



3D PDF: Technical Data Package

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Boeing Model Based Definition (MBD)

- Pervasive adoption & deployment of Model Based Definition
 - 787, 737, H47F/G, V22, T-X, C17, Phantom Swift, UCLASS, ...
- All parts are designed as a 3D MBD – CATIA V5 or NX9
 - Solid model
 - Dimensions, Tolerances and Annotation (PMI)
 - Engineering notes and attributes
- MBD data used throughout supply chain and by customer airlines for in-service support and modifications



3D PDF Use Cases

The delivery mechanism for a model base enterprise



Delivery in
compliance
with MIL-
STD-31000



Delivery /
Access to Co-
Production
Partners

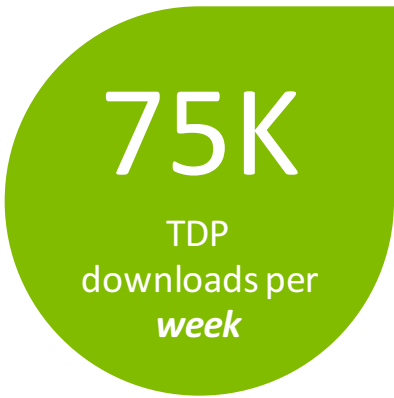
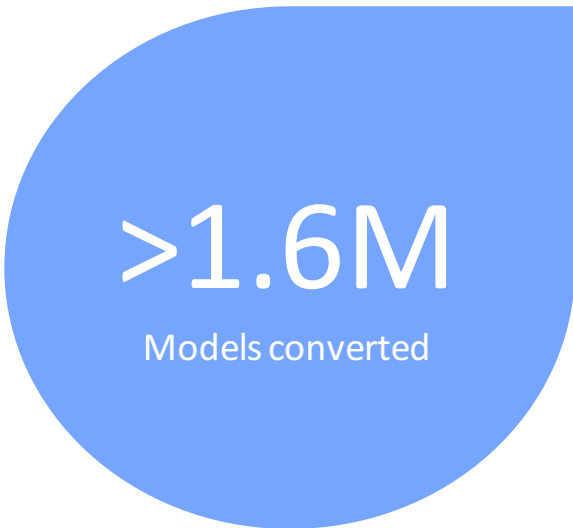


Delivery /
Access to
Customers



Delivery /
Access to
Suppliers &
Shopfloor

3D PDF Usage Across Boeing



The Challenge

How to distribute 3D MBD data throughout the world while:

- Minimizing cost impact
- Ensuring sufficient accuracy
- Making data access easy to use
- Being useful in areas with limited bandwidth
- Complying with direction on open data standards
- Protecting Boeing design Intellectual Property (IP)



Data Authority

- Boeing products are tightly controlled by various regulatory bodies (FAA, DOD, NASA, ...)
- Every part on our products must be traceable to approved engineering
- Strict requirements on data configuration and data processing if data is used to build, install or inspect parts
- Any conversion or translation process must be validated to ensure derived data is equivalent to original approved engineering data



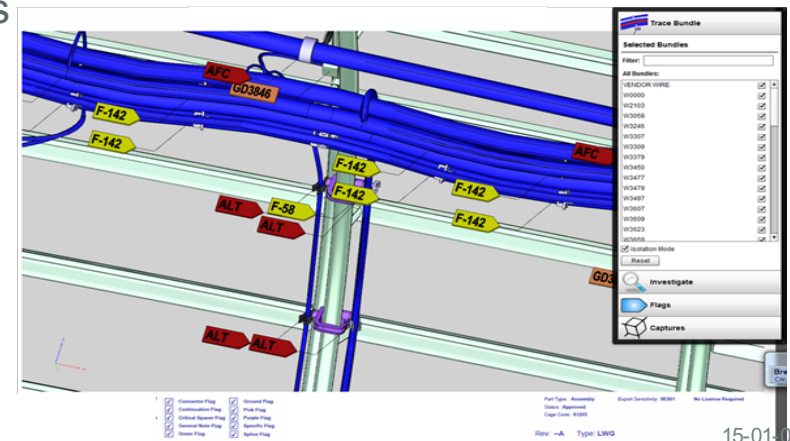
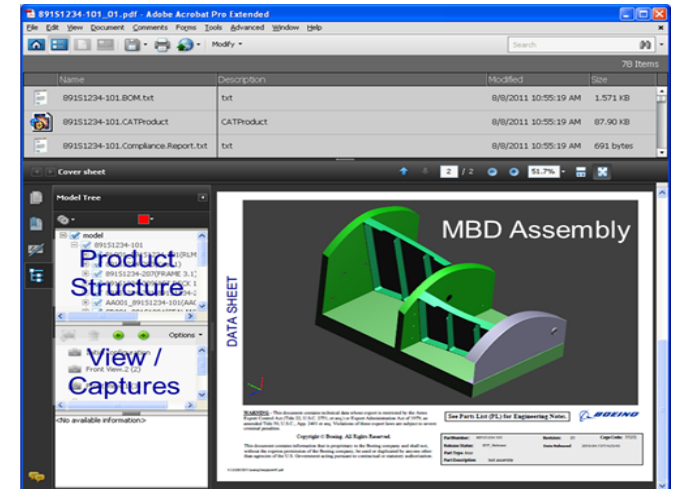
Intellectual Property Protection

- Part design methodology is a competitive advantage
- Composite design methods are highly sensitive
- Need to limit part manufacturing to authorized suppliers to avoid counterfeit parts
- Commercial customers typically contract for data showing assembly and installation, but not manufacturing of detail parts



Solution architecture

- Part and assembly CAD files extracted from PLM solutions using a mix of Boeing developed software & COTS triggered on part approval
- Translation from CAD to 3D PDF performed
- Customized translation workflow
 - Address Boeing customized product structure
 - Control exposure of IP
 - Ensure geometric accuracy
- Load PDFs to legacy drawing repository and reuse access mechanisms and controls



Current Status

- Production deployment in December 2007
- Production use by space and defense programs
 - 787 using SAP
 - A-10 using Anark
 - Chinook using ProSTEP
- Widely used for final assembly factory floor use
- Heavily used by partners for internal processes



Benefits

- Minimize customized applications and maximize COTS capabilities
 - Javascript allows for customization without changes to COTS translation tools
- Break the obsolescence cycle
- Minimize cost of integration and data migration
- Enable future technologies



Summary

- Highly customized unique program solutions are too costly, complex and rigid
- Architectures are required to support
 - Rapid changes in business environments
 - Emerging technologies
 - Business information analytics
- How do we get there
 - Information centric and application agnostic architectures
 - Harmonized, open data standards
 - COTS based capabilities
- Boeing, as an A&D industry leader, will help lead the development and adoption of industry data standards



Conclusions

- 3D PDF facilitates distribution of MBD data by removing barriers to data
- Industrial strength tools are available for 3D PDF
- User acceptance of 3D PDF is excellent
- Open standards are viable basis for implementation
- 3D PDF and STEP are key standards for worldwide MBD data distribution in support of Boeing 2nd Century Strategy



