

Aircraft Illustrated Parts Data and Strategizing for Use with S1000D and ATA 2400

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The Boeing Company

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ATA e-BUSINESS PROGRAM



Illustrated Parts Catalog/Data Leader

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About

Over 36 years of Aerospace/Aviation Leadership, Strategic Vision and Engineering Program Management as an Industry leader. Senior Manager of Commercial and Defense Illustrated Parts Data/Catalog documents. Ensures configuration as allowed and provisioning engineering part numbers for the IPC and customer use. prior led the Seattle Derivative Aircraft team overseeing the engineering parts data for KC-46, P-8 and VC-25B in all aspects of logistics support analysis. technical publication and provisioning. Prior served as Configuration Management, Technical Publications, Provisioning, Engineering Parts Definition, Supply Chain, Planning Senior Manager. Superior Profit & Loss Management supports multi-million business plan supporting Life cycle Maintenance, Supply Chain, Configuration Management Parts Data. Experienced with technical data specifications (ATA Spec 2000/2400, AiA S series) significant experience with Joint/Deployed Military Operations. Effective leader/team builder and Instructor with exceptional communication skills. Currently managing PMbp team, 70+ employees and 3 managers while experienced in leading organizations with 900+ personnel. Expert in logistics operations and aircraft maintenance specialties including air frame, power plant, line/base repair, aircraft health management/reliability/maintainability/PBL fleet management, and engineering. Extensive knowledge of military commercial derivative aircraft, FAA continued airworthiness, and provisioning. In-depth knowledge of systems integration, process development materials management and on/off equipment maintenance policies, procedures, methodology. Manages fiscal budgets/resources to optimize use. Leader with Program Management Best Practices (PMBP), EVM (Earned Value Management) and expert in metrics, RCCA (Root Cause Corrective Action), safety, operational risk management. Focused on improving Cost, 1st Pass Quality/Safety & redefining culture. Experience leading customer support. LEAN/SIX Sigma with 8+ years of aircraft accident investigation/Human Factors/error mitigation.



Agenda

- **Introduction**
- **S1000D Adoption for the Future – John Aitchison**
- **ATA Spec 2400 Adoption – Joseph Belton**
- **Summary**

Introduction

- **The Boeing Illustrated Parts Catalog/Data Document is looking to the future**
- **Our document is going through a metamorphosis internally – moving data in our IT structure to allow for growth and improvement**
 - Movement did impact our efforts and has slowed our improvement actions for several years but movement restarted and thus we are looking to validate improvements from previous Working Together sessions and look for new improvements to “rack and stack” what we can improve and how soon we can improve
- **We are focusing on being the leader in adopting these specifications**
- **Boeing wants to support ATA Spec 2400 across the industry as Configuration Management of the Aircraft will be critical to Reliability/Maintainability of our more and more advanced Aircraft**
- **Speakers today will be John Aitchison and Joseph Belton, 2 of our experts for the Illustrated Parts Catalog/Data**

Looking to the Future!

S1000D Adoption for the Future

John Aitchison – Boeing Illustrated Parts Catalog/Data Project Manager

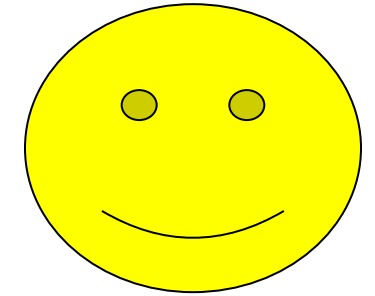


John currently acts as Project Manager for The Boeing Company in support of the Aircraft Illustrated Parts Catalog (AIPC) product support team. He has worn many hats in his 40+ years in the aerospace industry including; Lead Integrated Avionics and ECM Technician, Flight Test Engineer, Senior Technical Solutions Expert Project Manager and Contracts Manager. He possesses a Bachelor of Science Degree in Business Administration and a Masters Degree in Business Administration. He holds a Project Management Professional certification and is a member of the Alpha Chi Honorary Society. John is also a proud veteran of the United States Air Force.

Creating IPD Data Modules Using S1000D

→ **Structured Source Data**

- Bill of Materials
- Parts Data Base
- Provisioning/Logistic Support Analysis (LSA) data



→ **Unstructured Source Data**

- “But be prepared to work with what you have”



“I sure hope we are dealing with structured source data?”

Creating IPD Data Modules Using S1000D

→ Manual authoring

➤ IPD Schema

- ✓ Upwards of 200 elements/attributes
- ✓ 15-30 populated for each part
- ✓ Up to a million illustrated and non-illustrated parts

itemSeqNumber
quantityPerNextHigherAssembly
totalQuantity
partRef
partNumber
descrForPart
partUsage
natoStockNumber
partKeyword
shortName
overLengthPartNumber
Etc, Etc, Etc.

“Is manually authoring IPD data modules really feasible?”

What to do?

So what happens when you don't have any structured source data and as discussed, manually authoring IPD content is not really an option?

“Sometimes, structured source data just isn't there.”

Real World Example

→ Engagement with a Regional Jet manufacturer

- Came in with an S1000D requirement
- No structured BOM
- No structured Parts Data

→ Do what you can with what you have

- Home grown tool to convert raw MS Excel file to usable BOM
- Developed interface tool to ingest BOM into a structured parts data set
- Mapped parts data set directly into the IPD data modules eliminating the need to author them manually

“Flexibility is essential!”

IPD and S1000D Perfect World

→ Know the Specification and the IPD Schema

- Knowing the target for your data will help define the best way to stage your parts data

→ Structuring and influencing your engineering data to ease import of IPD data

- What does your current source data look like?
- Help yourself by engaging at the beginning of the product lifecycle
- Utilize specifications that structure parts data and ease the creation of S1000D IPD data modules e.g. S2000M/S3000L, GEIA-STD-0007, other

“Help yourself and get involved early!”

IPD and S1000D Perfect World

A well developed IPD will also aid in configuration management

“What does your end product look like?”

ATA Spec 2400 Adoption

Joseph Belton – Boeing Illustrated Parts Catalog/Data Subject Matter Expert



Joseph Belton is a Program Management Specialist with Boeing Illustrated Parts Catalog (IPC) / Illustrated Parts Data (IPD) Customer Support. Over his 29-year career with Boeing and its former subsidiary Continental DataGraphics (CDG), Joseph has worked as an IPC / IPD author, instructor, and customer support analyst on all Boeing 7-Series commercial and military derivative models. His experience includes standing up new IPC / IPD authoring systems and related supporting tools. Currently he is the ATA 2400 focal for Boeing IPC / IPD Customer Support. Joseph is a voting member of multiple ATA Working Groups and Sub-Teams, and follows AIA, IATA, ICAO, FAA, and EASA developments. He earned a Bachelor of Science in Business Finance from California State University San Marcos, and three Associates in Business Administration, Mathematics, and Liberal Arts from San Diego Community College, where he graduated with Highest Honors, Summa Cum Laude. Joseph is a proud 11-year veteran of the United States Navy and Naval Reserve.

Illustrated Parts Data and ATA Spec 2400

→ What?

- Both the aircraft and its components (hardware and software)
- Allowable parts (configuration attributes/concepts based on function position)
- Allowable modifications (allowed/embodied updates based on status/conditions)

→ Who?

- Interested parties (OEMs, Owners, Operators, MROs, MIS Providers)
- Applicable roles (Engineering, Maintenance, Spares, Provisioning, Planning, IT)

→ How?

- Preferably machine readable with automated validation

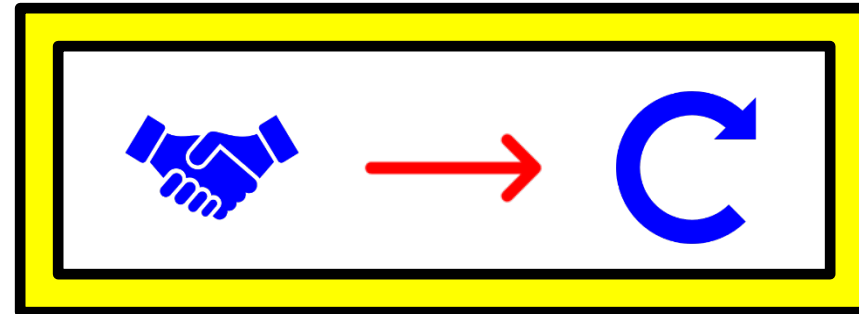
→ Why?

- Desire or need for a configuration management data exchange specification
 - ✓ Increasing capability with electronic tracking tools
 - ✓ Enhanced data availability for Reliability/Maintainability
- Define the allowable configuration of an aircraft and its parts throughout their useful life

Creating and Maintaining the Allowable Configuration

→ Multiple stages in illustrated parts data creation and consumption:

- As designed
- As manufactured
- **As delivered**
- **As maintained (post delivery)**



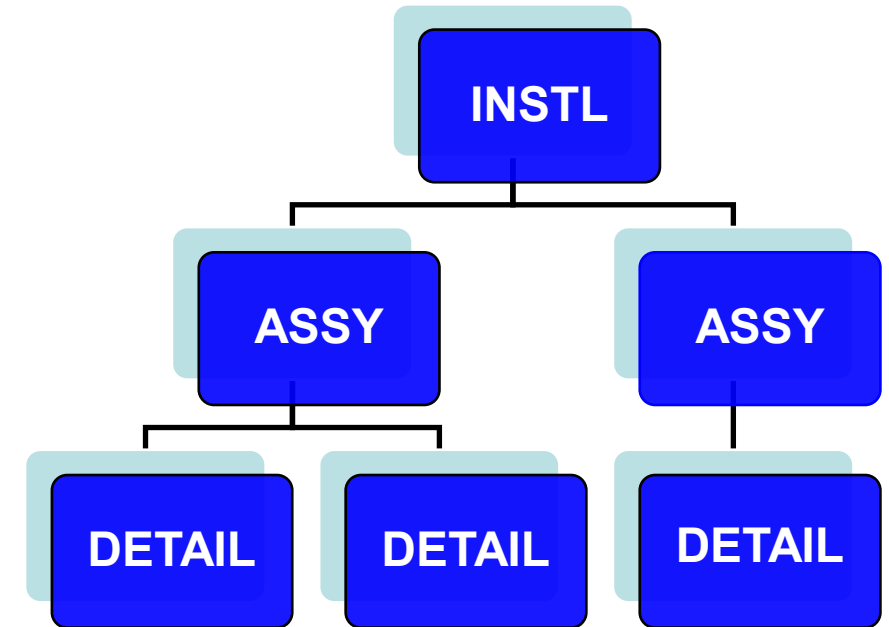
→ Allowable configuration is initiated at delivery (reflecting a snapshot in time) and updated throughout the useful life of the aircraft (reflecting changes over time)

Ensure aircraft configuration management throughout the product lifecycle.

Scope, Level of Detail, Data Elements, Limitations

→ **Minimum level of parts configuration data based on function positions:**

- Engines
- APUs
- Landing Gear
- Serialized parts
- Life-limited parts
- Flight-critical parts
- Primary airframe and engine maintenance parts
- Loadable software and associated hardware parts



→ **Desired level of detail (may vary with user?)**

→ **Mandatory or optional data elements (benefit or burden?)**

→ **Data limitations**

Define aircraft configuration management expectations.

As Maintained (Post Delivery) Challenges

→ **Post-delivery data can be particularly problematic due to variety, volume, revision schedules, and time span:**

- OEM engineering design progression and component spares interchangeability
- OEM components (M&A activity? CAGE Code changes? Part number changes?)
- ADs, SBs, and AMOCs (Embodied? Reported?)
- EOs, COCs, and STCs (Owner? Operator? Third party?)
- Alternate, optional, or substitute parts (Preferred parts? Preferred suppliers?)
- Part availability and part obsolescence



Plan for aircraft configuration management challenges.

Data Compatibility

→ Data compatibility:

- Unstructured legacy 2D data
- Structured digital 3D data
- Component OEM data (content and format differences)
- MIS platforms (functionality, content, and format differences)
- Data sharing (OEMs, Suppliers, Owners, Operators, MROs, MIS Providers, Regulatory)
- Mapping of Business Rules (BRs) and Data Modules (DMs)

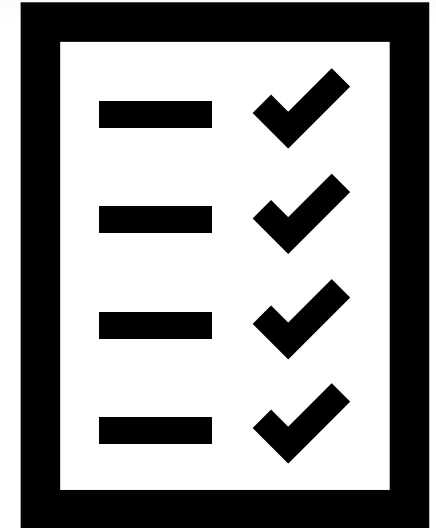


Understand aircraft configuration management data compatibility.

Data Usage and Consistency

→ Data usage and consistency:

- Part attributes (universal application)
- Usage attributes (limited to function, position, socket, etc.)
- Serialized, life-limited, and critical parts
- Loadable software parts and associated hardware parts
- Part configuration/modification levels and revision control:
 - ✓ Part number rolls?
 - ✓ Modification level changes?

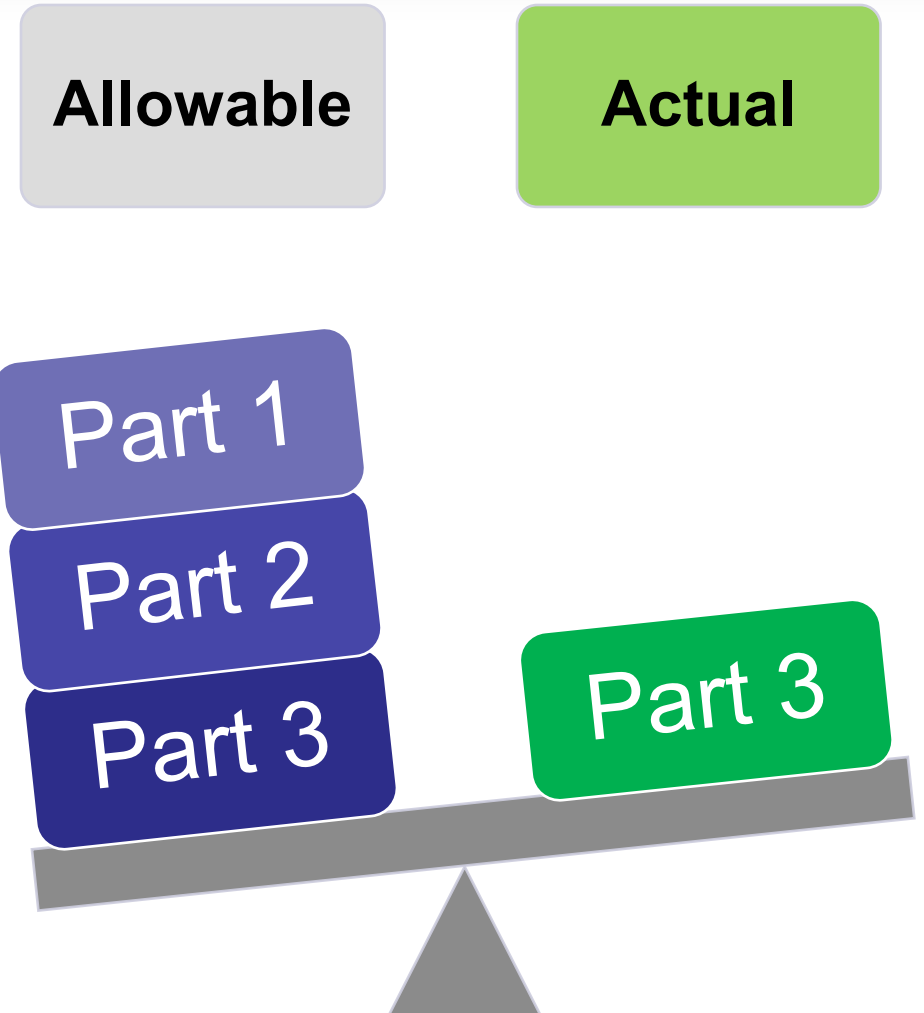


Leverage aircraft configuration management data usage and consistency.

Allowable Configuration vs. Actual Configuration

- Spec 2400: Allowable Configuration
- Spec 2500: Actual (Transfer) Configuration
- Synergy required to obtain full value:

- Operator changes
- Ownership changes
- Passenger to freighter conversions
- Validation of original delivered configuration
- Validation of actual current configuration
- Untracked or unreported changes
- Serialized parts and life-limited parts
- Deleted data
- Archive of previous configurations



Capture both the Allowable and Actual Configurations - synergy enhances value!

Goals, Challenges, and Opportunities

→ **Goals:**

- Single source configuration authority
- Easy to update and verify

→ **Challenges:**

- Data provided by multiple sources in multiple formats
- Data not always machine readable with automated validation
- Data changes occur over long period of time and not always synchronized
- Responsibility of owners/operators to manage data
- Transmittal processes and revision schedules may not align

→ **Opportunities:**

- Owners/operators can decide which parts to exclude
- Owners/operators can decide which parts to include (within regulatory limitations)
- Ability to validate configuration via MIS or onboard systems

The opportunities are worth the challenges!

Summary

→ Key Take-Aways!

→ S1000D

- Source Data – Key to effective use of S1000D
- Get to know the Specification and the IPD Schema
- Structuring and influencing your engineering data to ease import of IPD data
- A well developed IPC/D will also aid in configuration management

→ ATA

- Desire or need for a configuration management data exchange specification
- Both the aircraft and its components (hardware and software)
- Desired level of detail (may vary with user?)
- Mandatory or optional data elements (benefit or burden?)
- Responsibility of owners/operators to manage data

→ Synergy with Data and Spec Use required to obtain full value

Questions or Comments?