



Smart Products

The development of SMART PRODUCTS

BMW i. BORN ELECTRIC.



Automated Activities

The Internet

Why is Manufacturing going to Industry 4.0

10 - 30%

reduction in design and engineering costs

20 - 50%

reduction in time-to-market

20-50%

decrease in costs for

10-20% O

reduction in costs for quality

-0-45-55%

increase of productivity through automation of knowledge work

McKinsey Digital Capability Center Aachen, Germany

Re-think the SDO product

Industry 4.0 Imperatives

- Interoperability between machines, products and people
- Integration of data from multiple distributed sources (sensors to soldiers)
- Technical Interaction: Help systems conduct tasks that are unpleasant, exhausting or unsafe for humans
- Decentralized Decisions: systems perform their tasks autonomously

<u>SDO Product</u> Challenge

- Is the SDO product a document or a container for data?
- What does a customer do with the product after they buy it?
- Can the product directly communicate requirements with the machines that make finished goods?
- Does it work in Internet of Things as well as the Internet of People

How is DOD Meeting this Challenge?

- 1. Re-thinking Documents as Data
- 2. Modernizing ASSIST to meet the challenges of this century.
- 3. Developing the Semantic Web for Interoperable Specs and Standards (SWISS)
 - Reduces engineering lead time to manage standards and their derivatives such as test plans, purchase descriptions and work instructions.
 - Open, interoperable format that integrates with the enterprise software of our customers and suppliers.
 - DoD data directly linked to industry authorities such as ASTM

The Promise of SWISS

True Connected Documents

Automated Configuration "Awareness"

> Multi-Enterprise Interoperability

Tailored Derivative Works

It sounds so simple

• Example: PWB Drawing Note

"UNLESS OTHERWISE SPECIFIED PERFORM ELECTRICAL TESTS PER NG STD NUMBER 106"



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NG STD 106 – "PRINTED WIRING BOARDS, RIGID, FABRICATION REQUIREMENTS" DOCUMENT PAGE COUNT - 24



2 OTHER NGSC DOCUMENTS (AS APPLICABLE)

2 GOVERNMENT PUBLICATIONS

12 INDUSTRY PUBLICATIONS (ASTM, ANSI, IPC)

4 OTHER NGSC DOCUMENTS

Represents 40+ Unique Documents

Bow & twist requirement



37 Unique Documents

Let's get "Smart"

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Pertinent Information!

Change Management is Difficult



But Wait ... There's more!

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Is my task affected by the change?

Version Aware

Bow & twist requirement



1 Appropriate Document

Part of the Model Based Enterprise

Digitally Integrated Model definition

Maximize the Digital Thread

- Purposeful Specifications
- Version cognizance
- Linked to CAD data
- Available on Demand

SMART CONNECTED DOCUMENTS!

Derivative Works

- Custom, Appropriate, Version Aware, procurement specs, manufacturing data
- Test and inspection plans
- CAD/CAM developed from derivative Specs based on documents from multiple SDOs

Challenges

- Business Plans
- Revenue Stream
- Legacy Document Conversion

- Intellectual Property Protection
- Configuration Management

OPPORTUNU

- Automated Configuration Management
- Rapid Technology Insertion
- Real Knowledge Management linking:
 - Standards
 - Laws
 - Regulations
 - Policies
 - Guides
 - Papers
 - Lessons Learned
- And, Vastly Improved Time to Knowledge