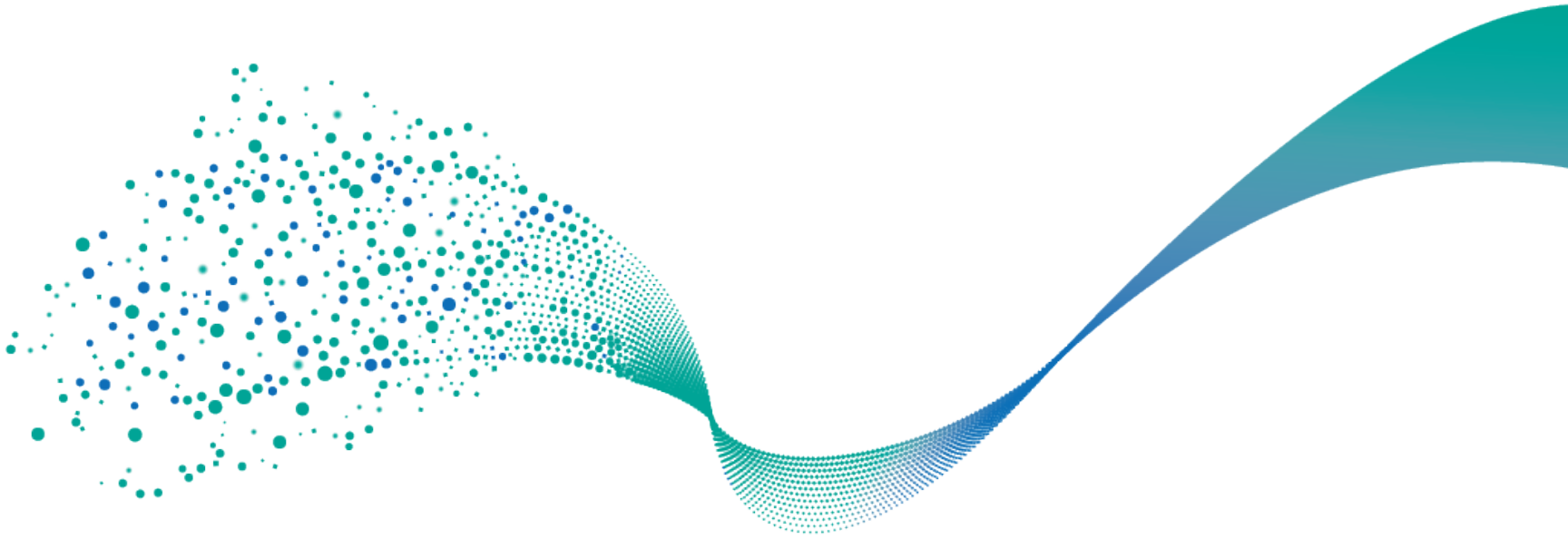
Extending the Digital Thread with Model-Based Characteristics (MBC) and QIF

DMSC Webinar 10/16/2026



Evan Kessick – Bio:

Evan Kessick
Director of Model-Based Initiatives

- 18+ years working in engineering and design, 8+ GD&T Training/Mentoring
- Led and advised on MBD and MBE Implementations for 7 years
- Industry Standards Involvement:
  - ASME MBE Committee Chair
  - ASME MBE & Y14 Harmonization Committee Co-Chair
  - ASME Y14.41 Member
  - ASME Y14.5-2009 GDTP Senior Certified
  - Involved with the DMSC, and DEDMWG

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Daniel Campbell | Rubypoint

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President, Rubypoint

Chair, QIF Working Group

Member, DMSC Board of Directors

Member, Technical Advisory Committee, MxD

Member, ASME Y14 MBD Harmonization Committee

Previously: VP MBD, Capvidia; Director of Software, Metrosage

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Strategic MBE Consulting

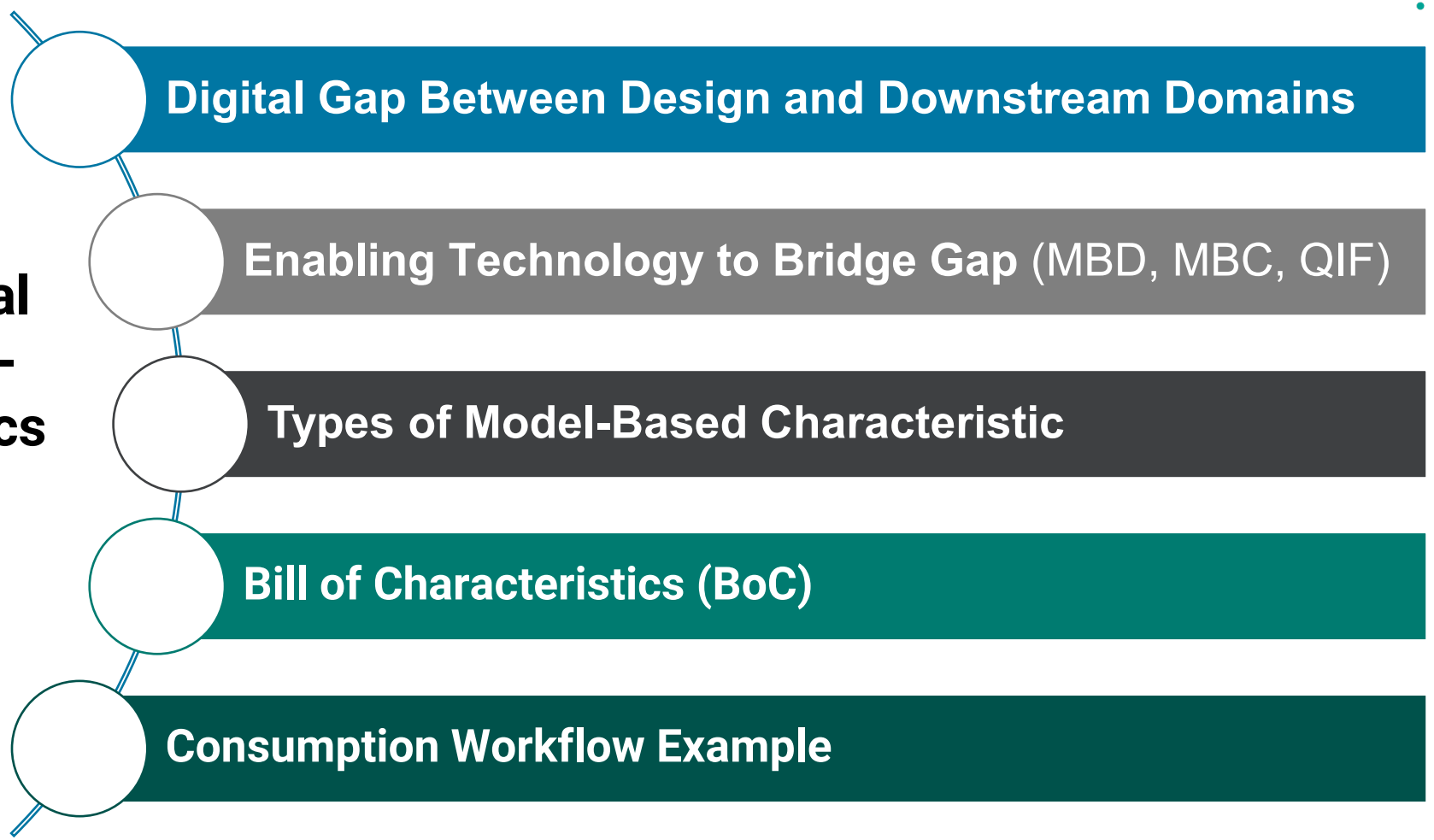
Helping end users understand the landscape of MBD technology and unlock the roadmap to a successful MBD implementation.

CAD/MBE Software Services

Providing expert software development services in CAD, MBD, QIF, Characteristic Management, and beyond.

Agenda

Extending the Digital Thread with Model-Based Characteristics (MBC) and QIF



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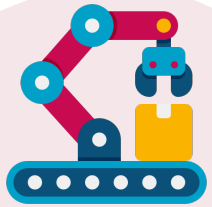
Digital Gap Between Design & Ops

Product Engineering

- CAD/PLM
- Requirements
- Simulation
- Costing

Valley of Death



Manufacturing & Quality

- Manufacturing Planning
- Quality Planning
- Metrology
- CAM & Other Process

📝🔁⏳ **Manual handling of characteristics at each stage is a burden**

👩‍🔧🎲⚖️ **Inconsistent processing of characteristics by personnel**

🙈🚫👁️ **No visibility of characteristics across enterprise**

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Digital Thread, MBD, and Characteristics

What is the Digital Thread?

- We have amazing, expert point technologies in narrow domains
- The Digital Thread is connecting these technologies to allow interactions

Enabling Technology

MBD is the data language for product data

Characteristics: the atomic unit of data in an MBD

Semantic characteristics are the core building block for the digital thread

How To

- Don't think of the enabling technology in the abstract
- Identify use cases in detail – then we can understand the application of the technology

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Model-Based Characteristics (MBC)

Model-Based Characteristics

DMSC 2024

How should we track characteristics?

Besides the characteristic ID, what additional metadata should we track?

Model-Based Characteristics provides guidelines for thinking of characteristics as business objects.

Even though it addresses the model-based case directly, its principles can be applied broadly, even to drawing-based products.

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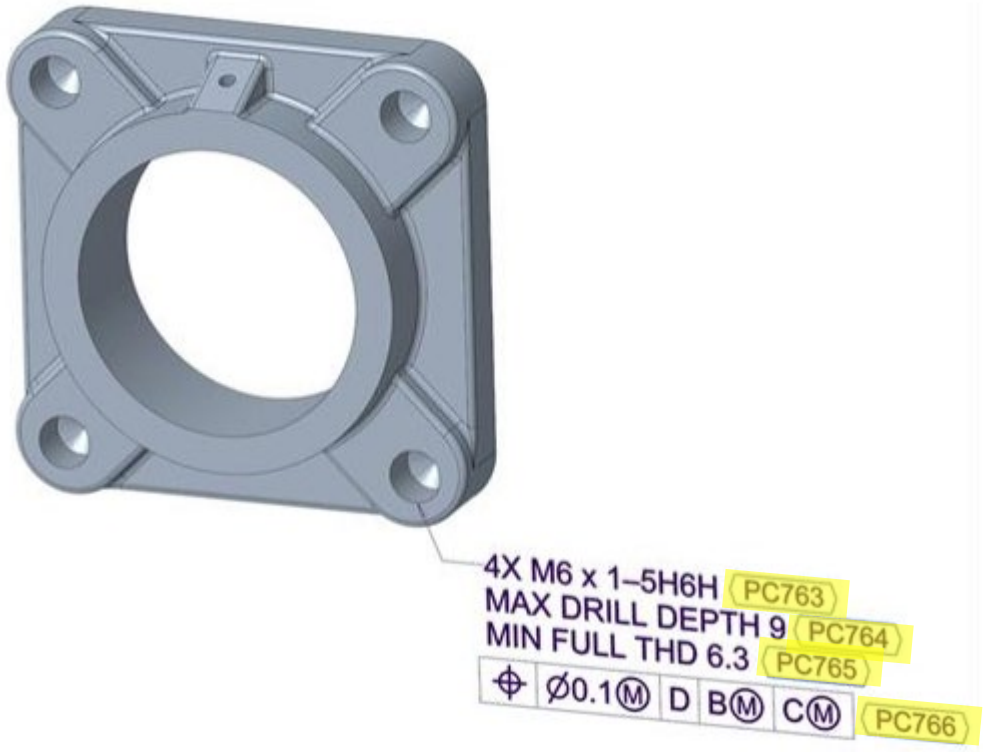
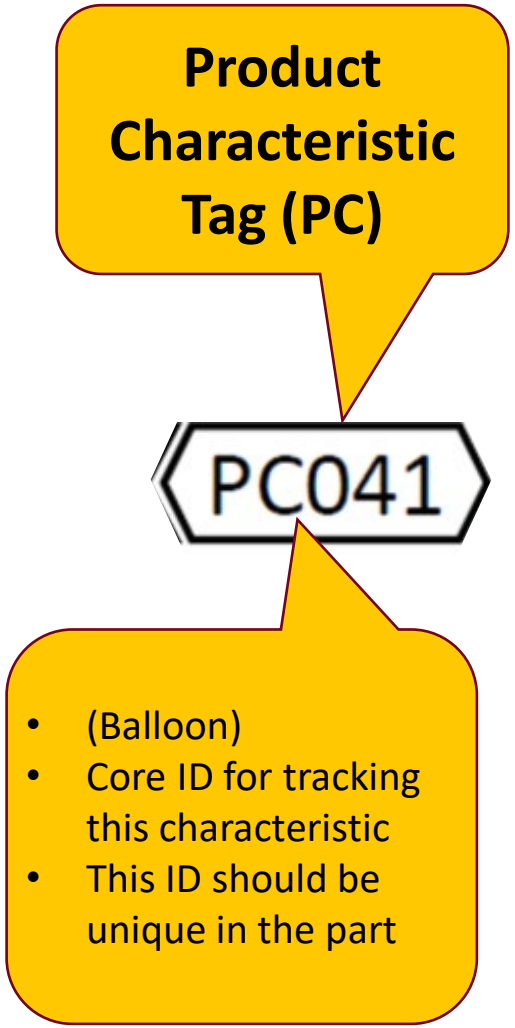
Model-Based Characteristics (MBC)



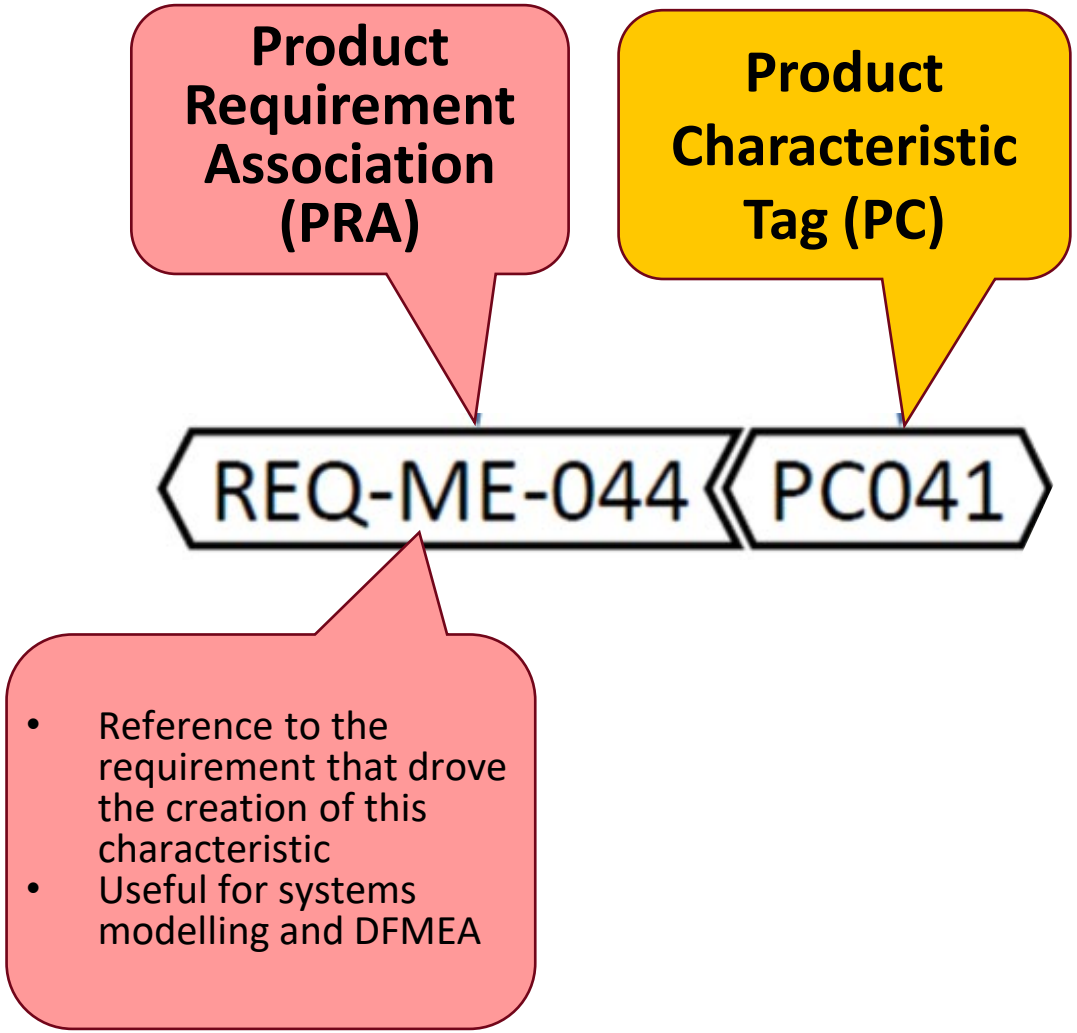
MBC Standard Overview

- **Characteristics IDs (Balloons)**
- Augmentations:
  - Criticality Classifications
  - Product Requirements Associations
  - Verification Plan Requirements

Model-Based Characteristics (MBC)



Model-Based Characteristics (MBC)



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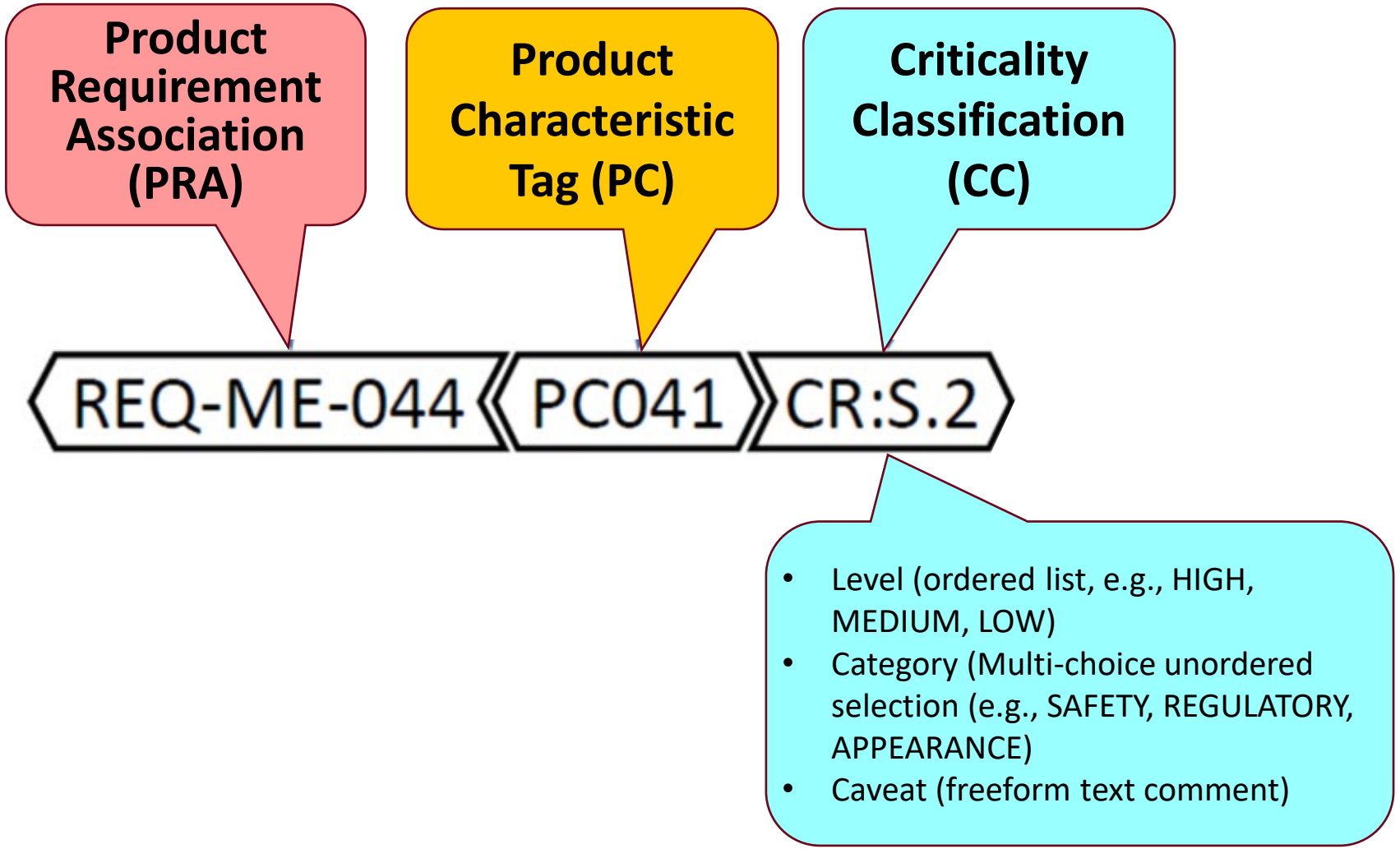
Model-Based Characteristics (MBC)



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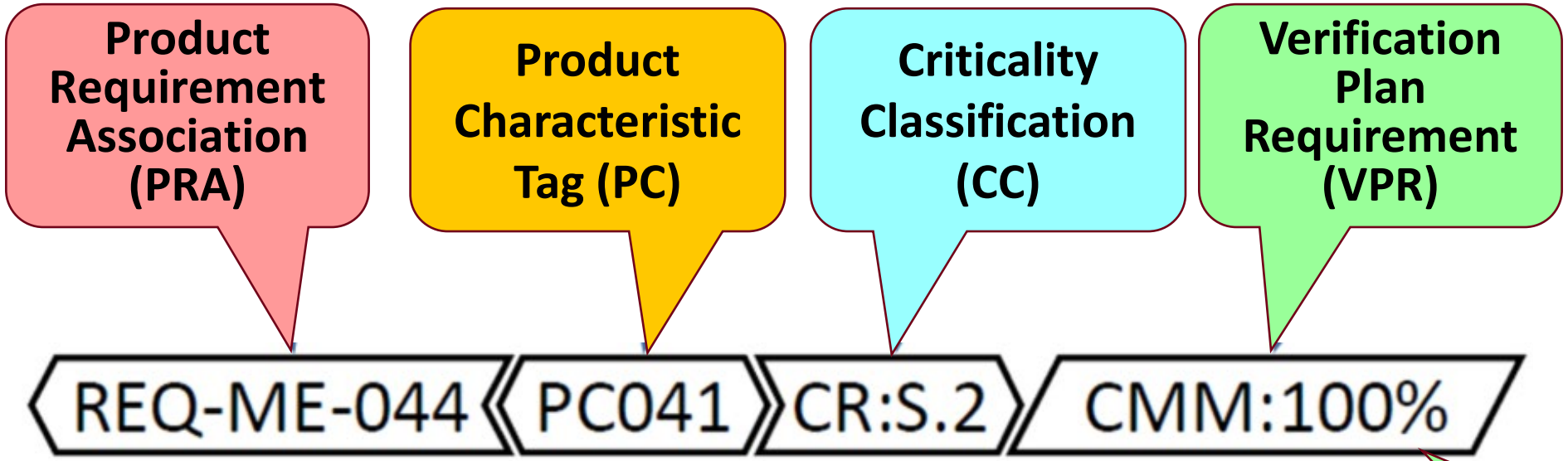
Model-Based Characteristics (MBC)



- Method (e.g., CMM, Caliper)
  - Alternative, too
- Context (e.g., FAI, Production)
- Sampling plan

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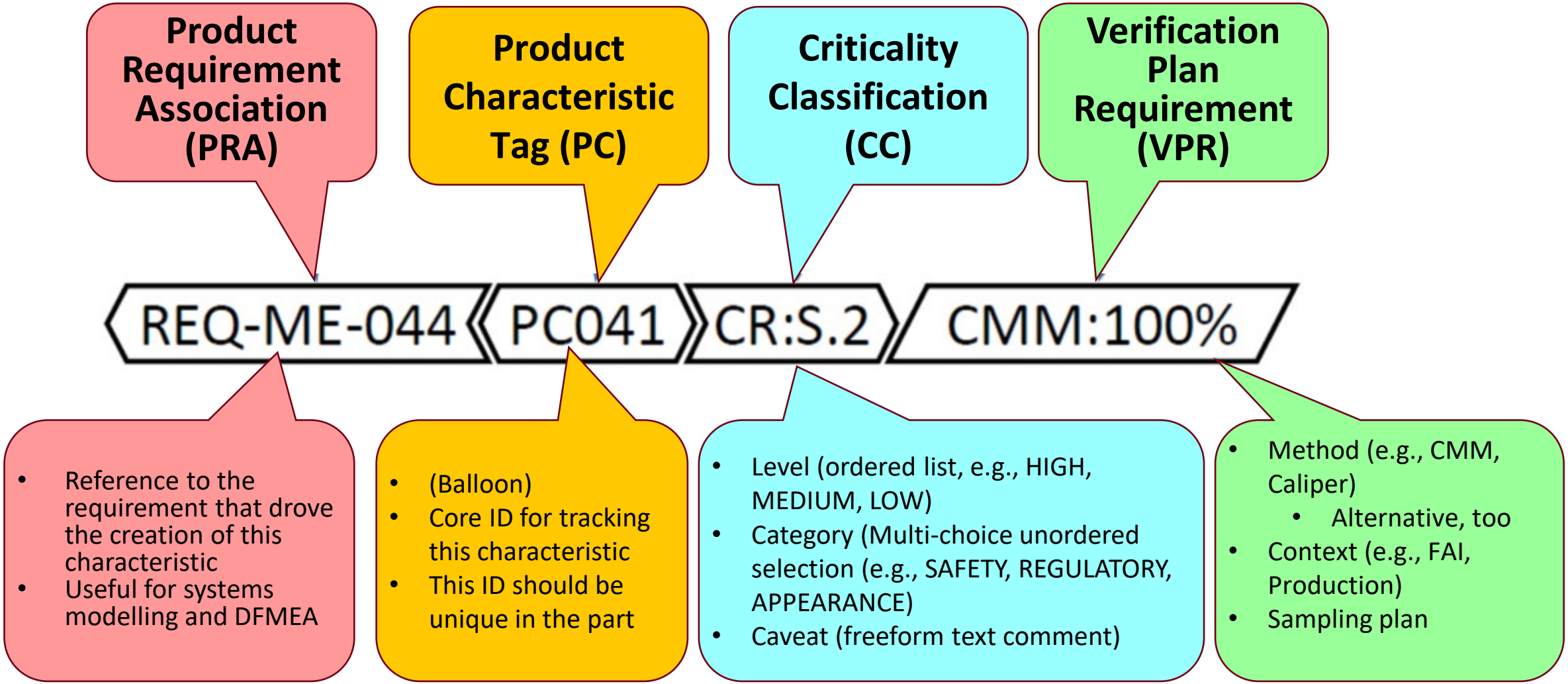
Model-Based Characteristics (MBC)



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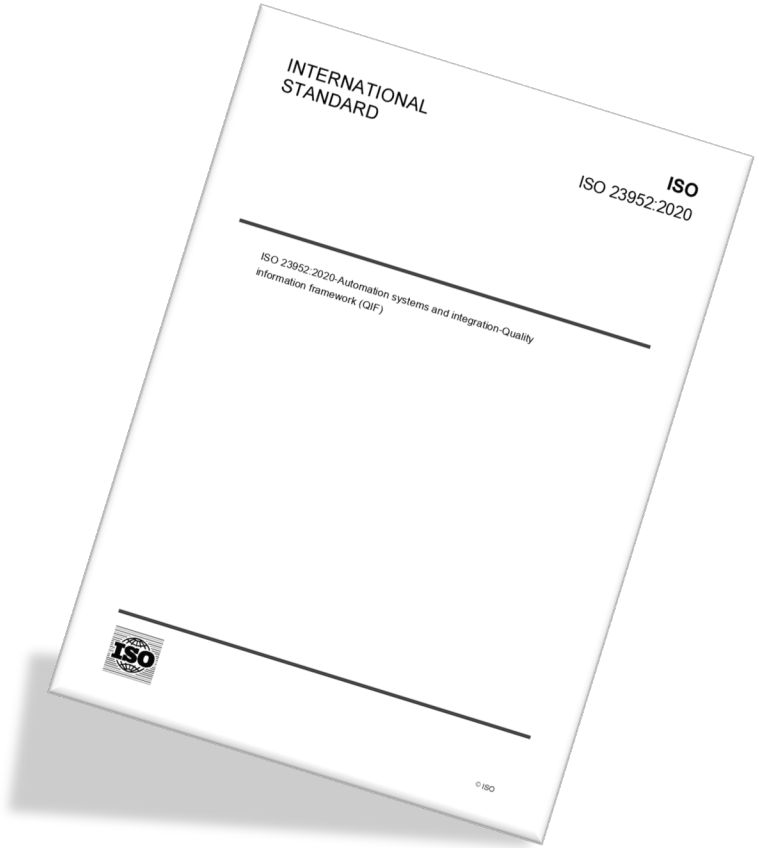
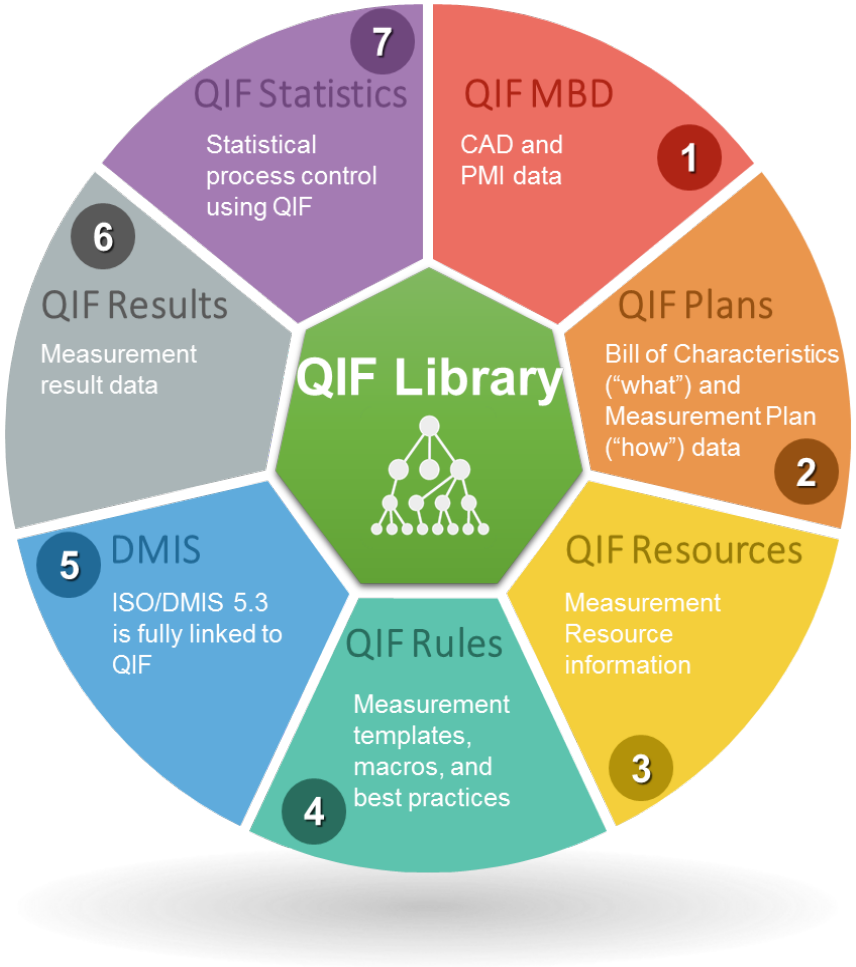
ISO 23952: QIF





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Features in QIF

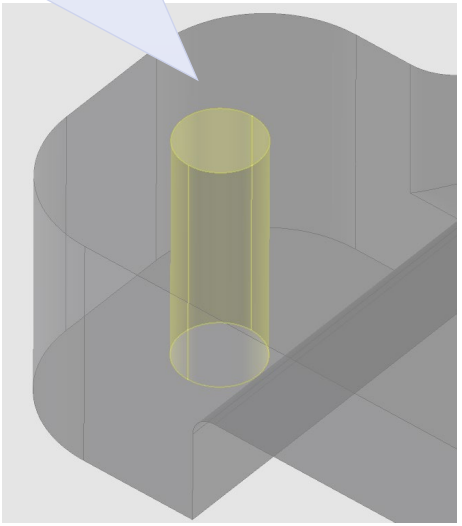
An abstraction for referencing a portion of a part.
In MBD, this means:
A container for referencing one or more geometrical entities on the model

There are lots of feature types! Some examples:

- Cylinder
- Plane
- Cone
- Opposite Parallel Planes (slot)
- Freeform (generic)
- Circles
- Lines
- Ellipse
- Compound Features
- Pattern Features
- Etc.

This Cylinder feature is made up of 2 CAD surfaces. (Pretty typical.)

But the CAD's mathematical representation of this geometry is irrelevant – this is a functional hole and needs to be treated as such!



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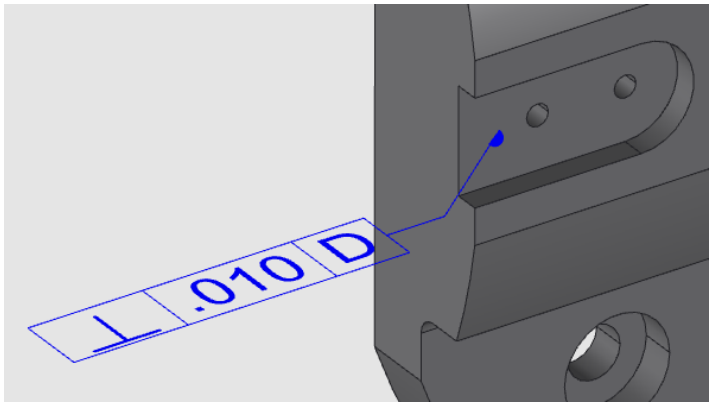
Characteristics in QIF

A control or specification placed on a Feature.

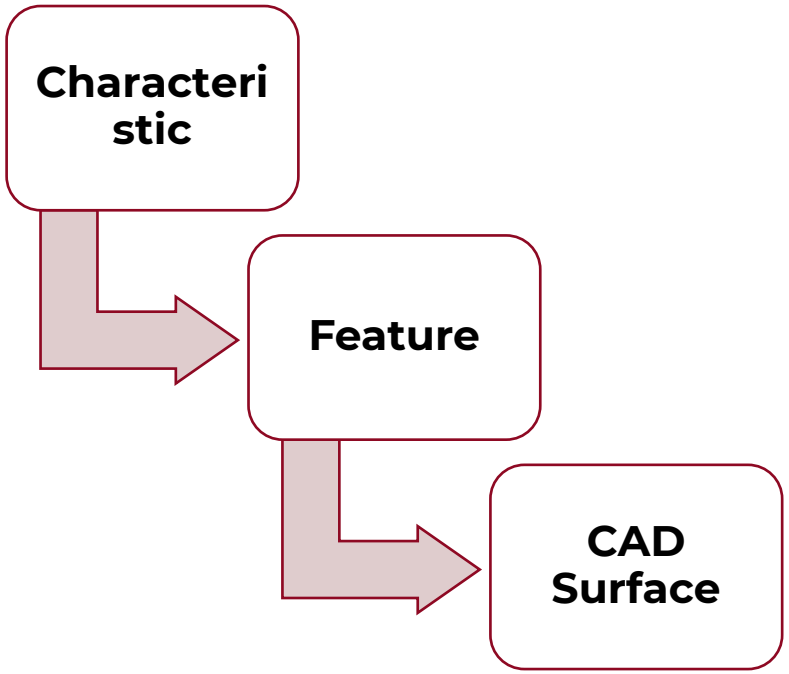
For example, a Tolerance, a Surface Finish, a Weld specification, etc.



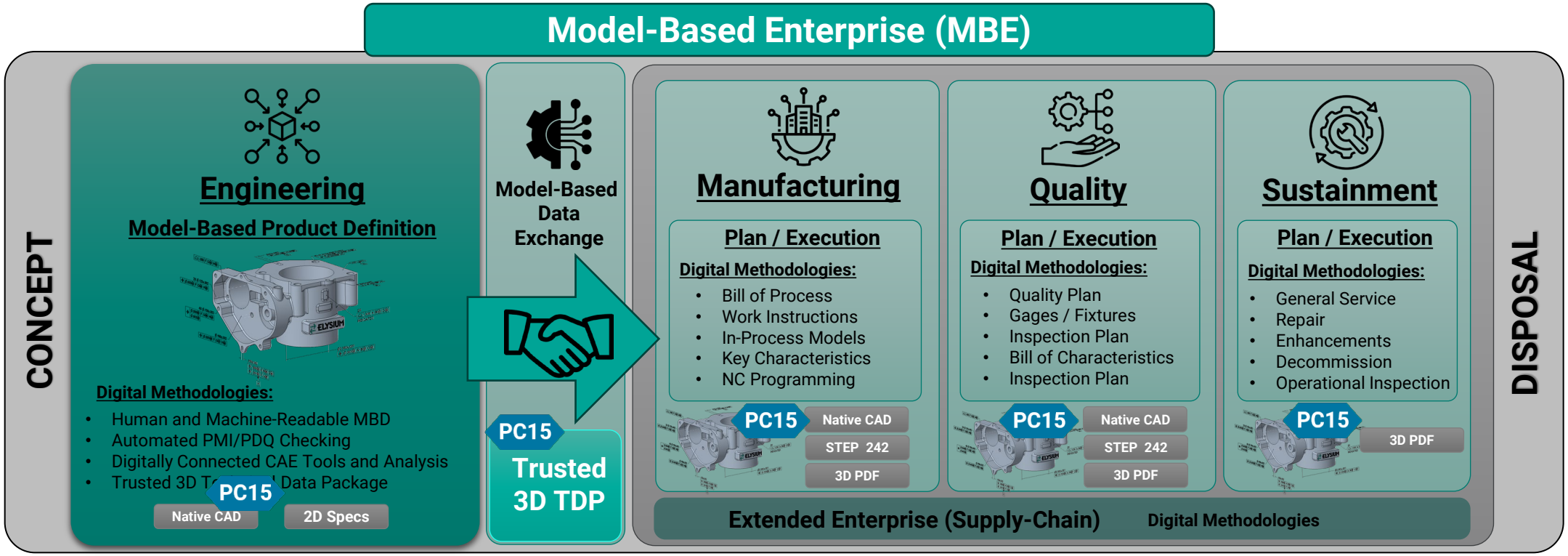
With QIF MBD, it is also possible for a Characteristic to have a 3D presentation element (e.g., an annotation). But that's for human consumption.

How is a Characteristic connected to the MBD?

A Characteristic points to a Feature, and a Feature points to CAD geometry.



Enterprise Technical Data Exchange



PC15 Model-Based Characteristic Data

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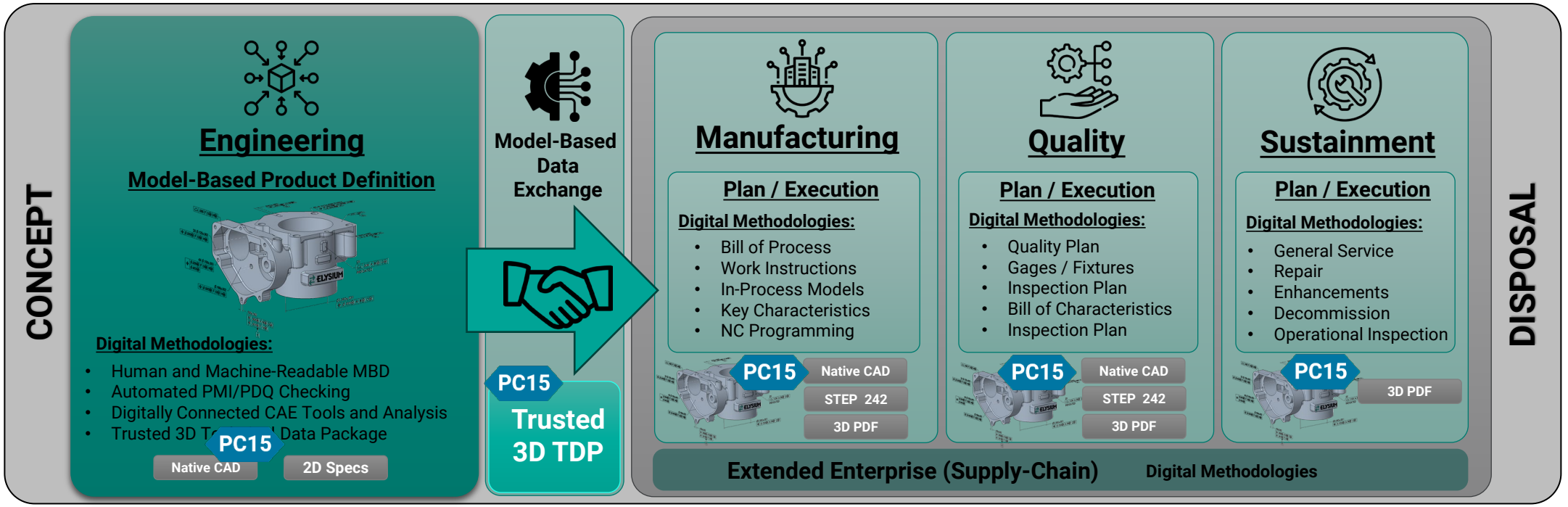
Enterprise Technical Data Exchange

Trusted 3D Data Package:

- A collection of **authorized**, **trusted** and **validated** model-based artifacts that communicate the **complete** technical description of a part that supports the **interoperability**, **traceability**, and **human-readability** of technical data across all enterprise consumption workflows.



PC15 Model-Based Characteristic Data

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Traceability of Model-Based Characteristics (MBC):

Characteristics

Human-Readable

- Graphical Representation

Interoperable

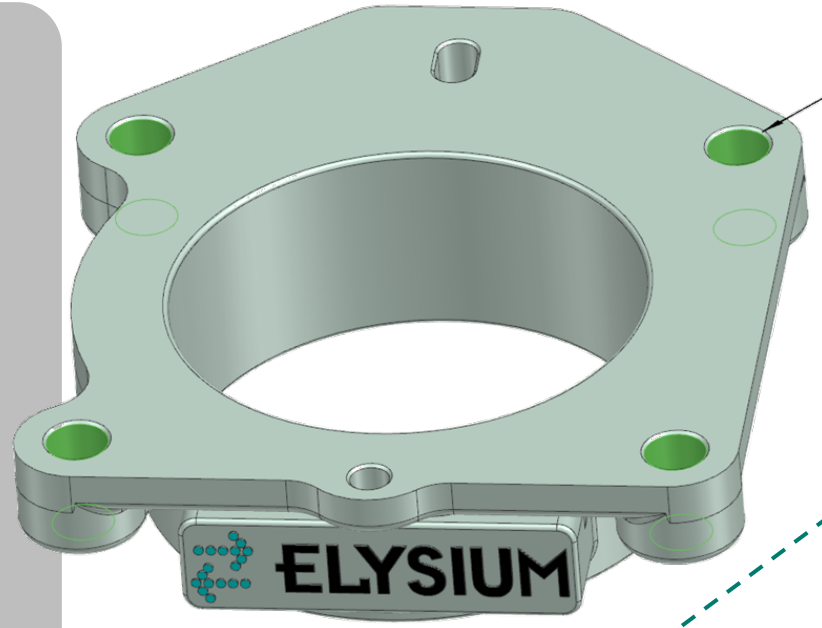
- Metadata/Attribute Structure

Trusted

- Compliant to Standards
- Semantic Completeness
- Universally Unique
- Verified Through Checking

Traceable

- Consumable and Supported by Software and System Providers Across the Enterprise



Graphical Representation

Trusted

4X Ø.312 ±.005 THRU <PC10>

Ø0.003Ⓜ | A | BⓂ | CⓂ <PC11>

MBC Underlying Data Structure:

Metadata / Attribute:

- Characteristic Tag: **MBC_PC_TAG**
- UUID (CPID): **MBC_PC_UUID**
- Annotation: **MBC_PC_ANNOTATION_ID**

MBC by DMSC Per DMSC MBC 1.0

Engineering → Manufacturing → Quality → Supply-Chain

Enterprise Traceability

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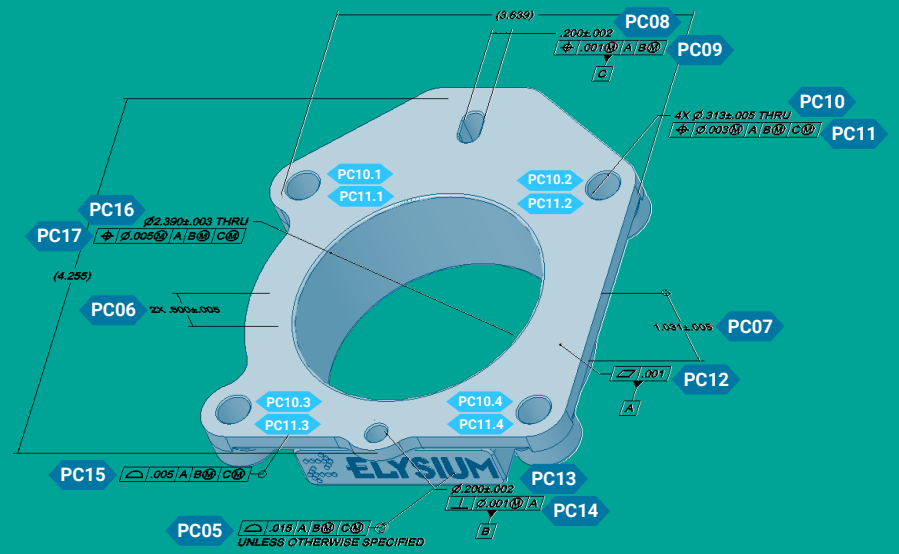
Types of Model-Based Characteristic (MBC)

Per DMSC MBC 1.0 Standard

Product Characteristic Tags PC15
(Aka: Parent Tag, Balloon)

Product Characteristic Instance Tags PC10.1 PC11.1
(Aka: Child Tag, Child Balloon)



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement	+TOL	Nominal	-TOL	DRF
PC10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC11.1	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.2	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.3	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.4	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC12	D04_Top	Ø2.390±.003	0.003	2.390	0.003	/
PC13	D04_Top	⌖ Ø.005Ⓜ A BⓂ CⓂ	0.005	/	/	AB(M)C(M)
PC14	D04_Top	▱ .001	0.001	/	/	/
PC15	D04_Top	Ø.200±.002	0.002	0.200	0.002	/
PC16	D04_Top	⊥ Ø.001Ⓜ A	0.001	/	/	A
PC17	D04_Top	⌓ .005 A BⓂ CⓂ	0.005	/	/	AB(M)C(M)

Product Characteristic Instance Tags (Child Tag)

Product Characteristic Tags (Parent Tag)

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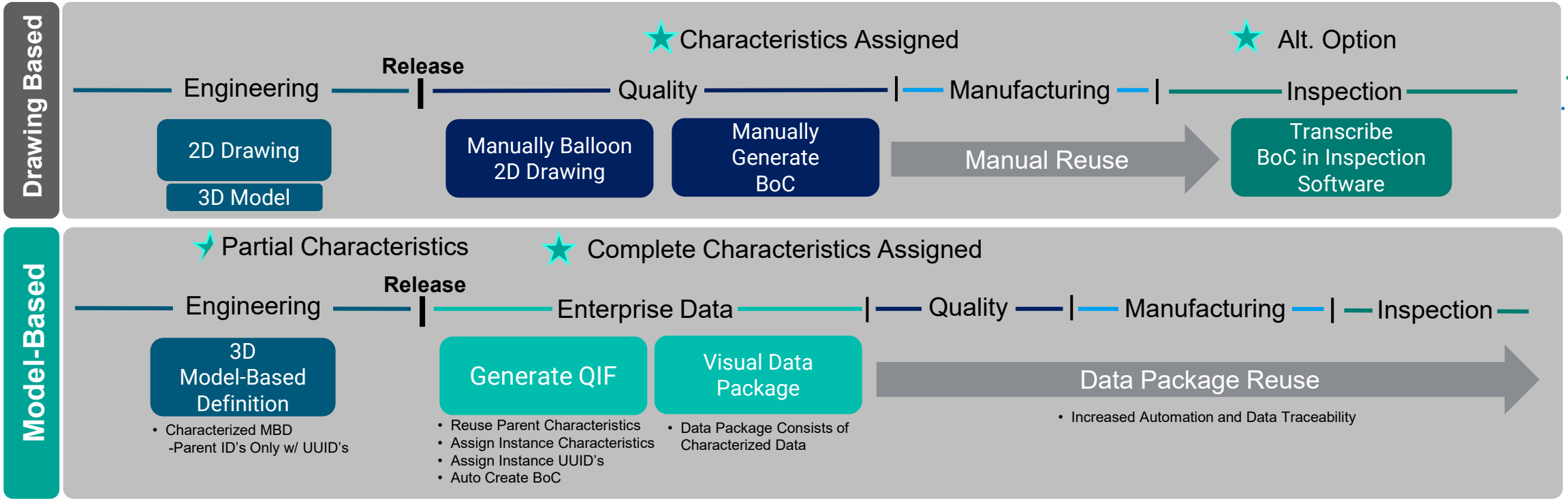
Characteristic/Balloon Assignments



Key Points:

- Nirvana State is to have ALL characteristics within the native CAD…
- Partial characteristics in Native CAD:
  - Lack of tools/support by CAD Vendors and 3rd party tools
    - NX Is the exception!
  - Pattern decomposition is complex, difficult, and lacks industry standardization
- Characteristic Authoring in QIF:
  - Mature and consistent workflow

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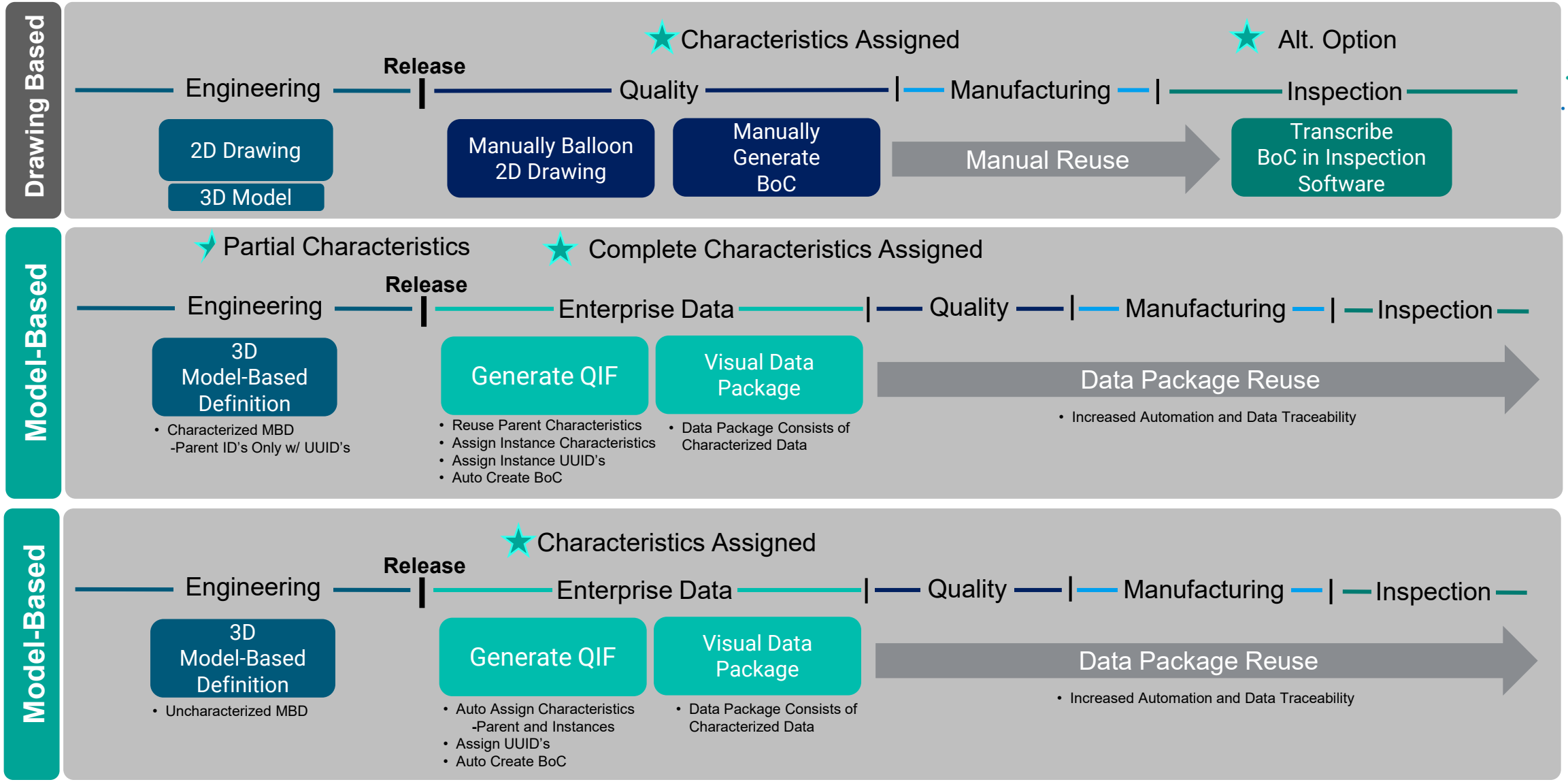
Characteristic/Balloon Assignments



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Model-Based Characteristic Assignment (Native CAD)

Model-Based

Engineering | Release | Enterprise Data | Quality | Manufacturing | Inspection

3D Model-Based Definition
- Characterized MBD
  -Parent ID's Only w/ UUID's

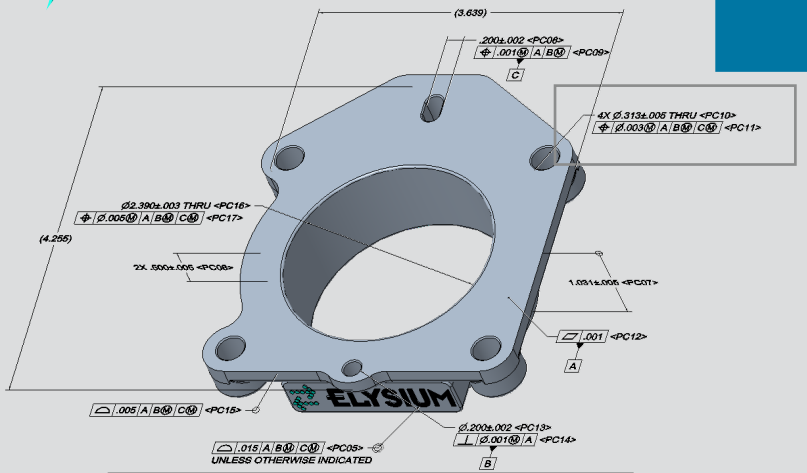
Generate QIF
- Reuse Parent Characteristics
- Assign Instance Characteristics

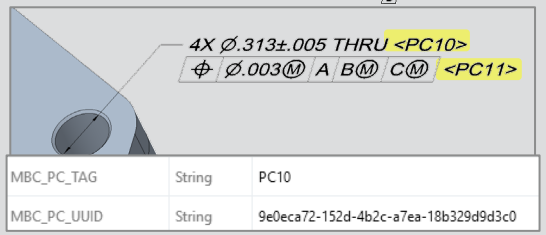
Visual Data Package
- Data Package Consists of Characterized Data

Data Package Reuse
- Increased Automation and Data Traceability

Source CAD Data

Partial Characteristic Assignment



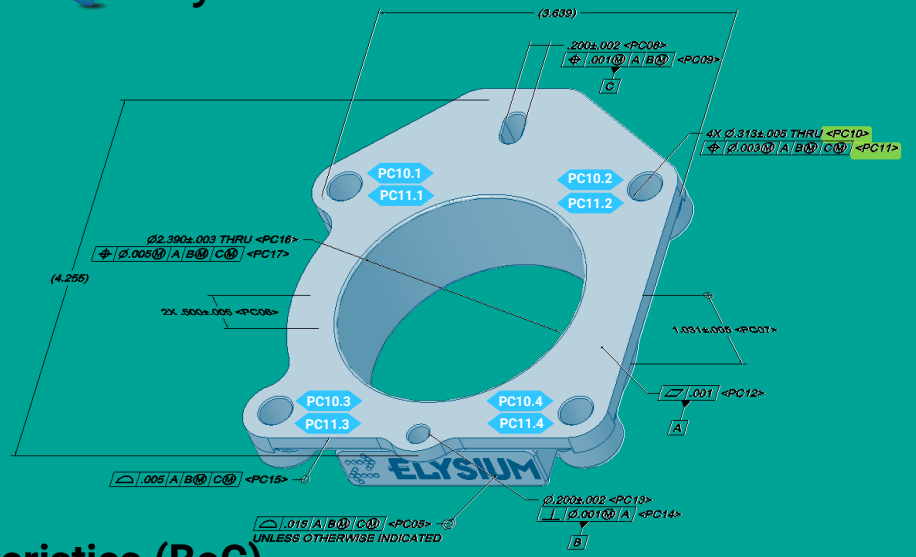


- Parent Characteristics and UUID's
- If Instance ID's, Incomplete or Low Pattern Support

QIF Export

Elysium **3D-SUITE**™

Complete Characteristic Assignment



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement	+TOL	Nominal	-TOL	DRF
PC10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC11.1	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.2	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.3	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC11.4	D04_Top	⌖ Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
PC12	D04_Top	Ø2.390±.003	0.003	2.390	0.003	/

Model-Based Characteristic Assignment (QIF Workflow)

Model-Based

Engineering | Release | Enterprise Data | Quality | Manufacturing | Inspection

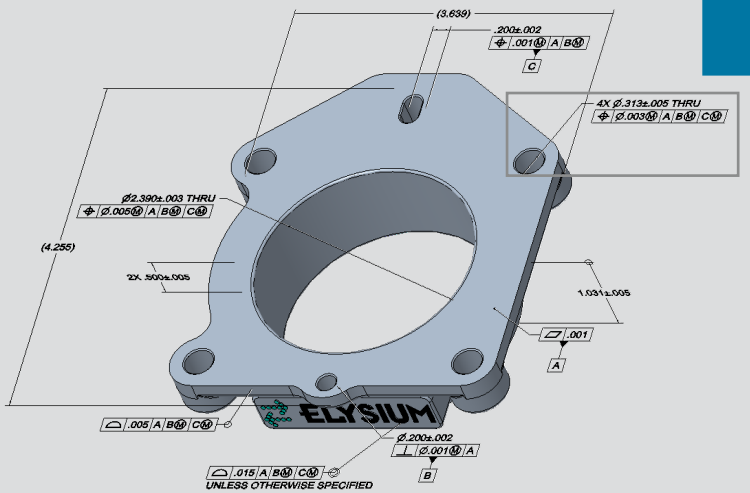
3D Model-Based Definition
- Uncharacterized MBD

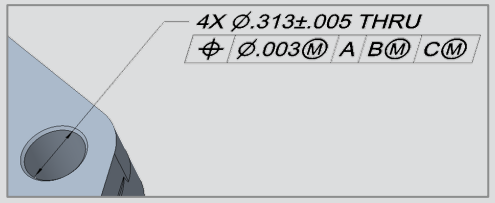
Generate QIF
- Auto Assign Characteristics -Parent and Instances

Visual Data Package
- Data Package Consists of Characterized Data

Data Package Reuse
- Increased Automation and Data Traceability

Source CAD Data



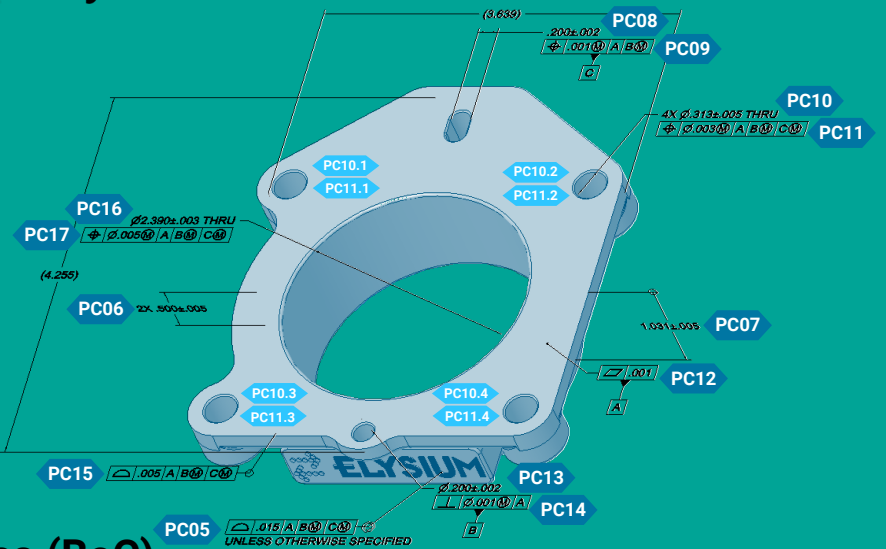


- No Characteristics Assigned

QIF Export

Complete Characteristic Assignment

Elysium 3D-SUITE™



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement	+TOL	Nominal	-TOL	DRF
PC10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
PC11.1	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
PC11.2	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
PC11.3	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
PC11.4	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
PC12	D04_Top	Ø2.390±.003	0.003	2.390	0.003	/

QIF and Characteristic Support

End-To-End Trusted 3D Technical Data

Compliant With

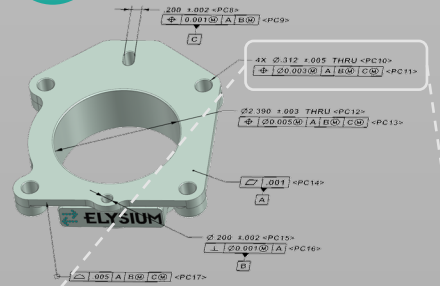
MBC by DMSC · QIF by DMSC

qifstandards.org

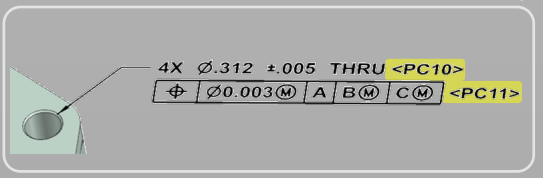
Technical Data Lifecycle Phases→

Design | Translate/Validate | Data Package | Data Reuse

Native Source CAD



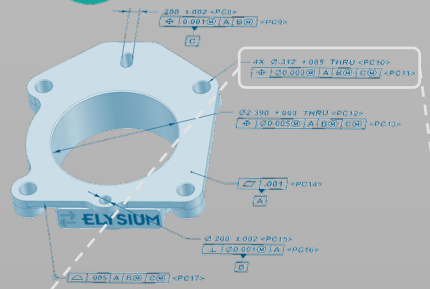
Characteristic Data Authored in Native CAD



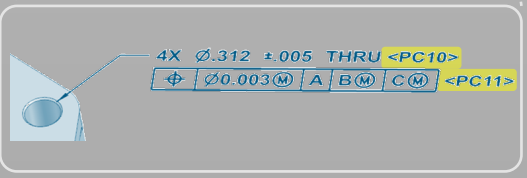
MBD Elements

- Geometry
- Annotations
- Presentation States
- Attributes & Metadata
- Characteristics

QIF Export



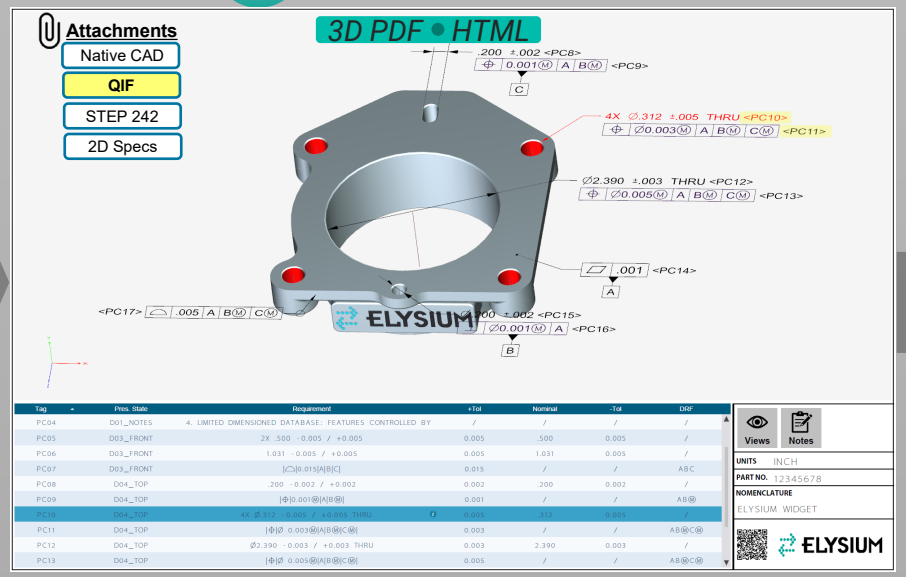
Characteristic Data Translated to QIF Derivative



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement (GD&T)	+TOL	Nom.	-TOL	DRF
10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
11.1	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.2	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.3	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.4	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)

Visual Data Package



Bill of Characteristics (BoC)

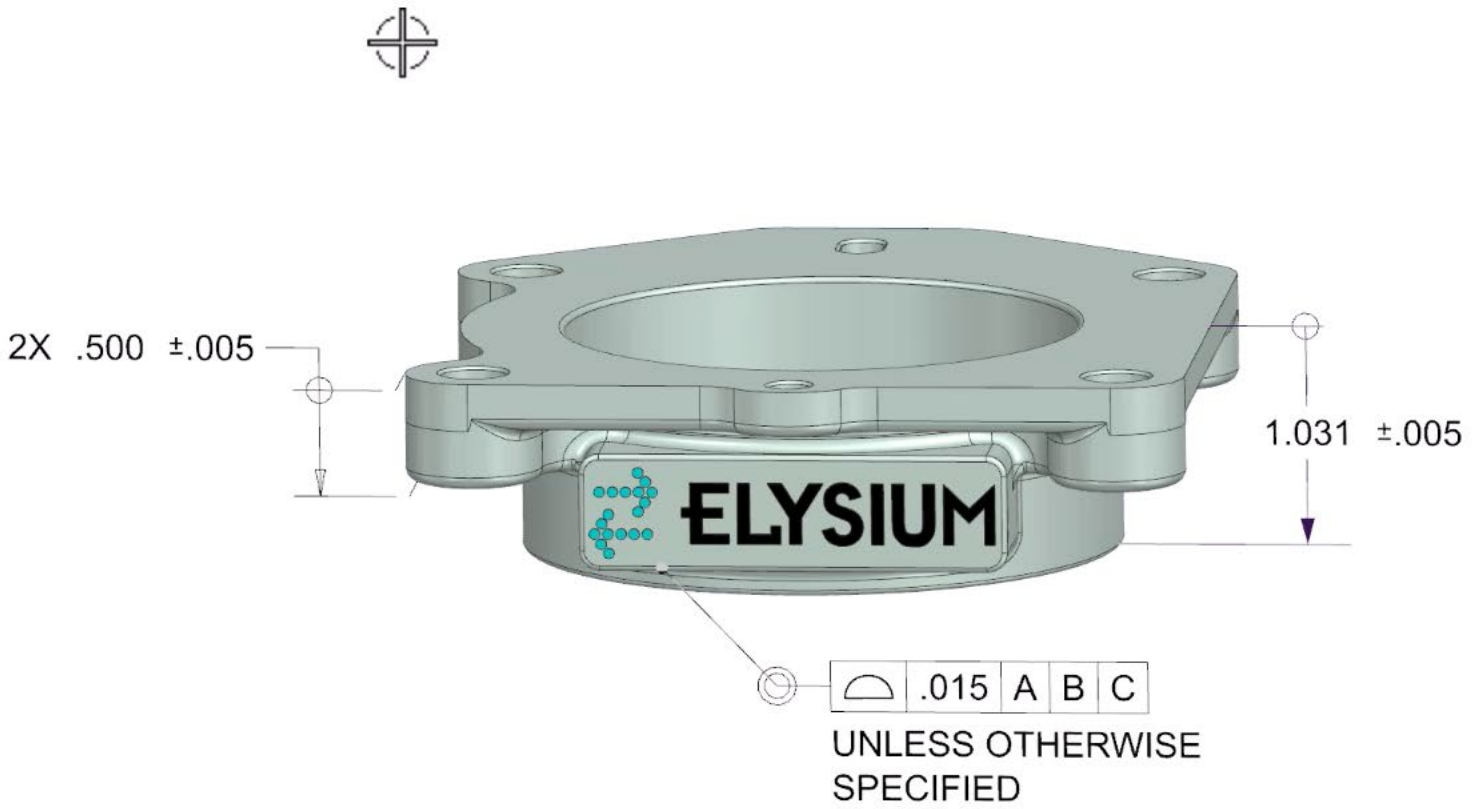
Tag	Pres. State	Pattern	Requirement
PC10	D04_TOP	4X	Ø 0.313 -0.005 / +0.005
PC10.1	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.2	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.3	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.4	D04_TOP		Ø 0.313 -0.005 / +0.005

Enterprise Reuse

Consumption Workflows

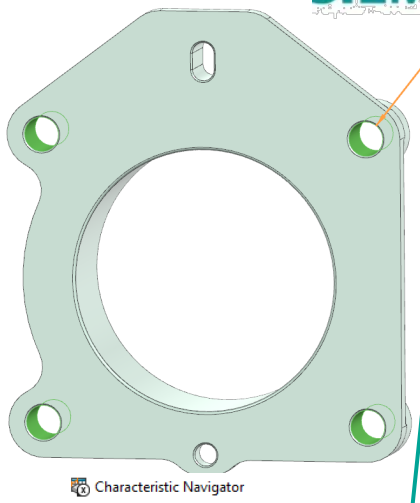
- Planning
- Manufacturing
- Inspection

ELYSIUM

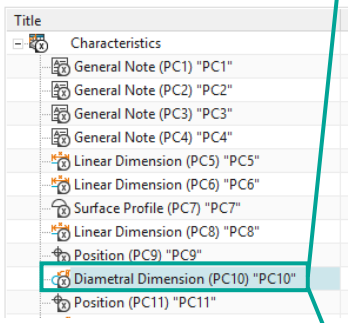

2X .500 ±.005
1.031 ±.005
ELYSIUM
.015 A B C
UNLESS OTHERWISE SPECIFIED

QIF Designators and UUID's

SIEMENS NX



Characteristic Navigator



Characteristic Instance Details

	Parameter	Value
1	Appended Text Bot...	
2	Appended Text Left	4X
3	Appended Text Right	THRU
4	Appended Text Top	
5	Base ID	10
6	Basic	No
7	Designator	PC10
8	Extension ID	
9	Index	0
10	Inspection	No
11	Lower Allowance	0.308
12	Lower Delta	-0.005
13	Nominal Precision	3
14	Nominal Value	0.313
15	Reference	No
16	Status	Saved
17	Tolerance Precision	3
18	Tolerance Type	EqualBilateral
19	Type	Diametral Dimension
20	Unit	Inch
21	Upper Allowance	0.318
22	Upper Delta	0.005
23	UUID	9e0eca72-152d-4b2c-a7ea-18b329d9d3c0

QIF

Elysium QIF

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322141  <DiameterCharacteristicNominal id="3502">
322142    <Attributes n="13">
322143      <AttributeStr name="MBC_PC_TAG" value="PC10"/>
322144      <AttributeStr name="MBC_PC_UUID" value="9e0eca72-152d-4b2c-a7ea-18b329d9d3c0"/>
322145      <AttributeD1 name="PTC_DIM_TOL_VALUE" value="0.005"/>
322146      <AttributeStr name="PTC_DIM_TYPE" value="Diameter"/>
322147      <AttributeStr name="PTC_DIM_VALUE_DISPLAY" value="Nominal Value"/>
322148      <AttributeD1 name="PTC_DIM_NOMINAL_VAL" value="0.3125"/>
322149      <AttributeBool name="PTC_FRACTIONAL_FORMAT" value="false"/>
322150      <AttributeBool name="PTC_DIM_DISP_VAL_ROUNDED" value="true"/>
322151      <AttributeI1 name="PTC_DIM_DECIMALS" value="3"/>
322152      <AttributeStr name="PTC_TOLERANCE_MODE" value="+- Symmetric"/>
322153      <AttributeStr name="PTC_DIM_TEXT" value="4X #{diameter}@D THRU &lt;PC10>"/>
322154      <AttributeStr name="PTC_DISPLAY_TYPE" value="Neither"/>
322155      <AttributeI1 name="_3dv.FeatureCounter" value="4"/>
322156    </Attributes>
322157    <CharacteristicDefinitionId>3501</CharacteristicDefinitionId>
322158    <FeatureNominalIds n="1">
322159      <Id>3504</Id>
322160    </FeatureNominalIds>
322161    <Name>ad687</Name>
322162    <CharacteristicDesignator>
322163      <Designator>PC10</Designator>
322164      <UUID>9e0eca72-152d-4b2c-a7ea-18b329d9d3c0</UUID>
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322166    <TargetValue decimalPlaces="3" linearUnit="inch">0.3125</TargetValue>
322167  </DiameterCharacteristicNominal>
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322478  <DiameterCharacteristicItem id="3515">
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322480    <CharacteristicDesignator>
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322482      <UUID>9e0eca72-152d-4b2c-a7ea-18b329d9d3c0</UUID>
322483    </CharacteristicDesignator>
322484    <FeatureItemIds n="1">
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322486    </FeatureItemIds>
322487    <CharacteristicNominalId>3502</CharacteristicNominalId>
322488  </DiameterCharacteristicItem>
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322489  <DiameterCharacteristicItem id="3517">
322490    <Name>DIAMETER</Name>
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322493      <UUID>9e0eca72-152d-4b2c-a7ea-18b329d9d3c0</UUID>
322494    </CharacteristicDesignator>
322495    <FeatureItemIds n="1">
322496      <Id>3516</Id>
322497    </FeatureItemIds>
322498    <CharacteristicNominalId>3502</CharacteristicNominalId>
322499  </DiameterCharacteristicItem>
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322500  <DiameterCharacteristicItem id="3519">
322501    <Name>DIAMETER</Name>
322502    <CharacteristicDesignator>
322503      <Designator>PC10.3</Designator>
322504      <UUID>9e0eca72-152d-4b2c-a7ea-18b329d9d3c0</UUID>
322505    </CharacteristicDesignator>
322506    <FeatureItemIds n="1">
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322509    <CharacteristicNominalId>3502</CharacteristicNominalId>
322510  </DiameterCharacteristicItem>
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322511  <DiameterCharacteristicItem id="3521">
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322516    </CharacteristicDesignator>
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322518      <Id>3520</Id>
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322520    <CharacteristicNominalId>3502</CharacteristicNominalId>
322521  </DiameterCharacteristicItem>
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ELYSIUM

QIF and Characteristic Support

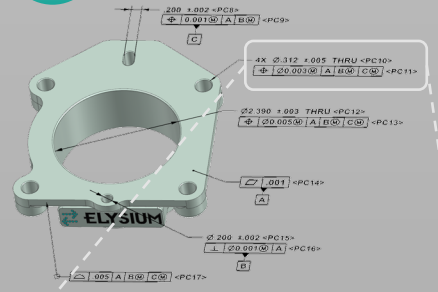
End-To-End Trusted 3D Technical Data

Compliant With MBC QIF by DMSC

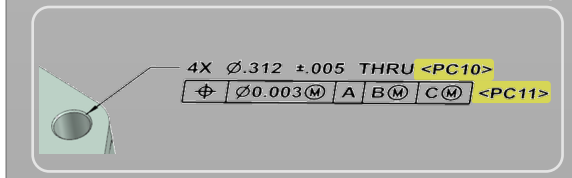
qifstandards.org

Design | Translate/Validate | Data Package | Data Reuse

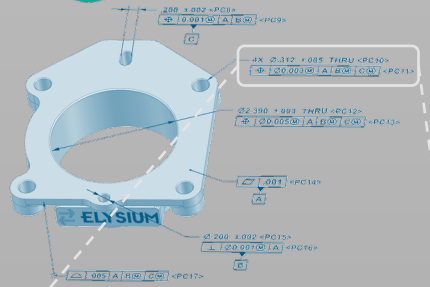
Native Source CAD



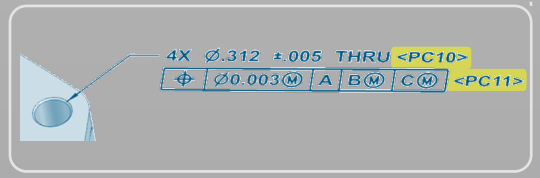
Characteristic Data Authored in Native CAD



QIF Export



Characteristic Data Translated to QIF Derivative



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement (GD&T)	+TOL	Nom.	-TOL	DRF
10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
11.1	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
11.2	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
11.3	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)
11.4	D04_Top	Ø.003 M A B M C M	0.003	/	/	AB(M)C(M)

MBD Elements

- Geometry
- Annotations
- Presentation States
- Attributes & Metadata
- Characteristics

ELYSIUM

CAD Validator

File C:/Users/ekessick/OneDrive%20-%20Elysium%20Inc/04%20Technical%20Content/NX/NX%20Inspector%20Characterized/Elysium_widget_characterized-NX_Inspector_diff_3dreport.html

Filter Issue

Structure Diff

Component Diff

Component Summary

Process Information

Help

▼ Validation Result Filter

Show Difference Only

▼ Filter by Element Type

- Structure
  - Name
  - Orientation / Position
- Geometry
  - Isolated Curve Geometry
- PMI
  - Model View
  - Note
  - Dimension
  - Datum
  - GD&T
  - Symbol
- Attribute
  - System Attribute
  - Attribute of Face

Diff

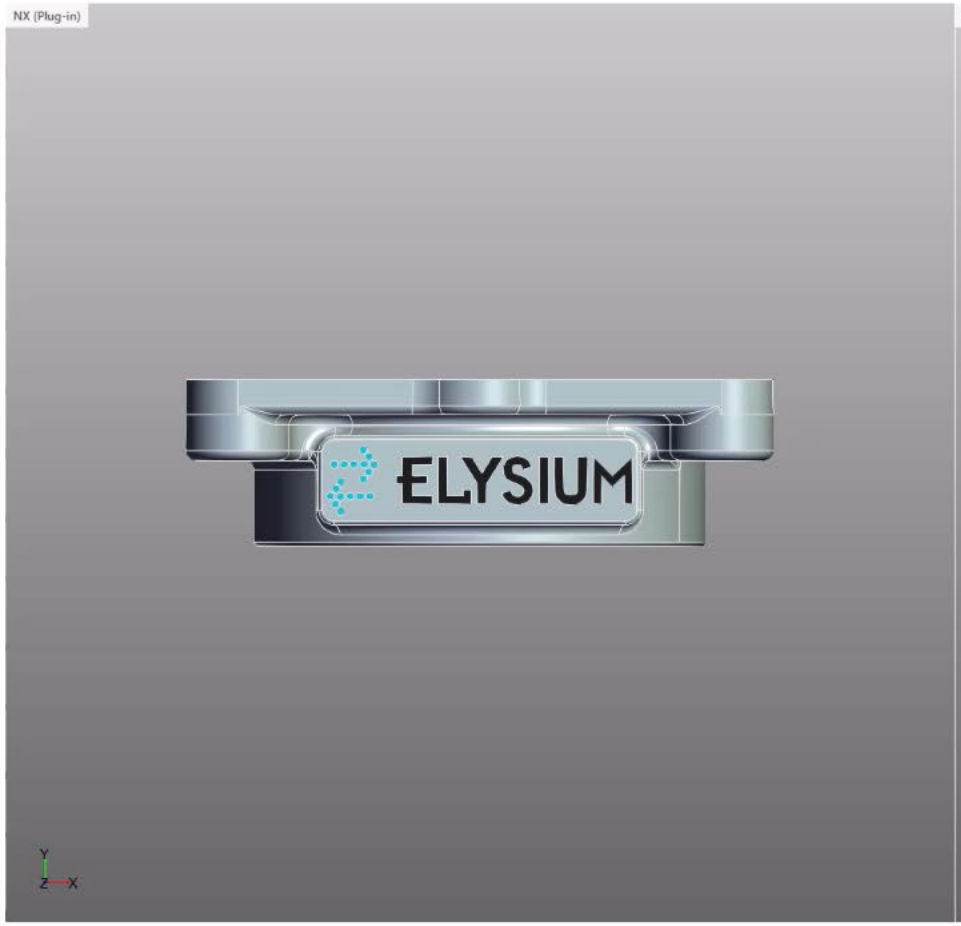
Structure	Geometry	PMI	At
1	29	28	

Structure

Elysium_widget_charact Elysium_widget_charact

Fit Orientation Highlight Difference View Layout Section Options

NX (Plug-in)



QIF

Result	Property ↑	Value (First Model)	Value (Second Model)	Info
Same	Attribute difference	-	-	
Diff	Geometric difference	-	-	
Same	Name	Elysium_widget_characterized-NX_Inspector	Elysium_widget_characterized-NX_Inspector	ⓘ
Same	Orientation / Position	1 0.0 0.0 0.0 0.0 1 0.0 0.0 0.0 0.0 1 0.0 0.0 0.0 0.0 1	1 0.0 0.0 0.0 0.0 1 0.0 0.0 0.0 0.0 1 0.0 0.0 0.0 0.0 1	ⓘ
Diff	PMI difference	-	-	

QIF and Characteristic Support

End-To-End Trusted 3D Technical Data

Compliant With

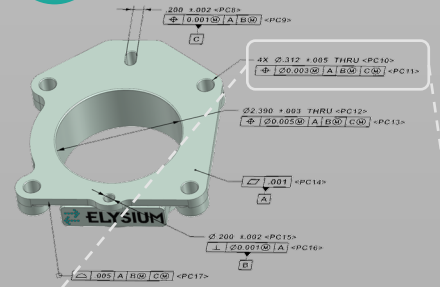
MBC by DMSC · QIF by DMSC

qifstandards.org

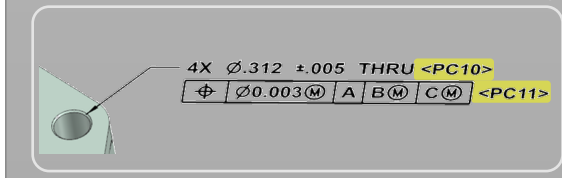
Technical Data Lifecycle Phases→

Design | Translate/Validate | Data Package | Data Reuse

Native Source CAD



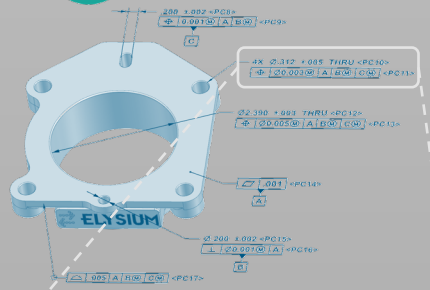
Characteristic Data Authored in Native CAD



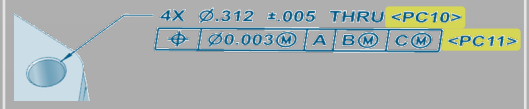
MBD Elements

- Geometry
- Annotations
- Presentation States
- Attributes & Metadata
- Characteristics

QIF Export



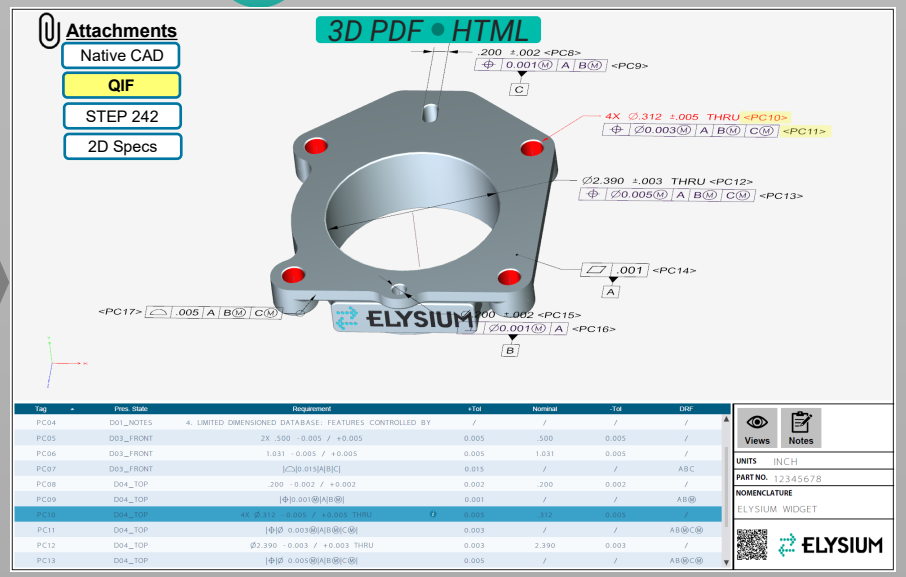
Characteristic Data Translated to QIF Derivative



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement (GD&T)	+TOL	Nom.	-TOL	DRF
10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
11.1	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.2	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.3	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.4	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)

Visual Data Package

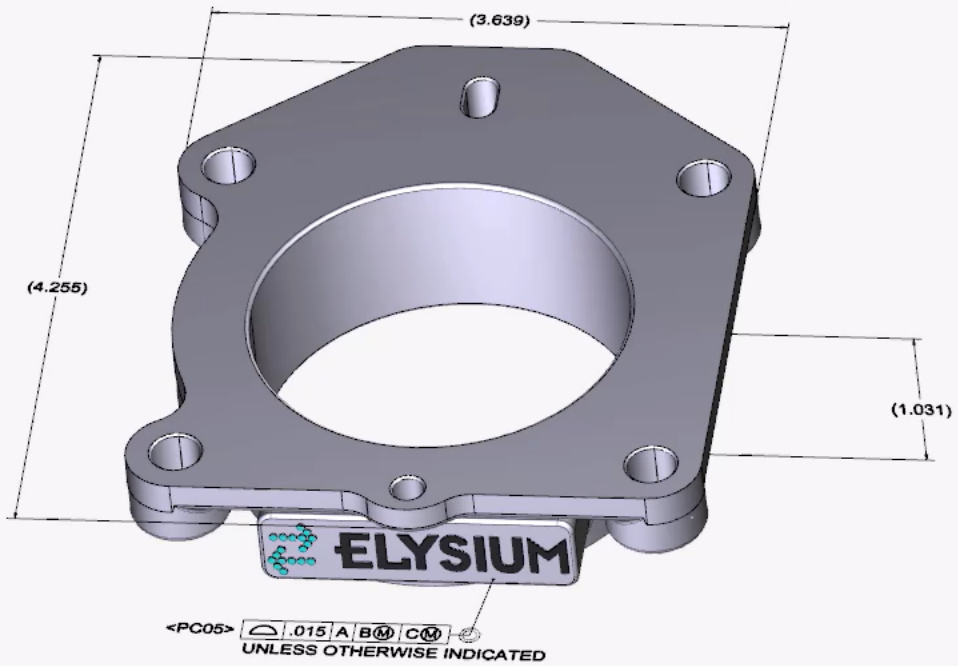


Bill of Characteristics (BoC)

Tag	Pres. State	Pattern	Requirement
PC10	D04_TOP	4X	Ø 0.313 -0.005 / +0.005
PC10.1	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.2	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.3	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.4	D04_TOP		Ø 0.313 -0.005 / +0.005

ELYSIUM

DataPackage™ STUDIO



Tag	Pres. State	Pattern	Requirement	+Tol	Nominal	-Tol
PC10	D04_TOP	4X	Ø 0.313 -0.005 / +0.005	0.005	0.313	0.005
PC10.1	D04_TOP		Ø 0.313 -0.005 / +0.005	0.005	0.313	0.005
PC10.2	D04_TOP		Ø 0.313 -0.005 / +0.005	0.005	0.313	0.005
PC10.3	D04_TOP		Ø 0.313 -0.005 / +0.005	0.005	0.313	0.005
PC10.4	D04_TOP		Ø 0.313 -0.005 / +0.005	0.005	0.313	0.005
PC11	D04_TOP	4X	⌖ |Ø 0.003Ⓜ|A|B Ⓜ|C Ⓜ|	0.003	/	/
PC11.1	D04_TOP		⌖ |Ø 0.003Ⓜ|A|B Ⓜ|C Ⓜ|	0.003	/	/
PC11.2	D04_TOP		⌖ |Ø 0.003Ⓜ|A|B Ⓜ|C Ⓜ|	0.003	/	/
PC11.3	D04_TOP		⌖ |Ø 0.003Ⓜ|A|B Ⓜ|C Ⓜ|	0.003	/	/
PC11.4	D04_TOP		⌖ |Ø 0.003Ⓜ|A|B Ⓜ|C Ⓜ|	0.003	/	/

Views | Notes

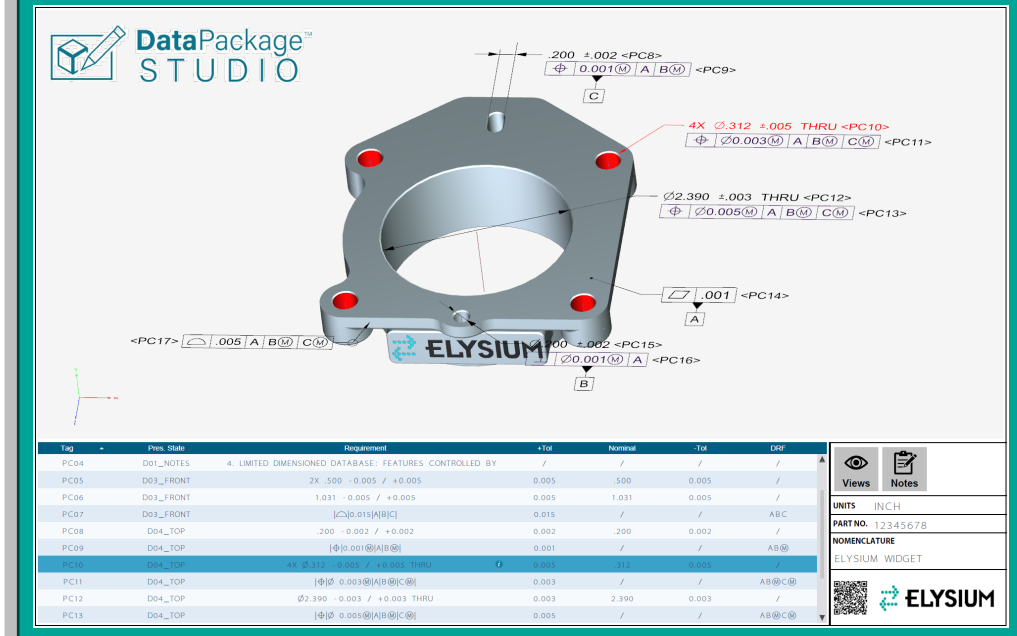
UNITS

PART NO.

NOMENCLATURE

ELYSIUM

3D Bill Of Characteristics (BoC) Use-Cases



Geometry

Annotations

Presentation States

Attributes/ Metadata

Characteristics

Human-Readability

- Visual Bill of Characteristics Table
- Visual Characterized PMI

Verify PMI From a BoC View

- PMI is Decomposed Properly
- PMI Is Characterized Properly
- PMI and Characteristics Imported into Tools Properly

Design Review

- ENG→ MFG→ Quality
- Metrology: PMI Measurability and Setups

Quality Planning

- Inspection Plan
- Bill of Characteristics

ELYSIUM

QIF and Characteristic Support

End-To-End Trusted 3D Technical Data

Compliant With

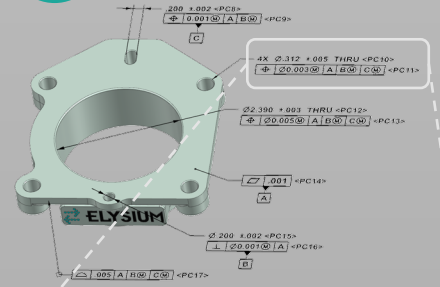
MBC by DMSC · QIF by DMSC

qifstandards.org

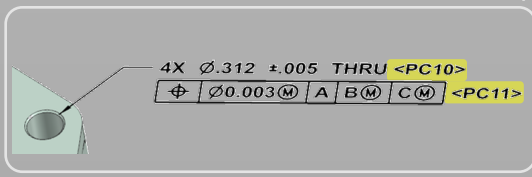
Technical Data Lifecycle Phases→

Design | Translate/Validate | Data Package | Data Reuse

Native Source CAD



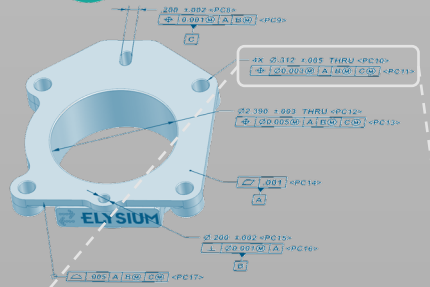
Characteristic Data Authored in Native CAD



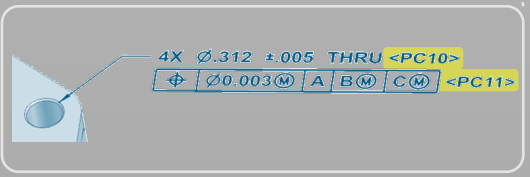
MBD Elements

- Geometry
- Annotations
- Presentation States
- Attributes & Metadata
- Characteristics

QIF Export



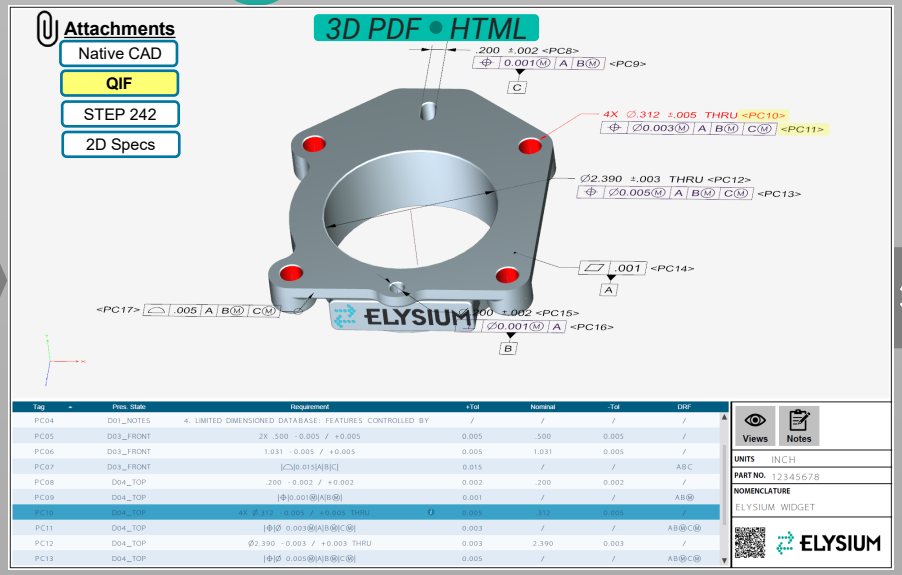
Characteristic Data Translated to QIF Derivative



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement (GD&T)	+TOL	Nom.	-TOL	DRF
10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
11.1	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.2	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.3	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.4	D04_Top	Ø.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)

Visual Data Package



Bill of Characteristics (BoC)

Tag	Pres. State	Pattern	Requirement
PC10	D04_TOP	4X	Ø 0.313 -0.005 / +0.005
PC10.1	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.2	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.3	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.4	D04_TOP		Ø 0.313 -0.005 / +0.005

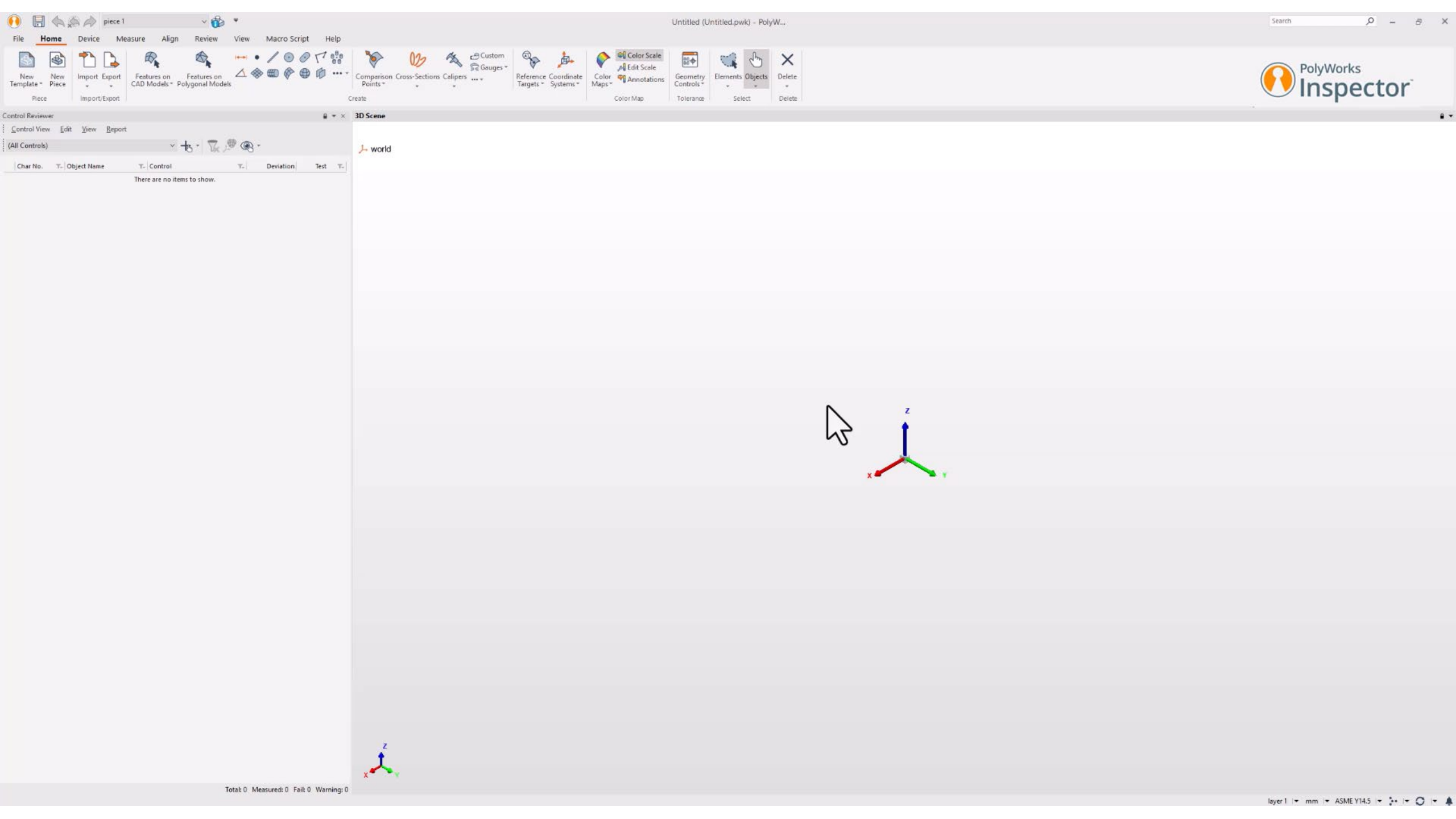
Data Reuse

Enterprise Reuse

Consumption Workflows

- *Planning*
- *Manufacturing*
- *Inspection*

ELYSIUM


piece 1
Untitled (Untitled.pwk) - PolyW...
Search
File
Home
Device
Measure
Align
Review
View
Macro Script
Help
New Template
New Piece
Piece
Import
Export
Import/Export
Features on CAD Models
Features on Polygonal Models
Comparison Points
Cross-Sections
Calipers
Custom
Gauges
Reference Targets
Coordinate Systems
Create
Color Maps
Color Scale
Edit Scale
Annotations
Color Map
Geometry Controls
Tolerance
Elements
Objects
Select
Delete
Delete
PolyWorks Inspector
Control Reviewer
Control View
Edit
View
Report
(All Controls)
Char No.
Object Name
Control
Deviation
Test
There are no items to show.
Total: 0 Measured: 0 Fail: 0 Warning: 0
3D Scene
world
Z
X
Y
layer 1
mm
ASME Y14.5

QIF Supporting Metrology Platforms

- Polyworks Inspector, Innovmetric
- Metrologic
- PD-DMIS, Hexagon
- Calypso, Zeiss
- Evolve SmartProfile, Kotem
- Verisurf
- MiCAT Planner and MCOSMOS, Mitutoyo
- Others….

QIF and Characteristic Support

End-To-End Trusted 3D Technical Data

Compliant With

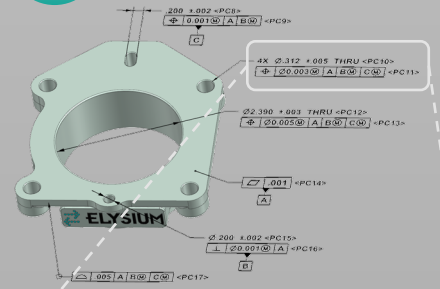
MBC by DMSC · QIF by DMSC

qifstandards.org

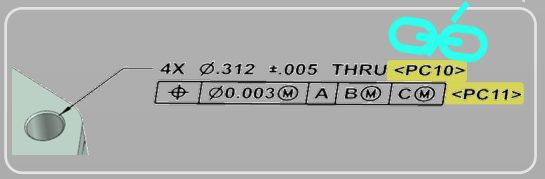
Technical Data Lifecycle Phases→

Design | Translate/Validate | Data Package | Data Reuse

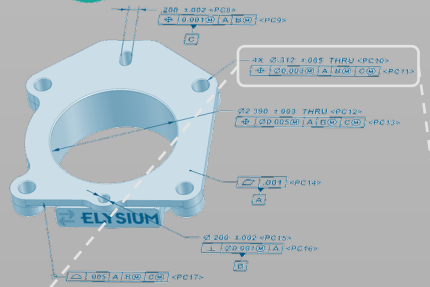
Native Source CAD



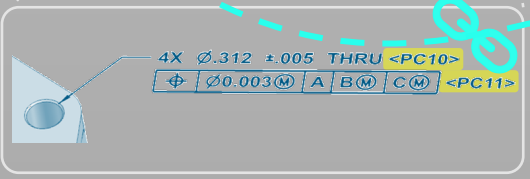
Characteristic Data Authored in Native CAD



QIF Export



Characteristic Data Translated to QIF Derivative



Bill of Characteristics (BoC)

Tag	Pres. State	Requirement (GD&T)	+TOL	Nom.	-TOL	DRF
10.1	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.2	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.3	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
10.4	D04_Top	Ø.313±.005	0.005	0.313	0.005	/
11.1	D04_Top	Ø0.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.2	D04_Top	Ø0.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.3	D04_Top	Ø0.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)
11.4	D04_Top	Ø0.003Ⓜ A BⓂ CⓂ	0.003	/	/	AB(M)C(M)

MBD Elements

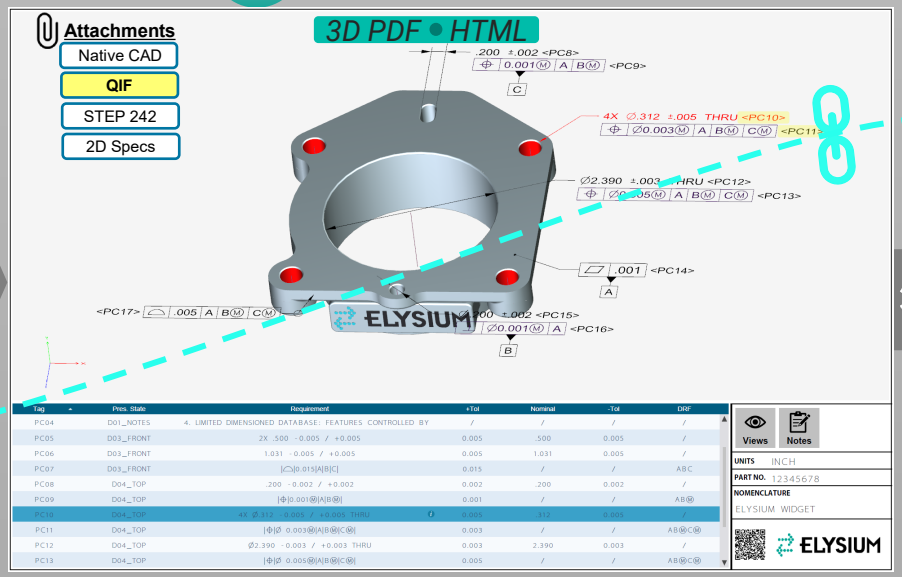
- Geometry
- Annotations
- Presentation States
- Attributes & Metadata
- Characteristics

Visual Data Package

Attachments

- Native CAD
- QIF
- STEP 242
- 2D Specs

3D PDF • HTML



Bill of Characteristics (BoC)

Tag	Pres. State	Pattern	Requirement
PC10	D04_TOP	4X	Ø 0.313 -0.005 / +0.005
PC10.1	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.2	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.3	D04_TOP		Ø 0.313 -0.005 / +0.005
PC10.4	D04_TOP		Ø 0.313 -0.005 / +0.005

Enterprise Reuse

Consumption Workflows

- *Planning*
- *Manufacturing*
- *Inspection*

ELYSIUM

QUESTIONS?

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