

CREO TECHNOLOGY ROADMAP

Paul Sagar
VP, CAD Product Management



forum
europe

The background of the slide features a view of the Earth from space, with a bright sun or star on the left creating a lens flare. Overlaid on the Earth is a blue, semi-transparent digital grid or mesh, symbolizing the convergence of the physical and digital worlds.

The **PHYSICAL** and **DIGITAL**
worlds have **converged**

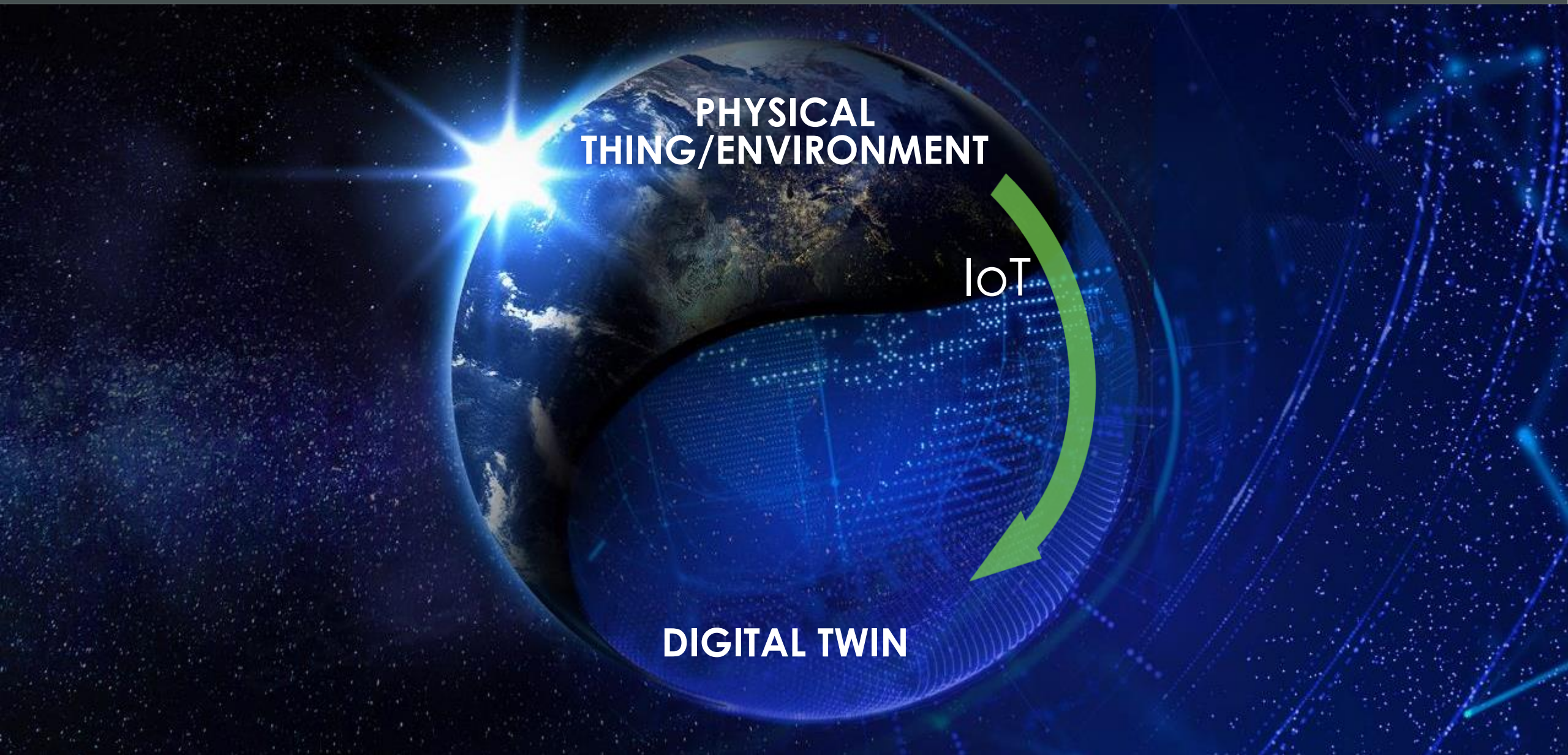


Product Design is changing

A conceptual visualization of a digital twin. It features a realistic Earth in space, partially obscured by a glowing blue digital grid that represents a virtual model. A bright sun is visible on the left, casting light across the scene. The background is a deep blue space filled with stars and faint digital lines.

**PHYSICAL
THING/ENVIRONMENT**

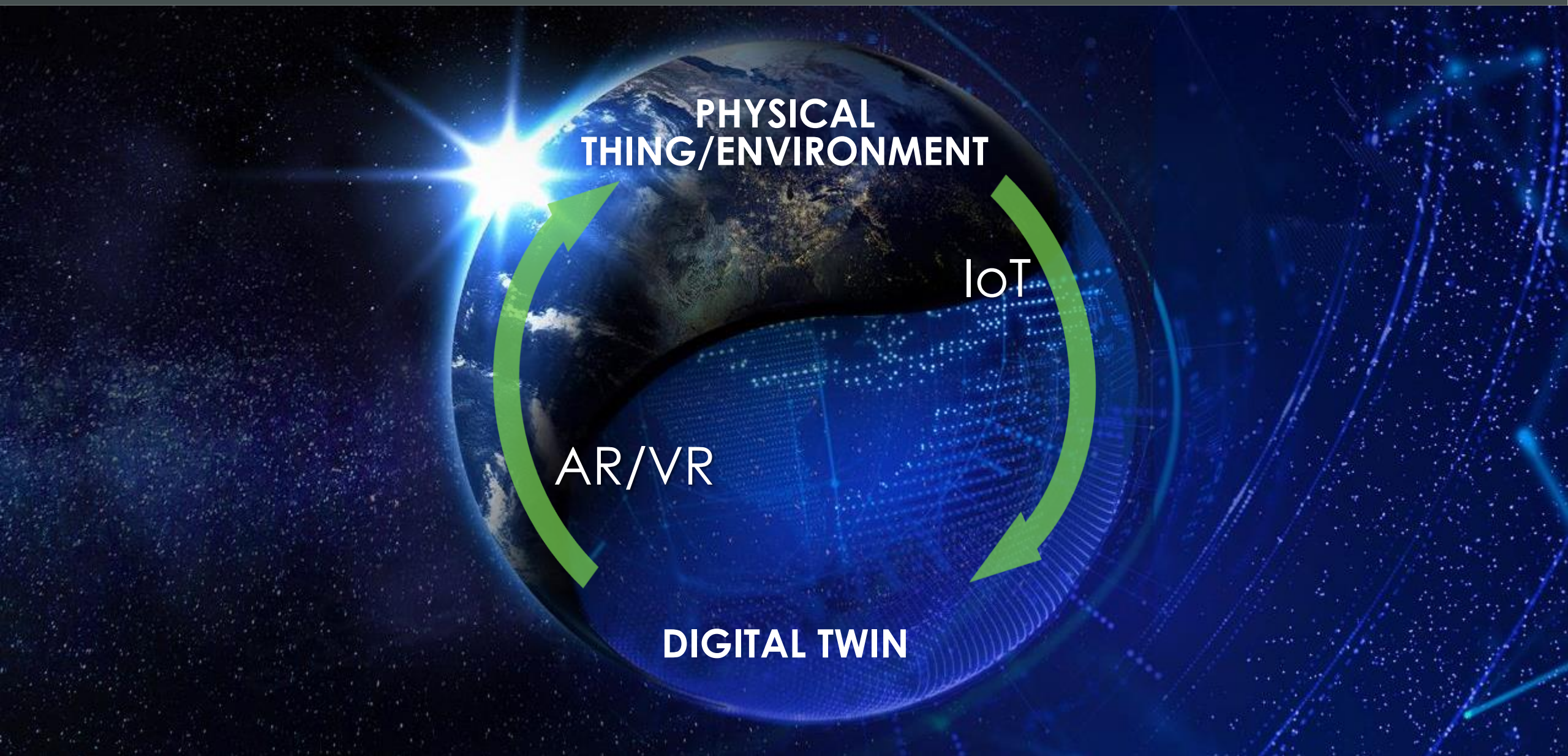
DIGITAL TWIN

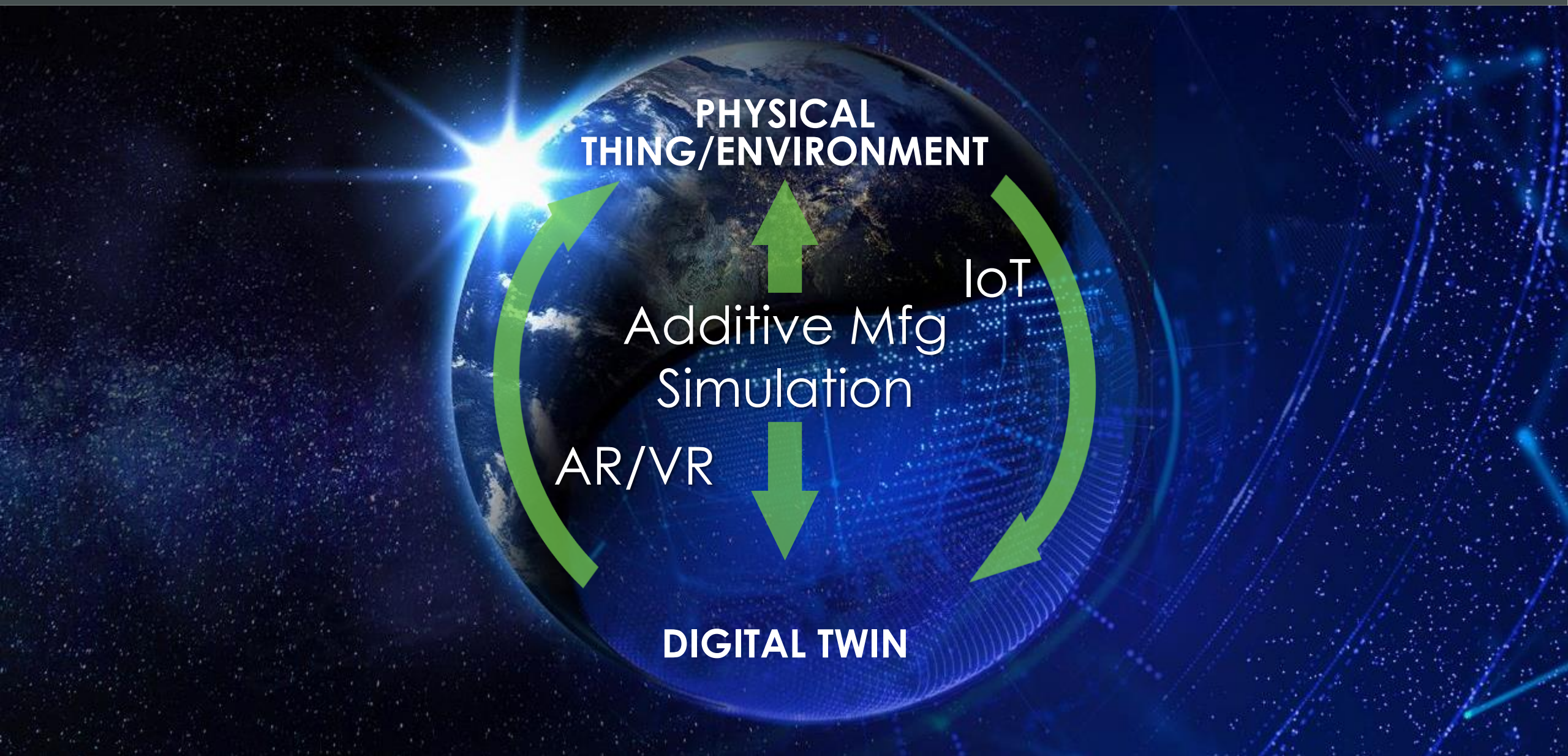


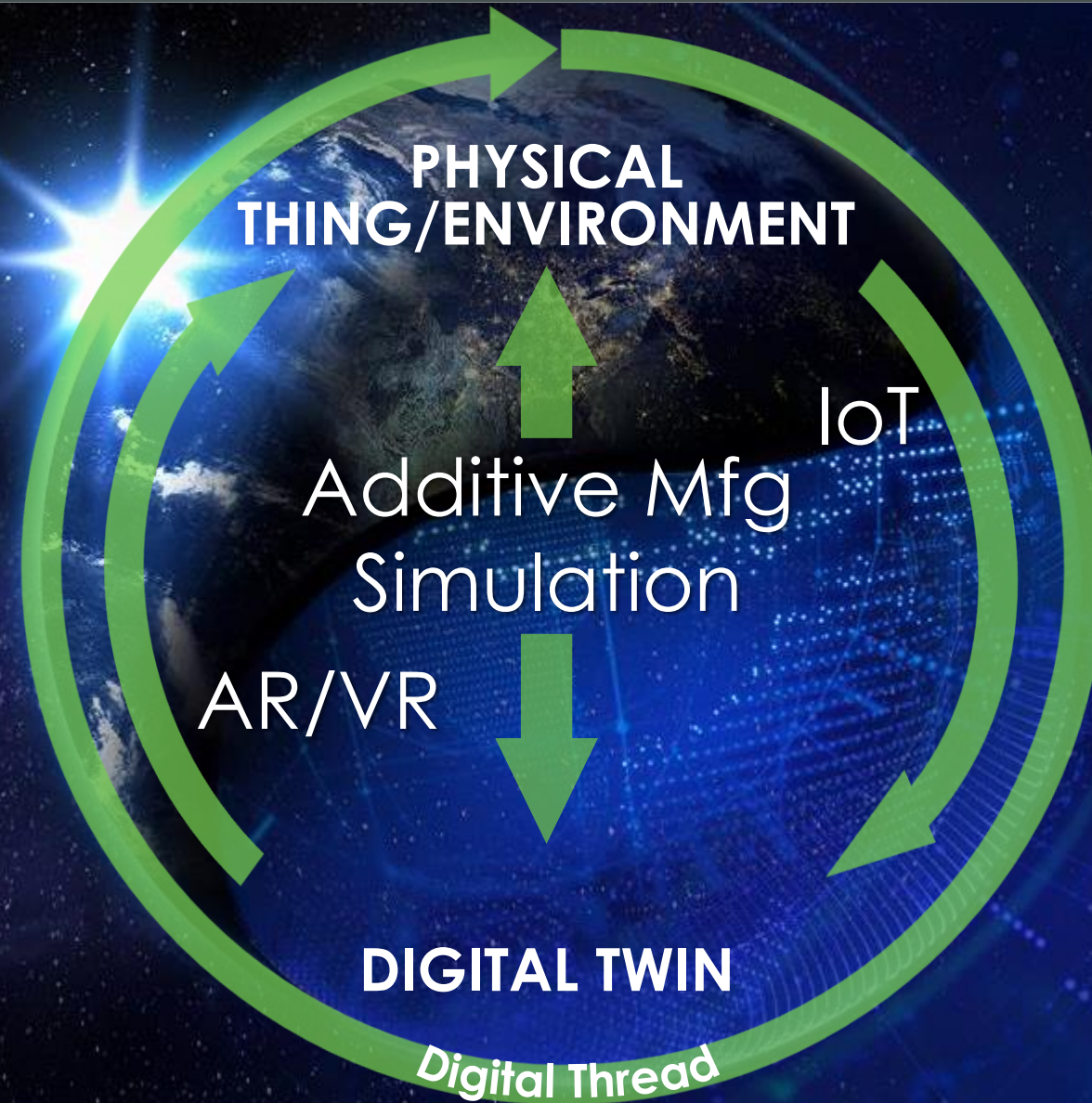
**PHYSICAL
THING/ENVIRONMENT**

IoT

DIGITAL TWIN





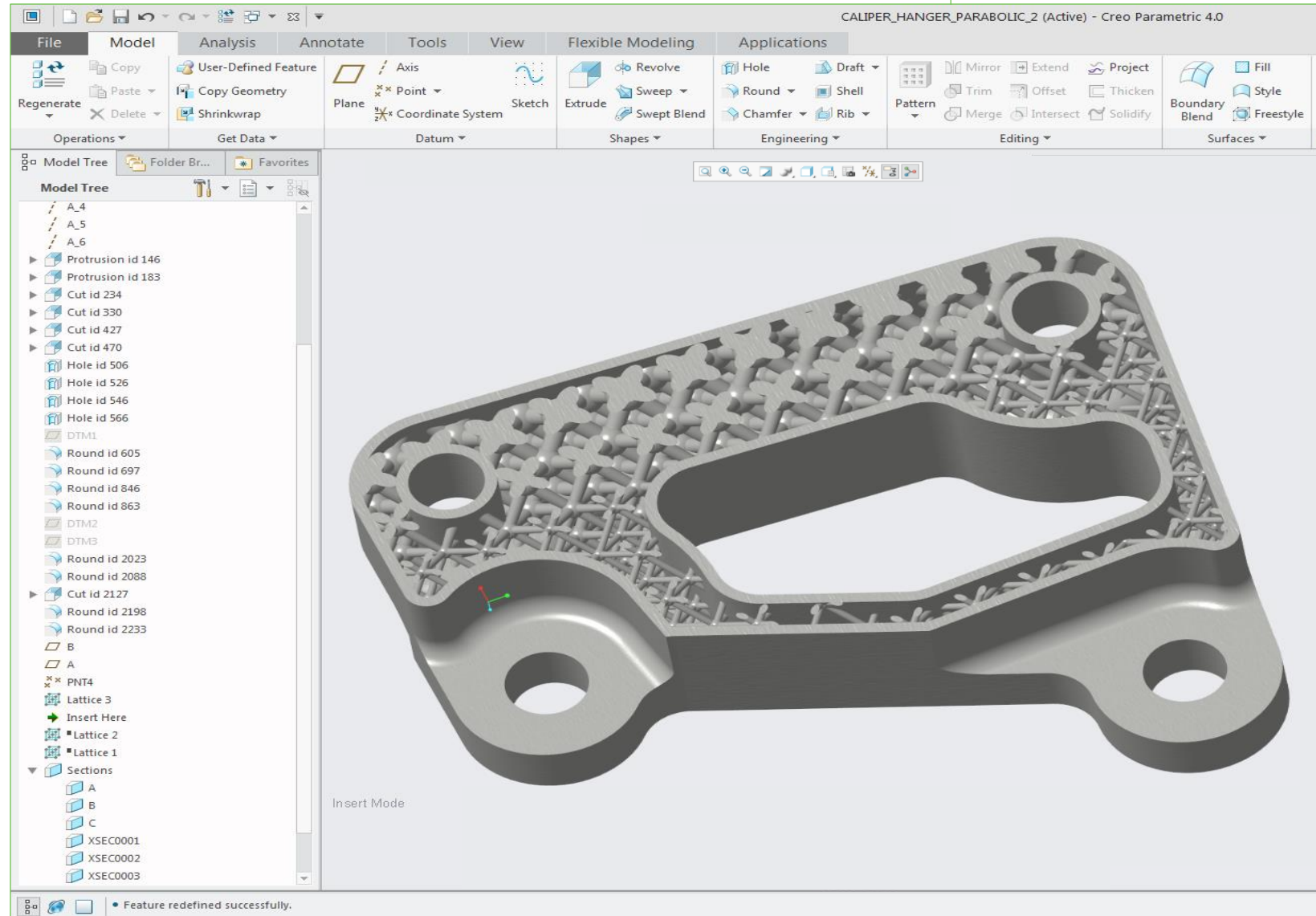


DESIGN FOR ADDITIVE MANUFACTURING •

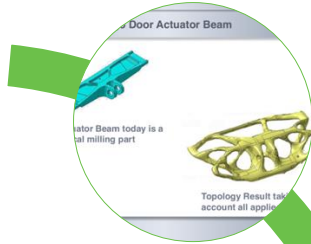
75%

of manufacturing operations worldwide will be using 3D-printed tools, jigs and fixtures made in-house or by a service bureau to produce finished goods by 2020

- Gartner



WHAT IS DRIVING ADOPTION?



Weight Saving: 3D Lattices and Topology Optimization

Adoption
Drivers for
Additive
Manufacturing

WHAT IS DRIVING ADOPTION?



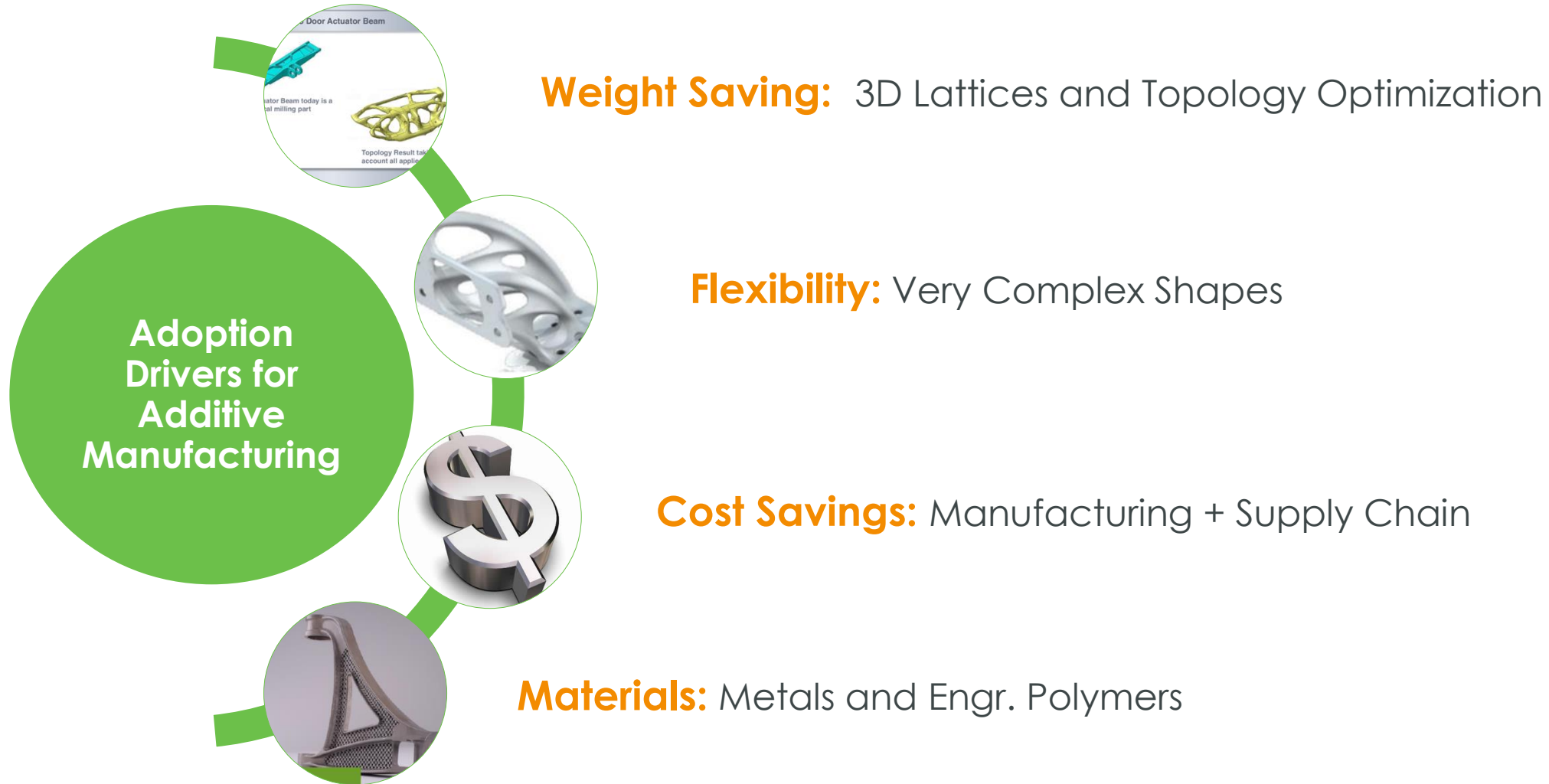
Weight Saving: 3D Lattices and Topology Optimization

Flexibility: Very Complex Shapes

WHAT IS DRIVING ADOPTION?

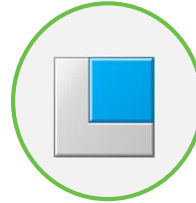


WHAT IS DRIVING ADOPTION?

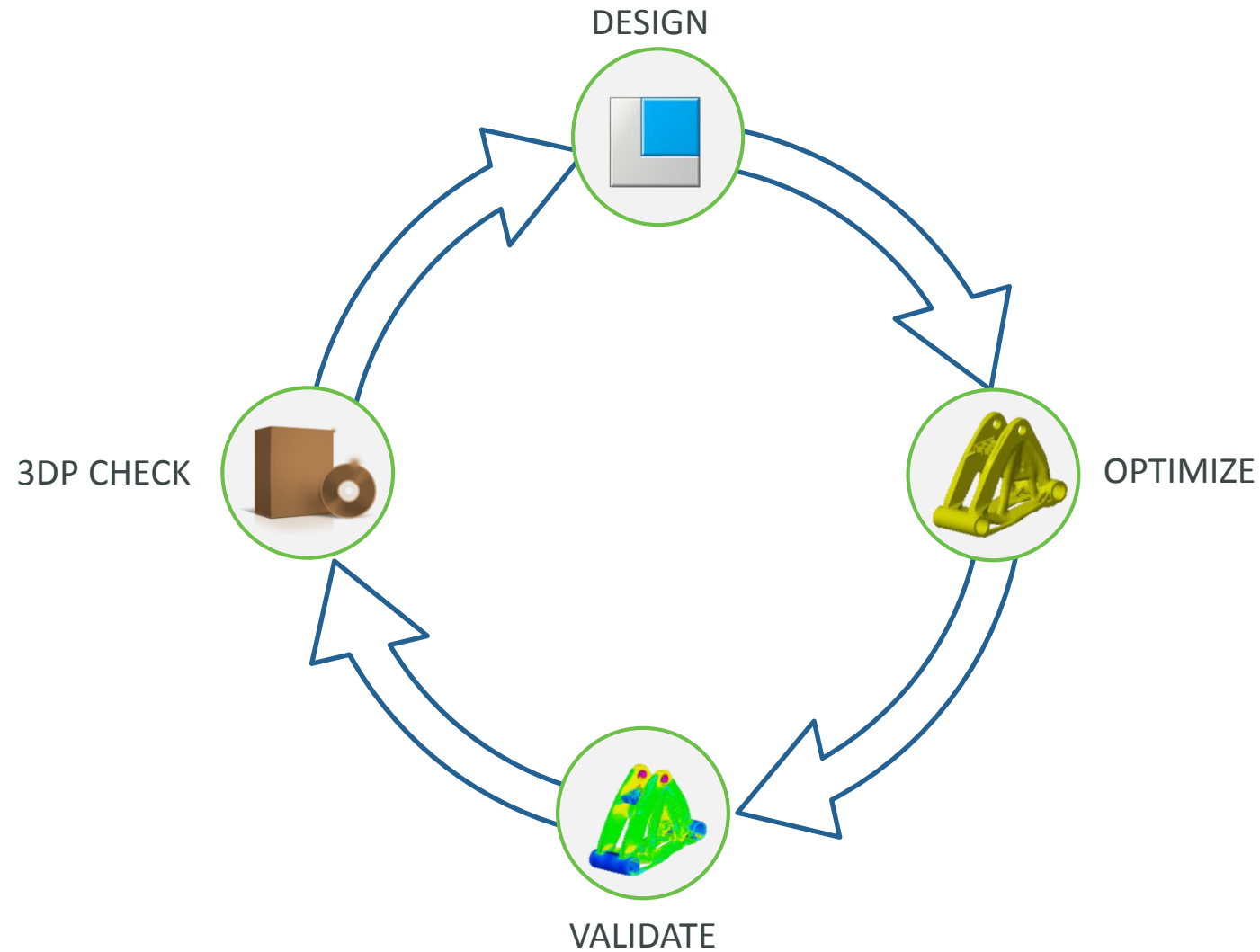


DESIGN FOR AM PROCESS CONSIDERATIONS

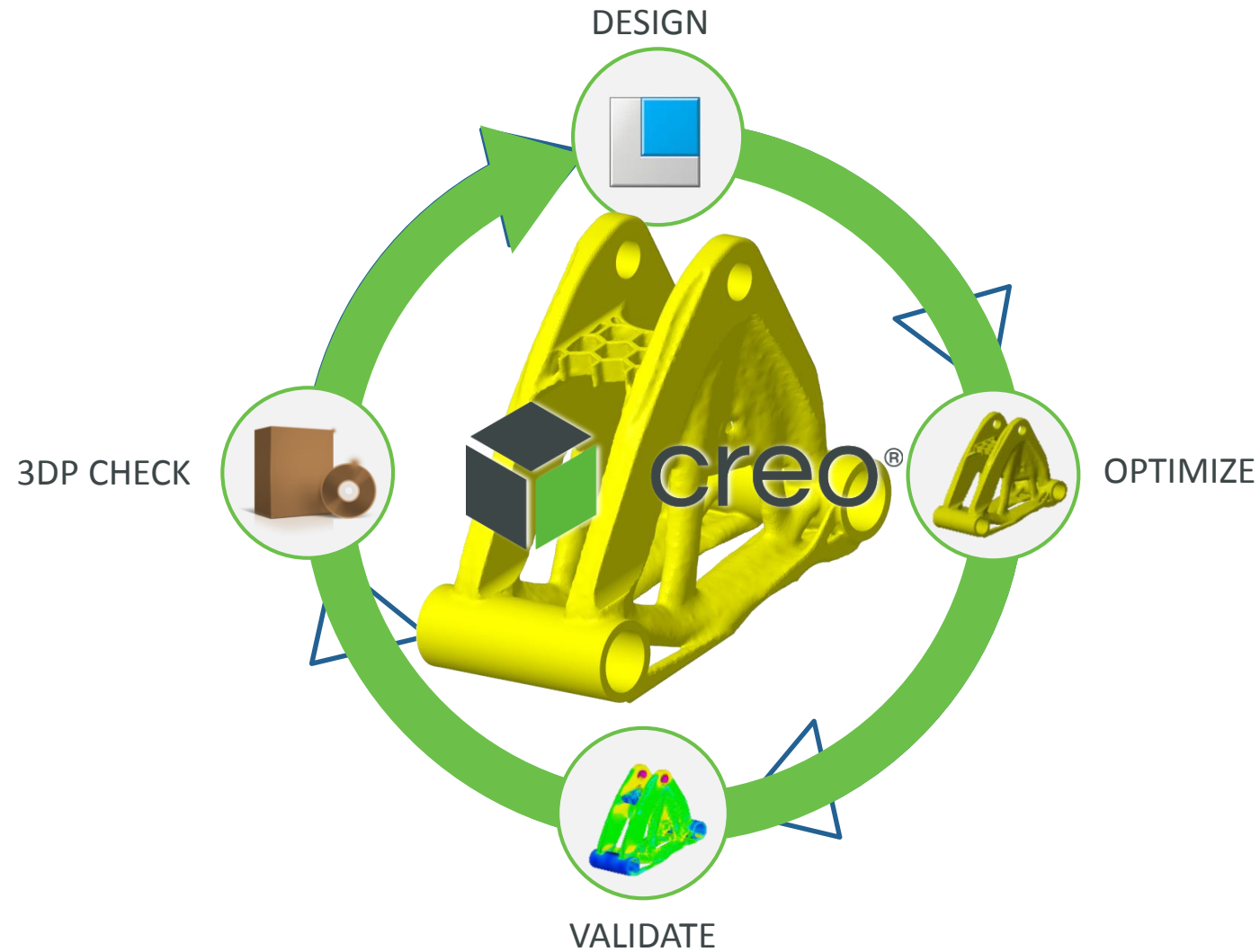
DESIGN



DESIGN FOR AM PROCESS CONSIDERATIONS



DESIGN FOR AM PROCESS CONSIDERATIONS



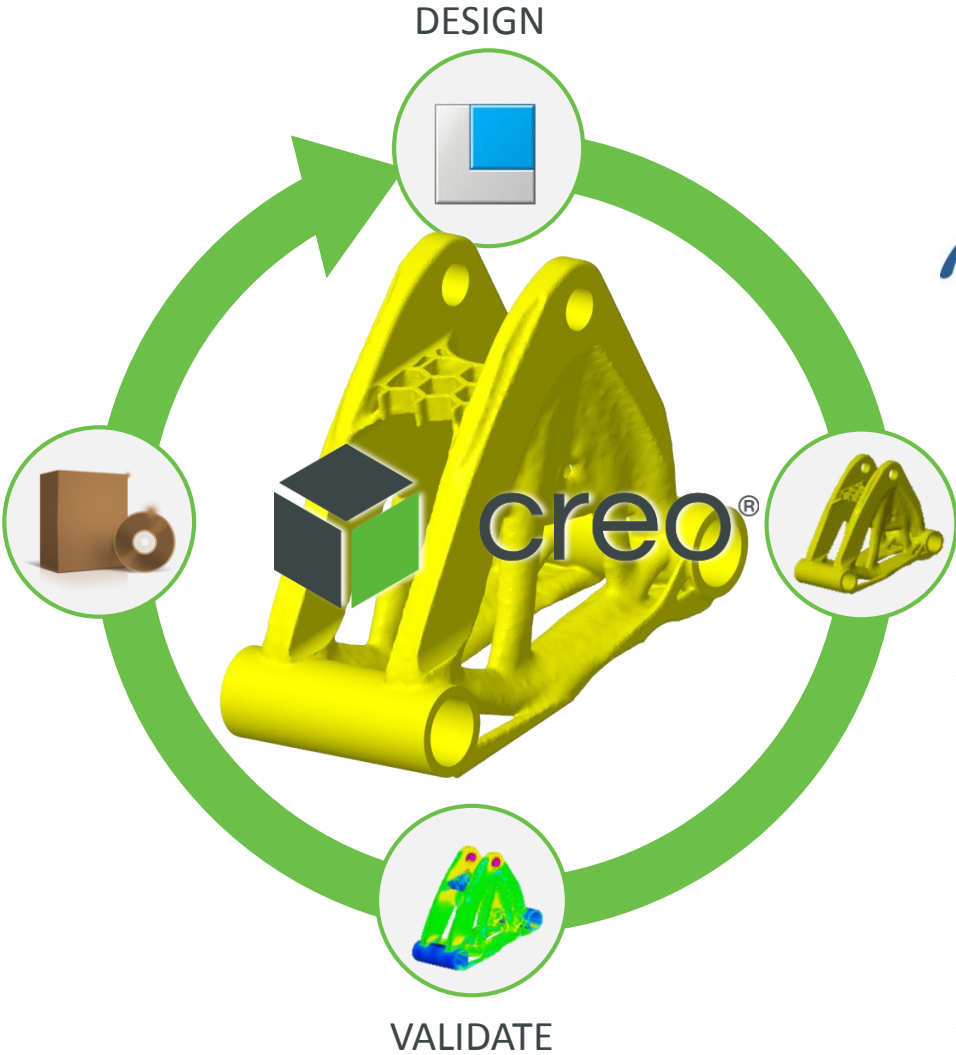
DESIGN FOR AM PROCESS CONSIDERATIONS



3DP CHECK



3D SYSTEMS



i.materialise

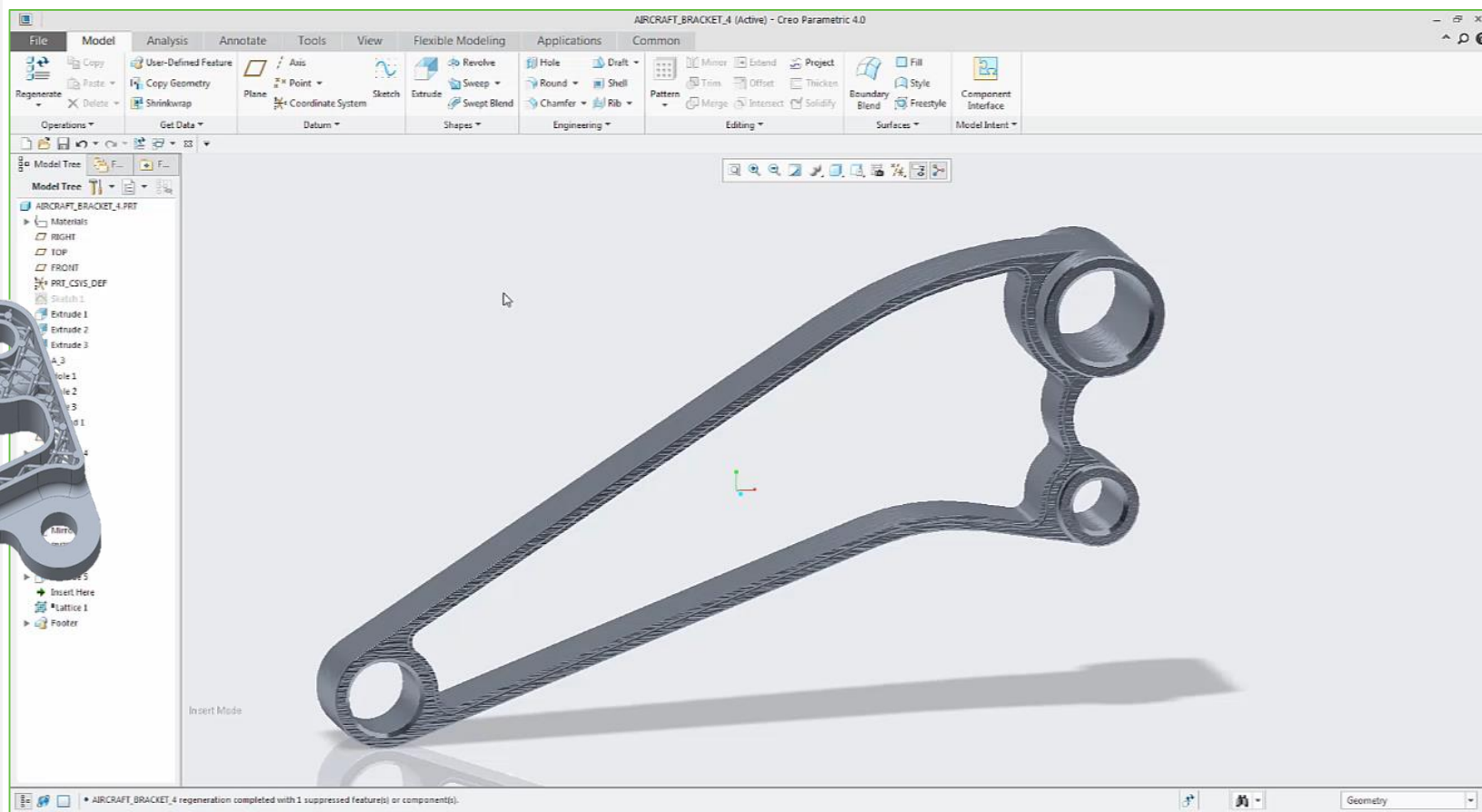
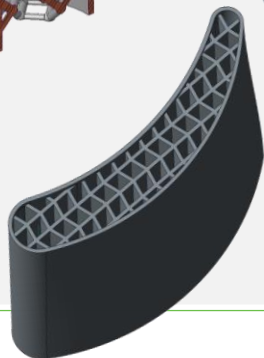
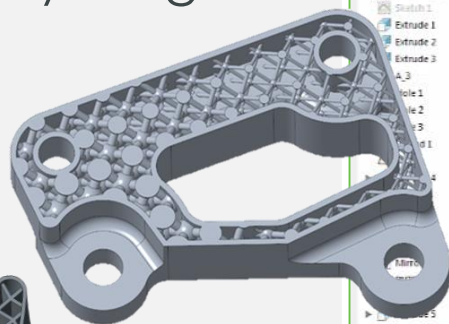
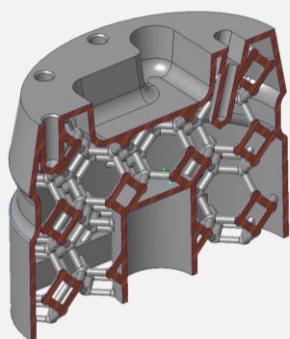
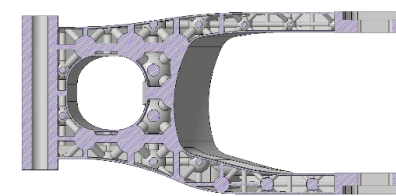
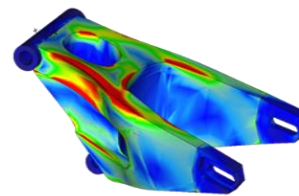


Additive Mfg Extension

Create: Build 2.5D and 3D parametric lattices

Analyze: Quickly perform FEA using Creo Simulation

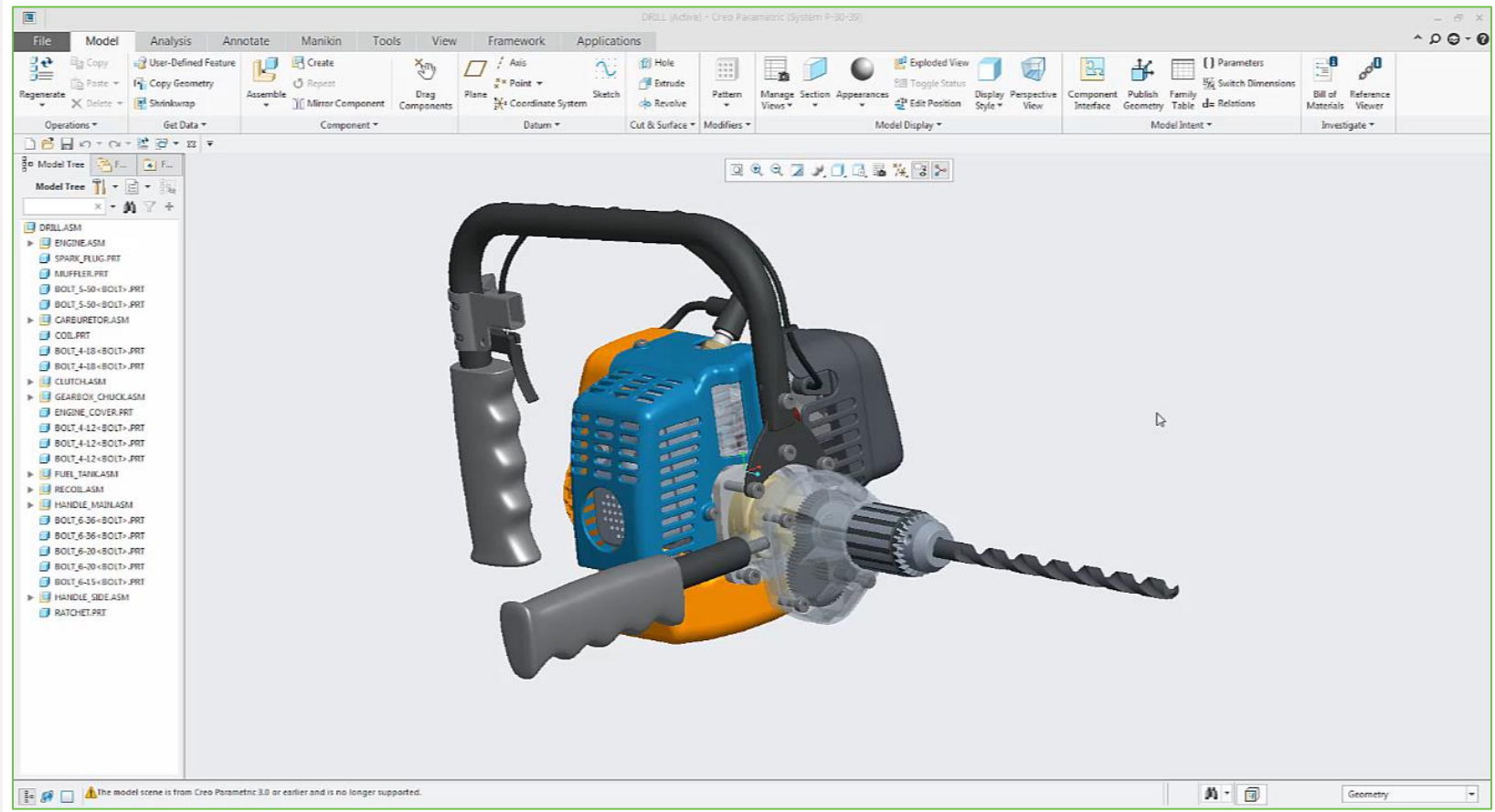
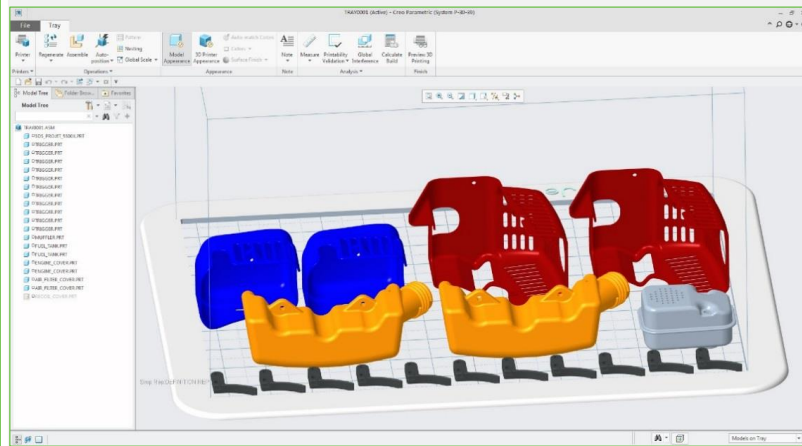
Optimize: Refine lattice structures to meet your goals



Additive Mfg Extension

Print Tray Assemblies:

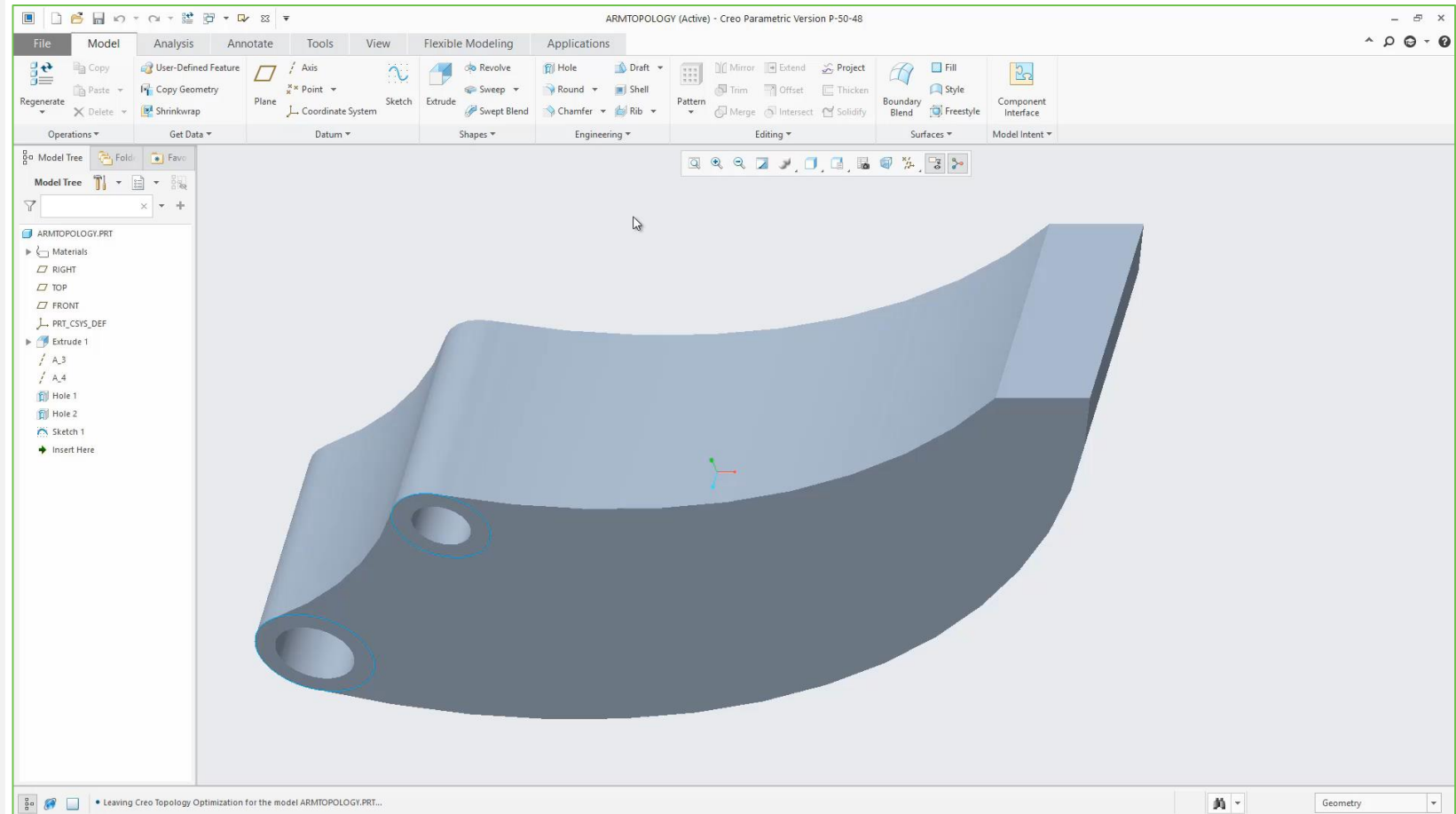
- Store, Track, Manage
- Component orientation and nesting
- Printability checking
- Printer connectivity



Topology Optimization

- Fully-integrated into Creo
- Create parametric geometry NOT tessellated surfaces
- Use structural, modal and thermal analysis
- Drive optimization against multiple objectives simultaneously

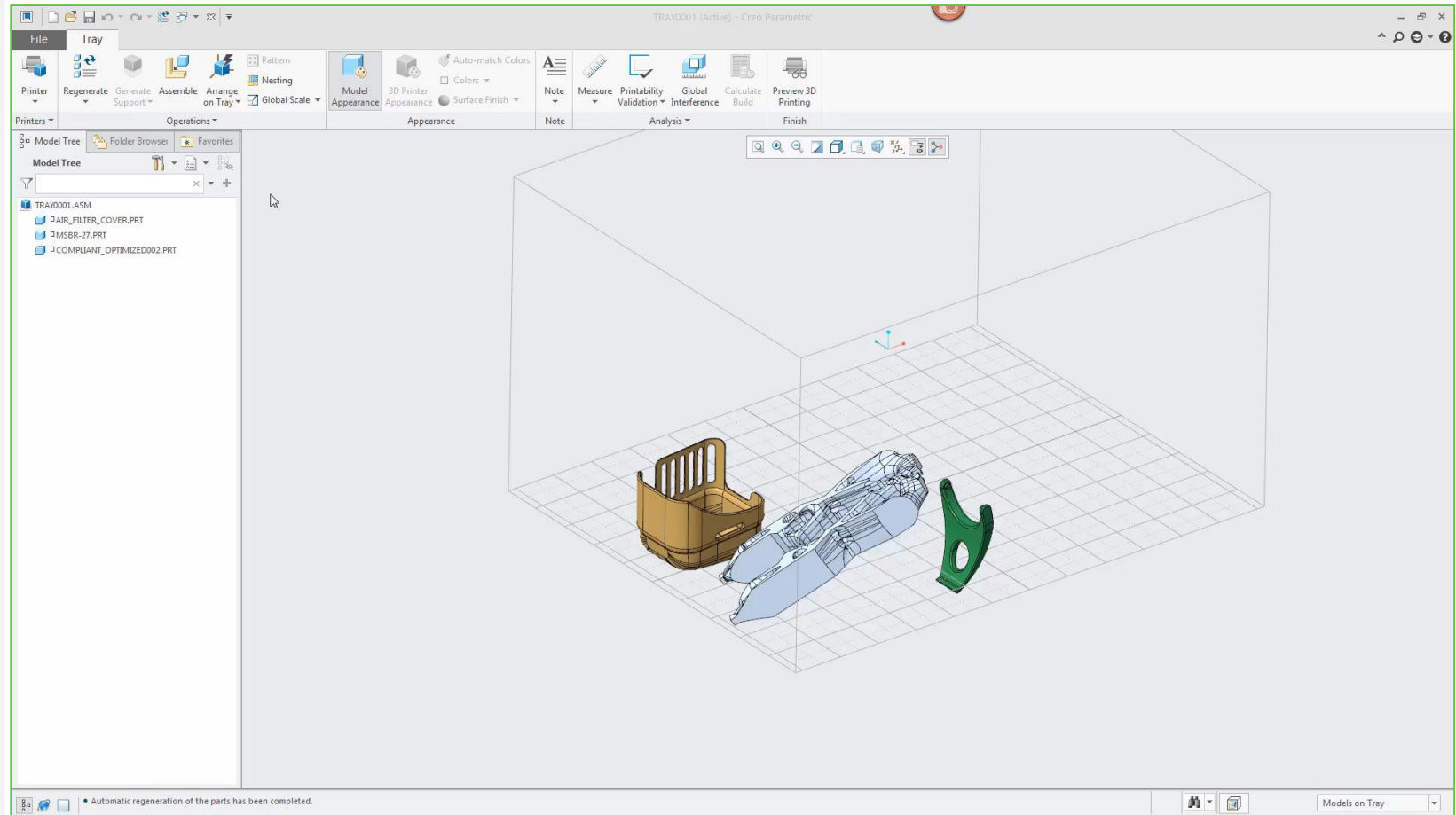
Powered by 

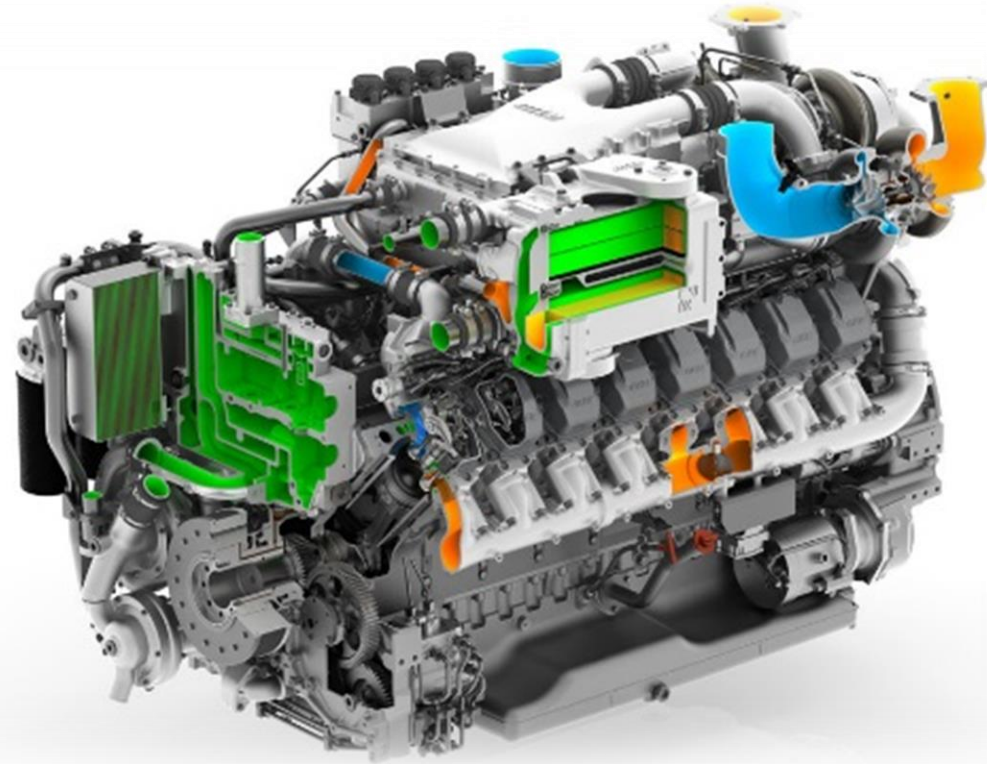


Support Generation

- Semi-automatic support generation for metal based on printer parameters

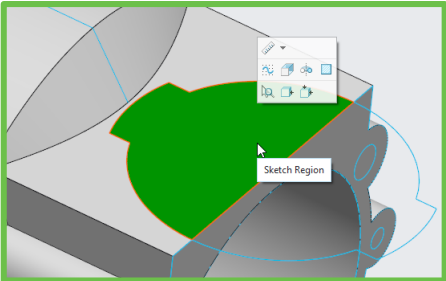
Powered by  materialise



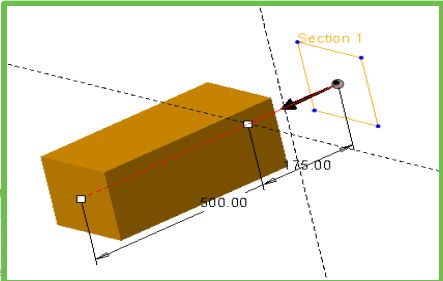


PRODUCTIVITY IMPROVEMENTS

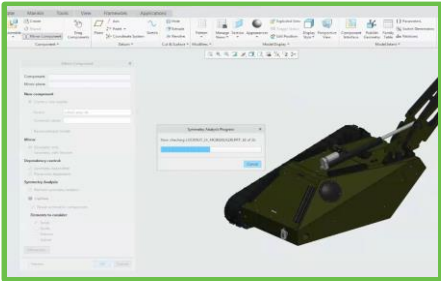
PRODUCTIVITY IMPROVEMENTS •



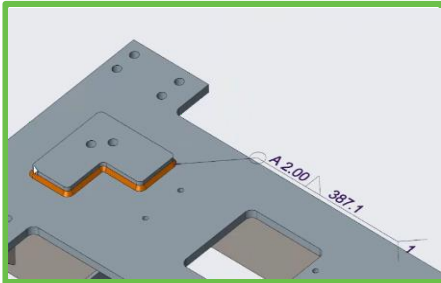
Sketch Improvements



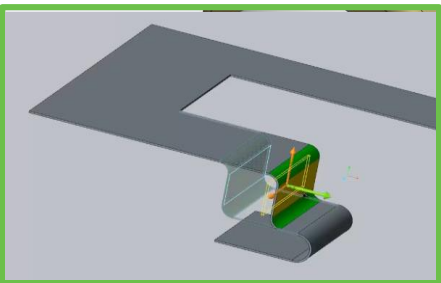
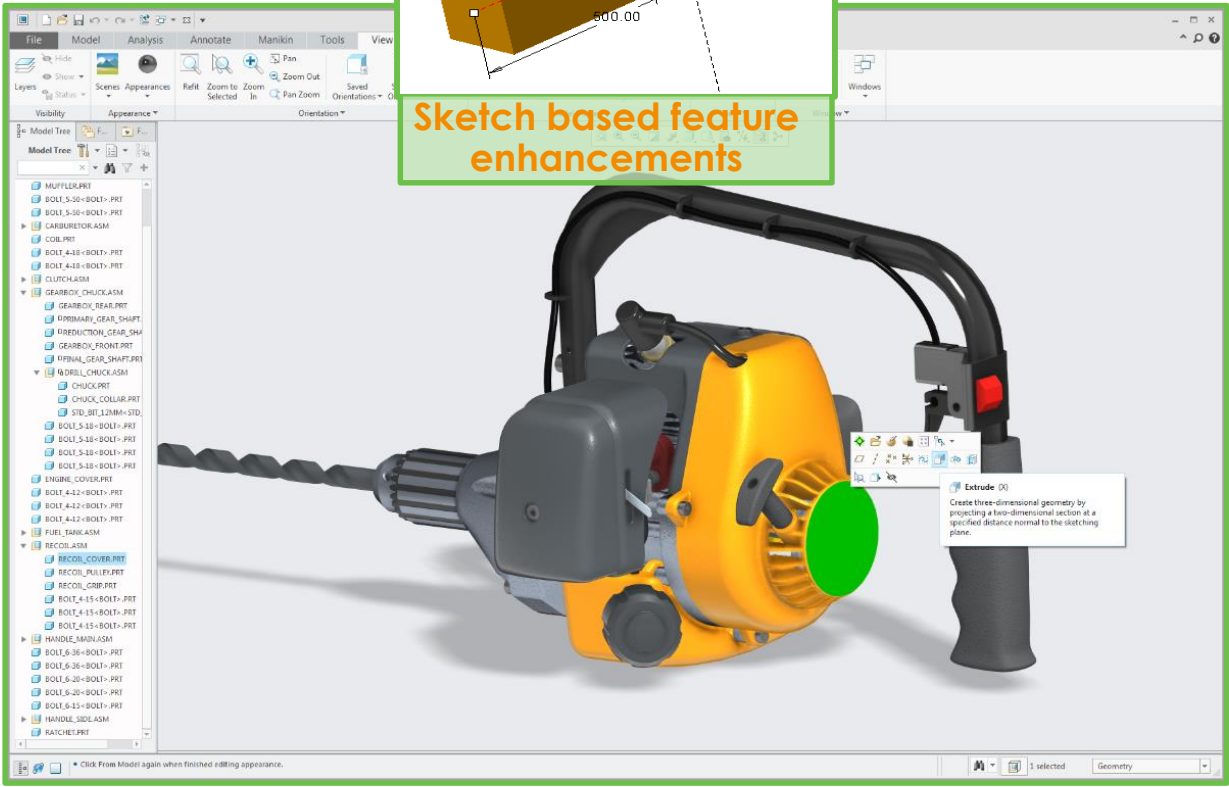
Sketch based feature enhancements



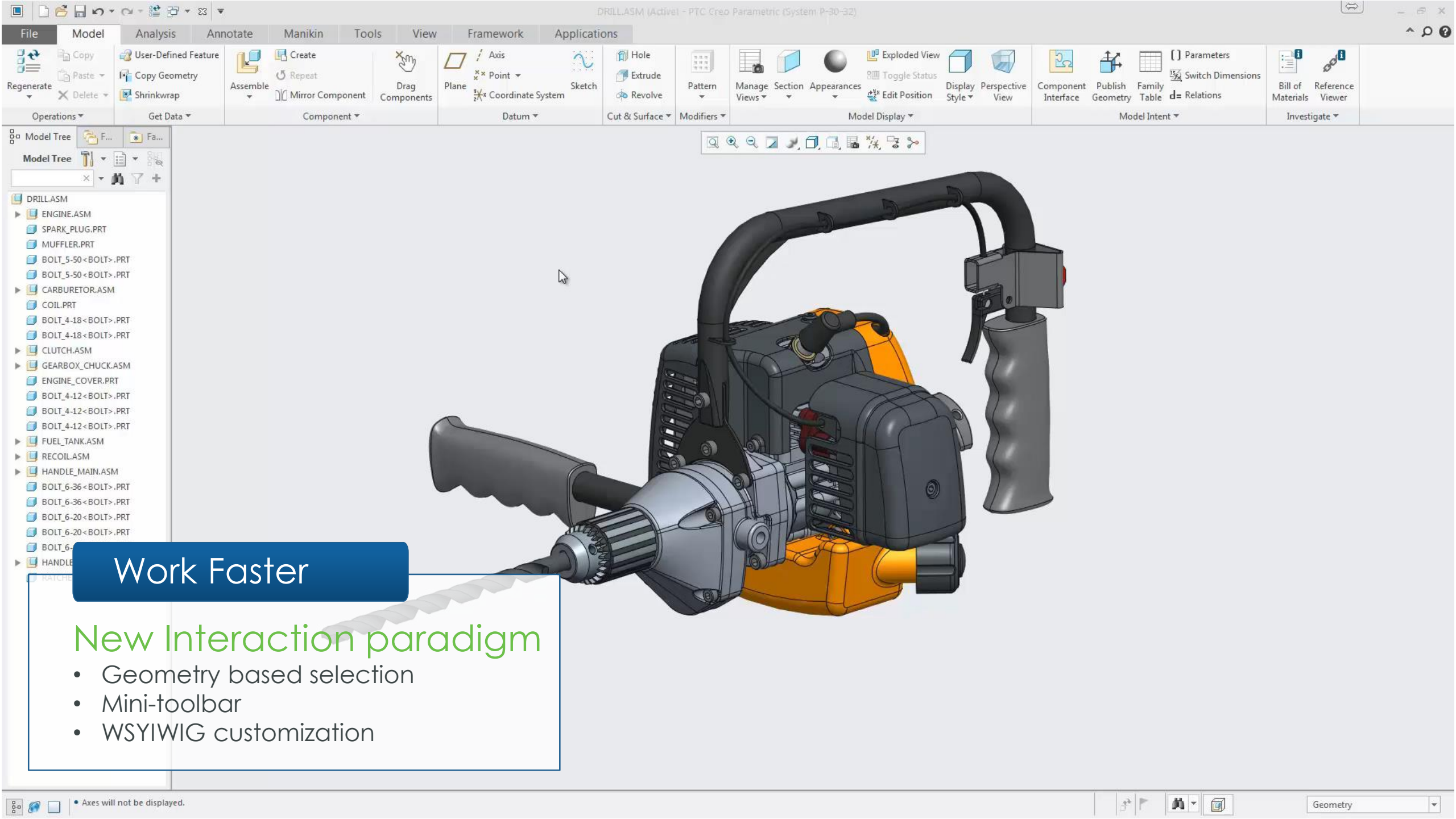
Intelligent Mirror



Solid Welds



Sheetmetal Direct Modeling



Work Faster

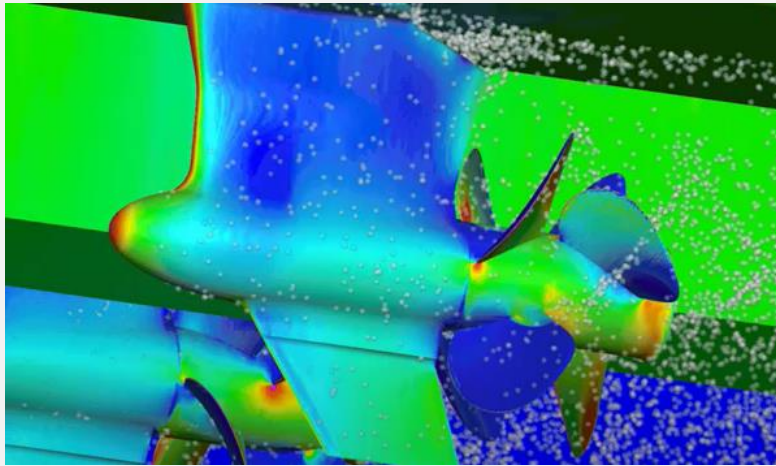
New Interaction paradigm

- Geometry based selection
- Mini-toolbar
- WSYIWIG customization

CREO FLOW ANALYSIS EXTENSION •

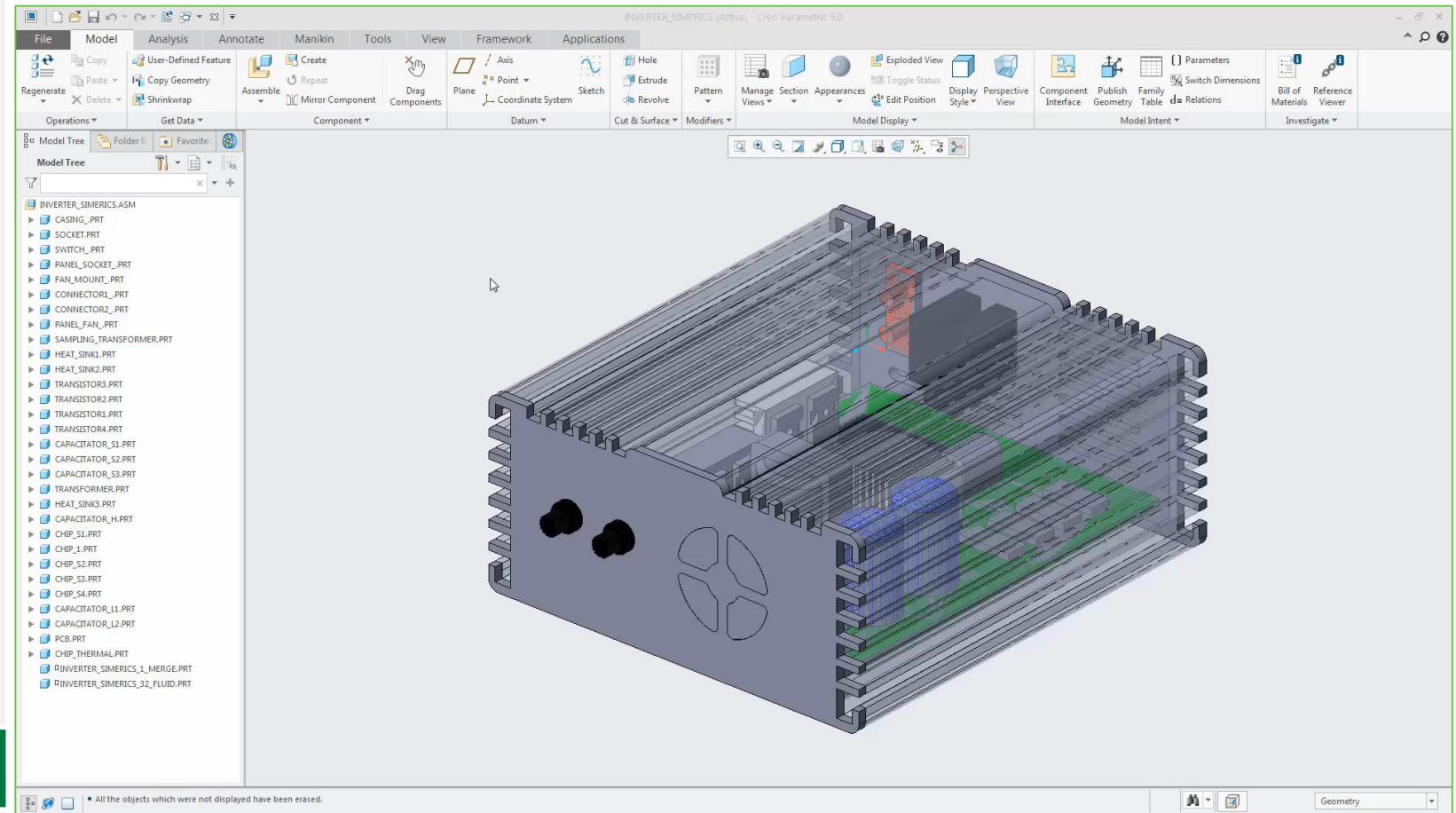
CFD

- Fully-integrated in PTC Creo
- Easy to setup and use
- Solution for the engineer through analyst
- High performance solver



Also in Creo 4.0 M040

Powered by



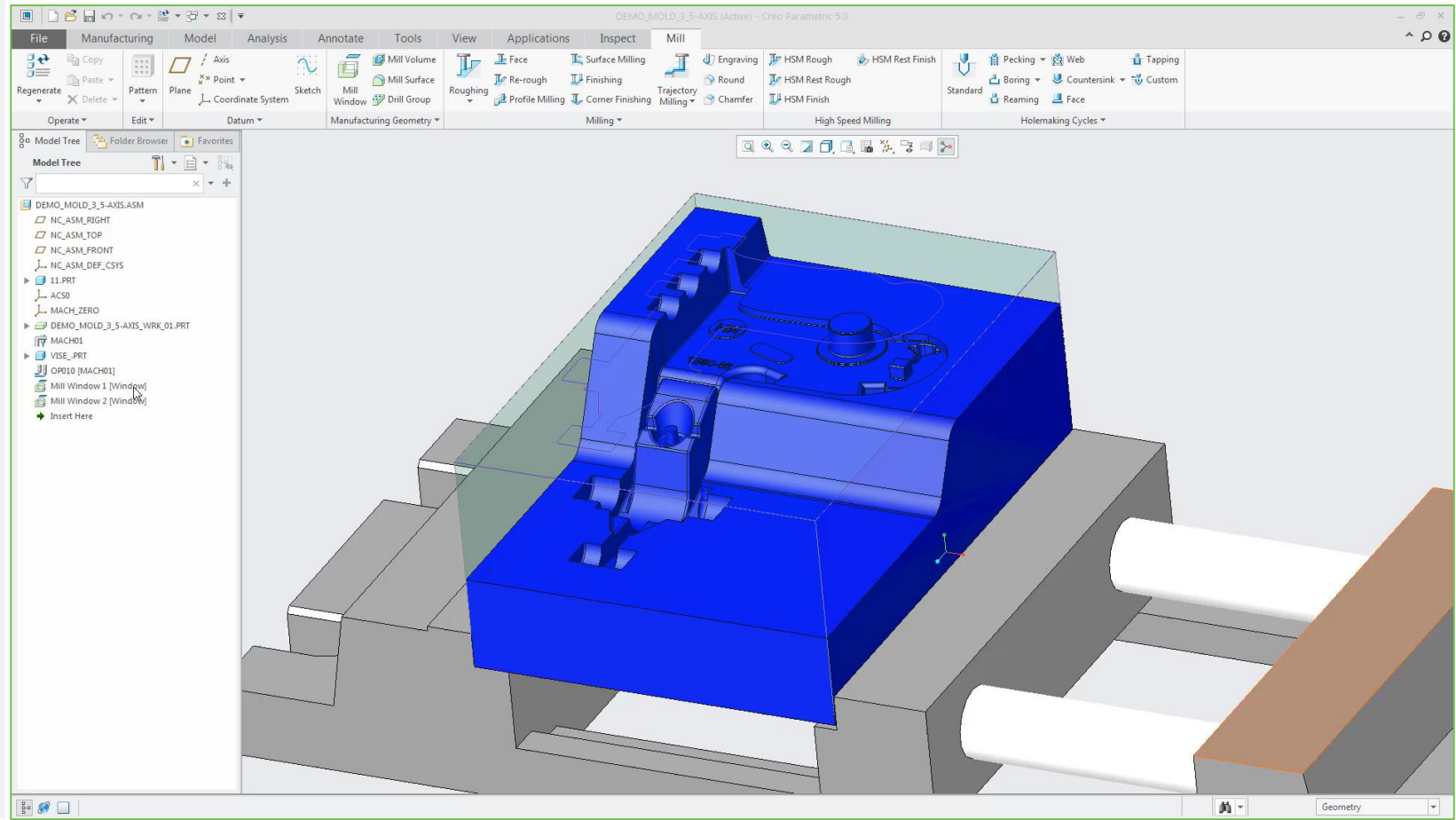
CREO MOLD MACHINING EXTENSION •

Mold Machining

- Fully-integrated in PTC Creo
- High Speed Machining toolpaths
- Multi-threaded for high speed calculation

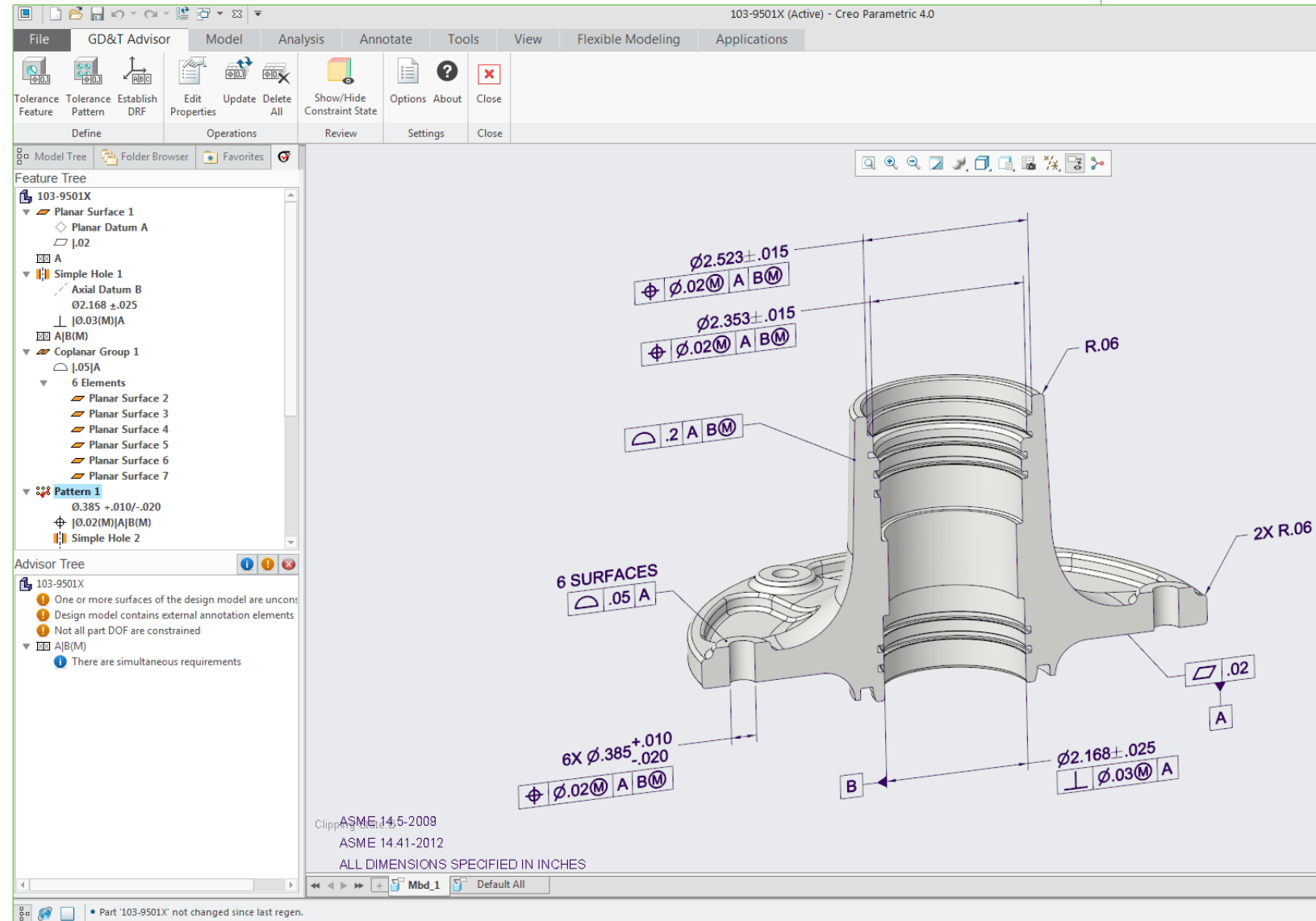


Powered by **Module Works**



84%

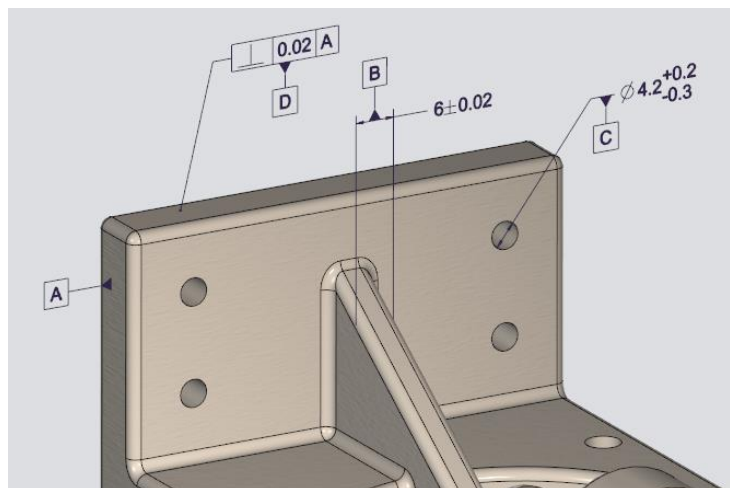
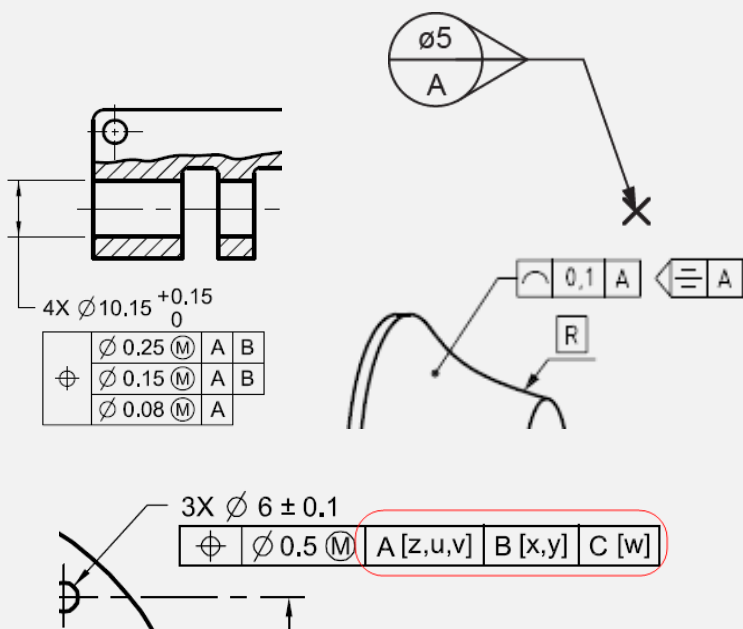
of products from best-in-class manufacturers achieve revenue, cost, launch and quality targets using model based engineering
- Aberdeen



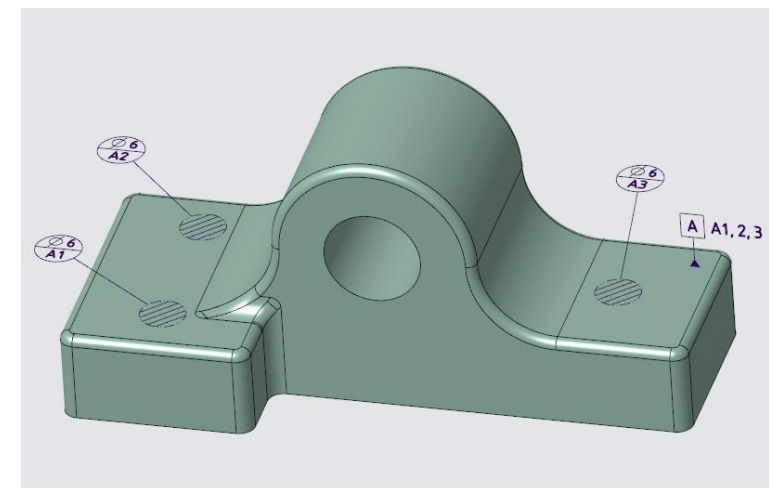
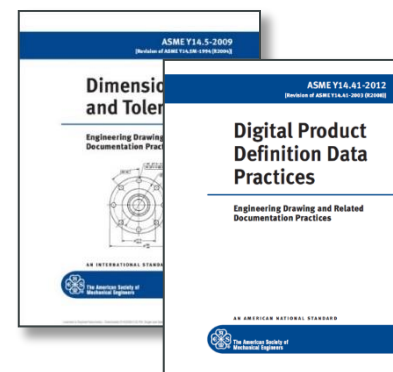
Improved Authoring

Standards support & Workflow

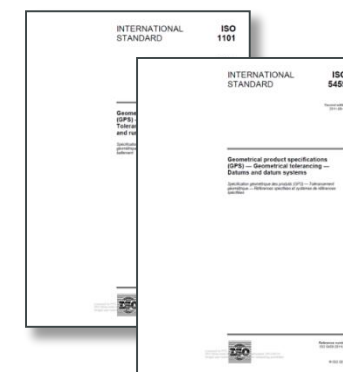
- ASME and ISO standard support
- Intelligent GD&T



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



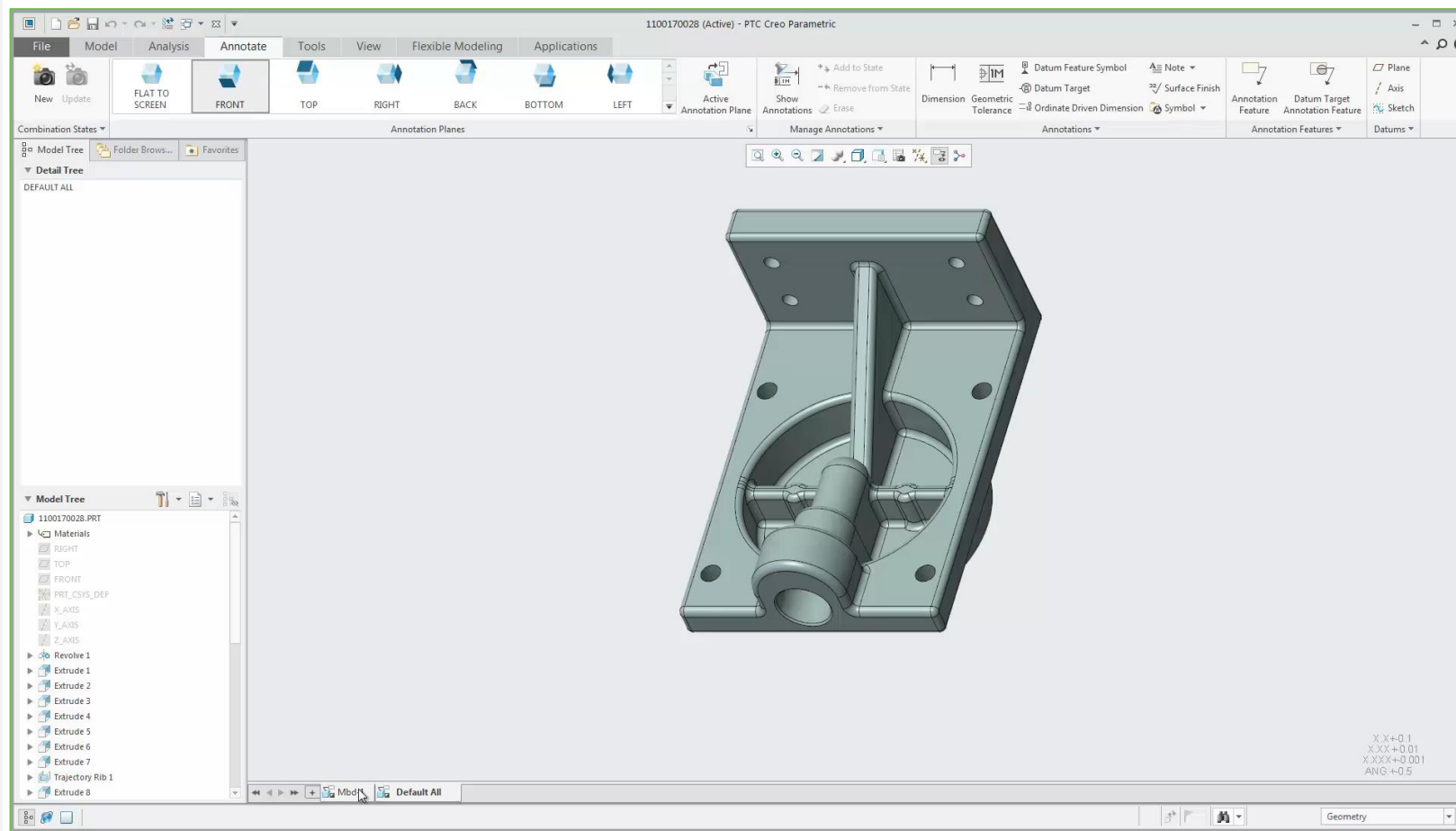
ISO 1101:2012
ISO 5459:2011
+ others...



GD&T Advisor

- Streamlined workflows
- Guide
- Educate
- Validate

Powered by  **Sigmatrix**



80%

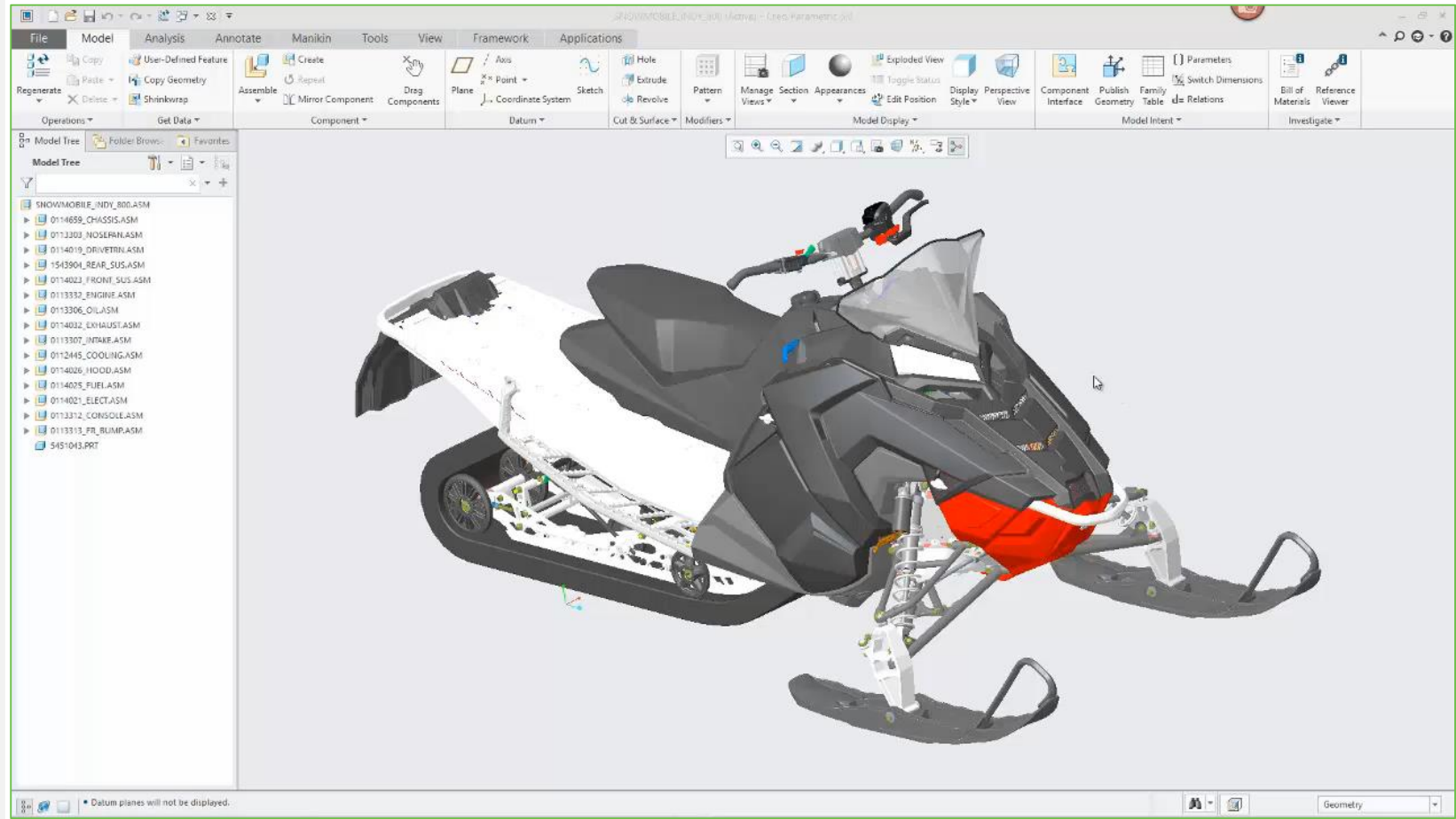
of use cases that
require human-to-
machine
interactions will use
immersive interfaces
by 2030
- Gartner



Benefits

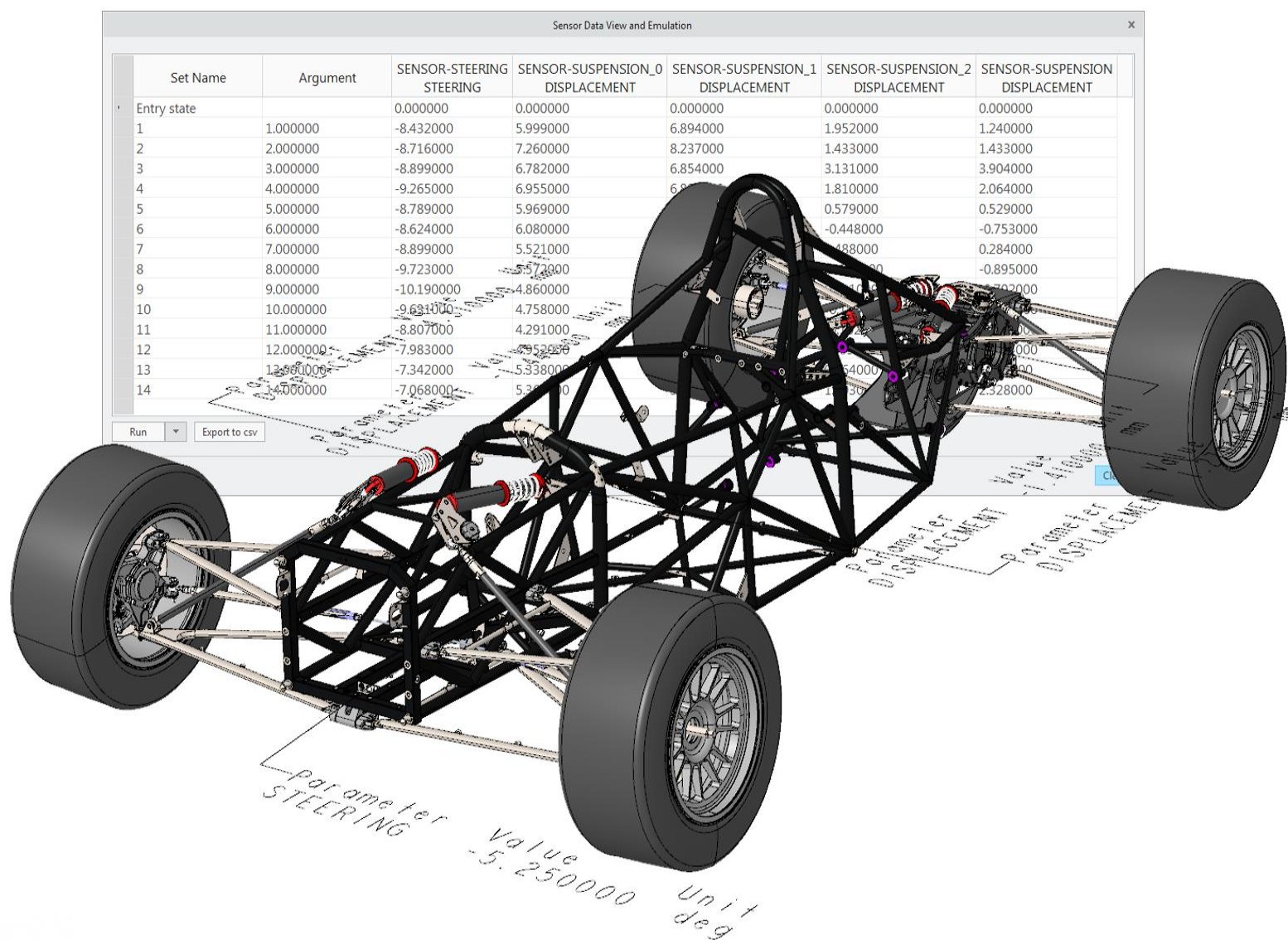
- Available on every seat
- Experience the Product in the Physical World at 1:1 Size and Scale
- Improve Design Review Effectiveness
- Enhance Sales and Marketing Engagements
- Share IP Securely
- Control and manage access to AR experiences

Powered by  vuforia™

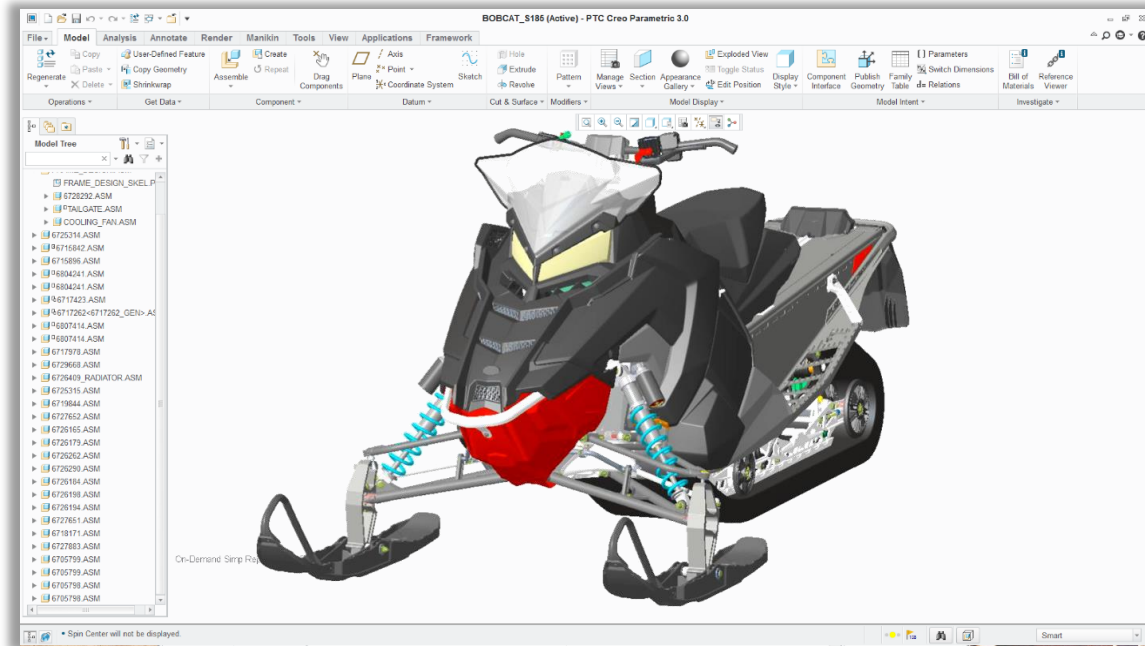


70%

of global discrete manufacturers will **offer connected products** by 2017, increasing the need for embedded software, systems engineering, and a product innovation platform
- IDC



Digital Prototype



Physical Product



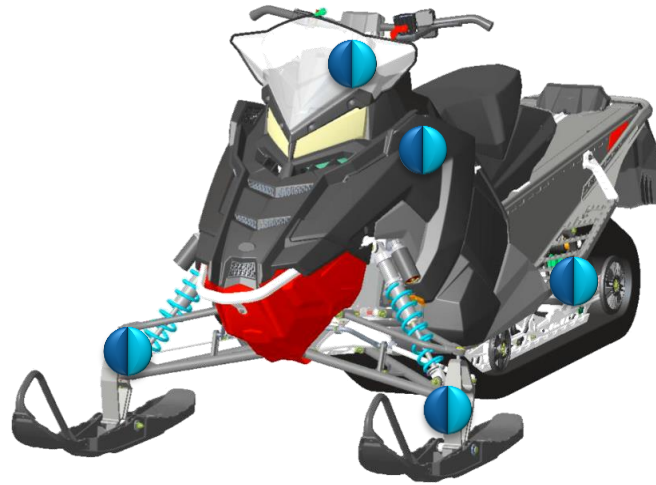
Physical Product



Physical Product



Digital Twin



Digital Twin: A digital representation of a unique occurrence of a physical product, used to gain greater insight into that product's state, performance and behavior.

Replace Assumptions with Facts

Optimize products to real world conditions

- Build sensors in your models, connect to sensors in the real world
- Using real world data to run simulations

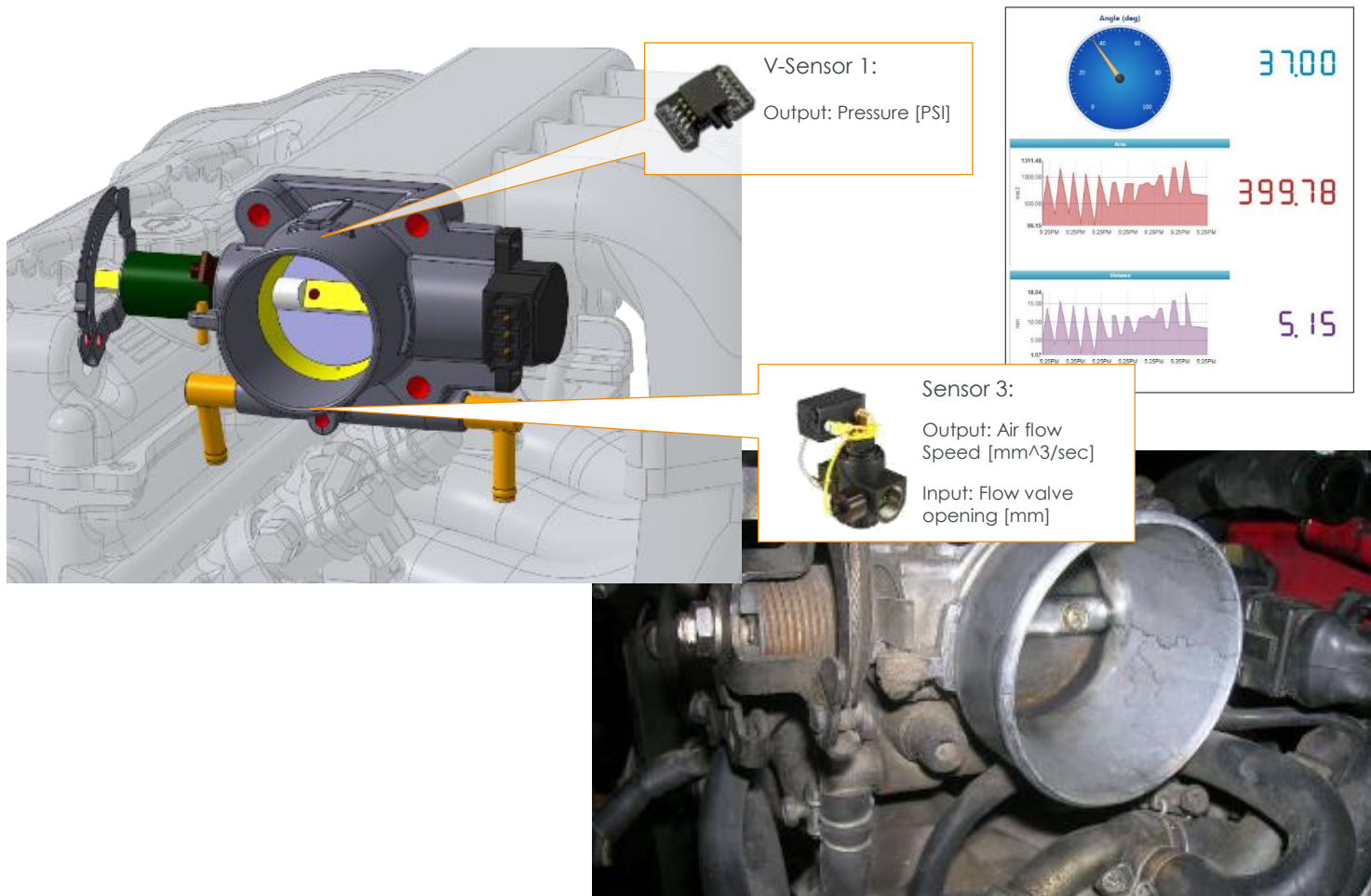
Create Virtual Sensors

- Use real world information to calculate data that can not be measured

Build out correct data streams

Share Results via ThingWorx

Powered by  thingworx®





AGENDA

THE FUTURE WITH CREO 6

- Design for Additive Mfg
- Usability/User Experience
- Productivity
- Simulation Driven Design

BEYOND

Additive Manufacturing

Design

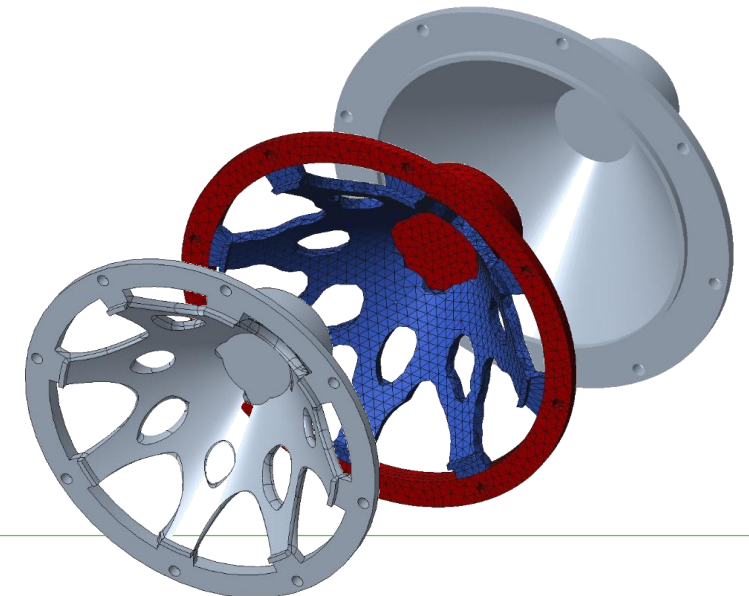
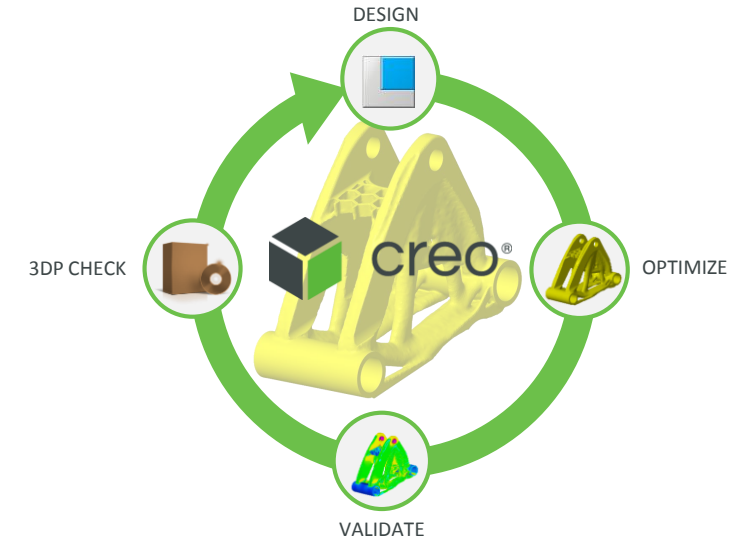
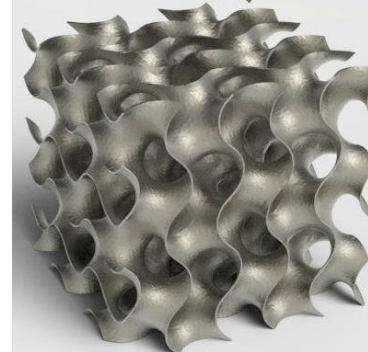
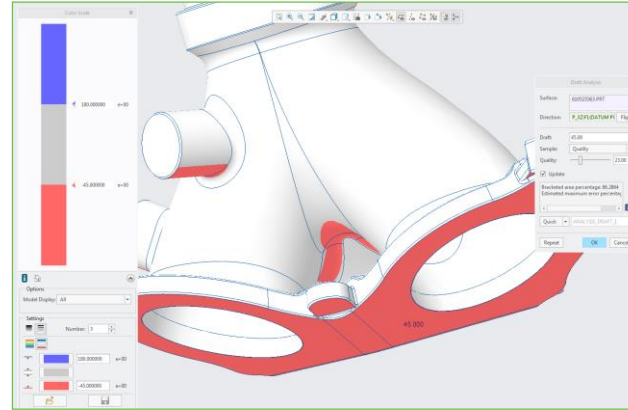
- Expand lattice capabilities
- Down skin Analysis

Optimize

- Support assemblies in Topology optimization
- Improved results window
- Improved geometry reconstruction

3D Print Check

- Enable 3rd party printer integrations
- 3MF Expansion



Usability

- Model tree improvements
- Modernized graphs
- Updated Skin & Dashboards
- In feature Mini-Toolbar

DRILL (Active) - Creo Parametric Version P-60-06

FileModelAnalysisAnnotateManikinToolsViewFrameworkApplications

CopyCopy GeometryPasteDeleteShrinkwrapGet DataUser-Defined FeatureAssembleRepeatMirror ComponentDrag ComponentsPlanePointCoordinate SystemDatumSketchExtrudeRevolveCut & SurfacePatternManage SectionAppearancesToggle StatusDisplay StylePerspective ViewComponent InterfacePublish GeometryFamily TableSwitch DimensionsBill of MaterialsReference ViewerInvestigate

Model Tree

BOBCAT_S185.ASM

773G_TVA_SKEL.PRT

ASM_RIGHT

ASM_TOP

ASM_FRONT

ASM_DEF_CSYS

FRAME.ASM

CAB.ASM

6705799.ASM

Annotations

ASSY_SIDE

ASSY_TOP

ASSY_FRONT

CSYS_ASM_DEF

6730771.ASM

1614765.PRT

6661287.PRT

6705799.ASM

6705799.ASM

6705799.ASM

6705799.ASM

BOOM1.ASM

Series Graph

StylesLegendTitle

Chart Background

Fill type: Solid color

Fill:

Chart Border

Color:

Style:

Thickness:

Corners: 0 px

Plot Area

Fill type: Solid color

Fill:

Opacity: 70 %

Plot Border

Color:

Style:

Magnitude

45.00

40.00

35.00

30.00

25.00

20.00

15.00

10.00

5.00

0.00

Time [sec]

0.00

0.50

1.00

1.50

2.00

2.50

3.00

PARAMETER_1

PARAMETER_1

Hole

Lorem Ipsum text of the tooltip text. This text describes the feature and tells alittle. hola eld [Read more...](#)

Select Type

Solid

Surface

Edit Depth

More Settings

Solid

Surface

Placement

Shape

Note

Properties

OK

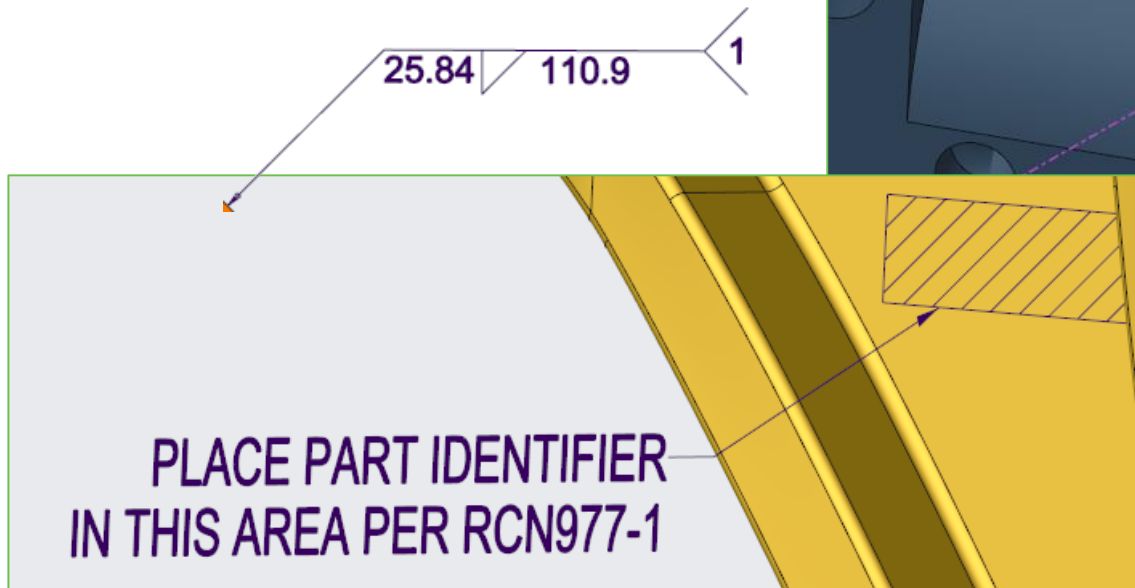
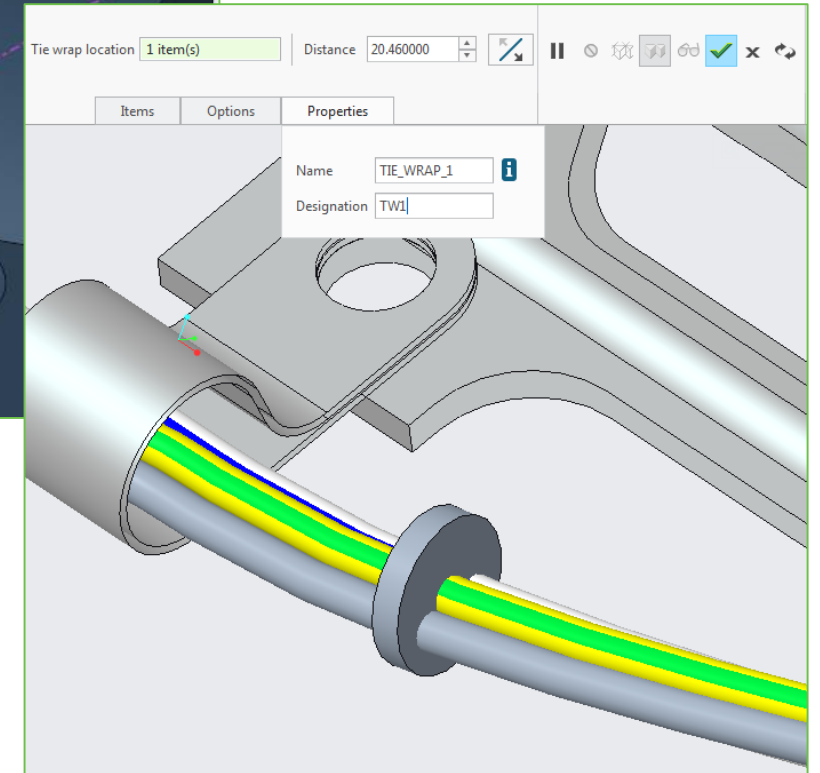
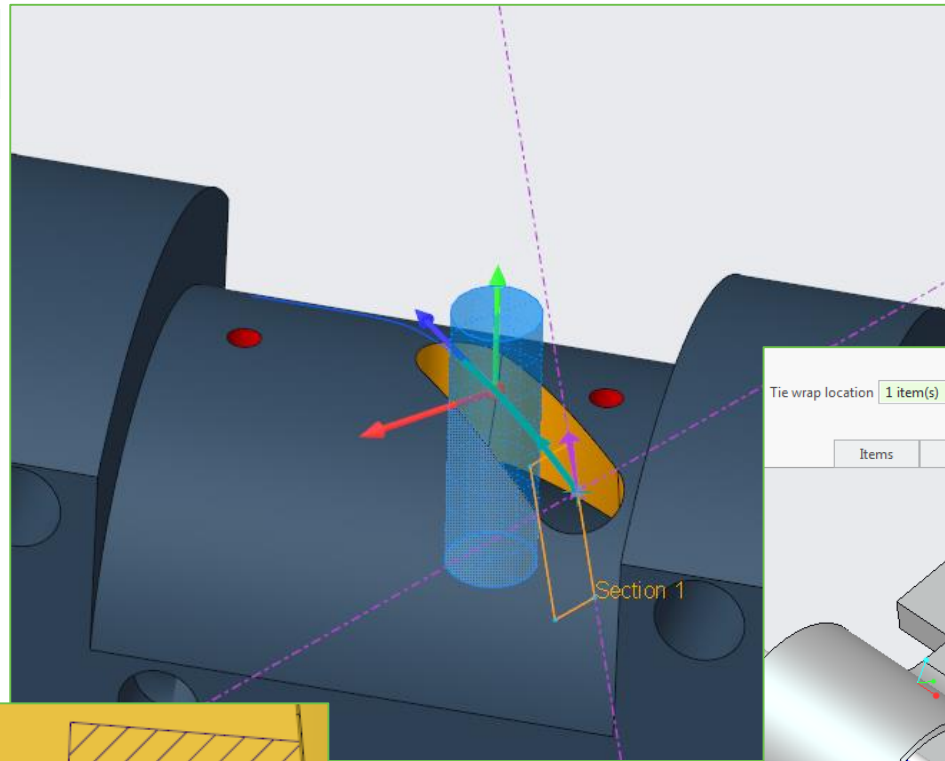
Cancel

Forward looking information subject to change

40

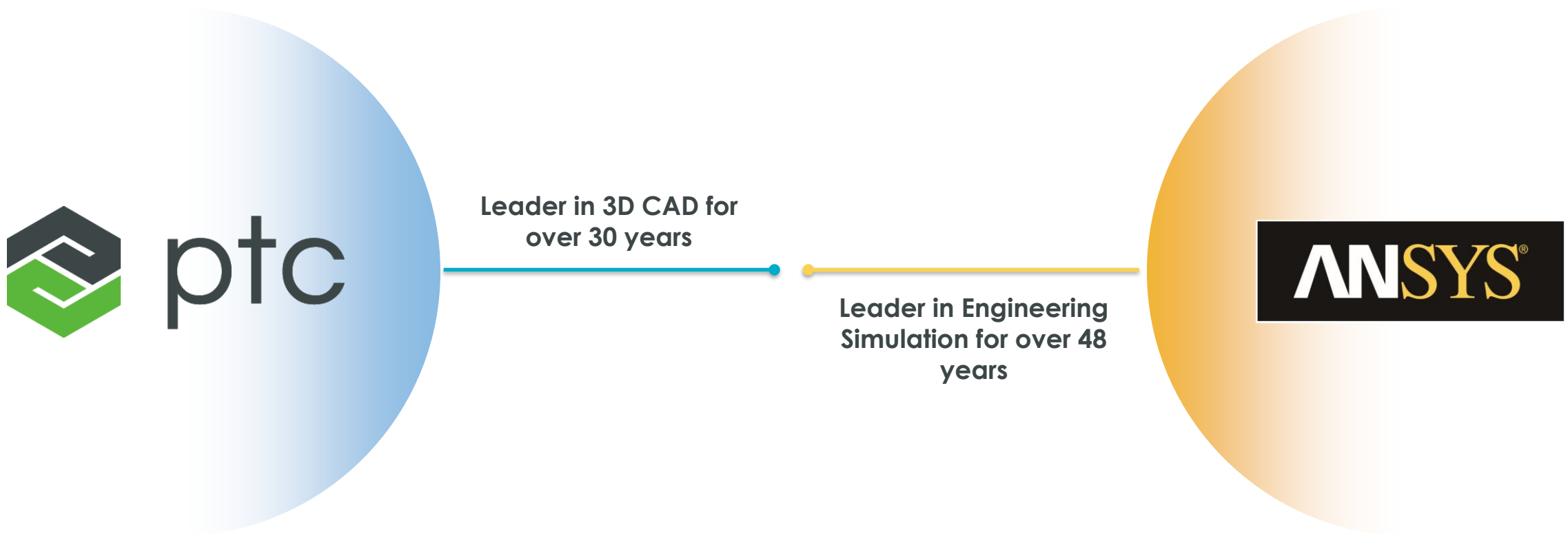
Productivity

- Cable Ties and Markers
- Continued Volume Sweep
- MBD Continued expansion



FUTURE OF SIMULATION DRIVEN DESIGN

Revolutionize product design by removing the barriers between CAD and CAE



FUTURE OF SIMULATION DRIVEN DESIGN



Revolutionize product design by removing the barriers between CAD and CAE

Partnership provides
best and broadest
portfolio of
engineering simulation
software



PTC and ANSYS will put
the power of gold-
standard simulation at
the fingertips of the
Design Engineer

SIMULATION DRIVEN DESIGN CHALLENGES•



SIMULATION DRIVEN DESIGN CHALLENGES•



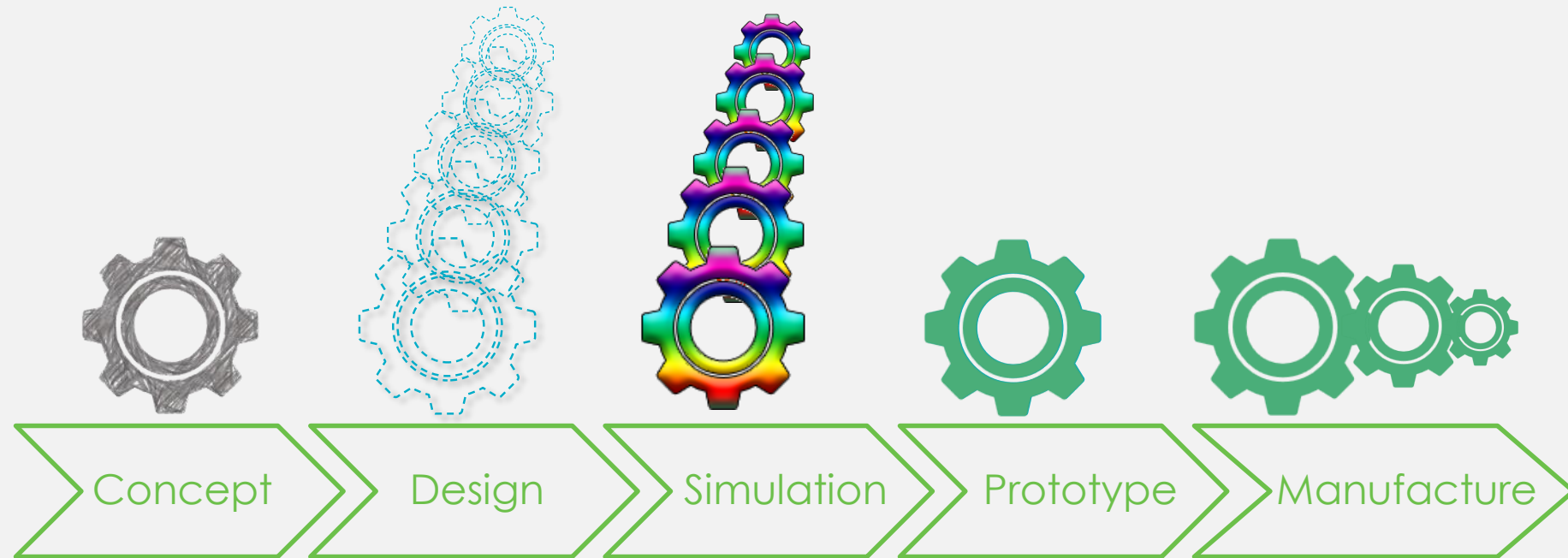
- Need to consult an expert

SIMULATION DRIVEN DESIGN CHALLENGES•



- Need to consult an expert
- Can't use the actual design model – need a simplified copy

SIMULATION DRIVEN DESIGN CHALLENGES



- Need to consult an expert
- Can't use the actual design model – need a simplified copy
- Design is an iterative process

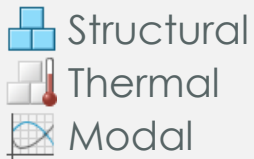
TRUE SIMULATION DRIVEN DESIGN •



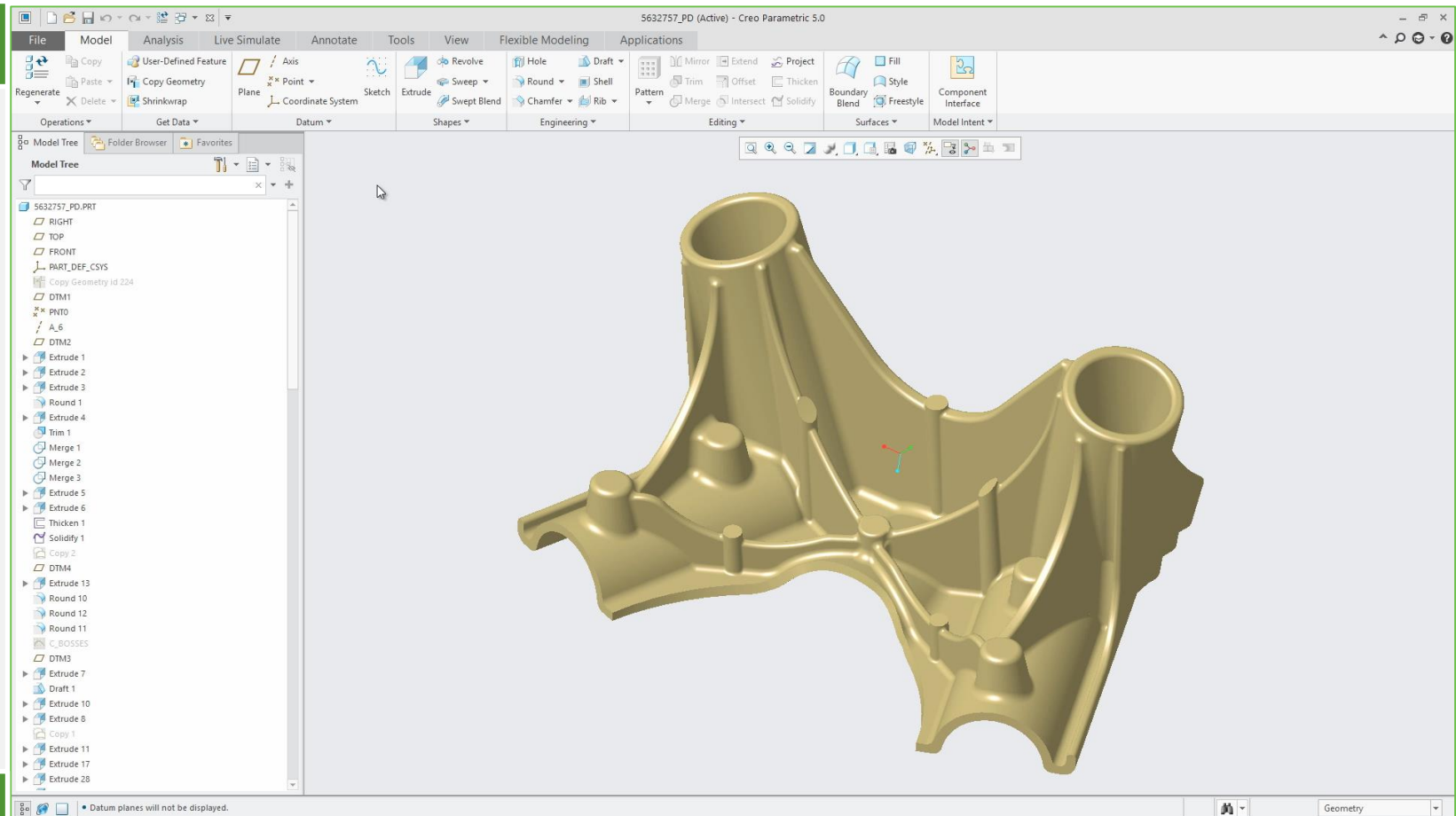
A new paradigm in 3D design exploration, bringing real-time simulation into the hands of every engineer, fully integrated into Creo Parametric

Features

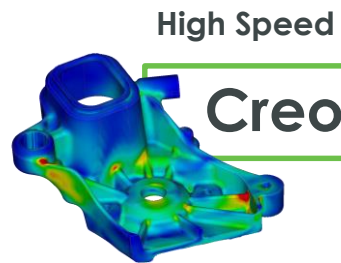
- **Speed** – Instantaneous simulation experience
- **Ease of use** – Run 1st simulation in minutes.
- **Geometry enabled** – Easily edit or create features while the analysis is running
- **Interactive** – Analysis results update dynamically as user makes geometry modification
- **Initial capabilities:**



Also in Creo 4 & 5

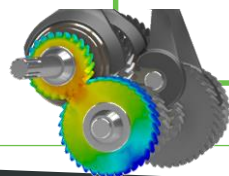


TRUE SIMULATION DRIVEN DESIGN •



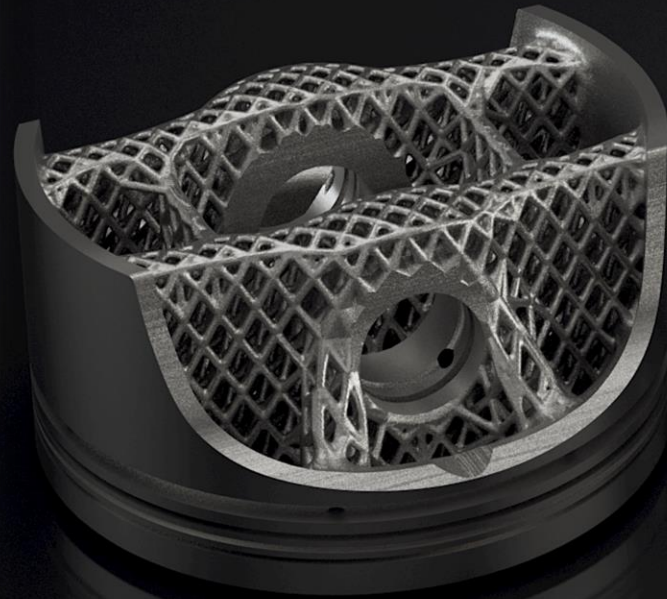
Creo Simulation Live

Instantaneous & interactive guidance for concept and detailed design



Creo Simulation

High-fidelity, high-accuracy simulation for design refinement and validation



FRUSTUM

“GENERATE® has been a game changer for my team. The ability to shortcut the design process from months to days with real usable geometry is unprecedented in my experience.”

– Harry Zhong
Breakthrough Innovation Technical Lead,
Stanley Black and Decker

StanleyBlack&Decker



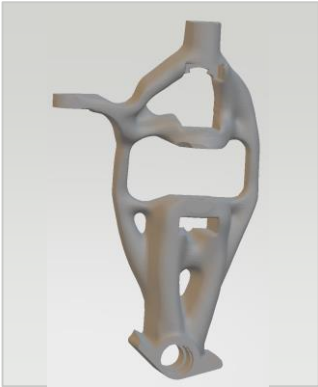
Design Process

GENERATE

ITERATE

VALIDATE

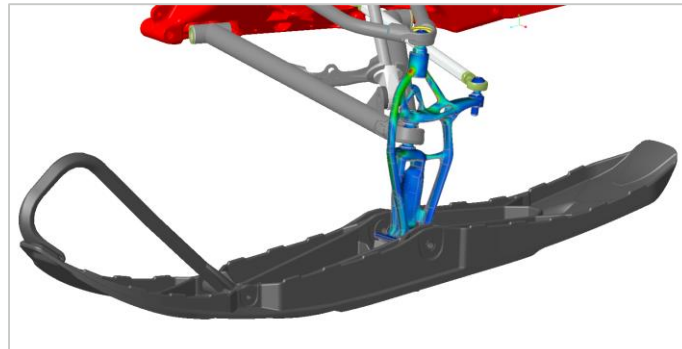
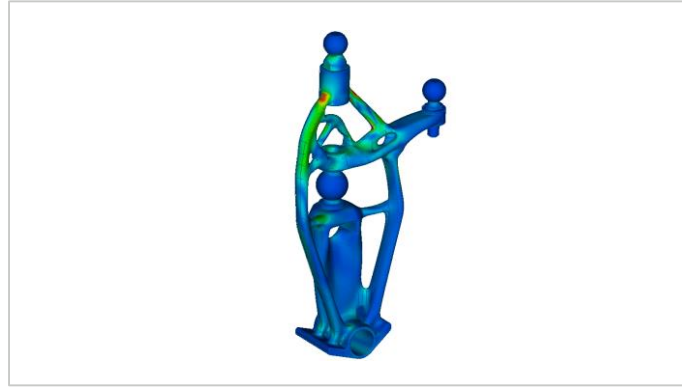




Generate



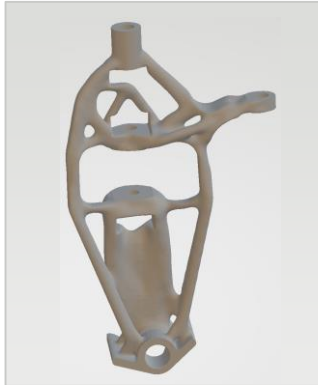
FRUSTUM



Generate

Iterate

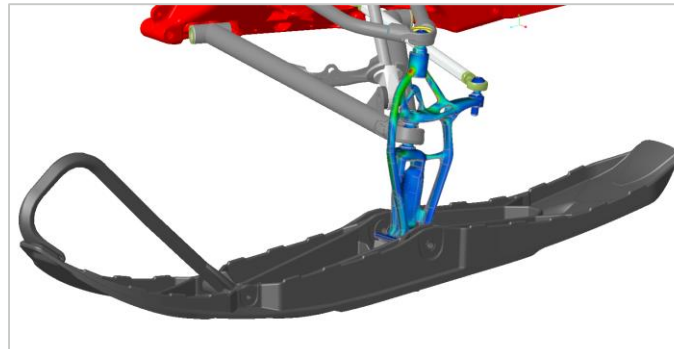
RESHAPING ENGINEERING THROUGH MODERN COMPUTING



Generate



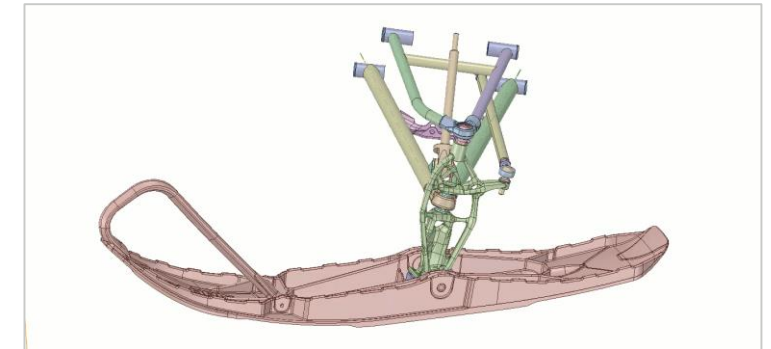
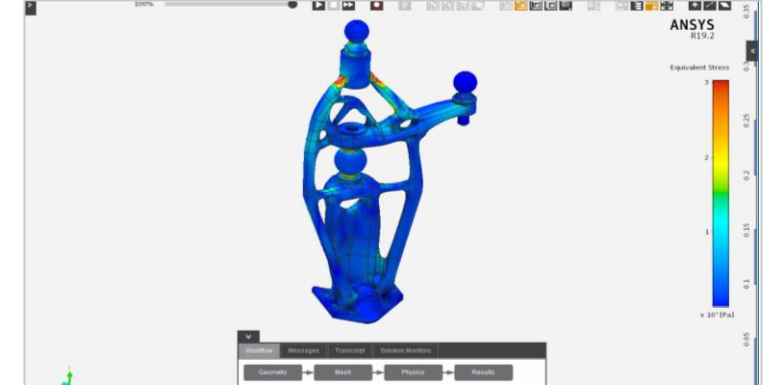
FRUSTUM



Iterate



Simulation Live

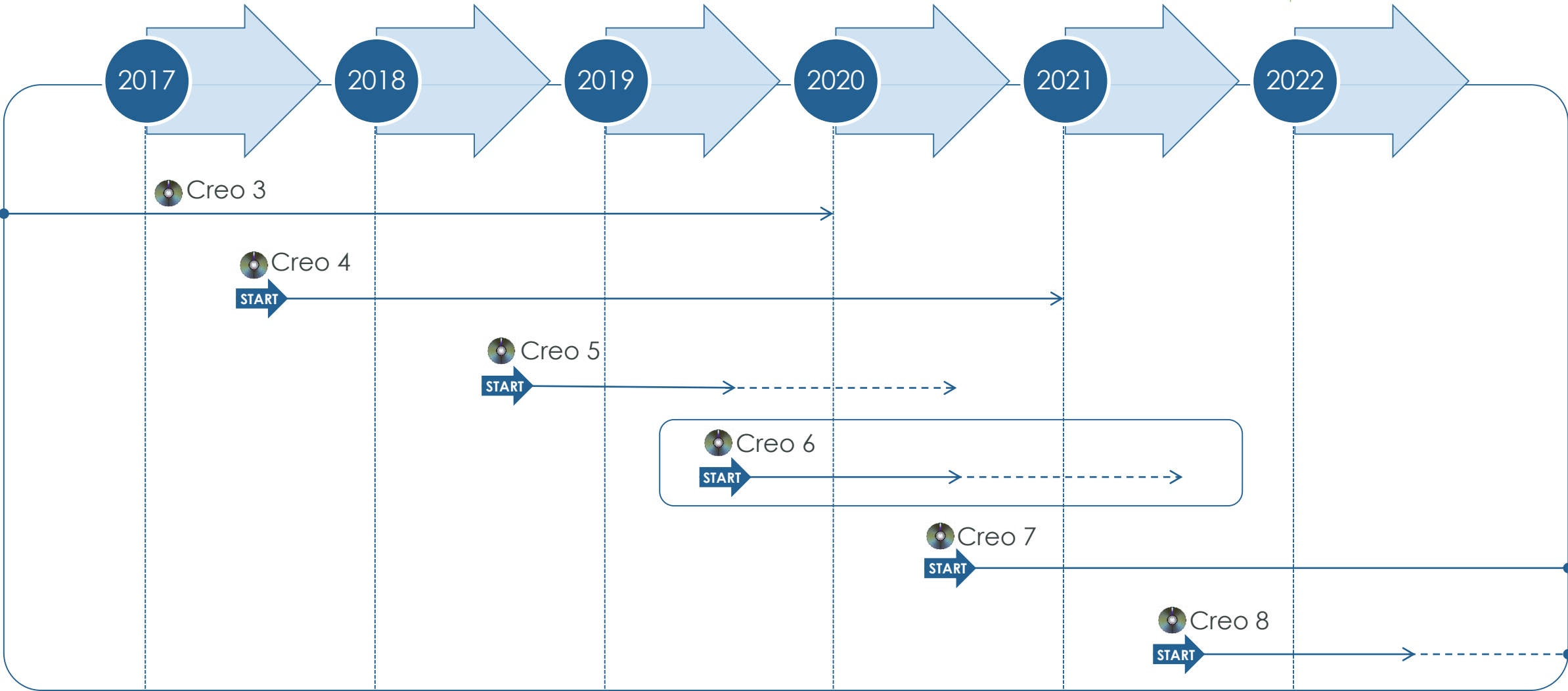


Validate



Simulation AIM

CREO ANNUAL RELEASE CADENCE •



Maintenance releases every 3 Months



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June 10 – 13, 2019

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