The Importance of a Technical Data Package to Support 3D MBE

Glen Voglesong – Faurecia
Rahim Alsaaffar – Johnson Controls
We deliver a full suite of design and engineering capabilities...

- Product Planning
- Benchmarking
- Consumer Research
- Design Studio
- Advanced Engineering
- Structural Analysis
- Project Management
- Quality Systems
- Purchasing
- Product Development
- Prototype Shop
- Comfort and Acoustic Lab
- Testing incl. Sled Test
- Production Process / Prove out
• Introduction – Information & Technology
• What’s a TDP?
• Drawings (the original TDP, pros and cons)
• Product Development - Changing Environment
• Constructing an Electronic Technical Data Package
• Standards, Industries & Where to Start
• TDP Examples
• Closing Remarks
Before getting technical ....
Lets look at other information Packages

Like Newspapers

Contains information:
- News
- Weather
- Sports
- .......
Pros:
• Portable/Low initial investment
• Little skill needed to operate
• No power/network connection needed

Cons:
• Limited to static content
• Last updated at print
• Limited to the physical item

Pros:
• Richer/Dynamic content
• Access to unlimited sources
• Search/Filter/Share

Cons:
• System operation skill needed
• Access to hardware is required
• Power/Network connection needed

It doesn’t have to be a Home Run !!!
What is a Technical Data Package?
What is a Technical Data Package?

According to Wikipedia:

Technical Data Package (TDP) is now used to refer to the complete package of information (in one medium or another) that *Communicates* information from *Design to Production* (such as 3D-model datasets, engineering drawings, engineering change orders (ECOs), spec revisions and addenda, and so on).

**Primary usage:**

- *Communicate* Design
- *Collaborate* on Design Revisions
Drawings, The Original Technical Data Packages
Drawings .... The Original Technical Data Packages

Typical Content in a Drawing

- Geometry
  - Product Geometry
  - Supplemental Geometry
- PMI (Part Manufacturing Information)
  - Datums
  - Dimensions
  - Feature Controls
- Title Block Information
- Revision Information
- Tables
- Notes

Pros:
- Low Cost
- Portable
- Easy to Mark-Up
- Low skill needed to access information
- No power or network connection required

Cons:
- Limited communication capability (content duplicated to ensure clarity)
- Limited collaboration capability
- Limited to static content
- High skill required to create/consume
Product Development - Changing Environment

**Before**

**People**
- Smaller Workforce
- Offshore/External Component

**Time**
- Shorter Development Cycle
- Get it right the first time

**Quality Expectations**
- Increasing Quality Expectations
- Cost of poor quality

**Location**
- Regional to Global Programs

**Now**

changing mix

Offshore / External

More time

Less Time

Less time

Higher Expectations

Global Programs

Crystal Clear Communication is Essential to Operate in the New Environment
Product Development - Changing Environment

Model Based Definition (3D-MBD)

3D Master CAD Model With 3D Annotations
2D Drawings By Exception

Model Based Enterprise (MBE)

3D Master CAD Model With 3D Annotations
Fully Leveraged By The Enterprise

2D Master Drawing
3D Model Not Verified Or Configuration Controlled

2D Master Drawing With Associative 3D Model
3D Model Is Verified & Configuration Controlled

Drawing Authority

Model Authority

Electronic Technical Data Packages Enables Model Based Enterprise
Constructing an Electronic Technical Data Packages

Digital Package of Technical Information

- Information Consumers
- Package Generator
- Work Instruction
- Financial
- Information Manager/s
- Compare Reports
- Inspection Reports

Revision Information
Tables
Geometry & PMI
Notes
Title Block Information
Standards & Industries

Glen Voglesong – Faurecia
Faurecia North America at a Glance

**KEY FACTS**
- Eighth largest supplier in North America
- $6.4B Total sales 2015
- 20,000+ Employees
- NA Headquarters in Auburn Hills, MI
- 28% of Global Faurecia Sales

**2015 DIVISIONAL SALES – NA**
- FECT $2.6B 41%
- FAS $1.88 B 30%
- FIS $1.7B 27%

**TOTAL SALES 2014**
- FCA 19%
- GM 27%
- 3% Others
- Other manufacturers 41%

**HEADCOUNT**
- United States: 9,864
- Canada: 133
- Mexico: 8,050
- Others: 5%

Insight. Expertise. Results.
A set of technical details .......... that have to be many things to many people

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http://www.nist.gov/el/msid/infotest/simca_mbe.cfm
TDPs in different industries

A set of technical details ................................................................. from Aerospace

Automotive

Department of Defense

ATTACHMENT 4

TECHNICAL DATA PACKAGE (TDP)

for Intermediate Level Test Program Sets (TPS)/ Operational Test Program Sets (OTPS)

NOT MEASUREMENT SENSITIVE

DEPARTMENT OF DEFENSE

TECHNICAL DATA PACKAGES

This standard is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This standard provides requirements for the deliverable data products associated with a technical data package (TDP) and its related TDP data management products. A TDP contains elements that are typically created and updated in the lifecycle of product data. These elements are shown in the appropriate breakout of data in Figure 1.

2. DRAWING-FREE PRODUCT DOCUMENTATION

2.1 The draft part of VDA Recommendation 4953 describes working with simplified drawings combined with 3D models and a meter data sheet.

3. INFORMATION FOR PRODUCT DOCUMENTATION

3.1 Part 2 of the Recommendation describes the measures available to the automotive industry for producing product documentation within a drawing-free procedure (DPP). It describes how all the information required for product documentation is brought together in a DPP container (DPF A/R 3). The container consists of a 3D part and an assembly model (STEP AP2032), a representation of the representation (FORA), as well as additional optional data for the representation (FORA), which is a file for long-term archiving. The use of this container makes it possible to develop and maintain product documentation without the need to work within the process chain described in product lifecycle management (PLM) without disruptions. This means that the effort required to maintain product documentation in 3D models, drawings, and other product management can be significantly reduced.

The following topics are covered:

- Structuring and mapping of product data in the metadata and 3D portion
- Reference process for the creation of the current data for the DPP container as well as the generation of data and use of the TDF container in the process chain

Insight. Expertise. Results.
What is a Technical Data Package?

A set of technical details ………… from ASME Y14.41:

Fig. 4-1 Contents of a Product Definition Data Set

- Model (PIN) (4)
- Drawing Graphic Sheet (4)
- PRODUCT DEFINITION DATA SET (4)
  - For Integral Content See Note 1
  - Drawing Graphic Sheet may be partial or complete See Note 2
  - Management Data, See para 5.3.1
- Associated Lists (5), Documents
- Materials, Finishes, Processes
- Notes
- Analytical Data, Test Requirements
- Printed Media [Note (3)]

NOTES:
(1) Related data, as applicable, required for complete definition may be integral to or referenced in the product definition data set. Data not integral to the product definition data set may be revised independently.
(2) A drawing graphic sheet is not required for Model Only data sets.
(3) Related data may be manually or computer generated.
(4) May have the same PIN.
(5) Shall have the same identity as the dataset identifier.
What is a Technical Data Package?

A set of technical details ........... from ASME Y14.41:
What is a Technical Data Package?

A set of technical details ............ from ASME Y14.41:

“Integral” = Internal to the Model
What is a Technical Data Package?

A set of technical details ............... from ASME Y14.41:

“Referenced” = External to the Model
What is a Technical Data Package?

While the Military Standard 31000A clearly denotes these different components ….

1.1 This standard provides requirements for the deliverable data products associated with a technical data package (TDP) and its related TDP data management products. A TDP contains elements, is described by a level and type, and may have associated metadata and supplementary technical data. TDP contains a sub-set of product data and product data is a sub-set of technical data. These relationships are shown in the hierarchical breakdown of data in Figure 1.

FIGURE 1. TDP relationships.
What is a Technical Data Package?

… the DoD is in pursuit of defining a single digital (i.e. ‘Integral’) master package of Form, Fit, Function, Operation, Maintenance, Installation, and Training information - the Digital Product Definition Package or (DP)²
What is a Technical Data Package?

The DP2 (Digital Product Definition Package)’s ‘Core’ elements’ alignment to ASME Y14.41
But ……“The TDP – much of which is separate from the model – is where many of the aspects that truly define the product reside. Moreover, the TDP is comprised of those critical details which ultimately determine whether the product will live up to the intent envisioned in the model.

At the recent Global Product Data Interoperability Summit, Boeing noted that some 40% of the technical data necessary to create a product resides outside the model. This significant fraction typically consists of narrative guidance, including specifications, standards, and notes. Without this vital information, even the most skilled production source cannot produce what meets design intent.”

From “Improving Supply Chain Collaboration”
Mark Kelly - DISCUS Software Co., & Robert Morris
- Renaissance Services
### Technical Data Package challenge

From AIAG’s Survey Data File Format Usage Results (earlier session)

<table>
<thead>
<tr>
<th>Software</th>
<th>Native CAD</th>
<th>Light-Weight Data</th>
<th>Neutral Formats</th>
</tr>
</thead>
<tbody>
<tr>
<td>CATIA - Dassault</td>
<td>96.1%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NX - Siemens</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>CGR - Dassault</td>
<td></td>
<td></td>
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</tr>
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<td>JT - Siemens</td>
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</tr>
<tr>
<td>STEP-AP242</td>
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<td></td>
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</tr>
<tr>
<td>XML</td>
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</table>
TDPs are “containers” assuring effective creation and consumption of the complete product definition:

- That includes all necessary information - in addition to 3D content - for ‘cross domain’ use
- Business rules govern the context and define what data is required for specific roles
- Most companies begin with simple engineering release needs then mature to more comprehensive, cross-domain requirements
Where to Start?
Technical Data Package - Where to start?

Materials are available from AIAG/SASIG:
TDP Examples
### PART SUBMISSION WARRANT

<table>
<thead>
<tr>
<th><strong>PART MANUFACTURING INFORMATION</strong></th>
<th><strong>Delivered Part</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Name: Differential Casting</td>
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<tr>
<td>Part Number: W0804</td>
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<tr>
<td>Safety and Government Regulations</td>
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<tr>
<td>Y.E.S. - N.O.</td>
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<tr>
<td>Additional Change: Changed Draft</td>
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<tr>
<td>Draining Number: 1009</td>
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</tr>
<tr>
<td>Engineering Changed: 500</td>
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<table>
<thead>
<tr>
<th><strong>SUPPLIER MANUFACTURING INFORMATION</strong></th>
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<tbody>
<tr>
<td>Supplier Name: Chris Carrin Casting</td>
</tr>
<tr>
<td>Supplier Code: 30028A</td>
</tr>
<tr>
<td>Address: 1454 Ignite Street</td>
</tr>
<tr>
<td>City: Honolulu</td>
</tr>
<tr>
<td>Zip Code: 92126</td>
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<table>
<thead>
<tr>
<th><strong>SUBMISSION INFORMATION</strong></th>
<th><strong>Part Specifications</strong></th>
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<tbody>
<tr>
<td>a. Dimensional x Material Functional x Appearance</td>
<td>Selected</td>
</tr>
<tr>
<td></td>
<td>a. Width = 12.00 +/- 0.00 in</td>
</tr>
<tr>
<td></td>
<td>a. Metric Width = 300 +/- 0.00 mm</td>
</tr>
<tr>
<td></td>
<td>b. Center to Center = 4.50 in</td>
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<td></td>
<td></td>
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<table>
<thead>
<tr>
<th><strong>REASON FOR SUBMISSION</strong></th>
<th><strong>REQUESTED SUBMISSION LEVEL (Check One)</strong></th>
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</table>

<table>
<thead>
<tr>
<th><strong>SUBMISSION RESULTS</strong></th>
<th><strong>Explanation (Comments) may not demonstrate the production run: Rate capacity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>These results met all drawing and specification requirements:</td>
</tr>
<tr>
<td></td>
<td>i. YES - NO</td>
</tr>
<tr>
<td></td>
<td>d. Sample result</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>EVALUATION</strong></th>
<th><strong>Explanation</strong></th>
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<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SIGNATURES</strong></th>
</tr>
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<tbody>
<tr>
<td>Supplier</td>
</tr>
</tbody>
</table>

**FOR CUSTOMER USE ONLY**

<table>
<thead>
<tr>
<th>Part warranty disposition: Approved</th>
<th>Rejected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Functional Approval: Approved</td>
<td>Rejected</td>
</tr>
</tbody>
</table>

**Customer Signature**

Date: 2000-09-30
Part Name

Instructions
After removing the primary caliper mounting bolts lift the brake caliper mounting lift brake caliper off of the rotor and then tie or set gently to the side, be careful of the brake caliper flex hose not to bend or kink it. Thoroughly inspect brake caliper and brake hoses for leakage and replace as needed. Next loosen the brake pads and secondary caliper mounting bolts.

Comments
Remove Outboard Pad Clips using needle nose Pliers
• Drawings are naturally limited in communicating design intent, The limitations are amplified by the changing business environment

• A technical data package enable an organization to become a Model Based Enterprise

• Model Based Enterprise provide significant benefits in cost, quality and timing

• Moving into a Model Based environment is a significant change to any organization, so start early and don’t wait for the perfect time to do it!
Thanks