# Uniting PLM & ERP for a complete 3D MBE Deployment

Anark Corporation

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# Agenda



- **Anark Introduction**
- **3D Model-Based Enterprise**
  - **Definition**
  - **Traditional Barriers**
  - **How did the DoD move past Level 2?**
- **Uniting PLM and ERP data for generating 3D MBE documents**
- **Successful 3D MBE deployments**
- **3D MBE ROI**



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# Anark Corporation Overview



- **Leading provider of advanced MBE and Visual Communication software and solutions to industry leaders since 2000.**
- **Empowering 3D Model Based Enterprise revolution within Aerospace, Defense, Automotive, Energy, Industrial, Electronics, Medical Equipment, and Consumer Products Sectors**
- **Growing company, with world-wide network of technology, integration, and channel partners**
- **Anark Corporation HQ in Boulder, Colorado**

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# Model-Based Enterprise



**What?**

- **Fully integrated and collaborative environment founded on detailed 3D product definition shared across the extended enterprise**

**How?**

- **A single digital master data set containing the 3D model and all needed product data in a managed secure and controlled environment that supports maximum data reuse for all aspects of acquisition, maintenance and operations.**

**Why?**

- **Rapid, seamless, and affordable deployment of products from concept to disposal.**



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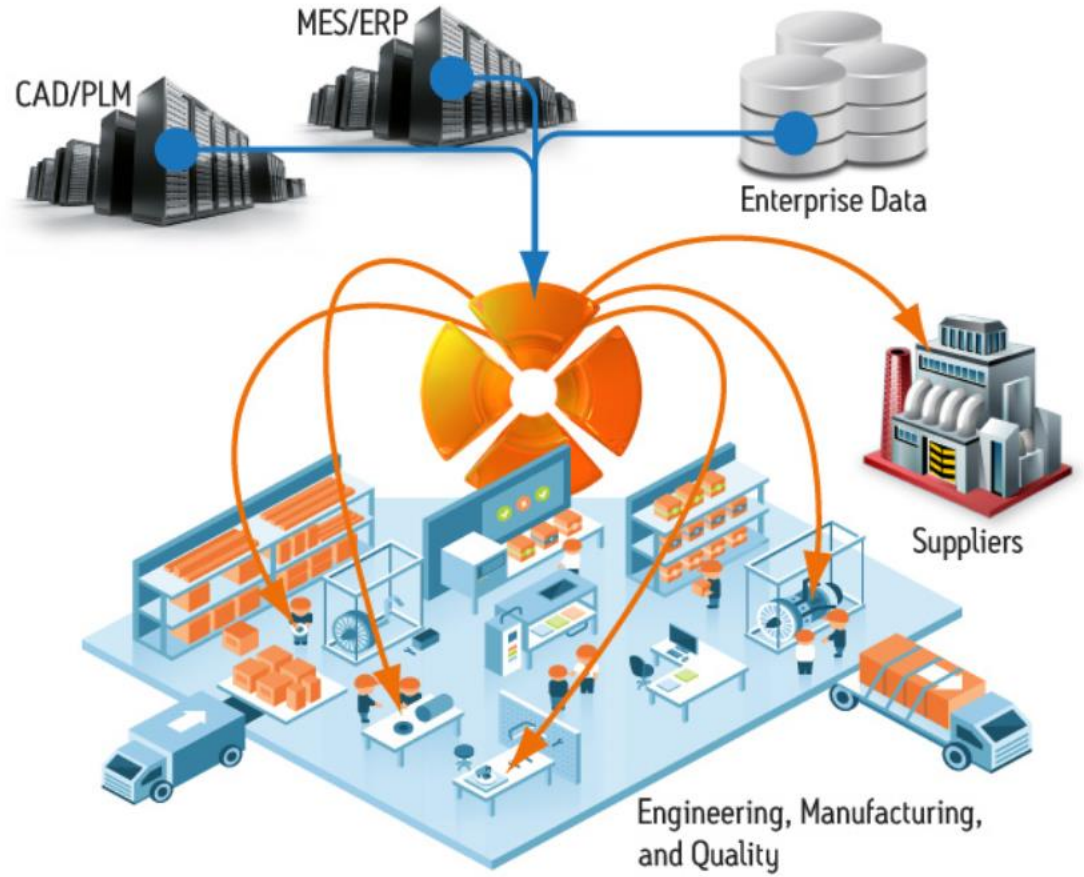
# Model-Based Enterprise





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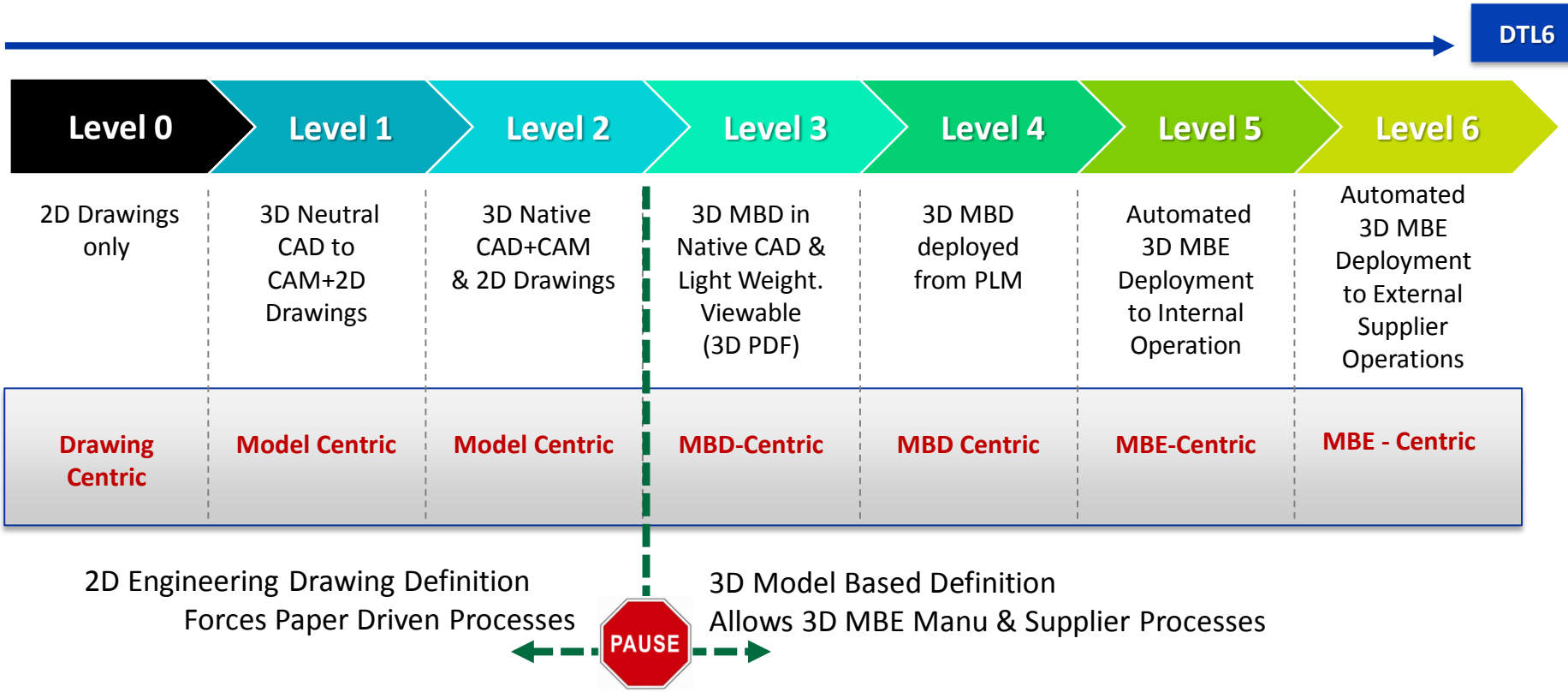
# MBD/MBE Capability Levels



## How to Drive through Level 6 (DTL6)




Many Stuck on Level 2

***Because MBD Data in CAD*** ≠ ***MBE Data Downstream***



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# What prevents moving past Level 2?



- **Cultural Resistance/Inertia to moving away from 2D Drawings**
- **Inability to move CAD Native to neutral formats with 100% fidelity**
- **Semantic Engineering Design Intent must be accurately conveyed MBE Viewing Technology Costly and Inflexible**
  - **CAD Viewers are proprietary, hard-coded, model-spinners with minimal MBE capabilities**
  - **Suppliers were adverse to buying, installing and managing multiple CAD viewing clients**
- **Full Product Definition is more than CAD MBD data**
  - **Required Data may also reside in PLM, ERP, MES, CRM, …**



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# How did the DoD move past Level 2?



- **Native CAD APIs for reliable access to 3D MBD data**
- **3rd party validation of all 3D Model Translation**
- **Leverage Open Formats for 3D MBE documents**
  - **3D PDF - ISO standard with robust 3D MBD support**
  - **HTML5 + WebGL**
- **Server-based automated publishing and regeneration**
  - **SOA/Webservices**
  - **Data Connectors for pushing and pulling data from multiple systems**
- **MIL-STD 31000 rev A – ratified in Dec 2013**
  - **Mandates all new system acquisitions include 3D Tech Data Packages**



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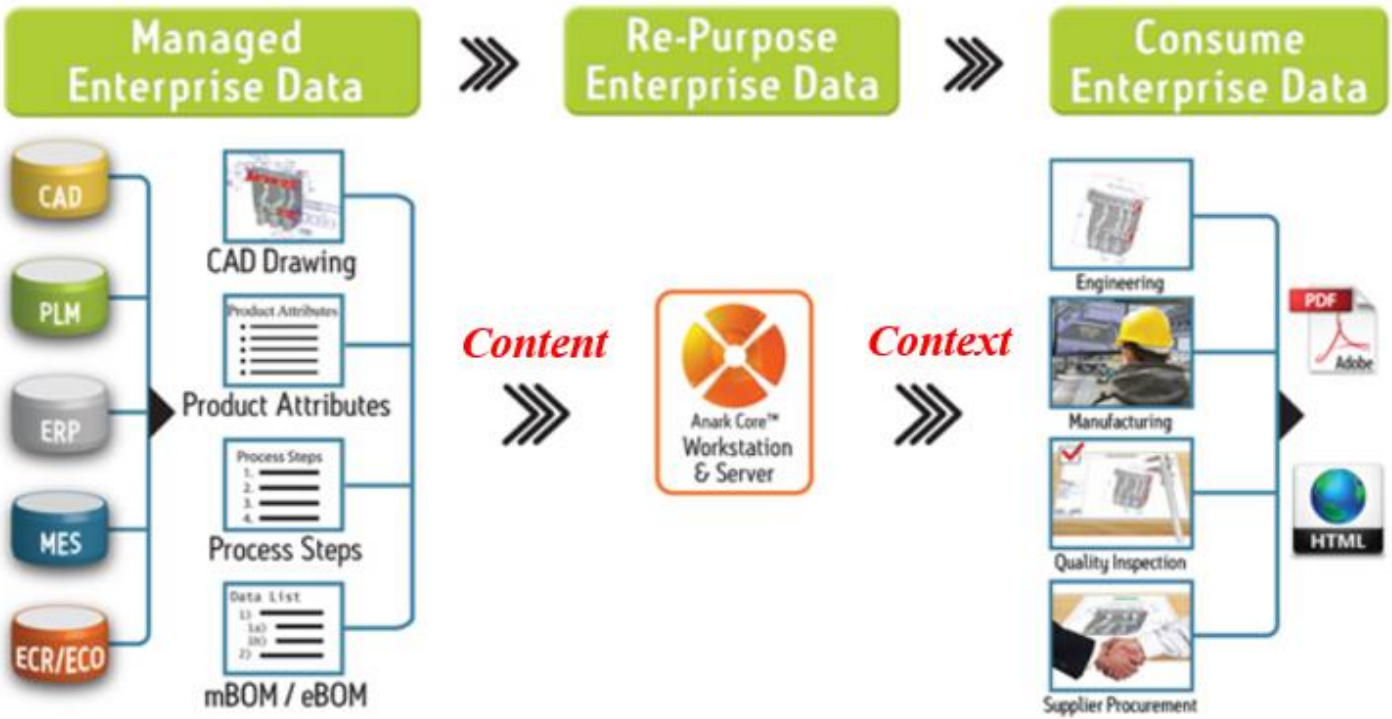
# Anark Core Platform



## Unite CAD/PLM & MES/ERP to Create Fit for Purpose MBE Documents




Product and Process Definition **(Content)**

Product & Process Definition Combined **(United)**

Recipe-Business Rules Using Templates **(In-context)**



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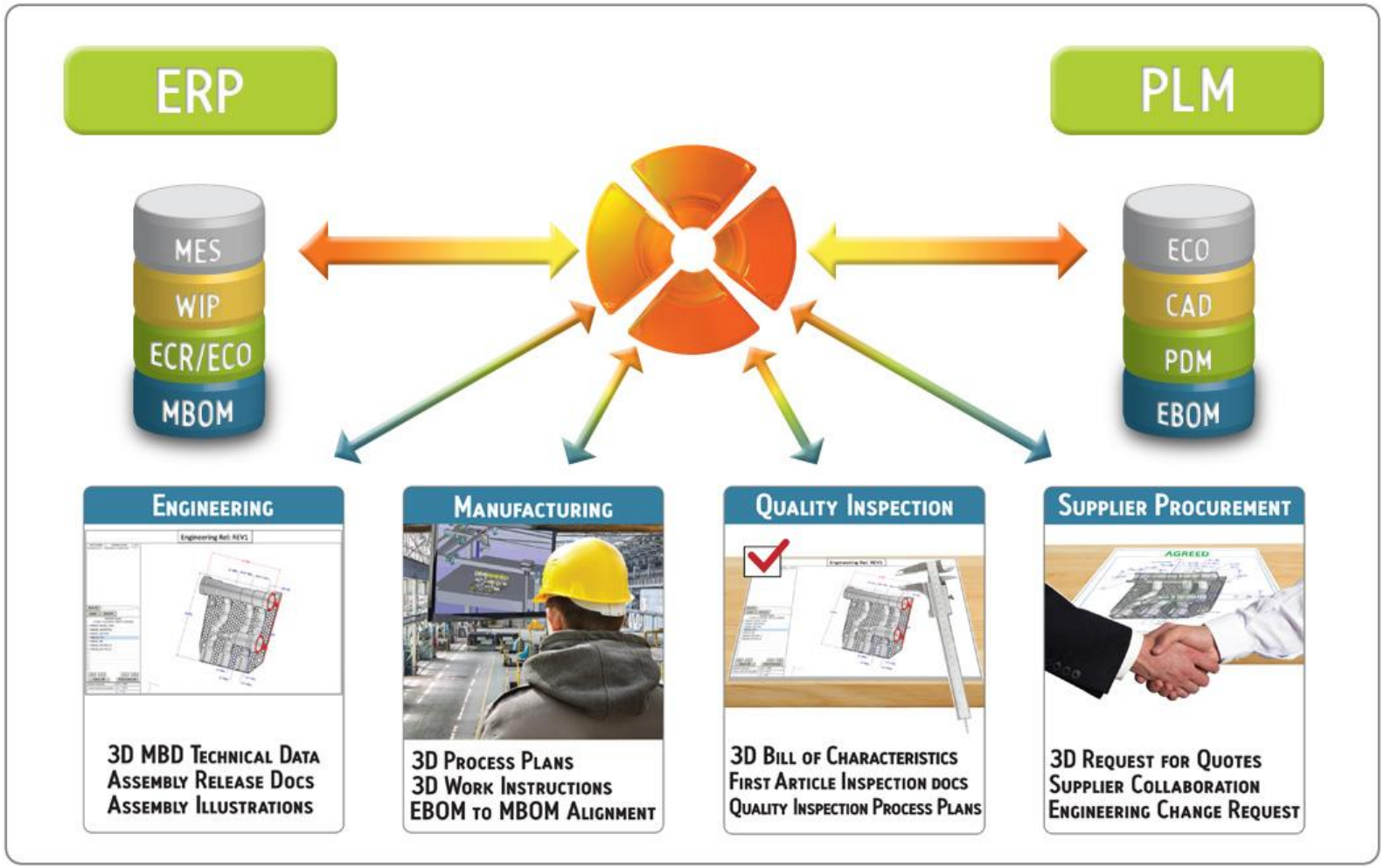




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# 3D MBE Successful Deployments

- US Army – ARDEC –TDPs
- US Navy – NAVAIR - TDPs
- Boeing – A10 Wing Replacement Program – Parts Provisioning Reports
- Hill Air Force Base – PPRs, TDPs, Model-based Work Instructions
- Honeywell – TDP, MBWI
- General Electric - TDPs
- Raytheon – TDPs, Quality Inspection Plans
- Lockheed Martin - TDPs
- General Dynamics - TDPs
- Navistar - TDPs
- CSR-Sifang - MBWI
- TE Connectivity - TDPs



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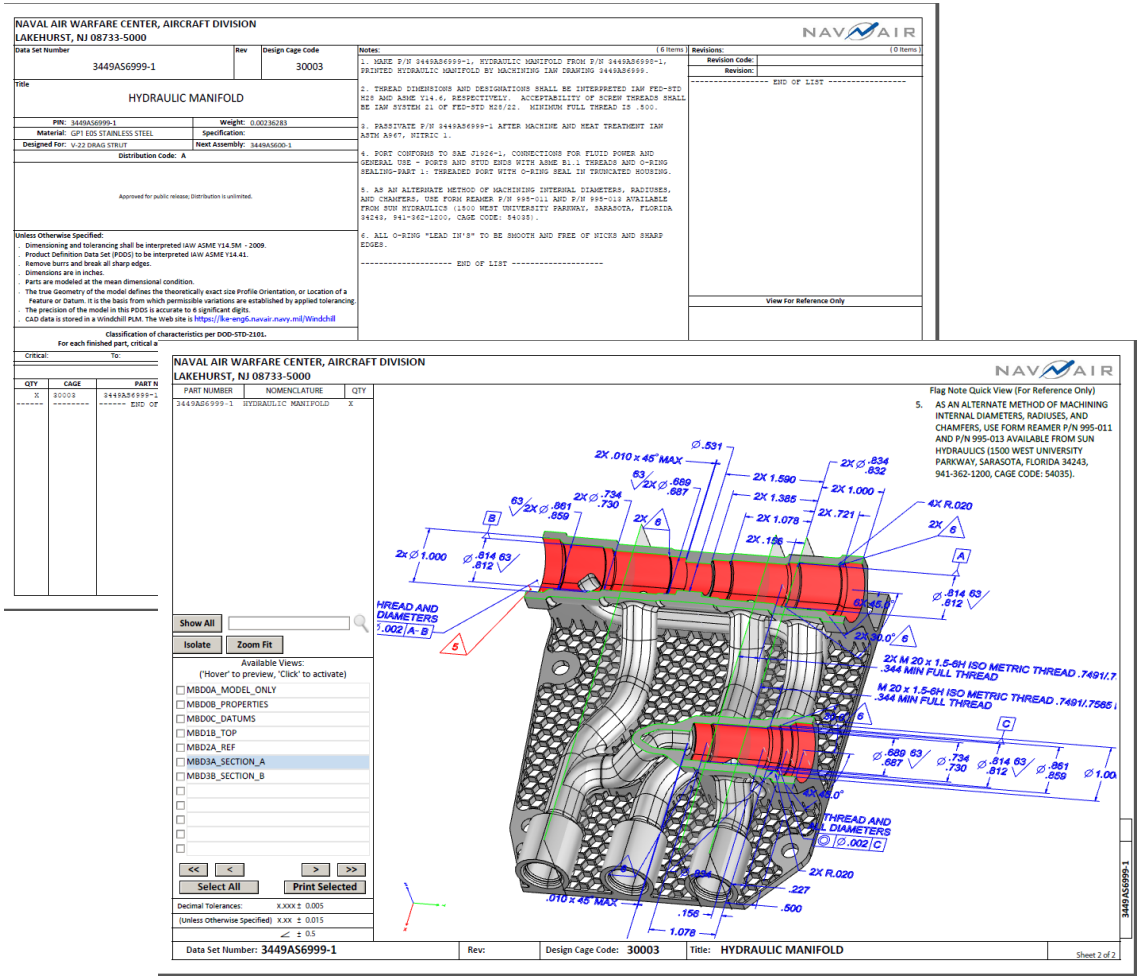
# Customer Samples - NAVAIR

Global Product Data Interoperability Summit | **2015**




## Technical Data Package

- 3D PDF from native Creo 3D MBD and Windchill Attributes
  - Title Block, Rev History, BOM, Mfg Notes, Approvals
- Validation Report
- BOM
- Validated STEP File



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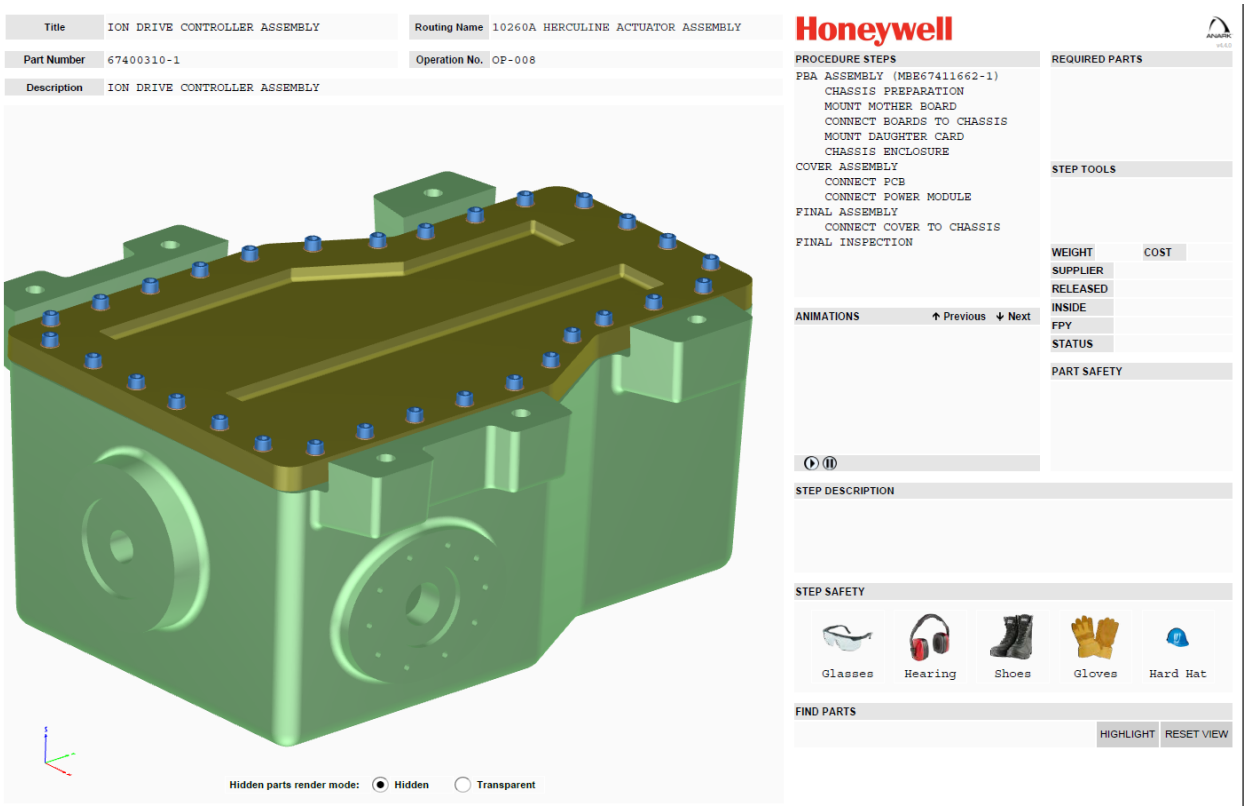
# Customer Samples - Honeywell






**3D Process Planning Documents**

Automated publishing combines

- CAD MBD engineering BOM (PLM)
- Process data (ERP)
- Part Attributes (ERP)



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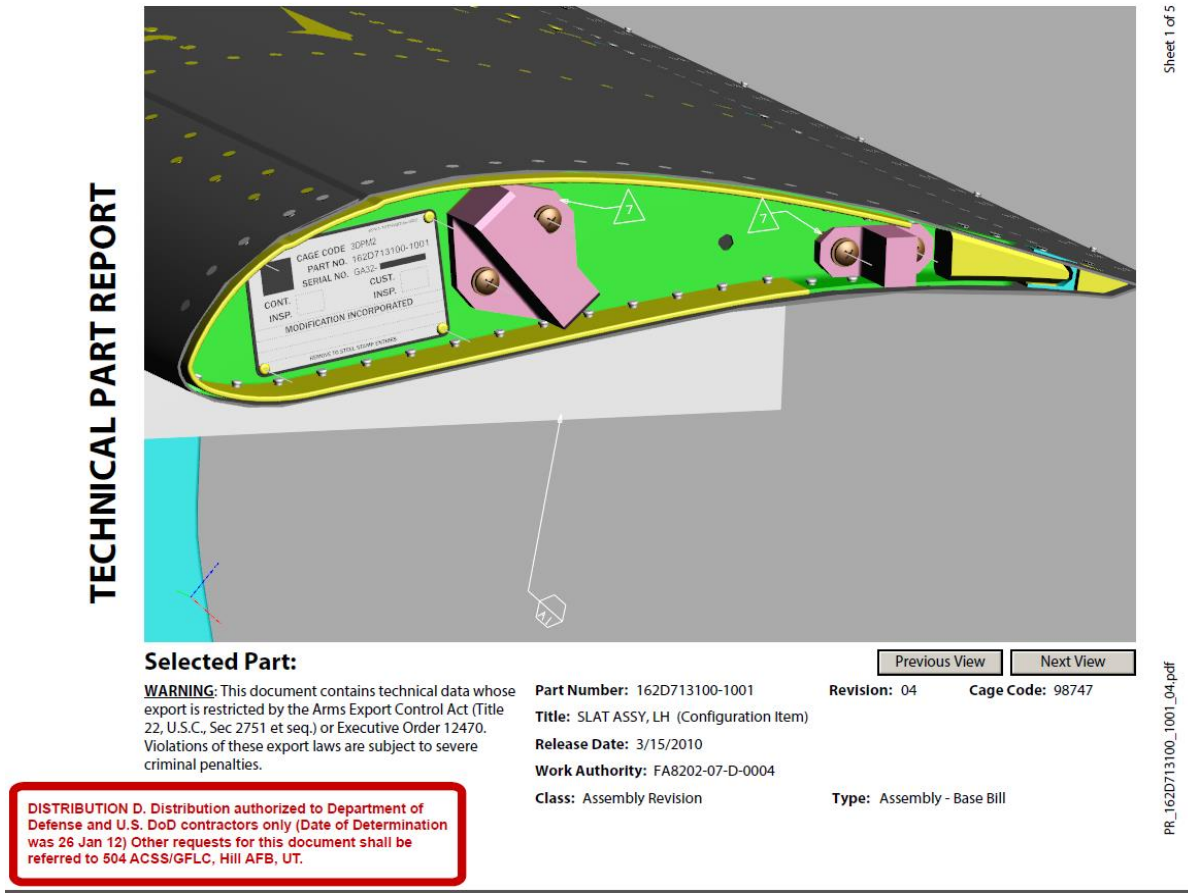
# Customer Samples – Boeing






**5000 A-10 Wing Parts**

- Native NX
- TeamCenter
- SlicWave Provisioning Attributes

Into Lightweight
3D PDF PPRs



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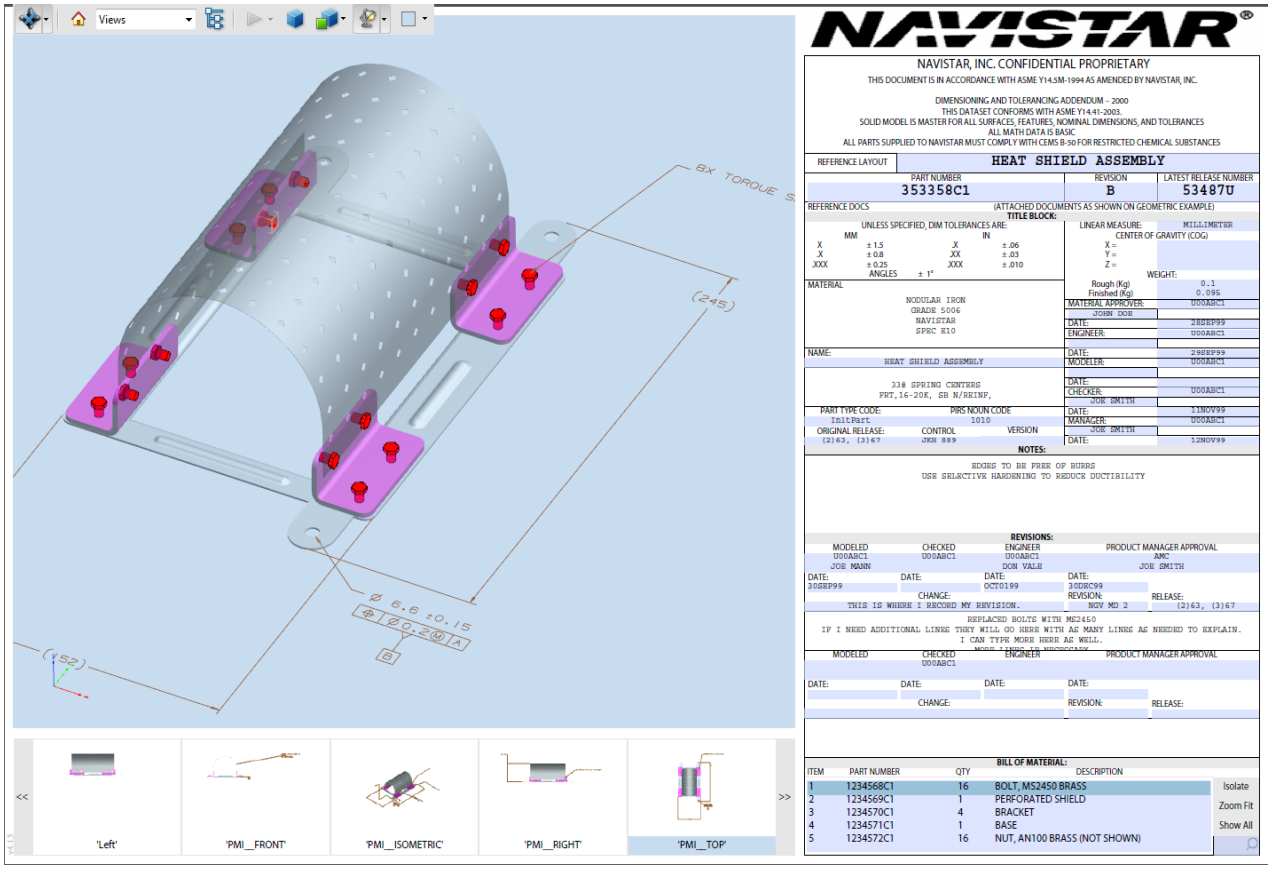
# Customer Samples - Navistar

Global Product Data Interoperability Summit | **2015**

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THIS DOCUMENT IS IN ACCORDANCE WITH ASME Y14.5M-1994 AS AMENDED BY NAVISTAR, INC.

DIMENSIONING AND TOLERANCING ADDENDUM – 2000
THIS DATASET CONFORMS WITH ASME Y14.41-2003.
SOLID MODEL IS MASTER FOR ALL SURFACES, FEATURES, NOMINAL DIMENSIONS, AND TOLERANCES
ALL MATH DATA IS BASIC
ALL PARTS SUPPLIED TO NAVISTAR MUST COMPLY WITH CEMS B-50 FOR RESTRICTED CHEMICAL SUBSTANCES

REFERENCE LAYOUT

**HEAT SHIELD ASSEMBLY**

| PART NUMBER | REVISION | LATEST RELEASE NUMBER |
|---|---|---|
| 353358C1 | B | 53487U |

REFERENCE DOCS (ATTACHED DOCUMENTS AS SHOWN ON GEOMETRIC EXAMPLE)

TITLE BLOCK:

UNLESS SPECIFIED, DIM TOLERANCES ARE:

| MM | | IN | |
|---|---|---|---|
| X | ±1.5 | .X | ±.06 |
| .X | ±0.8 | .XX | ±.03 |
| .XXX | ±0.25 | .XXX | ±.010 |
| ANGLES | ± 1° | | |

LINEAR MEASURE: MILLIMETER

CENTER OF GRAVITY (COG)
X =
Y =
Z =

WEIGHT:
Rough (Kg) 0.1
Finished (Kg) 0.095

MATERIAL
NODULAR IRON
GRADE 5006
NAVISTAR
SPEC R10

MATERIAL APPROVER: U00ABC1
JOHN DOE
DATE: 28SEP99
ENGINEER: U00ABC1
DATE: 29SEP99
MODELER: U00ABC1
DATE:
CHECKER: U00ABC1
JOE SMITH
DATE: 11NOV99
MANAGER: U00ABC1
JOE SMITH
DATE: 12NOV99

NAME:
HEAT SHIELD ASSEMBLY

338 SPRING CENTERS
PRT,16-20K, SB N/RHINP,

PART TYPE CODE: InitPart
PIRS NOUN CODE: 1010
ORIGINAL RELEASE: (2)63, (3)67
CONTROL: JKH 889
VERSION

**NOTES:**

EDGES TO BE FREE OF BURRS
USE SELECTIVE HARDENING TO REDUCE DUCTIBILITY

**REVISIONS:**

| MODELED | CHECKED | ENGINEER | PRODUCT MANAGER APPROVAL |
|---|---|---|---|
| U00ABC1 | U00ABC1 | U00ABC1 | AMC |
| JOE MANN | | DON VALE | JOE SMITH |
| DATE: 30SEP99 | DATE: | DATE: OCT0199 | DATE: 30DEC99 |

CHANGE: THIS IS WHERE I RECORD MY REVISION.
REVISION: NGV MD 2
RELEASE: (2)63, (3)67

REPLACED BOLTS WITH MS2450
IF I NEED ADDITIONAL LINES THEY WILL GO HERE WITH AS MANY LINES AS NEEDED TO EXPLAIN.
I CAN TYPE MORE HERE AS WELL.
MORE LINES IF NECESSARY

| MODELED | CHECKED | ENGINEER | PRODUCT MANAGER APPROVAL |
|---|---|---|---|
| | U00ABC1 | | |
| DATE: | DATE: | DATE: | DATE: |

CHANGE: REVISION: RELEASE:

**BILL OF MATERIAL:**

| ITEM | PART NUMBER | QTY | DESCRIPTION |
|---|---|---|---|
| 1 | 1234568C1 | 16 | BOLT, MS2450 BRASS |
| 2 | 1234569C1 | 1 | PERFORATED SHIELD |
| 3 | 1234570C1 | 4 | BRACKET |
| 4 | 1234571C1 | 1 | BASE |
| 5 | 1234572C1 | 16 | NUT, AN100 BRASS (NOT SHOWN) |

Isolate
Zoom Fit
Show All

Native NX +
Teamcenter Attributes

100% Drawingless
Product Definition



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# Why? Because 3D MBE Delivers massive ROI



TOYOTA

**50% Reduction** Tooling design & fabrication
**33% Reduction** Overall assembly hours
**30% Reduction** Rework

BOEING

**50% Reduction** Tooling design & fabrication
**30% Reduction** Overall assembly hours
**50% Reduction** Rework

**30% Reduction** Engineering Overhead
**20% Reduction** Scrap and Rework
**50% Reduction** Supplier Response Time

*Source :http://model-based-enterprise.org/Starting-Model-Based-Enterprise/default.aspx*

*DOD Report: [http://model-based-enterprise.org/2012-assessment.aspx](http://model-based-enterprise.org/2012-assessment.aspx)*



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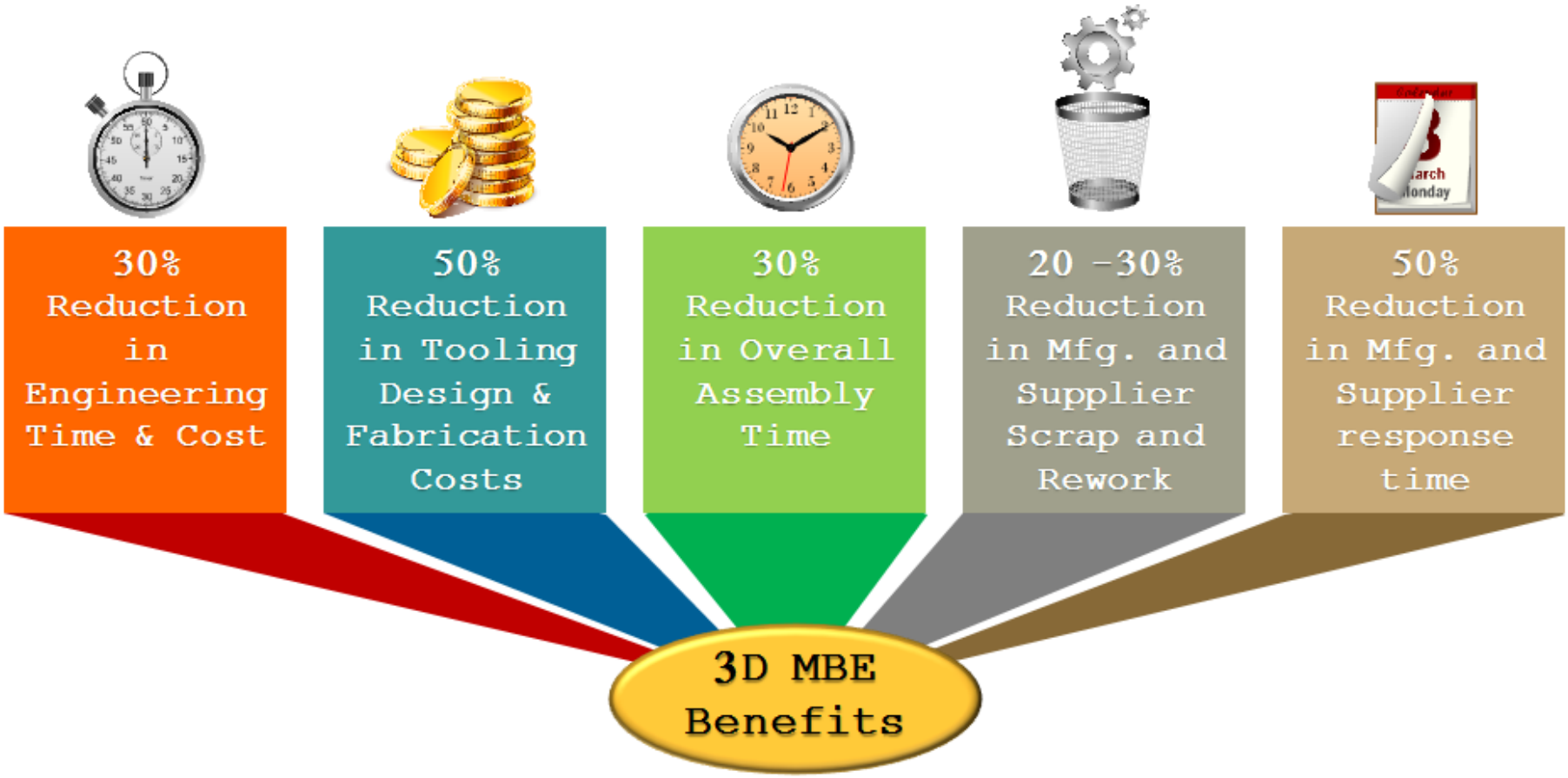
# Benefits of 3D MBE





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# Unleash the Model Based Enterprise



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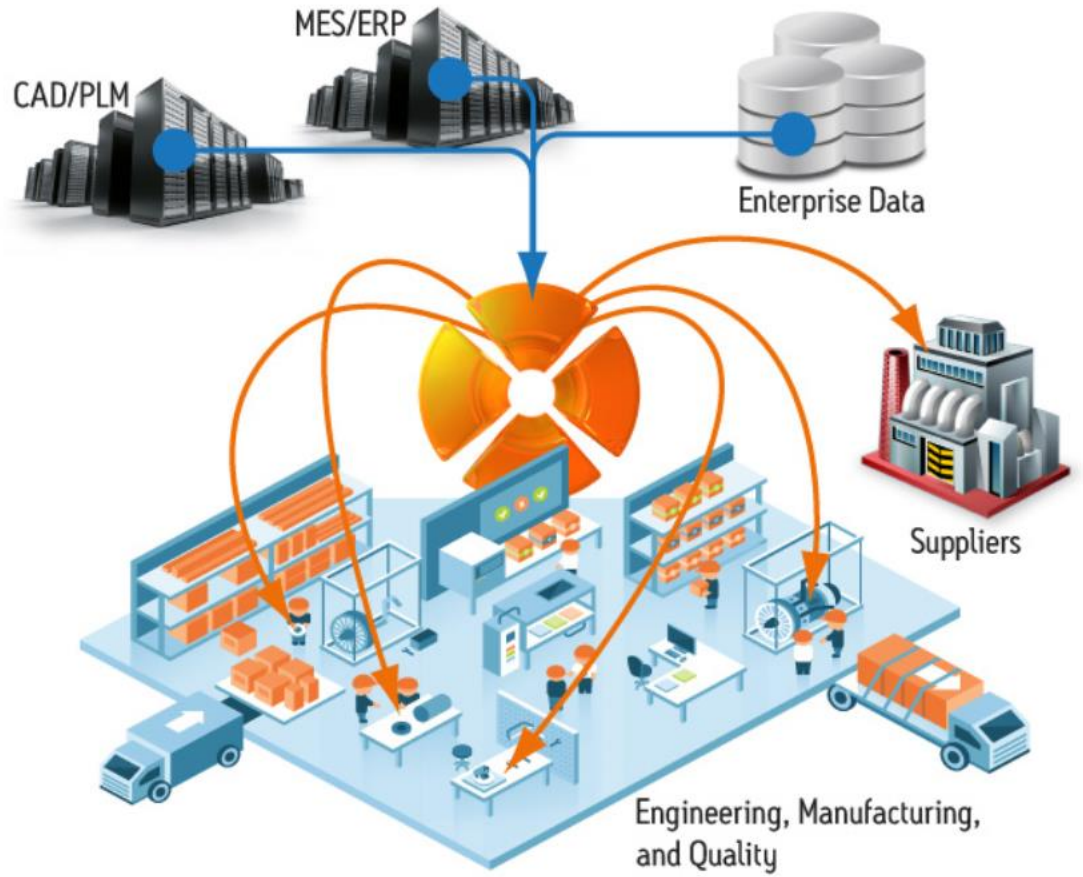
# Appendix – Additional Slides





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# Anark Core Product Line

**Anark Core Server**—enterprise MBE server software with SOA for recipe-based transformation, publishing, and collaboration. Advanced MBD CAD integrations to NX, Creo, CATIA, and SolidWorks.

**Anark Core Workstation**—MBE desktop software for recipe creation for server-side automation and SME authoring for manual document generation. Advanced MBD CAD integrations to NX, Creo, CATIA, and SolidWorks.

**Anark Core SDK**—Integration software development kit for connecting Anark Core software to other enterprise data sources and workflow engines.

**Anark Core Integrations for PDM**—Reference integration code for Teamcenter, Windchill PDMLink, ENOVIA, and SolidWorks EPDM for workflow-driven, recipe-based publishing automation. Provided as a service to our enterprise customers. Aras and Autodesk Vault are next up.

Anark Core™



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# Anark Core Product Licensing

**Anark Core Server**—licensed per OS server instance. Per user licensing is possible in contexts where user licenses are enforced (e.g. in the context of a PDM system like Teamcenter).

**Anark Core Workstation**—licensed per simultaneous desktop user (floating), similar to NX.

**Anark Core SDK**—licensed per IT development team.

**Anark Core Integrations for PDM**—provided as a service to Anark customers.

Anark Core™



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# Anark Core Key Commercial Differentiators



Anark Core™

1. Unites **CAD/PLM with MES/ERP** for “In-Context” Enterprise document generation
2. Transform **multiple sources of product data** based on **Enterprise Business Rules (Anark Core recipes)**
3. Multi-CAD support with **accurate & trustworthy MBD**
4. Server-based **automatic document generation & regeneration** based on source data changes, serving multiple engineering and manufacturing use cases.
5. Server-based **collaboration capabilities** for managing supply chain comments and markup.
6. Template based delivery platforms (3D PDF & 3D HTML), that are **FREE to View and FREE to deploy**


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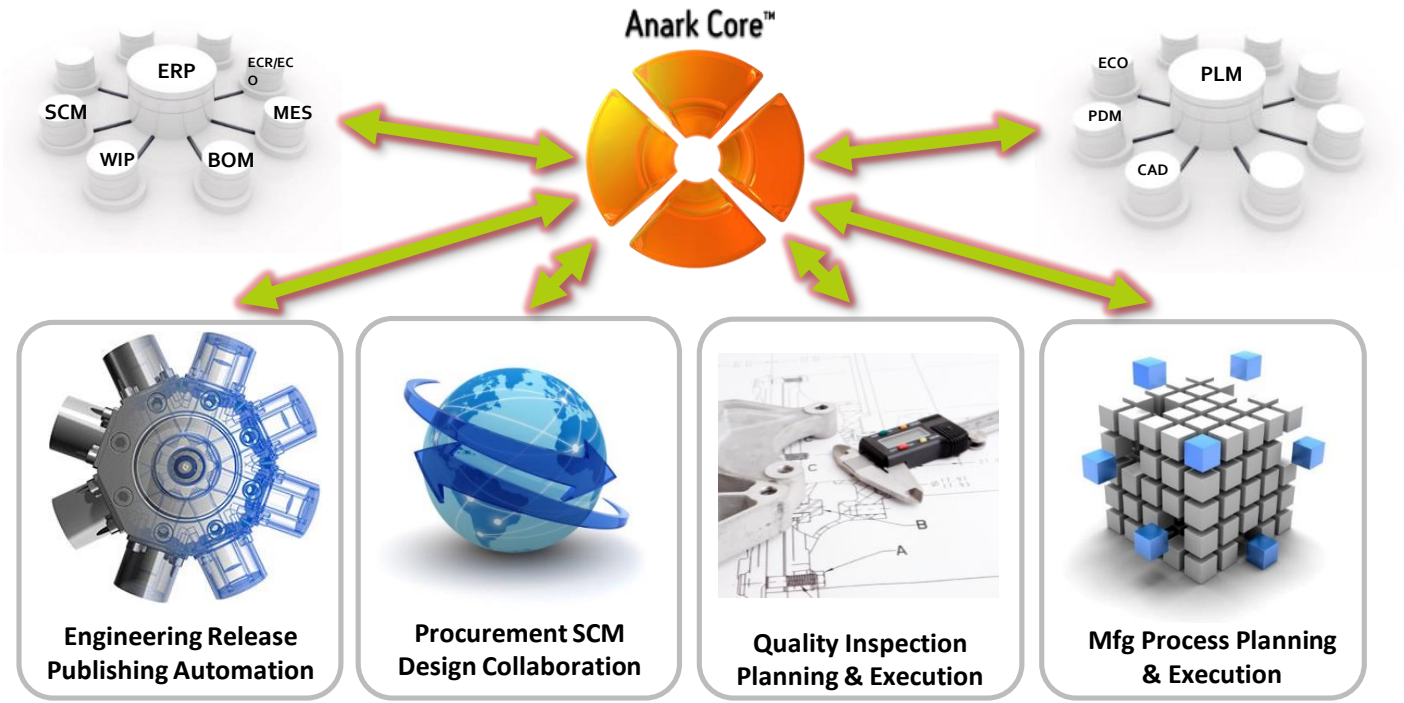
# Transform Master Data and Achieve ERP-PLM Harmony





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# Anark Core MBE Cloud and Mobile Platform

- Deliver the Fantastic Four to Web & Mobile
- Anark Core Services available from Any Device
- Robust HTML5 Application Publishing w/WebGL
- Multi-tenant Architecture
- Intelligent Clustering and WAN Localization
- Fully Virtualized for Private or Public Hosting
- No end-user licensing fees—free to view, free to deploy!

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