Standards-Compliant Technical Data Packages

Jennifer Herron, Action Engineering

GLOBAL PRODUCT DATA INTEROPERABILITY SUMMIT 2023

BOEING ELYSIUM NORTHROP GRUMMAN Parker PDES, Inc.® Connecting the Digital Enterprise

Jennifer Herron, Founder & CEO

FOUNDER & CEO

Jennifer Herron (She/Her)

EXPERTISE

B.S. in Mechanical Engineering

M.S. in Computer Engineering

- Advised **180+** organizations
- Strategic MBD and MBE Implementation Coaching
- MBD and MBE Solution Architecture
- MBD Pilot Planning
- MBD Modeling Standards and Best Practices
- Multi-CAD MBD and GD&T Authoring and Publishing
- MBD Supply Chain Readiness Coaching
- MBD-related software tool testing

CREDENTIALS

- Board Member, Digital Metrology Standards Consortium (DMSC), QIF
- ASME Y14 Series, Voting Member
- ASME Y14.46 Additive Manufacturing Product Definition, Voting Member
- ISO 10303 TC 184, DMSC Liaison
- AIAG TDP, Voting Member
- Dare to Lead Certified
- Certified Scrum Product Owner®, Scrum Alliance
- Patent for Toroidal Propulsion and Steering System (Snake)

PUBLICATIONS

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

QUOTE

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

Data markings must be retained.

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Topics

- What are 3D Technical Data Packages (TDPs)?
- How is Aerospace doing using and re-using 3D TDPs?
- What Standards are available?
- Manufacturing Scenarios that Leverage 3D TDPs
  1. Design Review
  2. Quality Planning
  3. Engineering Changes

ACTION ENGINEERING

What are 3D Technical Data Packages (TDPs)?

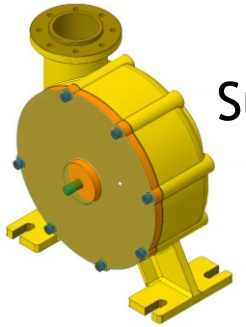
Interoperable Good Data Brings the Organization Together

ACTION ENGINEERING

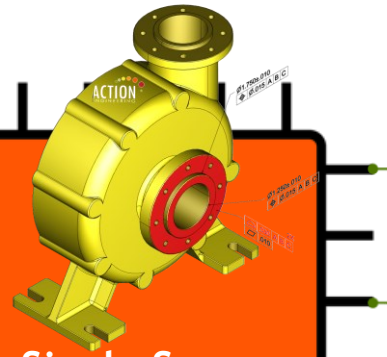
Design

Supply Chain

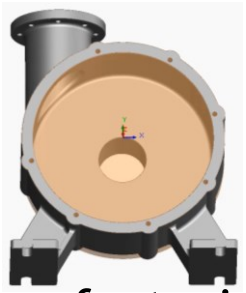
Sustainment



Automation

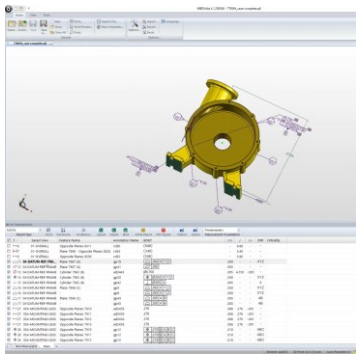


Manufacturing

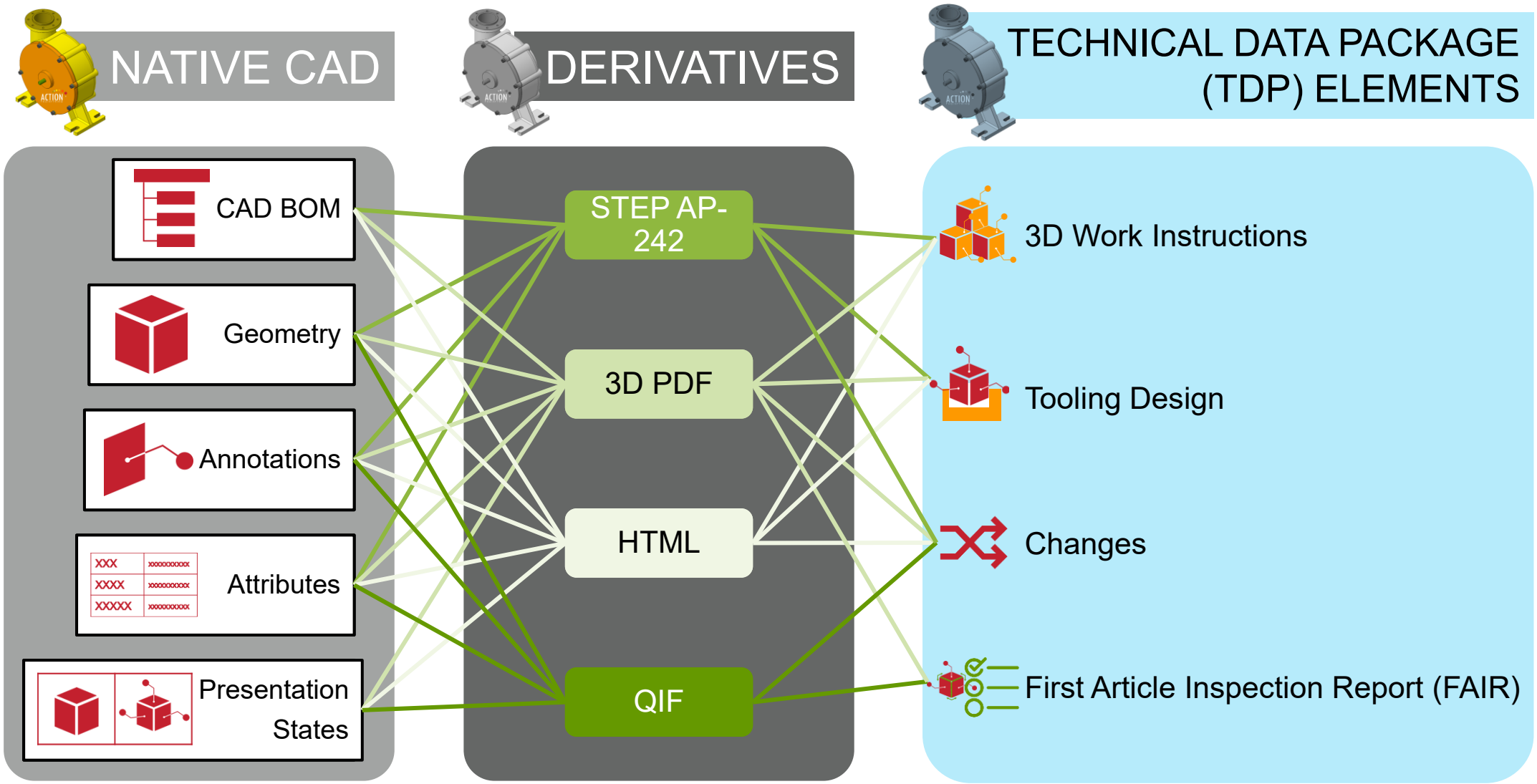


Quality

Procurement



3D TDP



ACTION ENGINEERING

Is Aerospace ready for 3D TDP Use and Re-Use?

Aerospace 3D Readiness Rating

What Standards are available?

Standards

Engineering

- ASME Y14 (Product Definition)
- ISO 10303 (STEP & PLCS)
- ISO 14306, 14739-1 (3D Viewables)
- MIL-STD-31000B (TDP)

Product Structure

- MIL-STD-881F (Work Breakdown Structure)
- MIL-HDBK-61A (Configuration Management)
- EIA-649 (Configuration Management)

Manufacturing

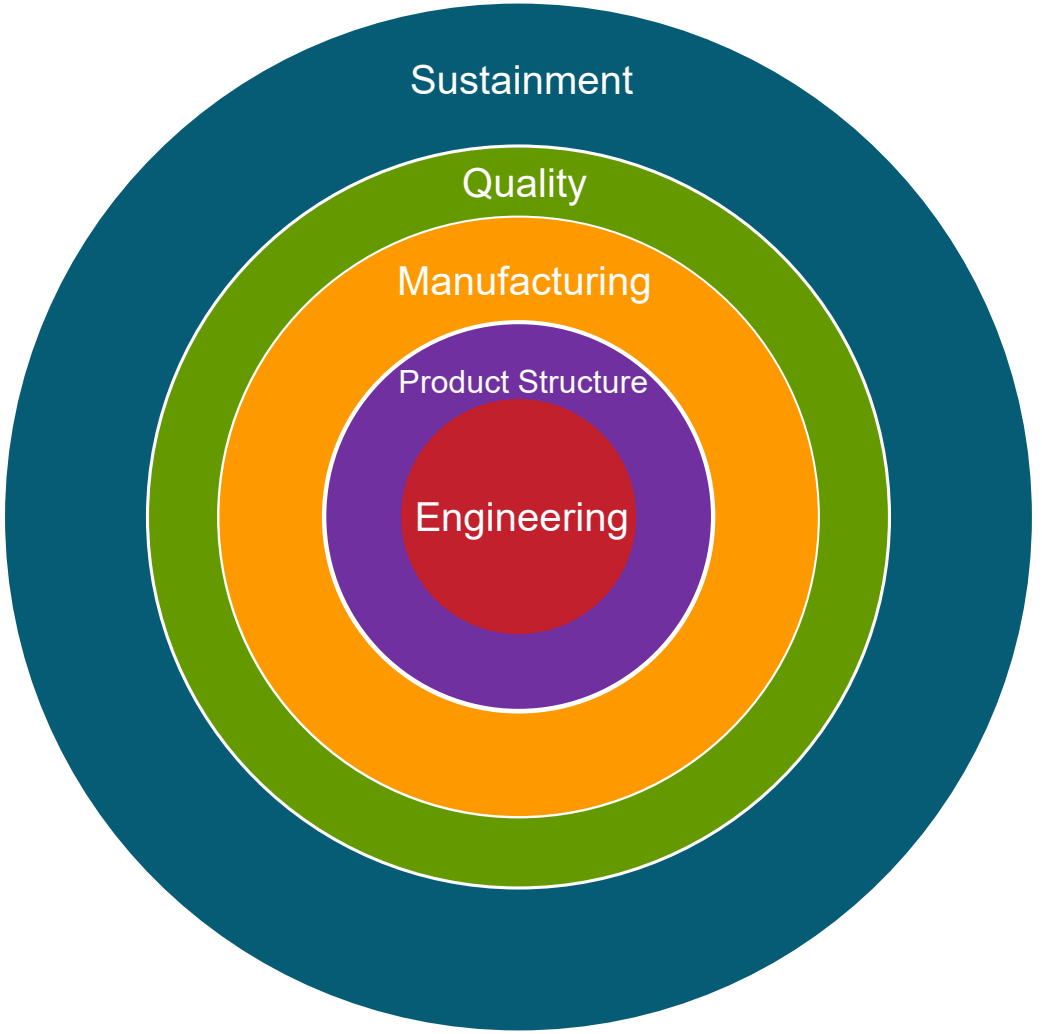
- ISO 10303-203, 214, 242 (STEP)
- MTConnect
- ASME, ASTM (Process Standards)

Quality

- QIF (Quality Information Framework)
- ISO 16949 (IATF AIAG Quality Management System)

Sustainment

- S-Series
- NAVSEA 9090-700E (SCLSIS)

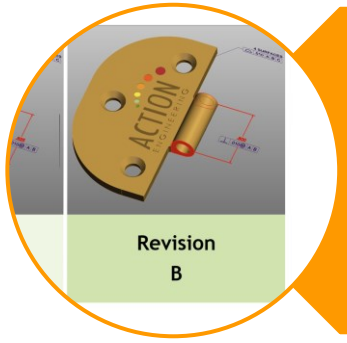


Manufacturing Scenarios that Leverage 3D TDPs

Manufacturing Scenarios

Design Review

Quality Planning



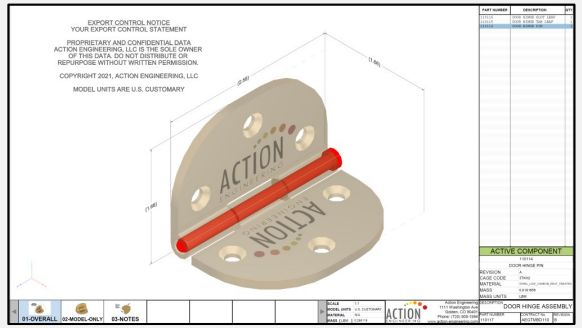
Engineering Changes

Design Review

Scenario

Design Review

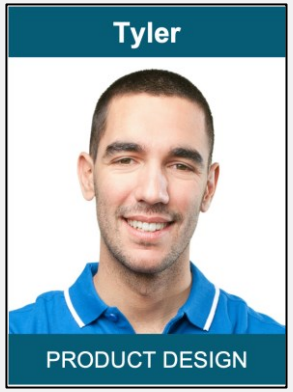
What



MBD Capabilities

- MBD Assembly
- 3D Parts List
- 3D Interactive Viewable
- Commenting

Who



How

Author
MBD Assembly
Product Definition

Publish
3D Interactive
Viewable

Send to
Manufacturing

Perform
Manufacturing
Review

Provide Feedback
to Engineering

Update
MBD Assembly

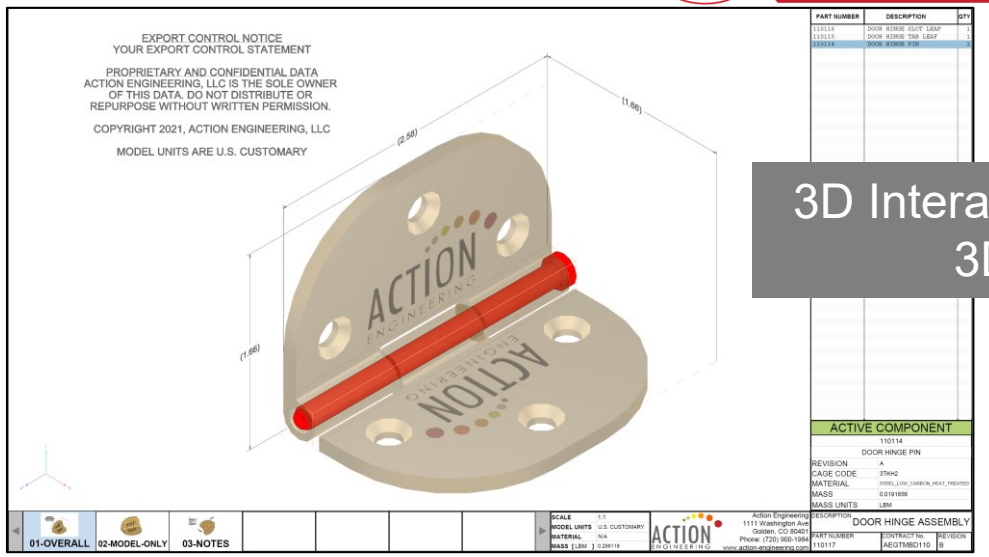
Publish & Release
3D Technical Data
Package

Description

Design Review

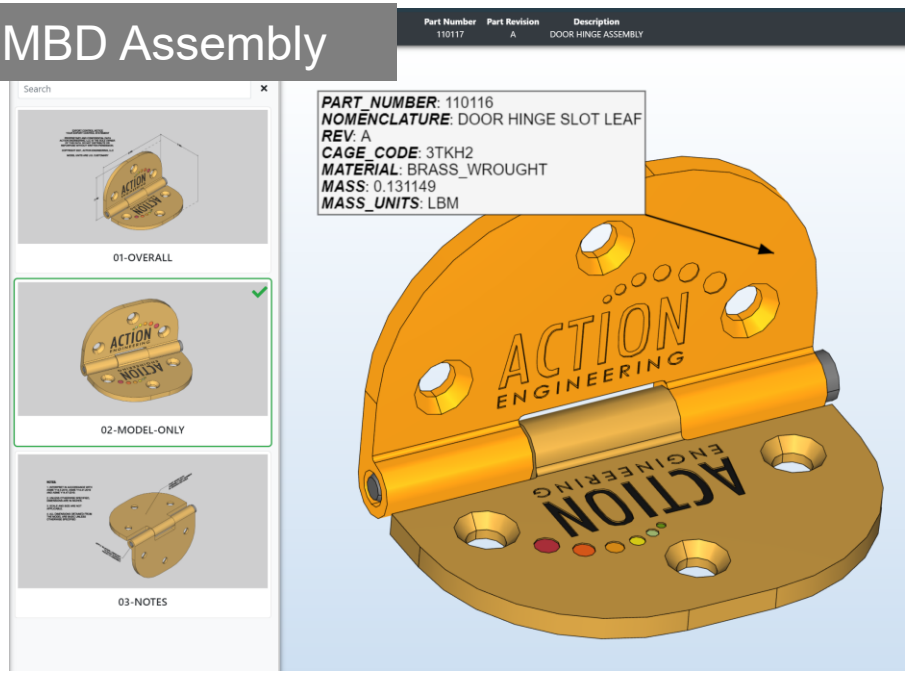
MBD Capabilities

- MBD Assembly
- 3D Parts List
- 3D Interactive Viewable
- Commenting

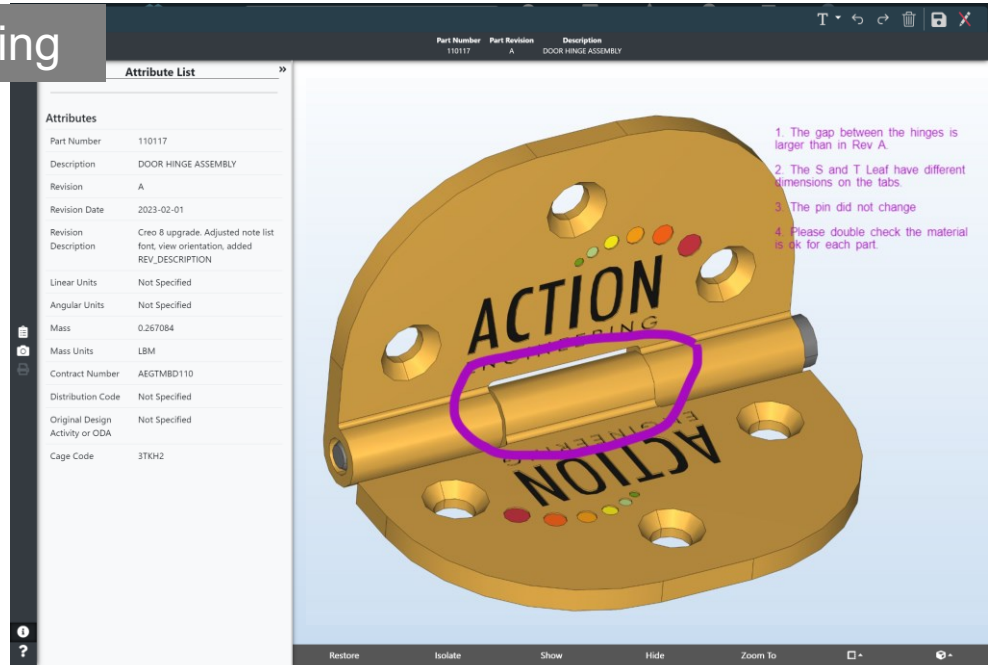


3D Interactive Viewable and 3D Parts List

MBD Assembly



Commenting



Business Case

Metrics

Reduction in duplicating manual data entry	24%
Documented feedback loops	100%

Reduce Current Pain Points

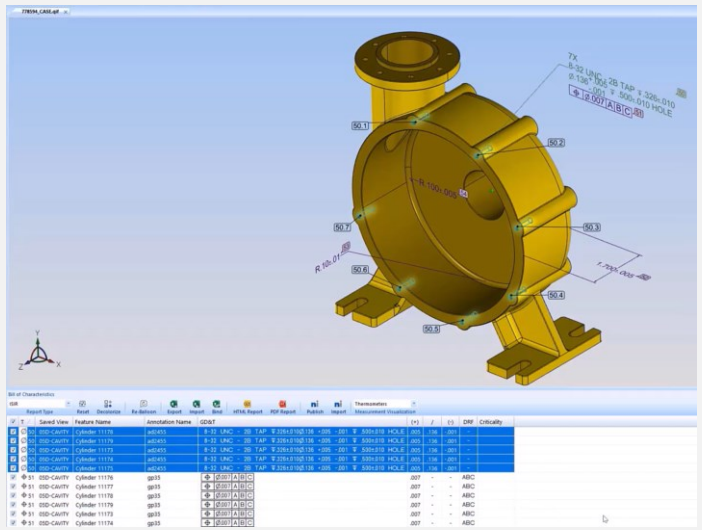
- Reduces communication gap between Engineering and Manufacturing
- Improves design review process

Quality Planning

Scenario

Quality Planning

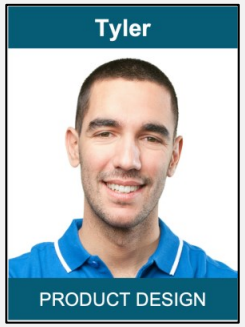
What



MBD Capabilities

- MBD Component
- Bill of Characteristics (BoC)
- First Article Inspection Report (FAIR)

Who



How

Author
MBD Component Product Definition

Pass to Quality

Perform Quality Review

Create (Balloon)
BoC

Create
Quality Plan

Publish
Quality Plan and FAIR

Inspect
3D Technical Data Package

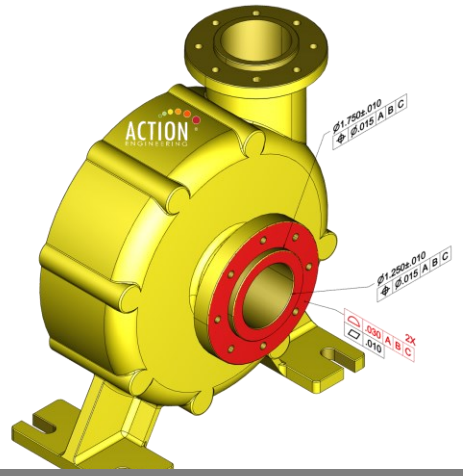
Record
Inspection Results

Description

Quality Planning

MBD Capabilities

- MBD Component
- Bill of Characteristics (BoC)
- First Article Inspection Report (FAIR)



MBD Component

FAIR

SAE AS9102 First Article Inspection (Rev. B)

Form 3: Characteristic Accountability, Verification, and Compatibility Evaluation

Sheet

1. Part Number	2. Part Name
778594	PUMP CASE

Characteristic Accountability				Inspection / Test Results			
5. Char. Num.	6. Reference Location	7. Characteristic Designator	8. Requirement	9. Results	Accept	Reject	10. Designed Tooling/Gauging used to accept product
27	05A-MOUNTING-LEGS		.276 +.006 -.001	.277			
27	05A-MOUNTING-LEGS		.276 +.006 -.001	.275			
27	05A-MOUNTING-LEGS		.276 +.006 -.001	.276			
27	05A-MOUNTING-LEGS		.276 +.006 -.001	.276			
29	05A-MOUNTING-LEGS		Ø.276 +.006 -.001	.277			
29	05A-MOUNTING-LEGS		Ø.276 +.006 -.001	.276			
29	05A-MOUNTING-LEGS		Ø.276 +.006 -.001	.277			
	05A-MOUNTING-		Ø.276 +.006 -.001	.275			
				.10			
				.10			
				.10			
				.08			
				.09			
				.10			
				.10			
				.08			
				.10			
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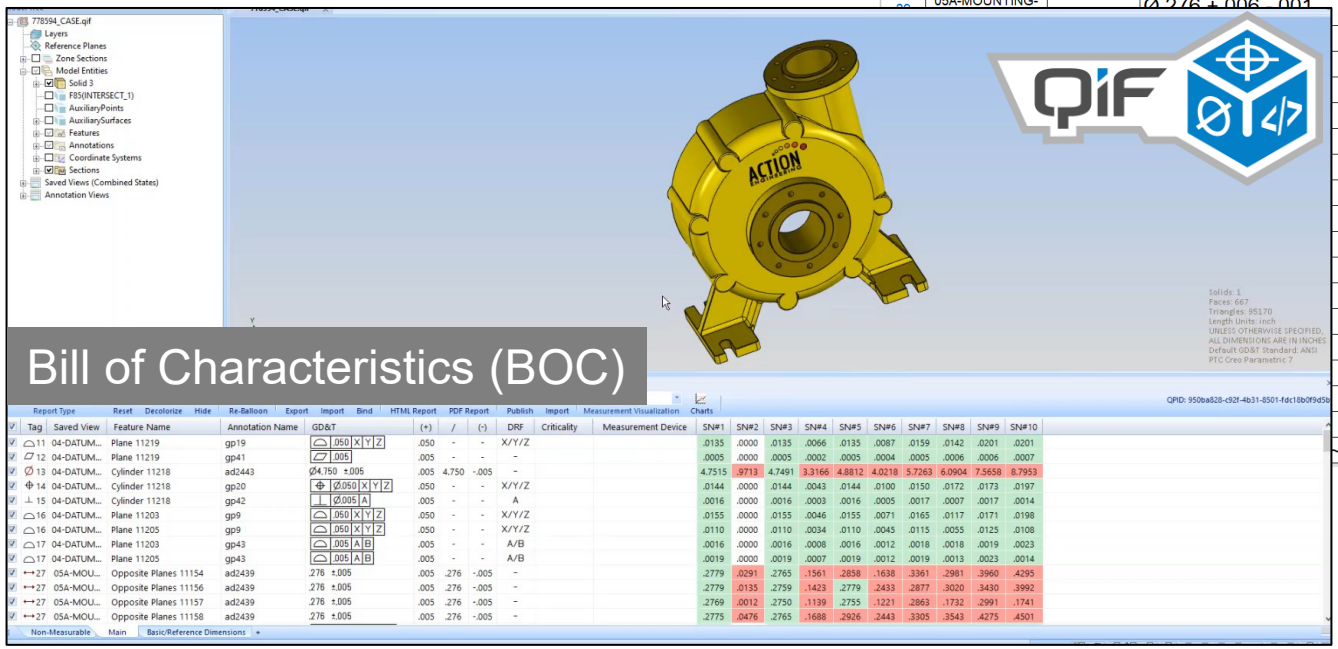
				.08			
				.09			
				.001			



Bill of Characteristics (BOC)

Business Case

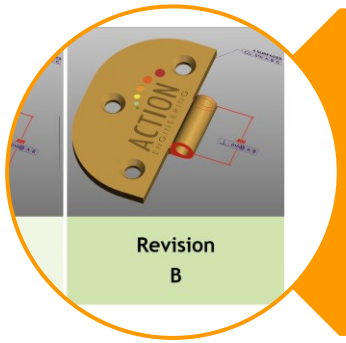
Quality Planning

Metrics

Time Savings	**73%**
Reduction in duplicating manual data entry	**66%**
Increased Throughput in Quality	**53%**
Data Traceability between Design and Quality	**100%**

Reduce Current Pain Points

- Reduces separation between Design and Inspection Data
- Reduces design interpretation errors and omissions

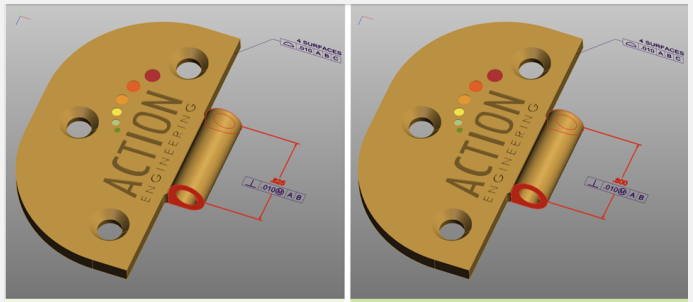


Engineering Changes

Scenario

Engineering Changes

What

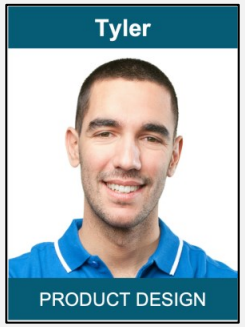


Revision A	Revision B

MBD Capabilities

- MBD Component
- MBD Assembly
- Change Detection
- 3D Automated Reporting

Who



How

Revise
MBD Component & Assembly Product Definition

Automated Review of unintended changes

Remove unintended changes Product Definition

Publish & Pass
3D Report that compares change to a previous revision

Review
Revised MBD Assembly

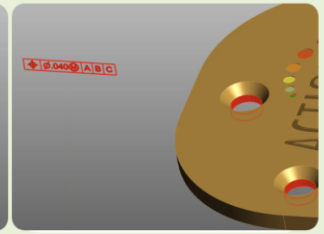
Description

MBD Capabilities

- MBD Component
- MBD Assembly
- Change Detection
- 3D Automated Reporting

Engineering Changes

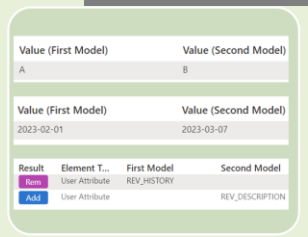
MBD Component



Tab
- Reduced Width
- Increased Gap

Holes
- Increased positional tolerance allowed
- Decreases manufacturing costs
- Increases manufacturer flexibility

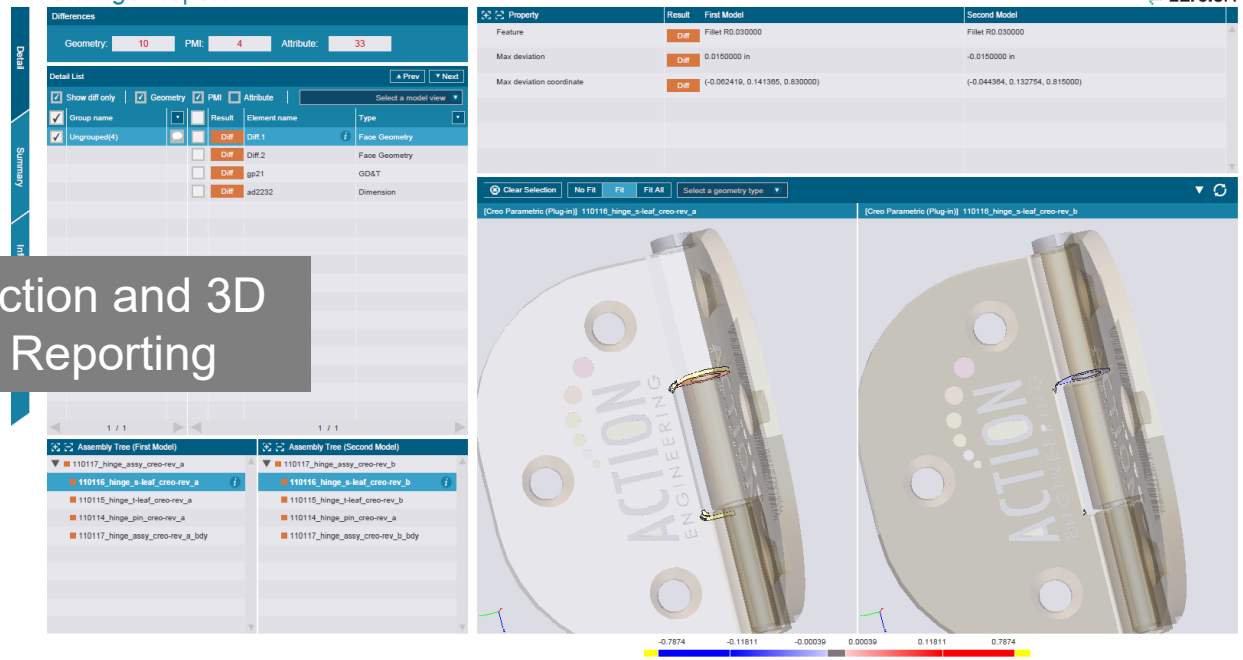
MBD Assembly



Attributes
- New Revision
  - REV
  - REV_DATE
- Revised the attribute name
  - REV_HISTORY changed to REV_DESCRIPTION

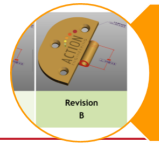
Assembly BOM
- Rev B
- T-Leaf Rev B
- S-Leaf Rev B
- Pin Rev A

Change Report



Change Detection and 3D Automated Reporting

Business Case



Engineering Changes

Metrics

Time Savings	**75%**
Reduction in duplicating manual data entry	**80%**
Cost reduction due to scrap reduction	**20%**

Reduce Current Pain Points

- Improved change communication
- Reduces change interpretation errors and omissions

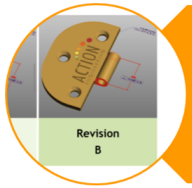
All Scenarios Provide Business Value

Key Performance Indicators (KPIs)

Sustain Existing Business	Definitive Communications between Engineering and Manufacturing and Quality
Cost Reduction	Decrease part costs by up to 35%
Business Growth	A new business offering to deliver standard-compliant MBD assemblies to customers

Design Review

Quality Planning



Engineering Changes

ACTION ENGINEERING

GETTING STARTED

Create Scenarios for High Business Value

Assess Your Readiness

- Complete 3D Transformation Readiness Assessment
- Conduct Process and Software Tools Inventory
- Collaborate on Customized Business Case

Prove Your Case

- Visualize your products as 3D data
- Maximize 3D data for manufacturing using our software tools
- Benchmark Efficiencies with Your Data

Form Your Team

- Set a Neuroscience-Based Organizational Change Foundation
- Empower Cross-Functional Ownership
- Refine Plan of Action for 3D Transformation

Build Your Foundations

- Assess Supply Chain Readiness
- Interview Users and Stakeholders
- Identify Training Needs
- Create Communication Plan

Plan Your Rollout

- Establish Iterative Project Practices
- Establish a Range of Use-Case Scenarios
- Establish Metrics
- Develop Strategic Implementation Roadmap
- Plan Your Pilots

Get Rolling

- Enunciate New Processes
- Learn Tools and Standards
- Train Authors, Practitioners, and Conversers

Pilot & Learn

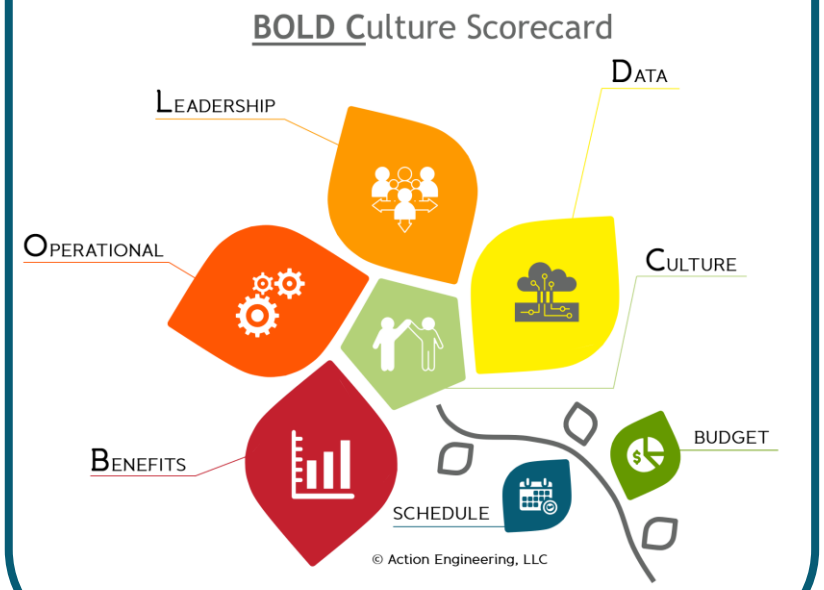
- Test & Increment New Processes
- Write & Increment Your Modeling Standards
- Train Consumers and Engage Supply Chain

Scale & Expand

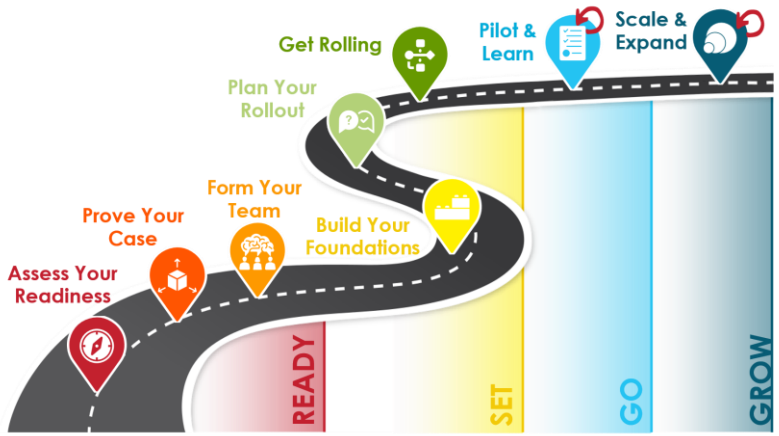
- Amplify Stakeholder Communications
- Expand Pilot Complexities
- Scale Training
- Refine Tools
- Practice, Reflect, and Adapt

ACTION ENGINEERING®

ROI & ACTIONABLE READINESS ASSESSMENT



3D TRANSFORMATION IMPLEMENTATION FRAMEWORK



FOSTERING COMMUNITIES OF PRACTICE

3D CIC

3D Collaboration & Interoperability Congress

EXPERT GUIDANCE

OSCAR™

Bringing MBD Within Reach

ACTION-ENGINEERING.COM
MBD USING MODERN GD&T

Team Training

1:1 Coaching

ACTION ENGINEERING

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