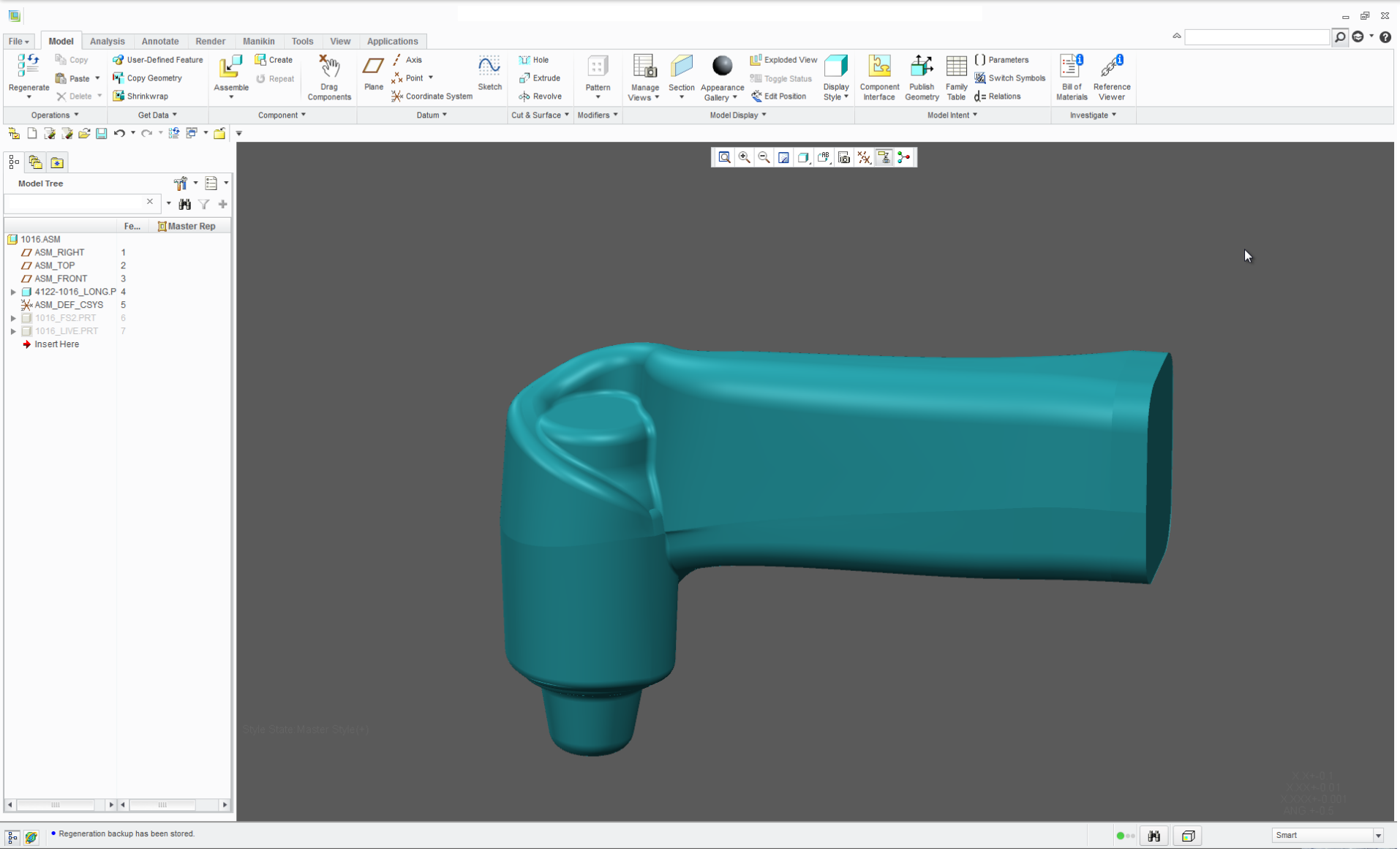


- Quickly create freeform shapes and surfaces
- Leverage sub-divisional modeling
- Deliver high-quality engineering surfaces
- Speed concept design for simple or complex shapes

"*The Freestyle capabilities in PTC Creo Parametric was one of the many product announcements that struck me as fascinating. Just the idea of having incredible ID software as a freebie within PTC Creo was one I wanted to explore further. We recommend that* ***users who do any industrial design begin using these capabilities in PTC Creo right away***."

– Ray Kurland
Technicom

Stylized Design: Intake Manifold



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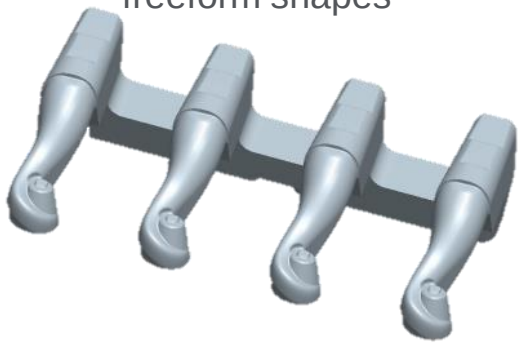

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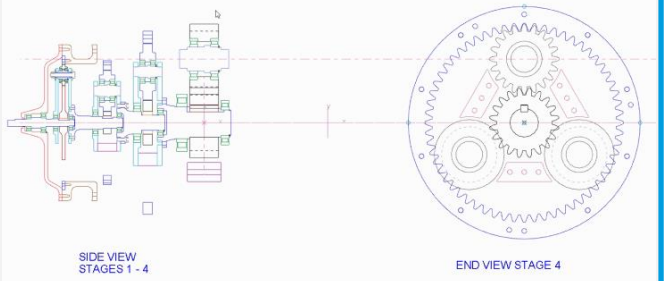

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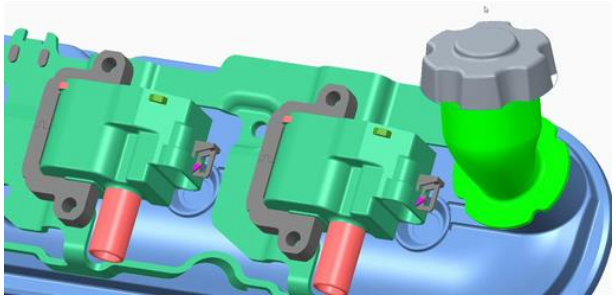
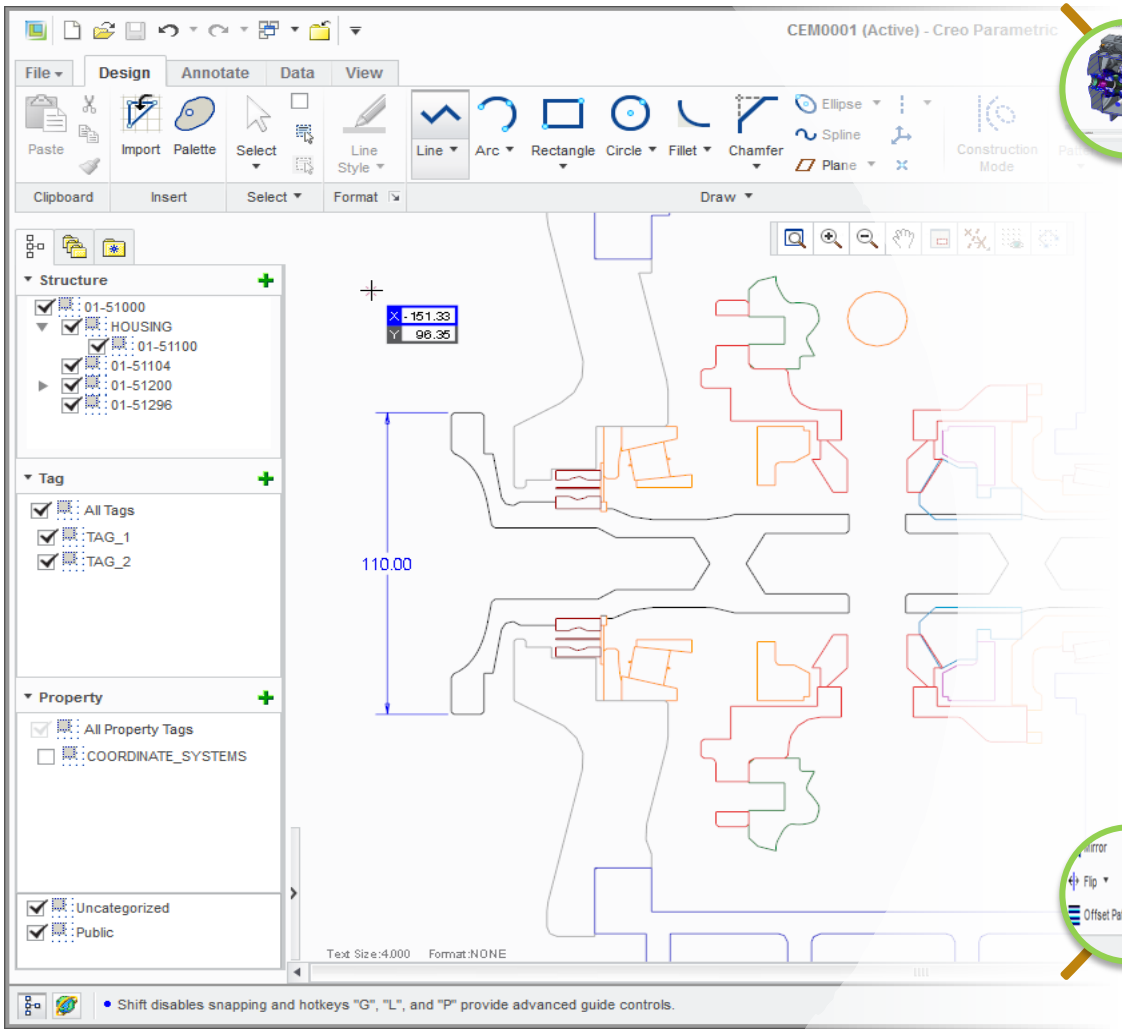
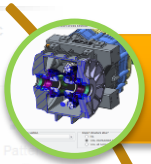


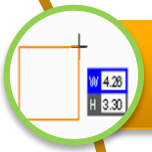
Product			
	Creo Sketch	Creo Layout	Creo Direct
	Freestyle		Flexible Modeling
	ISDX		

PTC Creo Layout – 2D Concept Design Capabilities



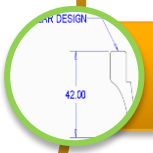


Data Importing



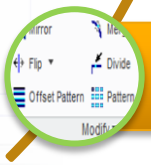
2D Sketching

Data Organization



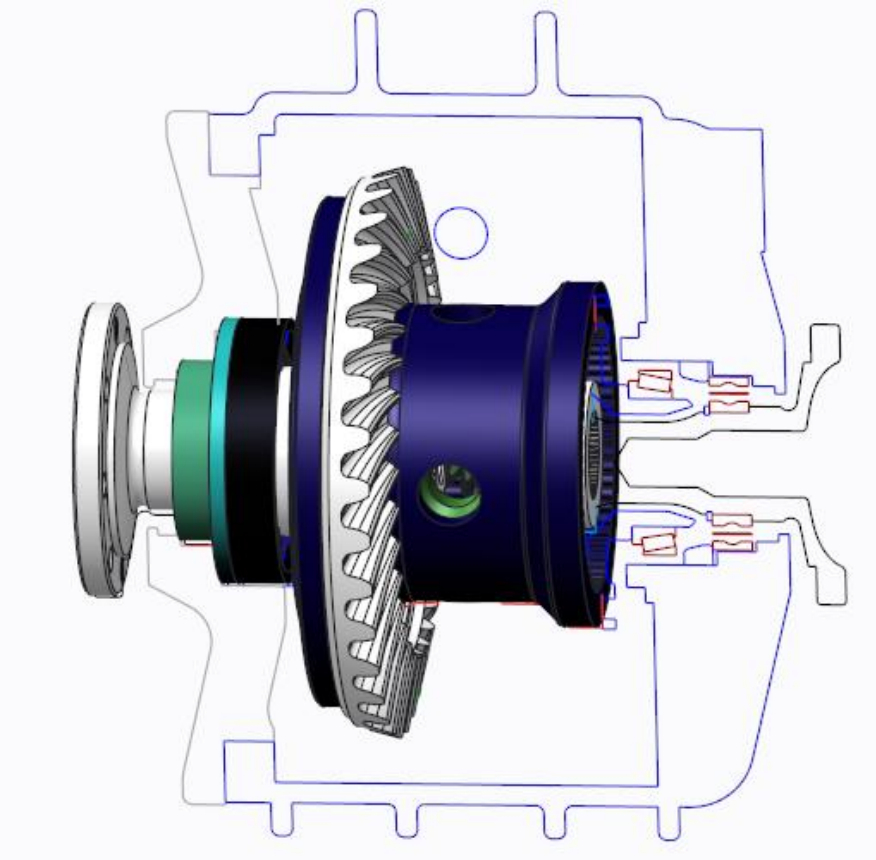
Detailing

View Management

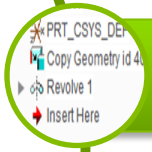


Geometry Manipulation

PTC Creo Layout – 3D Integration Capabilities



Direct Assembly



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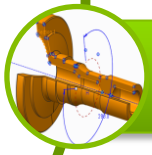
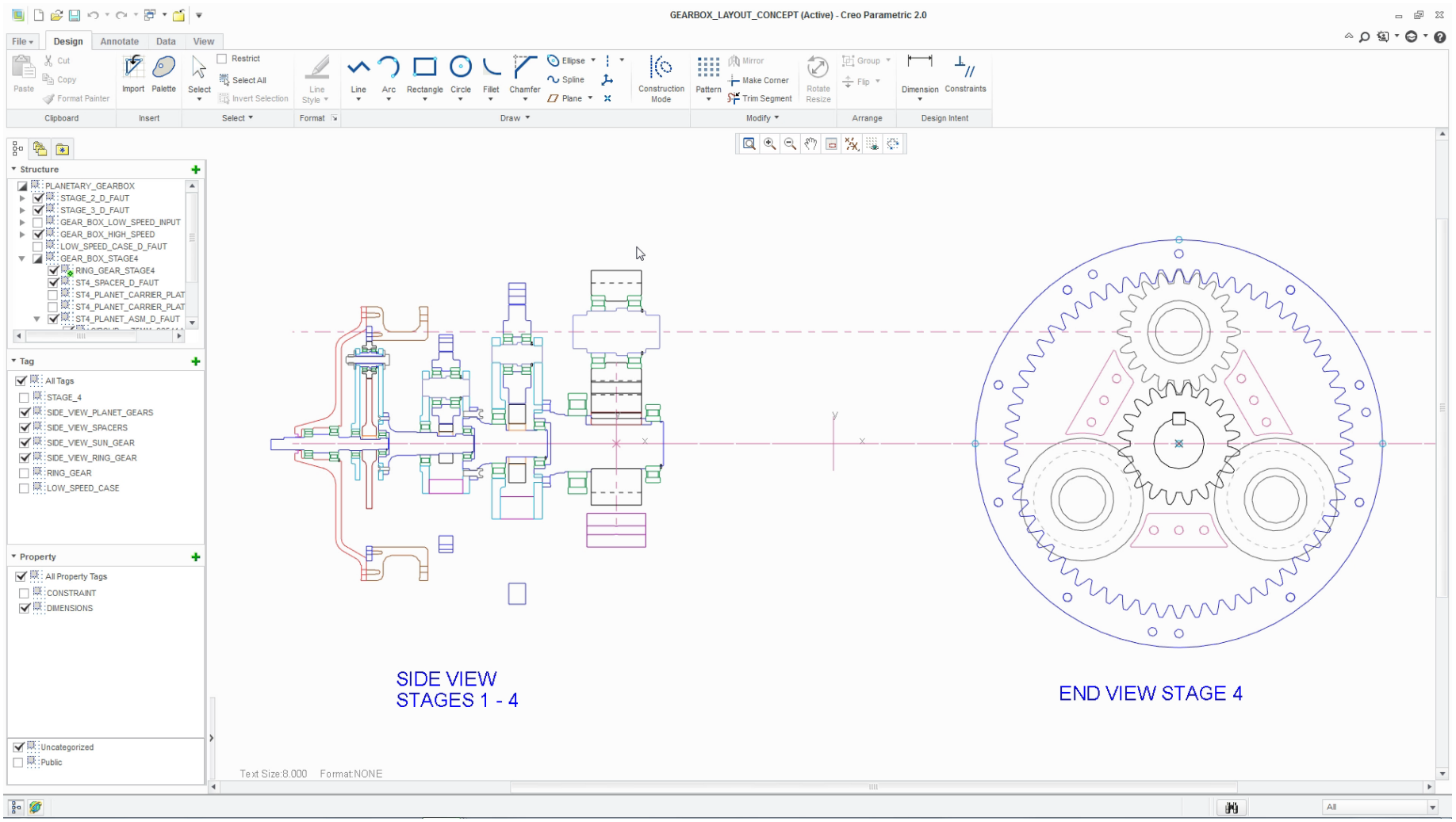


Feature References

Full Associativity

Gearbox Concept



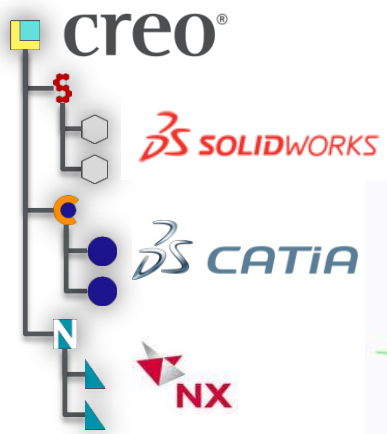
PTC Creo 3.0 Outlook

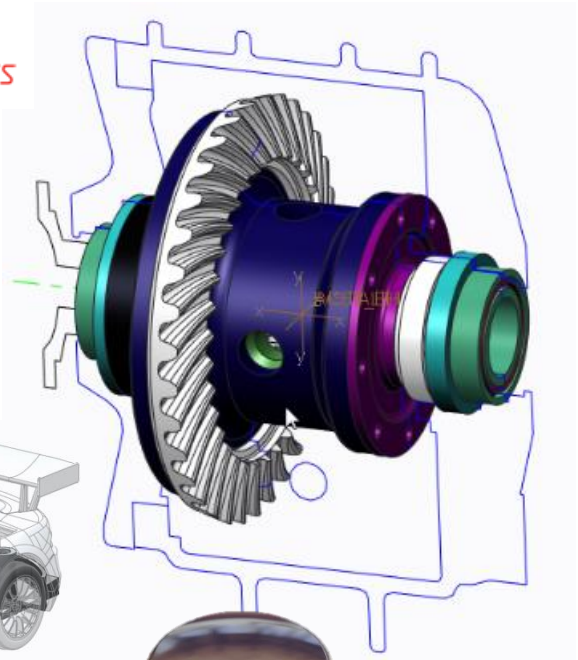
Highlights and Roadmap

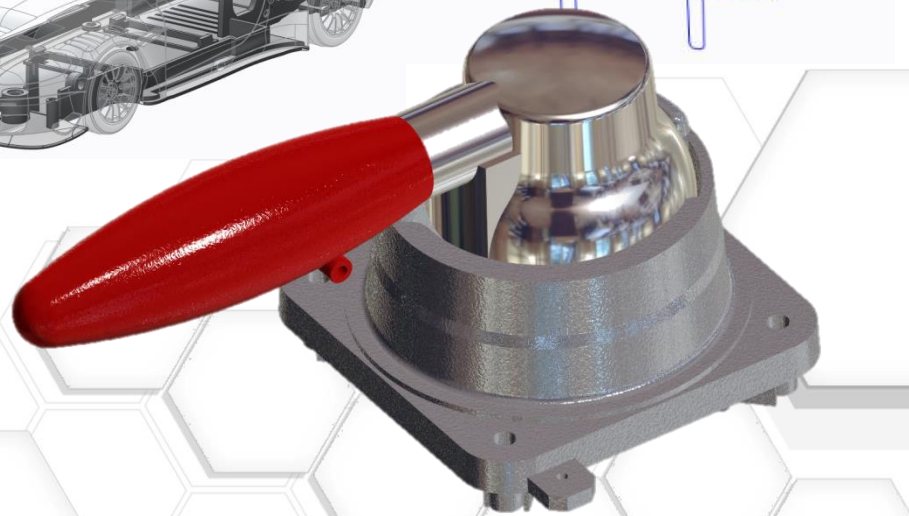
Agenda

PTC Creo 3.0 Strategic Initiatives

- Multi-CAD Design
  - Data Exchange
  - Flex Modeling
- Concept Design
  - PTC Creo Direct
  - PTC Creo Layout Integration Improvements
    - Layout DSF w/ accept/reject workflow
    - Design Exploration
  - Freestyle/Surfacing Improvements
- User Adoption
  - New Welcome Window
  - Better, more Integrated Hardware Libraries
  - Better App Behaviors and Help
  - More Immersive Environment

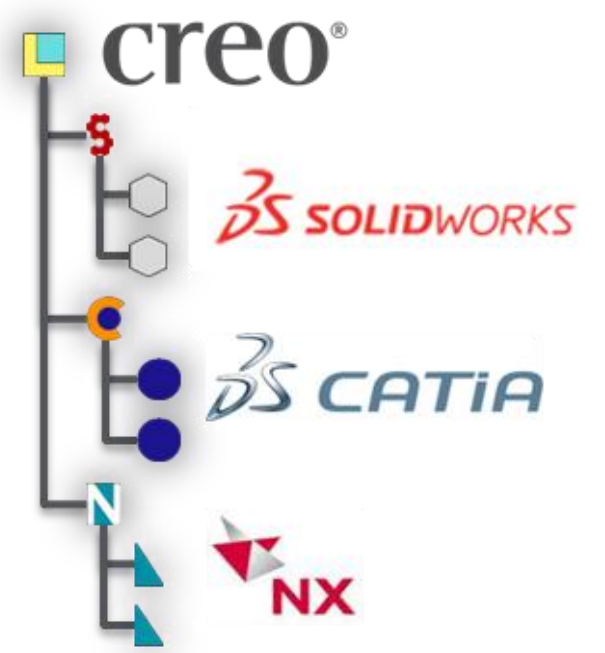






Introducing the Truly Heterogeneous Assembly (THA)

"Truly Heterogeneous" Assembly



- THA is a Creo assembly containing non Creo data.
- Open 3rd party CAD data as if it were native Creo data
- THA assumes that foreign source models are maintained by the foreign CAD tool.
- Updates to 3rd party CAD data behave like Creo native updates
- Objects appear in their native form in the Creo model tree

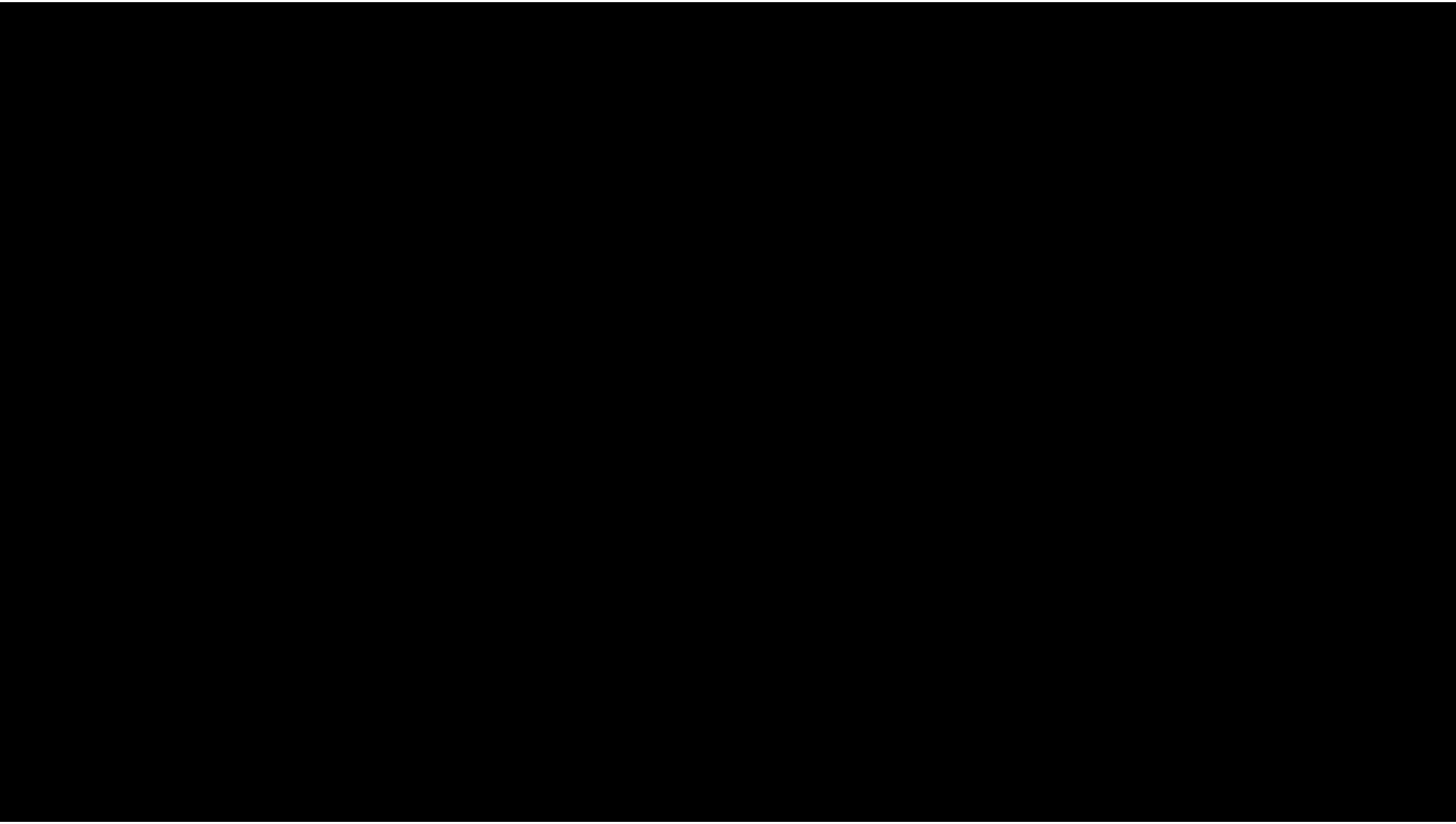
Multi-CAD Design – Today vs. Creo 3.0

Today

- Import Foreign Models
  - Keeping objects up to date requires special user attention
    - The user retrieves updates using “ATB Update”
  - Managing multiple CAD objects for the same part is required

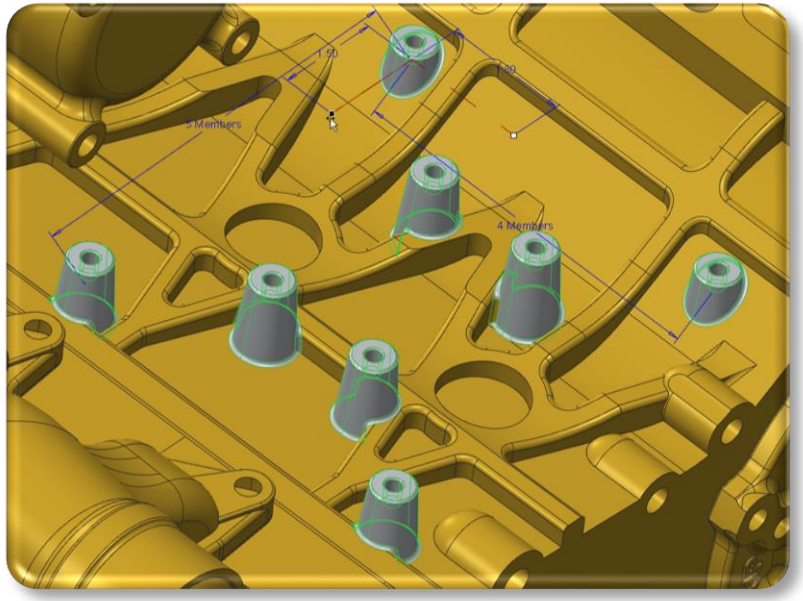
Multi-CAD Design

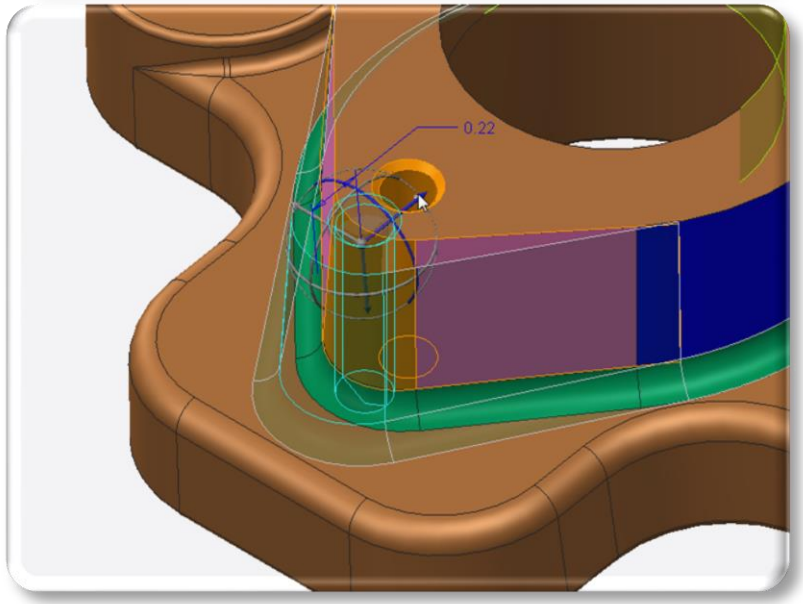
Truly Heterogeneous Assembly (THA) in Action



Improved PTC Creo Flex Modeling Extension

- New User-Efficiency Capabilities
  - Flex pattern – drives patterns across varying topology
  - Round/Chamfer recognition and editing
  - Pull option – streamlines special cases
  - Inferred refs for Move by Dimension
- New Geometric Control Capabilities
  - Tangency propagation and 3D solving
  - Add solver conditions to moving geometry
  - Support conic and C2 rounds
- Benefits
  - Better performance with round/chamfer recognition
  - More intuitive results with Pull option
  - More efficient geometry editing with the solver and inferred references
  - Broader use case support with new rounds

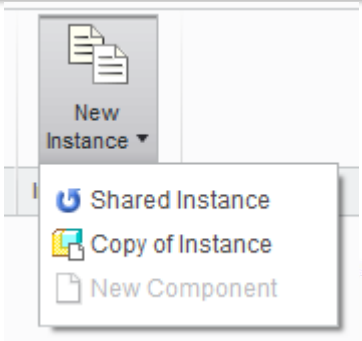


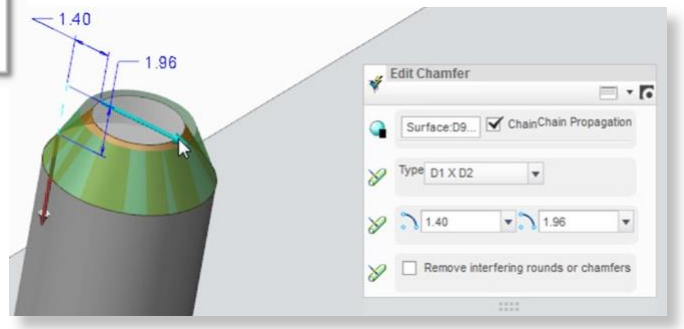


Concept Design in Creo 3.0

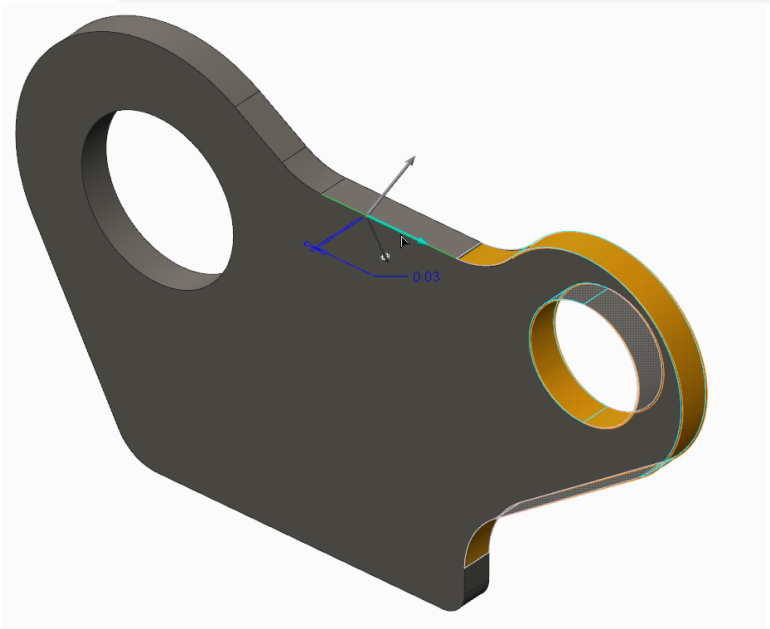
Creo Direct Improvements

- **Broader, Deeper Design Workflows**
  - Richer live toolbar provides broader options
  - Live toolbar remembers favorites
  - More intuitive, faster selection
  - New tools for Assembly context design:
    - New visibility controls
    - New component, new copy, new instance
    - Standard parts library
  - New tools in sketcher
    - Relative dimensions
    - Improved sketching guides





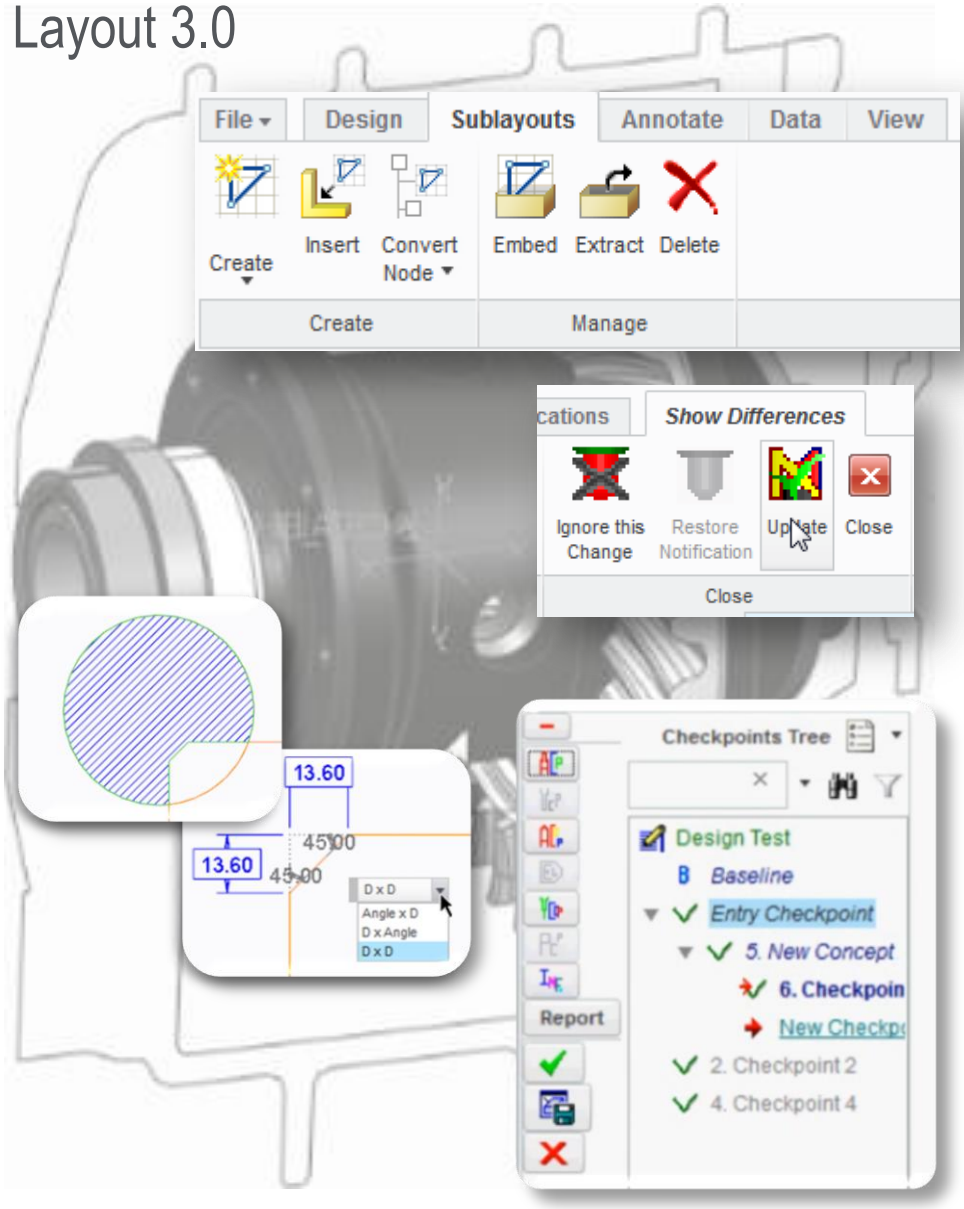
- **Robust Geometry Capabilities**
  - Intelligent round/chamfer recognition and editing
  - Comprehensive tangency control
  - New geometry operations: Pull, Substitute
  - Significantly improved geometry operations: Offset, Pattern



- **Benefits**
  - Faster, more flexible 3D Concept Design
  - Improved tools for CAE and tooling design

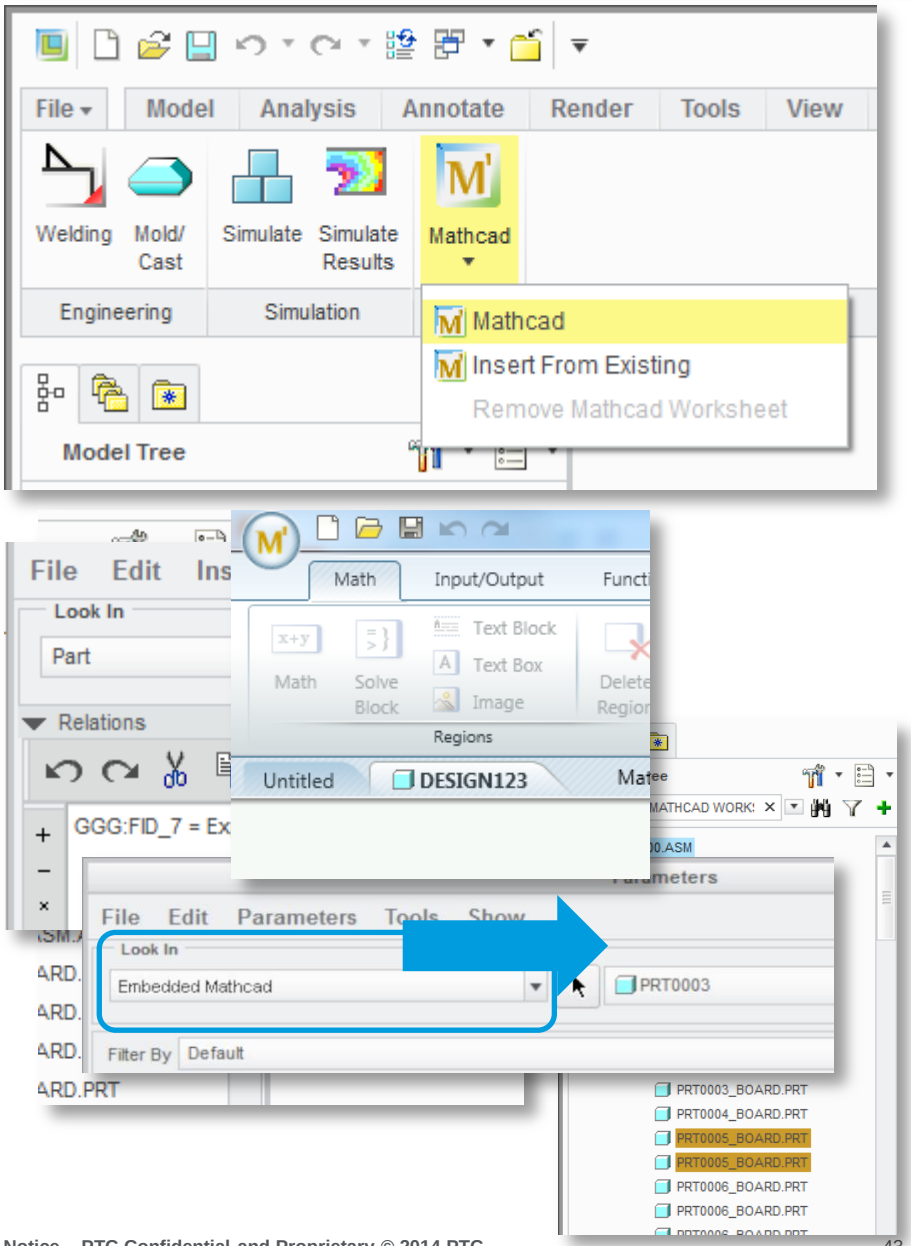
Improved Conceptual Design with Creo Layout 3.0

- Concurrent Layout Design
- Richer, More Capable 2D-3D Integration
  - 2D design change notification
  - 3D preview
  - Accept/Reject workflow
- New and Improved 2D Authoring Capabilities
  - Dependent copies
  - Cross hatching
  - Better snapping & guides
- New Design Exploration Mode
  - Explore multiple design branches
  - Save design checkpoints



Improved PTC Creo Mathcad Integration

- Capabilities
  - Embed a Mathcad object directly in the PTC Creo design
  - Each object can have its own associated Mathcad object – assembly, parts
  - Mathcad object can be edited side by side with PTC Creo session
  - Search enabled for any Mathcad embedded worksheets
  - Integration works with Parameters
    - More streamlined
    - Easier to set up and understand
    - 2-way communication between worksheet and PTC Creo
- Benefits
  - No concerns about separate management of Mathcad object
  - True engineering notebook embedded in the PTC Creo environment

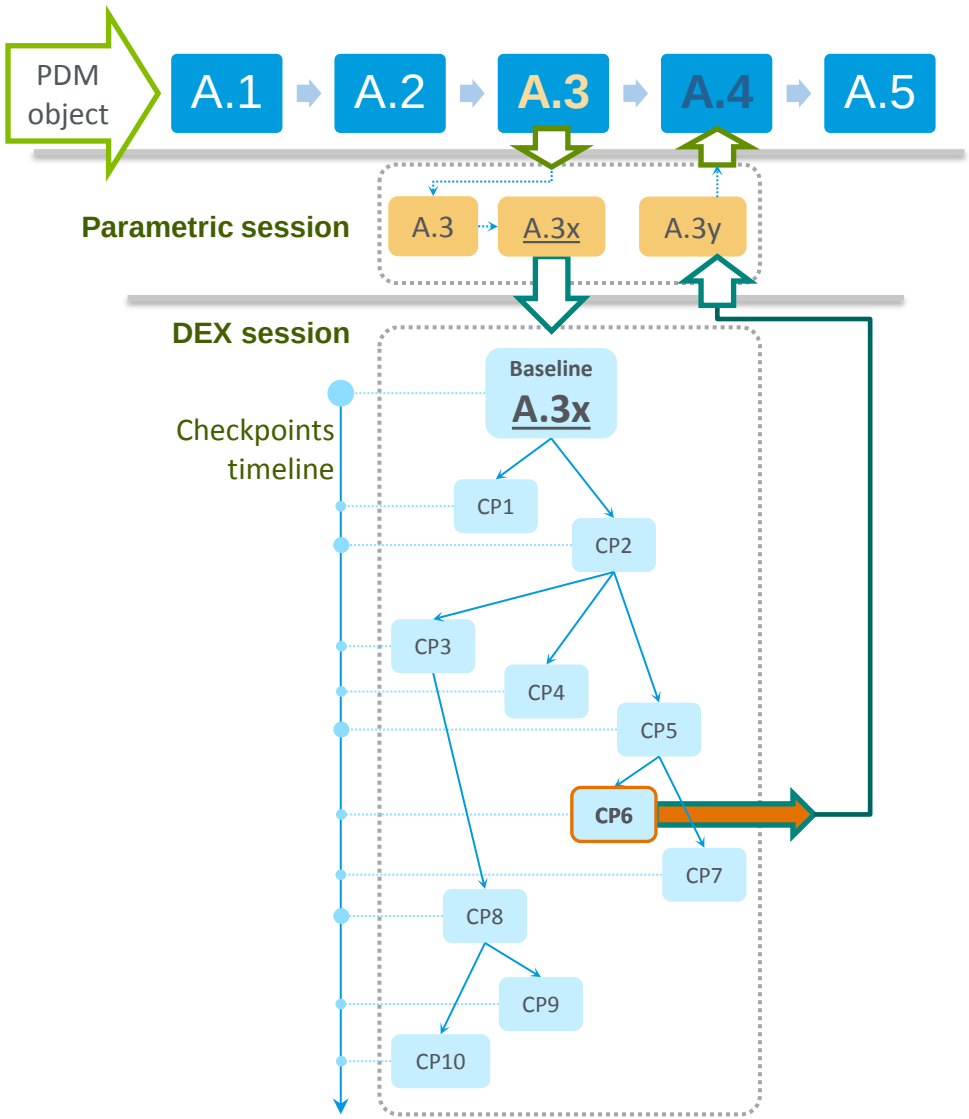


Concept Design with PTC Creo 3.0

Design Exploration Extension "DEX"

- Capabilities
  - Evaluate multiple, branching design alternatives
  - Works in Part mode, Assembly mode, Sheet Metal, Mechanism, Welding
  - Available as part of 2D-3D handoff
  - Design alternatives stored locally, outside of PLM system.
    - Encrypted – not reusable for other purposes
    - Can be restarted across multiple sessions
  - Each checkpoint is fully restorable, as is the baseline design
  - Choose your final design when you're confident you've got the right choice!
  - Review your design alternatives in a checkpoint view or timeline view

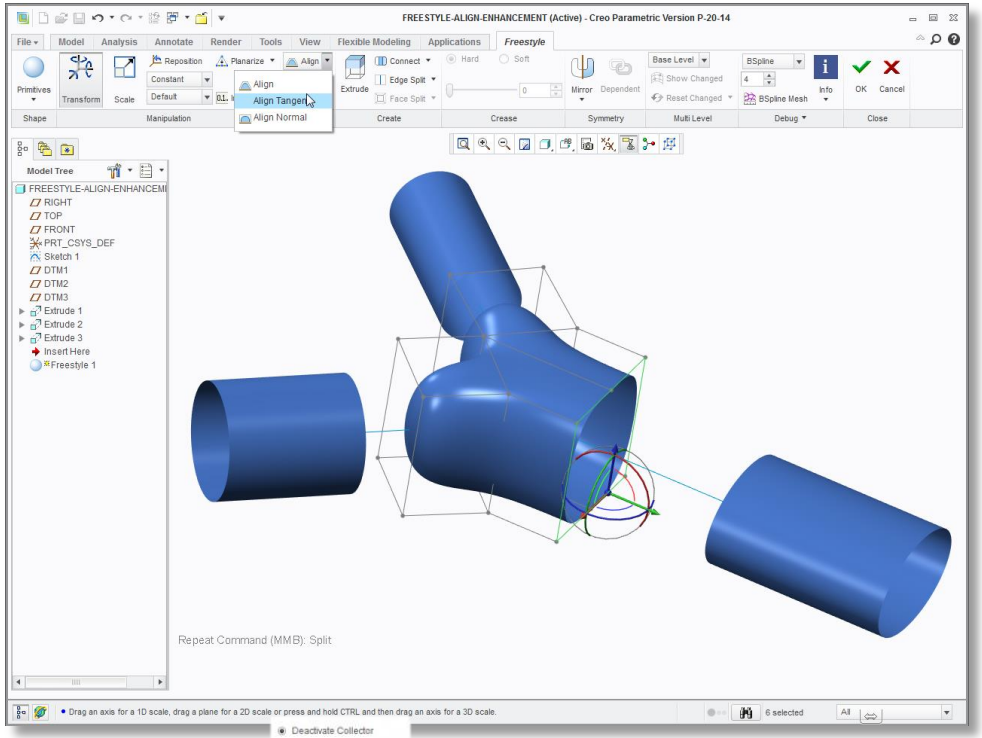
- Benefits
  - Completely safe environment for free evaluation of "what-if" scenarios
    - No limit to number of checkpoints
    - No limit to number of branches
  - No concern about managing incremental backups on disk

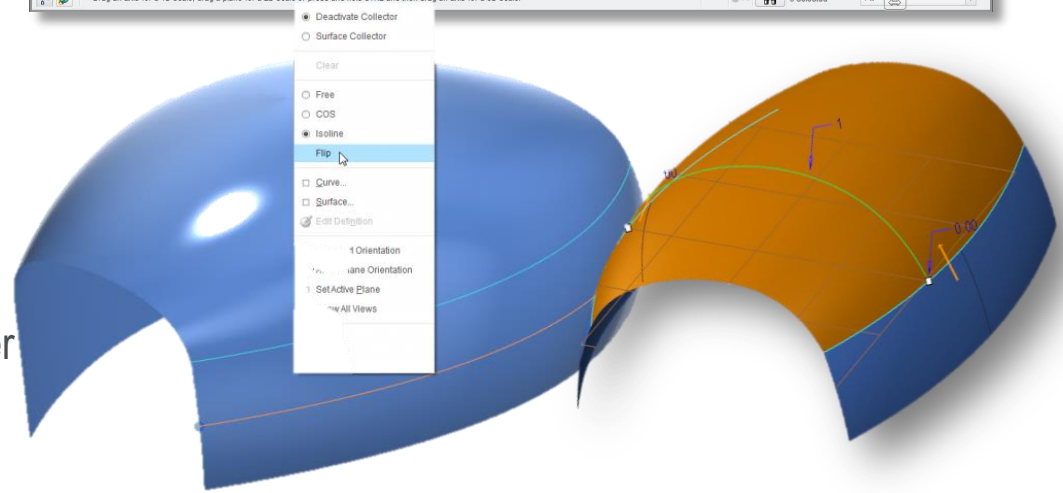


Concept Design in Creo 3.0

Improved Surfacing

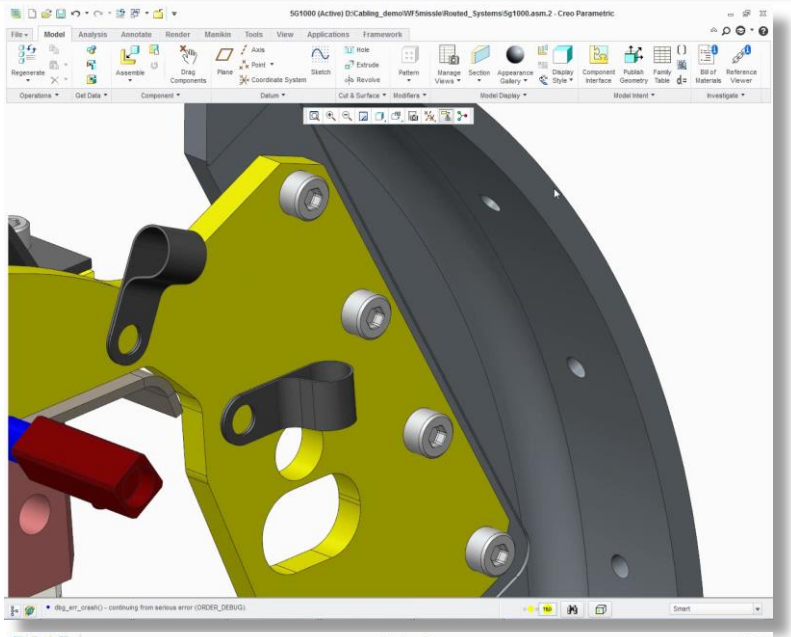
- **Freestyle**
  - Align to external curves/edges
  - Combine parametric control with freeform organic concept development
  - Add taper to freeform concepts
- **Style & Rendering**
  - High degree sweep surfaces w/ connections
  - Curves from a surface isoline
  - New connection analysis
  - Best quality boundary blend ever with Degree 5 surfaces
- **Benefits**
  - Easier boundary control and analysis of organic shapes
  - Easier prep for injection molding
  - Highest quality parametric surfacing ever
  - More immersive, realistic design environment

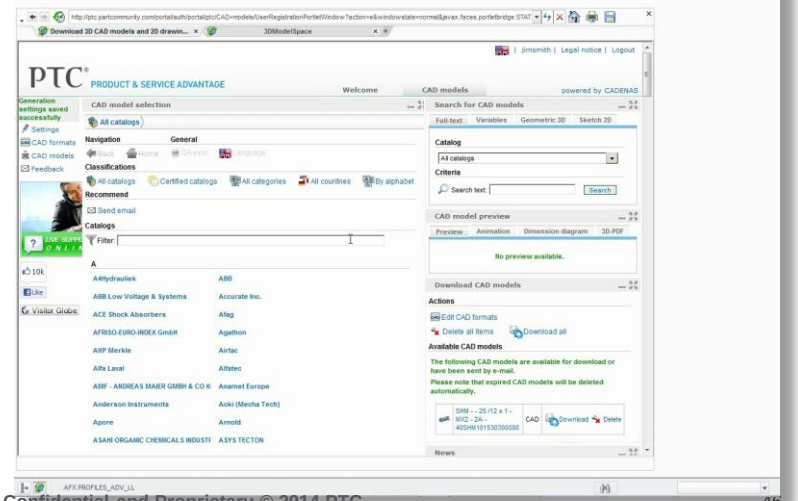




Creo 3.0 User Adoption Improvements

- New Welcome Page
  - Getting started info
  - What's new
  - Help
- Improved, App-Specific Help
  - Much better performance
  - Richer content
- Standard Hardware Libraries
  - Intelligently matched library of Bolts, Screws, Nuts and Washers.
  - Automatically create hole on placement
- Improved Access to COTS Hardware
  - Broader object availability
  - Improved workflow in embedded browser
  - Significantly improved access to local content





Graphics Improvements Create Better Design Environment

1

Open GL

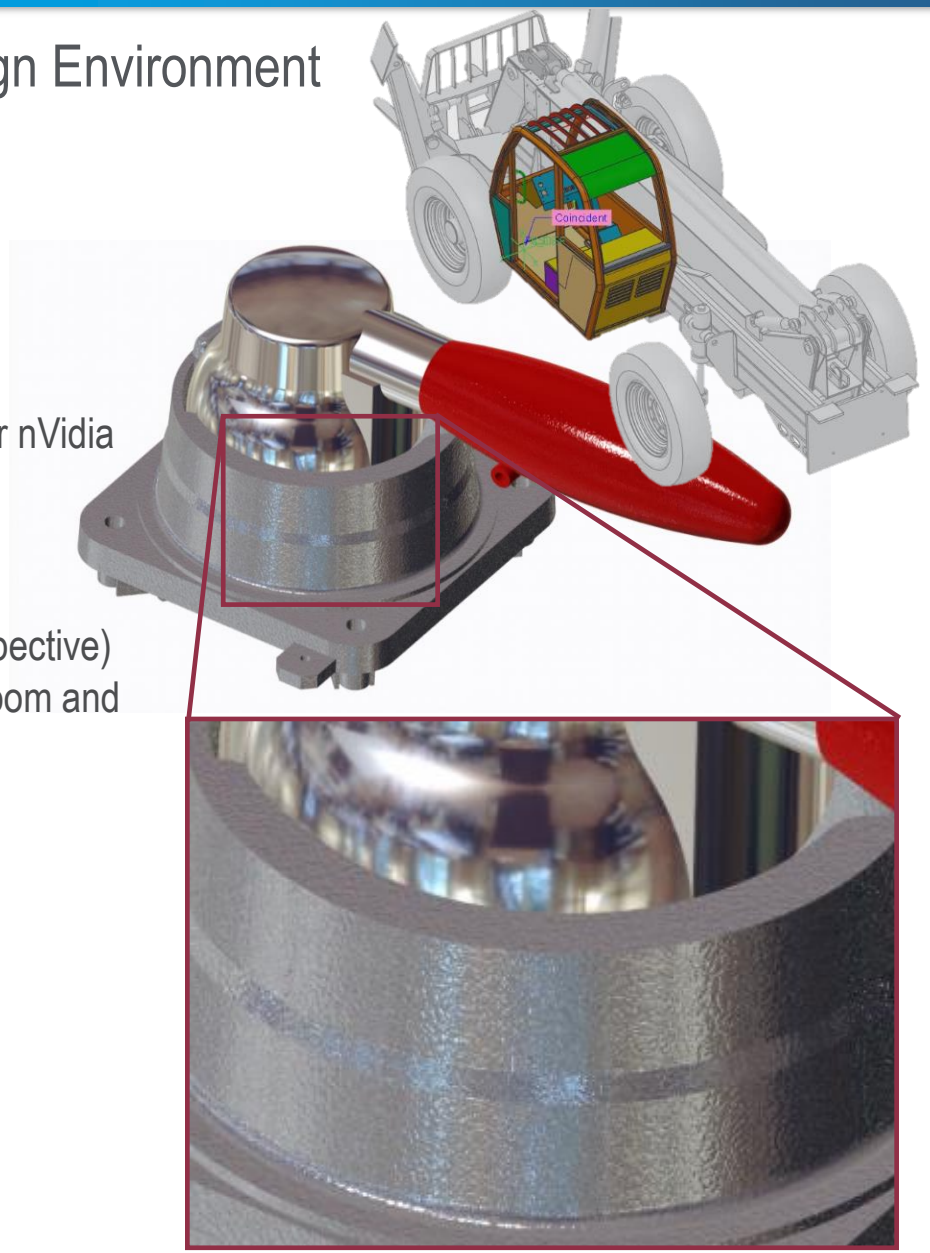
2

Rendered

Which one is Rendered?

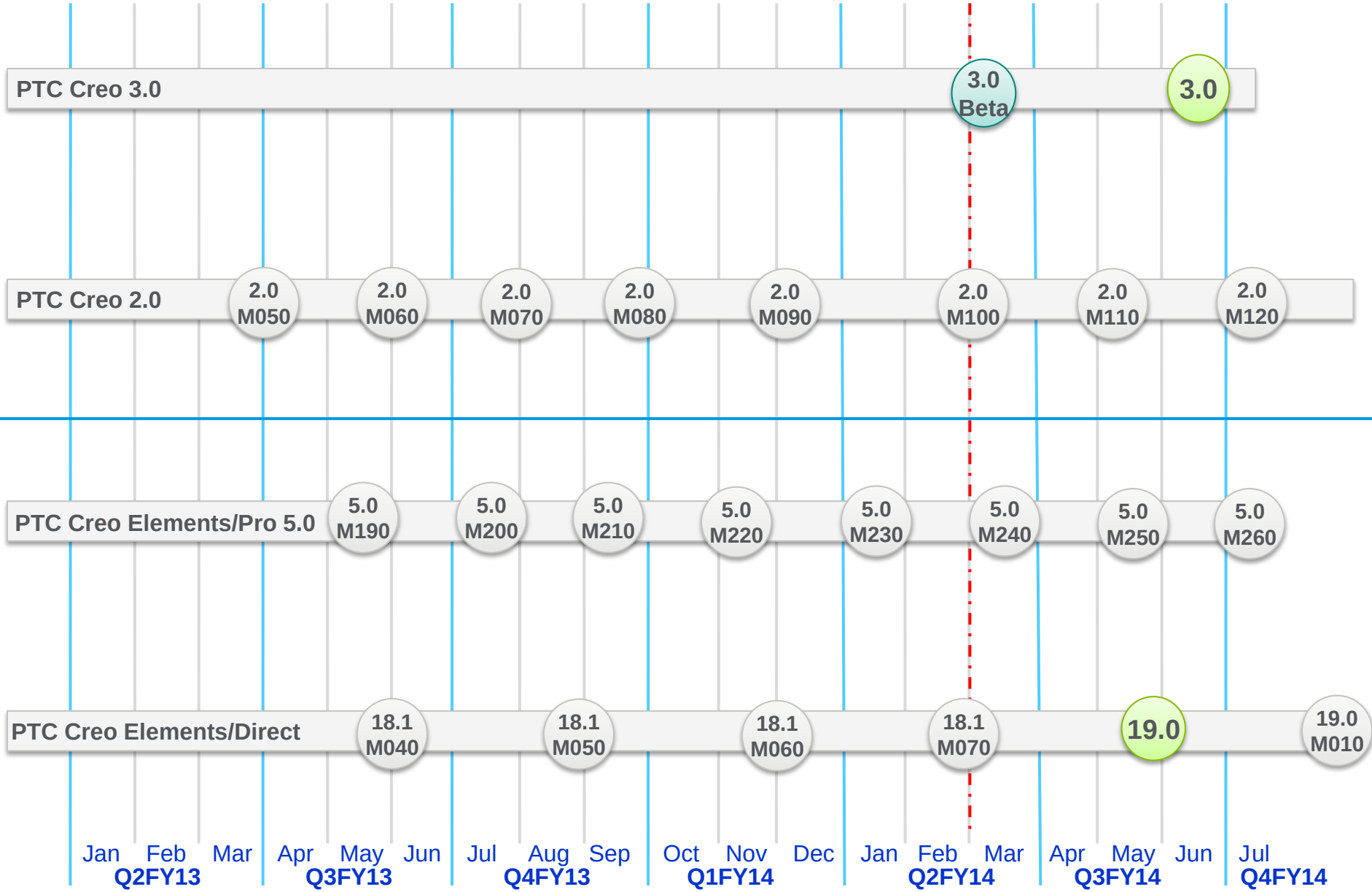
Graphics Improvements Create Better Design Environment

- Capabilities
  - Phantom effect in assembles for activated components
  - Reorient model normal to face
  - Order independent transparency
    - Improved performance and added support for nVidia
    - Allows for faster transparency display
    - Less artifacts due to sorting
  - HDR support in shade with reflections
    - HDR image for reflections (displayed in perspective)
    - Control HDR intensity, saturation, rotation, zoom and height
  - Realistic bump mapping
    - Bump maps now appear in regular graphics
    - Procedural bumps also supported
- Benefits
  - Immersive design environment
  - Model appearances approximate rendering



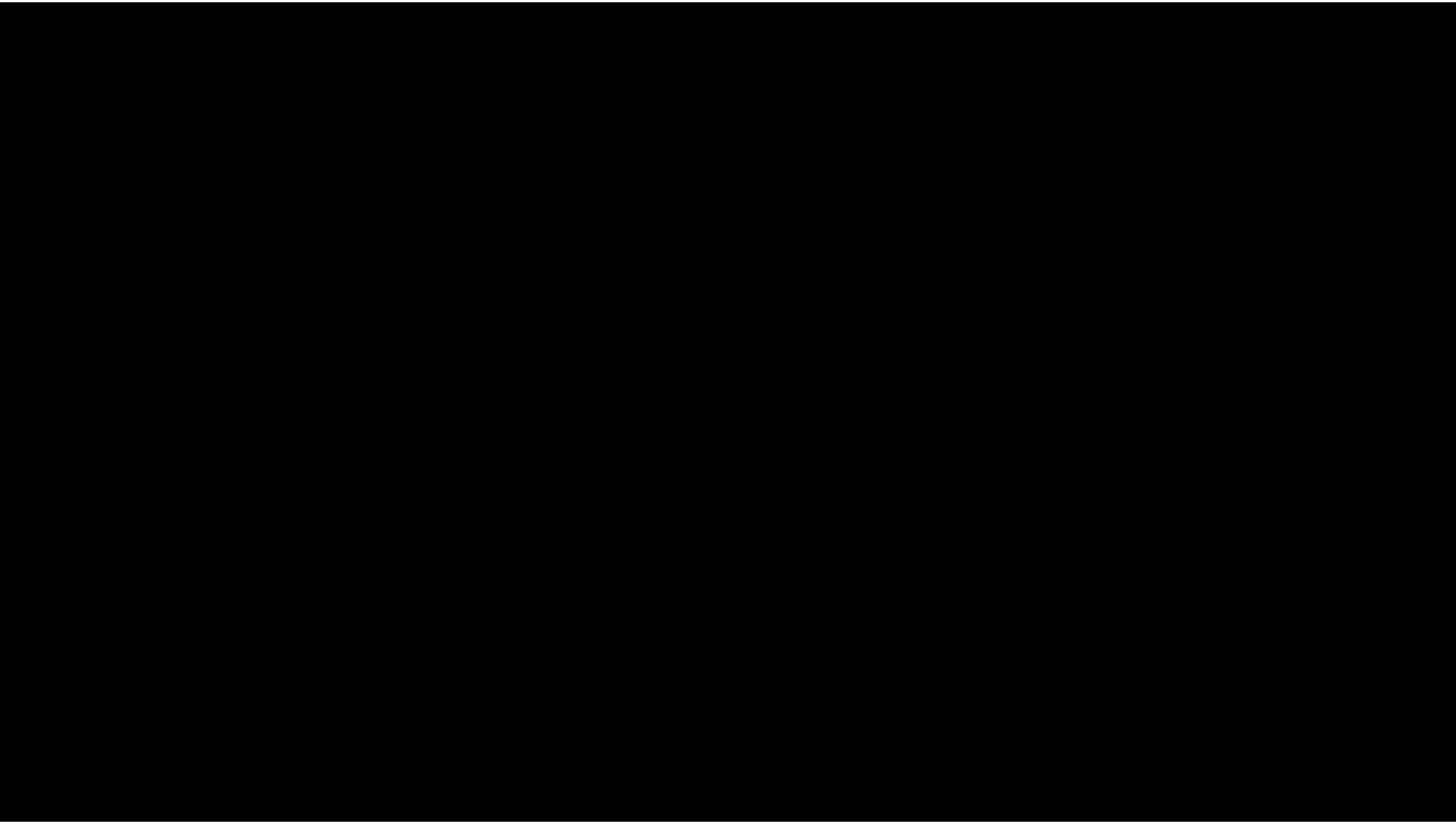
PTC Creo Release Schedule

(excluding PTC Creo View & PTC Creo Illustrate)



Forward Looking Information Subject to Change at PTC's Discretion

Improved Surfacing with Freestyle



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