Anark - Connecting the Digital Thread

3D MBE, Digital Thread, and Manufacturing Process

3D CIC + QIF Summit 2017
October 4, 2017
Leading provider of visual collaboration software and solutions to industry leaders since 2000

Empowering Model Based Enterprise & Digital Thread revolutions within Aerospace, Defense, Automotive, Energy, Industrial, Electronics, and Medical Equipment Sectors

Most capable, production-proven automated data transformation and publishing platform on market today.

Fast Growing, profitable company, with world-wide network of technology, integration, and channel partners

Anark Corporation HQ in Boulder, Colorado

Employees, Dev & Integration Partners in multiple locations in North America and India
Digital Thread & MBE Definitions

- Digital Thread
  Communication framework that allows a connected data flow and integrated view of the asset’s data throughout its lifecycle across traditionally siloed functional perspectives.

  The digital thread concept raises the bar for delivering “the right information to the right place at the right time.” – Industry Week

- 3D MBE – Model Based Enterprise
  Reuse of 3D engineering (MBD) outside of 3D CAD systems, including dimensions, tolerances, annotations, views for more effective communication and collaboration
  3D model-based drawings, TDPs, Inspection Documents, RFQs, manufacturing process, field service

  “A fully integrated and collaborative environment founded on 3D product definition detailed and shared across the enterprise; to enable rapid, seamless, and affordable deployment of products from concept to disposal.” – Model-Based-Enterprise.org
The Anark platform enables global manufacturing companies to complete the Digital Thread, by delivering the right information to the right place at the right time:

- Enables PLM and CAD users to easily transform critical CAD, PLM & ERP data into powerful, role-and-use-case-specific 3D PDF documents and HTML5 web content that can be consumed on virtually any device.

- Empowers knowledge workers along the Digital-Thread to communicate and collaborate more effectively and securely throughout engineering, manufacturing, supply-chain and field service operations.

- Supports powerful model-based (MBE) process change, yielding higher quality products, accelerated release cycles, and reduced scrap and material waste, netting substantial cost savings for OEMs and their suppliers.
Anark Core: Generate Technical Content for the Extended Enterprise
Leading manufacturers are moving away from traditional engineering drawings and paper based documents to communicate design intent and manufacturing processes to embrace more effective 3D model based practices.

The vision of the “Model Based Enterprise” is gaining momentum across all major industry segments, and manufacturers are implementing model-based practices and technologies to drive greater efficiency and improved quality in their manufacturing operations.

Leading OEMs and Suppliers are benefitting by taking a connected, "Model Based Enterprise" approach to transform their manufacturing operations.
Status Quo – Conventional Processes

- Time consuming to generate
- Manufacturing process documents often created in “ad-hoc” manner using variety non-standard tools
- Data often difficult to interpret, slowing process and resulting in unnecessary errors, re-work, scrap, and waste
- Duplication of data
- Lack of connection and integration with enterprise data systems, resulting in delays and out of date information
Status Quo – Conventional Processes

1. Load model in CAD
2. Create views of model
3. Take screenshots of model
4. Paste screenshots into MS Word, PPT, Excel, etc
5. Copy/Paste BOM into MS Word, PPT, Excel, etc
6. Add callouts, annotations, etc
7. Write steps/processes to perform

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>A651</td>
<td>Battery Pack</td>
<td>1</td>
</tr>
<tr>
<td>A126</td>
<td>Bracket</td>
<td>2</td>
</tr>
<tr>
<td>A025</td>
<td>Gear</td>
<td>1</td>
</tr>
<tr>
<td>A259</td>
<td>Bushing</td>
<td>1</td>
</tr>
<tr>
<td>A337</td>
<td>15/64&quot; Screw</td>
<td>4</td>
</tr>
<tr>
<td>A337</td>
<td>Square nut</td>
<td>4</td>
</tr>
</tbody>
</table>

1. Place one A025 gear and one A259 bushing the motor shaft as shown in Figure 6.
2. Attach the two A126 brackets on top and bottom of the motor with four A637 screws and four A337 square nuts as shown in Figure 6.
3. Stamp and date Data Sheet block 30 when complete.
There is a different way to go....

Anark Demo
How Does Anark Server-Side Generation Work?

(When occurrence to process mapping already exists)

Anark Core Server

Recipe-Based Transformation

Published 3D PDF and 3D HTML5

Publishing Template
How Does Anark Work Instruction Authoring Work?

3D CAD, BOMs, Process, Safety

(When occurrence to process mapping does not exit)

Anark Core Workstation

Recipe-Based Transformation

Published 3D PDF and 3D HTML5

Publishing Template

CONFIDENTIAL
Host Technical Web Content Across the Digital Thread

- Allows knowledge workers across the extended enterprise to communicate and collaborate with fit-for-purpose technical web content from any device.

- Publish content with Anark Core into MBEWeb with up-to-date content derived from PLM, ERP, and other critical data sources, while providing links to easily download TDP file attachments.

- Built with scalable cloud technologies that can be installed on-premise, with content privileges defined from PLM or ERP workflows, insuring the protection of your data.
MBEWeb Benefits Over PLM, Custom Portals, SharePoint

- **Inexpensive compared to PLM licenses.** Allows the system to be used widely across the extended enterprise.

- **Easy to deploy, easy to use system** does not require specialized user training often required for PLM software. Reduced IT and user support costs.

- **Role-and-use-case-specific content** can be published instead of hunt and peck for documents in PLM systems. More efficient access to critical data.

- **Content can be accessed from virtually any device**, anywhere in the enterprise: supply chain, manufacturing, customers. Allows flexibility with paperless access.

- **Integrated content-centric collaboration** supports critical technical conversations within the extended enterprise. More efficient than email-based collaboration.
3D PDF & HTML5 – Ideal Formats for Data Sharing & Collaboration

3D PDF Capabilities:
- ISO Standard & free to consume using ubiquitous Adobe Reader
- Can serve as contractually binding document
- Well suited to complex use-cases where data from multiple enterprise sources is required for template-based publishing
- Security of the PDF Container
- Involves certain limitations inherent in the PDF standard and Adobe Reader
- Limited to windows-based mobile devices
- Struggles with extremely large files--impeding collaboration and sharing

HTML5 Capabilities:
- Universally available W3C standard plus WebGL for 3D content enables unfettered data consumption
- Extremely well suited to complex use-cases where data from multiple enterprise sources is required for template-based publishing
- Available on virtually all devices
- Virtually limitation free, supporting more advanced MBE/Digital Thread needs
- Allows content to be streamed, eliminating most file size issues
Solving the “last mile” problem & Digital Thread

- You can never anticipate who will need access to technical data
- 3D PDF lowers the bar for accessing technical data
  - It’s document plus an embedded viewer
  - ...still need to distribute
  - ...how to ensure everyone is looking at the same thing?

- HTML + “the Web” further lowers the bar for accessing and distributing technical data
  - HTML describes content
  - WWW is the distribution network
  - (Any) Browser is the viewer
  - Everyone is connected (clients can communicate with other clients)
  - No need to switch contexts (distribute, view, collaborate, capture, history, analytics, etc)
# 3D MBE Process Benefits

<table>
<thead>
<tr>
<th>Performance Benefits</th>
<th>MBE Contributors to Savings</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Easier to Accurately Interpret Information</td>
<td>• Accelerates execution of process steps and overall pace of assembly.</td>
</tr>
<tr>
<td></td>
<td>• Eliminates costly errors caused by misinterpretation.</td>
</tr>
<tr>
<td>2  50% Reduction in Tooling Design &amp; Fabrication Costs</td>
<td>• There is no need to remodel the original design (typically from 2D Drawings) around which the Tooling/fabrication processes will be designed</td>
</tr>
<tr>
<td></td>
<td>• ‘Original engineering design intent’ is more easily and quickly understood by the tooling designer</td>
</tr>
<tr>
<td>3  30% Reduction in Overall Assembly Time</td>
<td>• Complete Assembly process can all be seen within 1 - 3D PDF MBE document.</td>
</tr>
<tr>
<td></td>
<td>• The exact assembly process, animated in 3D leaves less room for shop floor confusion or delays</td>
</tr>
<tr>
<td>4  20% Reduction in Manufacturing and Supplier Scrap and Rework</td>
<td>• Manufacturing and Supplier process documents automatically updated when an Engineering change or new version occurs</td>
</tr>
<tr>
<td></td>
<td>• Both Manufacturing and Quality gain a much clearer idea of the Engineering Designers Key Characteristics, Important Assembly Datums and Sequence</td>
</tr>
</tbody>
</table>

*Source: US Dept. of Defense, Analyst reports & studies presented at conferences*
What Can Anark Core & MBEWeb Do For Manufacturing?

1. Server-side automatic generation of **3D PDF** and mobile-ready **3D HTML** content from master manufacturing data stored in Enovia, Teamcenter, and Windchill
2. Dramatically reduce time and cost to create and maintain model-based visual work instructions
3. Seamlessly combine enterprise CAD, manufacturing, and process information into published model-based content that can be accessed via mobile and traditional desktop devices
4. Regenerate documentation if source data changes
5. Formalize the process of creating and publishing model-based visual work instructions
6. Improve communication of design, manufacturing, assembly, and maintenance intent to downstream users
Thank You