From Paper to Interactive Electronic Technical Publications (IETP)

The ATA iSpec 2200 Standard

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The purpose of this white paper is to provide an understanding of the ATA specification and how it has evolved to accommodate the authoring, management and publication of digital manuals and documents. As technology progresses organizations use paper manuals less frequently. Creating, managing and publishing Interactive Electronic Technical Publications (IETPs) produce greater efficiencies and drastically cut costs. Today, the ATA iSpec 2200 fully supports electronic delivery for the global commercial aviation industry.

In 2005, an agreement was signed between several organizations to promote a common aerospace and defense interoperable, global technical publication standard. The main goal of the agreement was to incorporate commercial aviation requirements with the S1000D specification, an internationally accepted standard in the aerospace industry, to establish a single specification for both military and commercial aviation globally.

This paper will first cover a brief history of the ATA Association and standard and how it has changed to accommodate digital data delivery. Also discussed is the highly complex conversion process from complex and technical paper publications to Interactive Technical Manuals (IETMs). Background and synergies between the ATA iSpec 2200 and S1000D is presented for comparison of the standards. Finally, we cover a brief overview of how to successfully author and manage your technical ATA iSpec 2200 data.

How Inmedius is addressing the changes in the standard and its implications in regard to its ATA Publishing Suite™, is also presented.
A Brief History: Air Transport Association (ATA)
Founded in 1936, the ATA is America’s oldest and largest airline trade association. Members include airlines, aerospace manufacturers, distributors, suppliers, repair agencies and software providers. The main purpose of the ATA e-Business Program is to assist the global commercial aviation industry in creating standards for developing content structure, and electronic exchange of aircraft engineering, maintenance, material management and flight operations information. These standards enable airlines and suppliers to experience exceptional levels of efficiencies and cost savings.

Progression of ATA Standards
The ATA standards were initially developed to provide users with an international specification for developing technical airline documentation in the paper format. Over the years they have evolved to meet the changing needs of the industry and to embrace the latest technological advances.

In 1999, the ATA released the latest version of the ATA Spec 100, providing an industry-wide standard for aircraft system numbering. The numbering system, or ATA chapter numbers, provide format and content guidelines for conventional printed documentation and facilitate greater ease of learning and understanding for pilots, engineers and other users.

Creation of the Current Specification: ATA iSpec 2200
In 2000, the ATA Technical Information and Communications Committee (TICC) recognized the synergies between ATA standards and developed a new consolidated specification for the commercial aviation industry. Like the previous standards, ATA iSpec 2200 includes an industry-wide approach for aircraft system numbering, as well as formatting and data content standards for documentation output. These standards, however, are not specific to conventional printed documentation and can be used regardless of the delivery medium.

The main objectives of the new specification are to minimize cost and effort expended by operators and manufacturers, improve information quality and timeliness, and facilitate manufacturers’ delivery of data that meet airline operational needs. These objectives support ATA iSpec 2200’s primary purposes to enable the use of electronic delivery. ATA iSpec 2200 is now the most widely used standard in the global commercial aviation industry. It consists of a suite of maintenance and, procedure requirements, and aircraft configuration control and flight operations data specification for paper and digital publications.
Today, radical changes are occurring in the technology used to produce and use electronic technical documentation. In particular, the move to digital publications is being driven by the need to cut costs and increase efficiencies in the creation, production, use and reuse of technical information. As companies strive to become more efficient and productive, technical publications must become progressively more flexible. ATA iSpec 2200 has laid the groundwork for the process. Companies, however, that develop best practices for managing, authoring and printing complex electronic ATA documents, will experience the highest efficiency levels.

Moving Towards a Digital Format
Today, radical changes are occurring in the technology used to produce and use electronic technical documentation. In particular, the move to digital publications is being driven by the need to cut costs and increase efficiencies in the creation, production, use and reuse of technical information. As companies strive to become more efficient and productive, technical publications must become progressively more flexible. ATA iSpec 2200 has laid the groundwork for the process. Companies, however, that develop best practices for managing, authoring and printing complex electronic ATA documents, will experience the highest efficiency levels.

Digital Data Benefits
The ATA iSpec 2200 standard determined that exchange of technical publications in a digital format provides substantial advantages compared to the traditional paper delivery. The benefits of moving towards creating and maintaining technical publication in an electronic format are experienced by all users, from the producers to the end users.

Electronic Documents Differ
IETPs or IETMs are electronic portals used to managing technical documentation. They allow users to quickly locate necessary information. Organizations need to understand, however, that all electronic documents are not the same. Digital publications come in many different types and forms. They range in complexity from a simple scanned PDF to a fully interactive document. There are five IETP classes:

Class I The structure and format is similar to a printed book or manual. An index and Table of Contents are hyperlinked to content.

Class II Documents include more hyperlinks and consist of figures, tables and section references. Documents are authored in XML or SGML.

Class III Documents are structured more freely following the logical flow of content. They no longer follow a book structure and are printed, but won’t necessarily match the presentation on the screen. Hyperlinking throughout the document is necessary, and the document is authored in a markup language (SGML).

Class IV Data is now stored in a relational database, facilitating the benefits of data integrity and removal of data redundancy. Relationships in the content that are presented as hyperlinks are mapped directly to relations in the database schema. Redundancy in the data and concept of static pages is eliminated. Content changes dynamically and can be user specific. Linear formats of the document can no longer be printed.
Class V Documentation is integrated with Expert Systems influencing the display of content.

Fast, Accurate XML Conversion of Data
Organizations utilize eXtensible Mark-up Language (XML) to transform ATA technical data from paper to electronic format. By supporting electronic data, organizations can develop common retrieval systems to access airline databases. Essential to their success is the authoring, viewing and delivery of accurate, complex data. Technical data can come in many different formats including:

- Paper
- Microsoft® Word
- Adobe® PDF
- ATA Spec 100
- ATA iSpec 2200
- S1000D
- DITA

As technologies change, authoring and management of technical data has also evolved. It is no longer sufficient to manage ATA data in paper or Word documents. Management of legacy files is costly and time consuming. To compete, organizations are forced to author electronic documents. Converting legacy documents may sometimes feel like an impossible task. For complex data conversions outsourcing is often not a reality. Using a conversion service can be costly and can result in inaccurate data conversion. Conversion software must be safe and reliable. It should have already demonstrated proven results, having been rigorously tested with sensitive and complex aerospace and defense technical data is the best solution. The reality is that with a tool that supports quality complex technical document conversion will provide the maximum cost savings in the long term.

Conversion of ATA Data
Using the ATA standard, common elements and structures for documents are established by aircraft manufacturers and suppliers. The defined vocabulary can then be utilized in software for printing and displaying. Traditionally, most ATA manuals have been managed in some type of word processing software tool like Word. Using Word templates, organizations maintain complex ATA manuals over the life of the aircraft. These manuals are maintained by multiple authors in various locations. They are often costly to distribute, manage and update.
Choosing the Right Conversion Tool
While there are hundreds of conversion tools, better quality data will come from tools that specifically perform complex conversions. When choosing a tool, organizations need to remember that the process will not be a single or even rare occurrence. Most commercial aviation companies have thousands of legacy documents that need to be converted to or maintained in the electronic format. Additionally, organizations cannot just choose any conversion tool. A tool that is used to convert a simple Word or PDF document will not sufficiently handle a complex ATA document conversion project. The ATA Specification is complicated and the tool must be pre-configured to perform the ATA to XML conversion. It will need to support Document Type Definitions (DTD) or XML Schemas. Additionally, a tool that enables non technical users to convert the documents will provide for increased access and higher cost savings. Conversion tools that focus on ATA iSpec 2200 will provide the highest quality data resulting in a smoother conversion process and higher long-term savings.

ATA Modularization
Once ATA iSpec 2200 legacy documents have been converted to ATA XML, organizations can efficiently manage and utilize these electronic documents via modularization. Modularizing the ATA publications by their component page blocks and parts listings breaks the XML documents into smaller fragments enhancing ease of use when managing and updating documents. Modularization relies on bursting technology and requires breaking up large documents into chunks in a Content Management System (CMS).

How Bursting Works
Bursting rules govern how the document is divided into individual pieces. These rules allow an element in a document to be saved as its own chunk or another document in the CMS. These elements can be reused in other documents or managed independently of the containing document. Bursting rules are automatically applied by the CMS when a document is imported or checked into the central repository.

Bursting functionality for ATA manuals enables authors to manage a very large XML/SGML document, by automatically breaking it down or decomposing it into smaller subdocuments. These subdocuments can then be assigned and reassembled when necessary.
ATA bursting chunks are page blocks which can be managed separately in the ATA repository, within the document. Each chunk can then be authored separately. Authors can check out the page blocks and use them in different manuals or documents.

**Authoring ATA Documents in an Electronic Environment**

Now that ATA data is stored and modularized in a central repository users can create and edit electronic manuals with Inmedius ATAAuthorPro™ XE. Easy-to-use, XE will enhance the user’s authoring experience. It is accessible by the Internet via a browser, eliminating the need for information to be passed to the client computer. This increases security of the data and enables multiple authors to edit the same document in multiple locations. XE is a WYSIWYG editor allowing non-technical authors to create and revise ATA manuals with minimal XML training. Editing in XE is similar to authoring documents in a Word template allowing for faster uptake and better user productivity.

**ATA Standards a Basis for S1000D**

Before S1000D, the only internationally accepted specification in the aerospace industry, was the ATA 100 standard. Seeking an aerospace standard, the Document Working Group (DWG) was tasked to report on current documentation practices and to recommend a unified method of documentation for air vehicle projects. They recognized a need to harmonize civil and military documentation using ATA 100 as a source for documentation. The coordination of specifications and the establishment of commonalities whenever possible had the following major advantages:

- Cost saving on data generation
- Cheaper, deliverable publications
- Uniformity of standard for aerospace projects
- Standard format for data exchange
- Enhanced inter-operability
- Improved clarity

In 2005, a MOU was signed between ASD, AIA and ATA to promote a common aerospace and defense interoperable, global technical publication standard. It was to work in collaboration with the joint development and maintenance of S1000D. The main goal of the agreement was to incorporate commercial aviation requirements (currently addressed by the ATA iSpec 2200) with the

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**The Rationale to Create ATA Manuals in S1000D**

Complex data is everywhere. Multiple communities need to share data, and which must be compatible to be exchanged. There is also a large and growing crossover between civilian and military projects, as well as international ventures. Many organizations provide equipment that is used in support of both defense and commercial applications. The marketplace and customer base are more diverse, with multinational organizations and multi-vendor projects. All these require better collaboration.

Today, many see the capabilities of S1000D as a good fit for managing technical data. XML is a better format for data processing and web-based tools. There is also a need to deliver XML data to S1000D, but many still have customers that require ATA print output.

**Is S1000D Capable of Supporting ATA iSpec2200**

S1000D is jointly produced by defense and commercial organizations, their members and customers. These include the Aerospace and Defense Industries Association of Europe (ASD), the Aerospace Industries Association of America (AIA), and Airlines for America via the ATA e-Business Program. ATA has provided input to allow S1000D to support ATA requirements.

There are already a number of current commercial S1000D programs, including:

- Boeing® 787 Dreamliner
- Airbus® A350
- Bombardier Aerospace C Series and Global 7000 & 8000

And, several new military programs are based on commercial platforms or are incorporating commercial equipment, like Boeing’s P-8A Poseidon and KC-46A Tanker. The Airbus A400M includes components produced by suppliers for both commercial and military use.
Produce an ATA CMM in S1000D

A Component Maintenance Manual (CMM) is the documentation for an aircraft line replacement unit. The CMM generally covers repairs or maintenance of components that have been removed from the aircraft to return it to a serviceable state. S1000D provides a description of a Component Maintenance Publication (CMP) in Issue 4.1 that describes the same concept but uses different terminology.

CMMs use a specific S1000D Publication Module (PM) and the information set to structure the appropriate Data Modules. The PM’s Table of Contents folder hierarchy allows a folder per Pageblock. Each CMM defined Pageblock becomes a `<pmEntry>` with the title element defined as the required Pageblock title. Data Modules that are appropriate to each Pageblock are listed in the order in the `<pmEntry>`. An Abbreviated CMM (ACMM) may contain just one Data Module per Pageblock.

S1000D Evolution & Reuse of Data Modules

The initial S1000D Specification was designed to support page-oriented publications. Over the years as electronic publishing and database technologies evolved, S1000D was modified to focus on Data Module (DM) reuse and to encompass delivery of electronic publications with a high level of interactive functionality. In S1000D, the header and content sections of the Data Modules (DMs) are tagged with relevant S1000D SGML Document Type Definitions (DTDs) or XML Schemas. These electronic tags and their attributes enable the data to be presented dynamically in an IETM. Higher classed IETMs are uniquely dynamic and generated on the fly.

Which Standard is best for My Organization?

Those who author and maintain technical documentation understand the huge costs that can be incurred when creating documentation in a variety of proprietary formats. Switching to an entirely new standard such as S1000D may not be feasible as many organizations have thousands of legacy ATA documentation projects to maintain. Additionally, these organizations buyers, suppliers and manufacturers may still be using the ATA standard. By utilizing ATA as a single, widely accepted standard to facilitate information sharing between these parties may far outweigh the benefit of switching to a new specification. Because ATA promotes reuse, it naturally results in reduced costs. Using one information source to produce various types of online and printed deliverables saves time, effort and costs.

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S1000D standard, and to establish a single specification for both military and commercial aviation industries worldwide. In 2007, the MOU between the three organizations was renewed enabling further development and promotion of S1000D in the global arena.

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Inmedius, a Boeing Company, is a global leader in delivering innovative, performance-oriented applications and services that capture, create, manage and deploy information and learning assets. By applying these solutions, Inmedius customers, and their clients, are enabled to share an unprecedented level of productivity and efficiency. In addition to defense program services, Inmedius provides Content Management, S1000D, ATA, DITA and learning management lifecycle solutions for publishing, aerospace, defense, government, manufacturing, and health care organizations worldwide.

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Fully Integrated, Browser-Based Lifecycle Solution

With a wealth of technical expertise and experience, Inmedius strategically forged a set of tools with extraordinary capabilities. Imbedded in the software is the power to manage and customize the information development process that is essential for cost-effective, high-quality ATA iSpec 2200 implementations.

The industry’s most comprehensive set of tools, the Inmedius ATA Publishing Suite™ is a browser-based solution to successfully manage the lifecycle of ATA iSpec 2200 technical documentation for commercial aircraft. The software set supports and integrates the key functions of managing, authoring, viewing and publishing ATA data, while providing precise control over documentation delivery, including support for PDF files and IETMs.

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Comprehensive Environment for Fast, Accurate Conversion

Converting your most important data to (XML) sometimes feels like an impossible task. The more important the data, the less likely outsourcing is a viable alternative. Inmedius iConvert allows for the conversion of documents into structured XML in your own facility or by Inmedius. The software supports conversion from paper, Word or PDF. The software comes pre-configured for extensive out-of-the-box conversion of original S1000D, 40051B and ATA documents, and supports any Document Type Definitions (DTD) or XML schema. Most importantly, Inmedius iConvert is safe and reliable, having been rigorously tested with some of the most sensitive and complex technical documents ever created for aerospace and defense applications.

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