



TECHNICAL SERVICES DIVISION

S1000D

S1000D Capabilities and Project **Management**





S1000D Capabilities and Project Management

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S1000D

Overview

DTB can be your partner for the effective management of an S1000D integration or conversion project. We have performed successful information conversion projects to a S1000D CSDB (common source database) from a variety of sources. We are also ready to help customers decipher the S1000D specification and implement an S1000D-compliant product and information architecture.

An S1000D-Knowledgeable Partner On Your Side

S1000D Technical Authoring and Conversion Services

- Proven experience in authoring of S1000D based publications
- Assistance in conversion of existing legacy publications
- Expertise in the use of *Simplified Technical English*

S1000D Consulting Services

Assisting our clients in understanding the ramifications associated with making various business choices relating to S1000D delivery, DTB offers the following consulting services:

- DTB can assist your organization with the writing and development of business rules to support your projects
- Educate your staff on the fundamentals of the S1000D/S2000M specifications
- Review of end customer data and delivery requirements
- Interview key disciplines to determine in-house capability
- Assess in-house information systems and technologies
- Recommend ongoing development of S1000D/S2000M capability in your organization





S1000D Capabilities and Project Management

S1000D Leadership

DTB has made a significant commitment to the advancement of the S1000D specification. We're an active member of AIA (Aerospace Industries Association), a proponent and steering organization for implementation of S1000D. This allows us to contribute to steering activities, as well as to attend all public sessions of the S1000D steering committee. It also provides up-to-date information on the development of S1000D Business Rules and progress related to the adoption of this specification by DoD and commercial US and Foreign organizations.

DTB and the Advancement of the S1000D Specification

To further our commitment, we have continued to provide resources in support of the development of the S1000D specification as well as other related technical groups.

Our *Chief Technologist* is an active member of the S1000D organization.

- He is the secretary of the S1000D Electronic Publications Working Group (EPWG)
- An active member of the United States S1000D Management & Implementation Group (USSMG) Land Working Group
- Participates on the PTC Technical Committee on Arbortext products including:
 - Arbortext Integrated Logistics Solution (S1000D / S2000M / SCORM)
 - Arbortext IsoDraw
 - Arbortext Editor/Styler
 - Arbortext Publishing Enging
 - Advanced Print Publisher
- Has been engaged in the world of structured markup applications (SGML/XML) for over twelve years.
- He is a frequent speaker at the AIA/Joint Service Technical Publications Workshop in Clearwater, FL, and the PTC/User World Events.



Technical Publication Process

The establishment of a formal process to produce S1000D technical publications forms the cornerstone of a successful project. The initial effort in this process is the creation and ratification by the customer of a Project Management Plan (PMP). The plan describes the manpower staffing of the technical publications effort, the deliverables, the production process, the review process, the security and quality issues, the times frames, the customer's business rules, and the project-specific business rules to which the project will adhere.

Producing S1000D Tech Pubs

Key Milestones for DTB's S1000D Publication Projects

- The production and delivery of the Project Management Plan and the initial production and delivery of the Data Module Requirements List (DMRL)
- The creation of the Data Modules identified in the DMRL, the passing of their first verification requirements, and specification of the first issue number
- The optional second verification to ensure the "fitness for purpose" of the data modules
- The final verification of the technical publication for valid links, the currency of its information, and the fitness of the technical publications package as a whole. A certificate of accuracy or conformance may be required

S1000D Business Rules

The aim of the Business Rules is to provide a project with a set of rules for the production of data modules and graphics to ensure that the technical publications material is produced in a consistent manner. These rules may include:

- An overview of the general requirement for technical publications for the project
- An explanation of the production process, in terms of sources of data and controls on production
- File naming conventions for data module files and the general guidelines for the transfer of data between the customer and any subcontractor
- Details of the management organization for the technical publications production; Rules for the identification of data modules and graphics
- Rules for the IDSTATUS section
- Rules for the contents sections for the different data module DTDs / Schemas
- Project-specific rules for non-textual data

At the end of the work, DTB delivers the complete Common Source Database (CSDB) snapshot of relevant Data Modules to the customer as a Delivered Publications Database (DPDB) enhanced by the addition of any linking information required to turn the material into the actual end deliverable (for IETP deliveries), or formatted output data for paper-based deliveries.



S1000D Capabilities and Project Management

Business Rules

Business Rules typically contain information governing the activities involved in producing successful ASD / AIA S1000D technical publications, such as:

| NOMENCLATURE | DESCRIPTION |
|---------------------------------------|---|
| Terms and Definitions | Information on the terminology used to describe content structure and data |
| Synopsis of Data Module Types | Summary of the types of data modules that are to be produced for the technical publications project |
| Writing Regulations | Information about populating free text elements such as paragraphs and procedure steps |
| Identification and Status | Rules for the population of the data modules' IDSTATUS section |
| Descriptive Content | Rules for the population of elements and attributes that are used when creating data modules using the Descriptive DTD/Schema |
| Procedural Content | Rules for the population of elements and attributes that are used when creating data modules using the Procedural DTD/Schema |
| Illustrated Parts Data Content | Rules for the population of elements and attributes creating data modules using Illustrated Parts Data (IPD) DTD/Schema |
| Crew Content | Rules for the population of elements and attributes that are used when creating data modules using the Crew DTD/Schema |
| Maintenance Planning Content | Rules for the population of elements and attributes used creating data modules using the Maintenance Planning DTD/Schema |
| Fault Information Content | Rules for the population of elements and attributes used creating data modules using the Fault Information DTD/Schema |
| Wiring Content | Rules for the population of elements and attributes that are used when creating data modules using the Wiring DTD/Schema |
| Data Dispatch Note | Rules for the population of elements and attributes used creating data modules using the Data Dispatch Note DTD/Schema |
| Data Module List | Rules for the population of elements and attributes used creating data modules using the Data Module List DTD/Schema |
| Association to Other Databases | Maps from the SGML/XML elements and attributes to other (possibly external) databases |

Business rules decisions are ultimately transformed into data elements in the S1000D technical publishing projects. DTB manages the use and assignment of these elements for S1000D projects with specialized software which interoperates with our technical publishing solution. This allows DTB to reuse business rule information within the project and ensures that specific, up-to-date rules are communicated in the S1000D publishing process.

S1000D

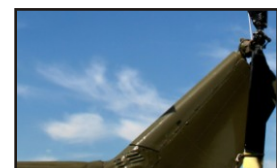
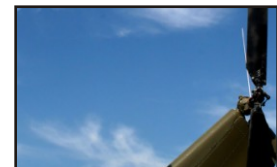
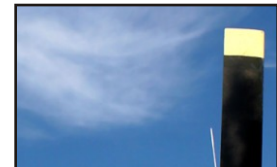
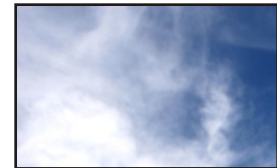
S 1000D Project-Specific Configurations

In addition to the *Business Rules* established and agreed upon for the S1000D technical publications project, for S1000D Issue 2.2 and earlier, it is also possible to identify and implement project-specific configurations to modify portions of the publications to comply with special needs.

These project-specific configurations are handled within the S1000D specification by .cfg files containing externalized project-configurable enumerations, which can have customer-specific definitions, including the following items:

| CONFIGURABLE ENUMERATIONS | |
|---------------------------|--|
| ACROTYP | Type of acronym or abbreviation |
| CAVEATS | Type of caveat |
| CLASSES | Security classification |
| COLOURS | Color of the caption |
| COMMCLSS | Commercial security classification |
| CPRIOS | Priority level of a comment |
| CREWMEMS | Crew member required for drill or step |
| DRILLTPS | Type of aircrew drill (Flight deck pres.) |
| EMPHS | Type of emphasis |
| PREFIXES | Prefix of random list items |
| RSPTYPES | Type of response to a comment |
| SKILLS | Personnel skill level |
| SUP.LEVS | Supervisor level |
| TYPES | Limit type |
| THIUOMS | Unit of measurement for threshold interval |

DTB also manages the use and assignment of project-specific configurations for S1000D technical publications projects with specialized software, which interoperates with our technical publishing solution. This environment allows DTB to reuse management information within the project wherever it is applicable and ensures that specific and up-to-date configuration data are communicated to whoever needs it in the S1000D publishing process.





S1000D Capabilities and Project Management

Data Module Coding

Data Module Code (DMC)

As S1000D information (data modules) are managed by the Common Source Database as autonomous units, an identification scheme is required to address these units. This is the Data Module Address.

The Data Module Address comprises the Data Module Code (DMC), the Data Module Title and the Issue details. The Data Module Code (DMC) is the unique address that the Common Source Database uses to identify the data module.

A typical S1000D technical publication project may use the following DMC scheme depending on the S1000D Issue:

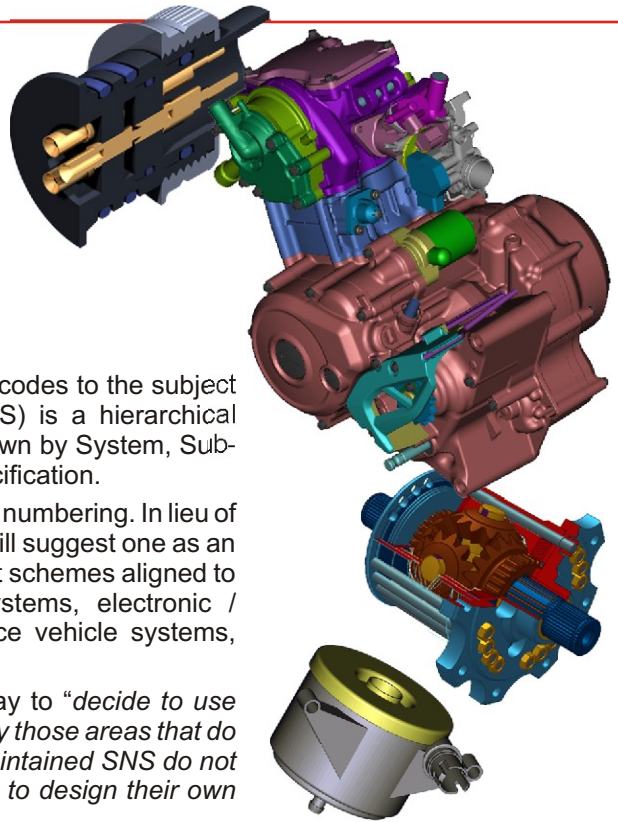
DTB's strategy for handling DMC is to first identify any existing customer-provided DMC scheme for appropriation. If our analysis proves that the customer's DMC scheme is a good fit for the current technical publication project, then it will be incorporated into the Project Management Plan and agreed upon by all parties. If not, DTB will suggest amendments to the coding scheme to make it suitable.

A number of available standards provide input to the DMC scheme analysis. In lieu of a customer-provided DMC scheme, DTB will use standards promulgated by ASD/AIA and various commercial and non-commercial projects as suggested input to the customer's DMC scheme. An agreed-upon DMC scheme will be adopted by the customer and incorporated into the Project Management Plan for communication to all involved personnel.

| CODE | DESCRIPTION | DEFAULT VALUE (IF ANY) |
|--|--|------------------------|
| Model Identification Code | The Model identification code is a thirteen-character alphanumeric code which identifies the project name. It also includes the end item usable on code. | "EQUIPMENTSAAA" |
| System Difference Code | The system difference code is a three-alpha-character code allocated by the project when different systems with the same system / sub-system and sub-sub-system identity are used. This is derived from system level usable on code. | "AAA" |
| Material Item Category Code | The material item category code is used to indicate different SNS coding structures that are applicable to an individual project at the system, subsystem and sub-subsystem level within the SNS. The material item category code is also used to differentiate between different definitions within the same SNS. | |
| Standard Numbering System (SNS) | The DMC includes a Standard Numbering System (SNS) identifying the part of the system that data module is related to. If no established SNS schema consistently supports the structural breakdown of the customer's equipment, the project will establish its own SNS. <i>See discussion (opposite) on SNS.</i> | |
| Disassembly Code | The disassembly code is a two-character code, the first alphanumeric and the second numeric. It identifies the breakdown condition of a component to which maintenance information applies. | "00" |
| Disassembly Code Variant | The disassembly code variant is a two-character code. It designates alternative items of equipment differing in design that are otherwise not enough to change the system difference code. | "00" |
| Information Code | The information code is a three-character alphanumeric code. The code is used to identify what type of information is within a data module. | |
| Information Code Variant | The information code variant is a single-character alpha code that provides an indication to the variants that may need to be covered. | |
| Item Location Code | The Item location code is a single character alpha code that designates where the maintenance task will be carried out or what information is applicable to it. It is identified from the following list: <ul style="list-style-type: none"> - A Information associated with items installed on the equipment. - B Information associated with items installed on an engine or major component removed from the equipment. - C Information associated with items on the bench. - D Information associated with all three locations A, B, and C. No other combinations are allowed. - T Information associated with training-only data modules. | |

S1000D

Part Numbering — Standardized



Standard Numbering System (SNS)

A similar process applies to the assignment of SNS codes to the subject equipment. The Standard Numbering System (SNS) is a hierarchical breakdown of the end item. It is generally broken down by System, Sub-System and Sub-Sub-System within the S1000D specification.

DTB will first look to the customer for guidance on part numbering. In lieu of a customer-provided scheme for SNS coding, DTB will suggest one as an amalgam of purpose-built configuration management schemes aligned to specific equipment such as aircraft / missile systems, electronic / automated software systems, ship systems, surface vehicle systems, ordnance systems or other.

The S1000D specification allows projects the leeway to “decide to use these SNS without modification or use part and modify those areas that do not suit their needs. If these example SNS or the maintained SNS do not suit a projects [sic] needs, then projects can decide to design their own complete SNS.”(1)

(1) Spec 1000D
AE-A-08-02-0500-00A-040A-A
Chap 8.3

A typical S1000D technical publication project may use the following SNS scheme:

TABLE 1

| SYSTEM | SUBSYSTEM | TITLE | DEFINITION |
|---|-----------|-----------------------------|---|
| System 00 Equipment 00 | | Equipment (General) | |
| | -00 | Equipment | Refers to the complete equipment system |
| System 01 Functional Part 1 A0 | | Functional Part 1 (General) | |
| | -00 | Functional Sub-Part 1A | Refers to those parts of the system that represents a functional part. This may include sub-sub part 1 A1, sub-sub part 1 A2, sub-sub part 1 A3, etc. |
| | -10 | Functional Sub-Part 1B | Refers to those parts of the system that represents a functional part. This may include sub-sub part 1 B1, sub-sub part 1 B2, sub-sub part 1 B3, etc. |
| | -20 | Functional Sub-Part 1C | Refers to those parts of the system that represents a functional part. This may include sub-sub part 1 C1, sub-sub part 1 C2, sub-sub part 1 C3, etc. |
| System 02 Functional Part 2 A1 | | Functional Part 2 (General) | |
| | -00 | Functional Sub-Part 2A | Refers to those parts of the system that represents a functional part. This may include sub-sub part 2 A1, sub-sub part 2 A2, sub-sub part 2 A3, etc. |
| | -10 | Functional Sub-Part 2B | Refers to those parts of the system that represents a functional part. This may include sub-sub part 2 B1, sub-sub part 2 B2, sub-sub part 2 B3, etc. |
| System 03 Functional Part 3 A2 | | Functional Part 3 (General) | |
| | -00 | Functional Sub-Part 3A | Refers to those parts of the system that represents a functional part. This may include sub-sub part 3 A1, sub-sub part 3 A2, sub-sub part 3 A3, etc. |
| | -10 | Functional Sub-Part 3B | Refers to those parts of the system that represents a functional part. This may include sub-sub part 3 B1, sub-sub part 3 B2, sub-sub part 3 B3, etc. |
| | -20 | Functional Sub-Part 3C | Refers to those parts of the system that represents a functional part. This may include sub-sub part 3 C1, sub-sub part 3 C2, sub-sub part 3 C3, etc. |
| | -30 | Functional Sub-Part 3D | Refers to those parts of the system that represents a functional part. This may include sub-sub part 3 D1, sub-sub part 3 D2, sub-sub part 3 D3, etc. |



S1000D Capabilities and Project Management

Data Module Coding

S1000D Data Module Requirements List (DMRL)

The Data Module Requirements List (DMRL) provides a complete breakdown of all the data module information types mandated by the technical publications project. It lists all the data modules needed to meet the requirement to produce technical publications matter to support the technical publications project and delivered in the DPDB. The DMRL identifies each data module by means of the data module title, data module code, issue number, quality assurance status information, draft complete date, and verification date. DTB produces the DMRL based upon the logistics requirements for the technical publications project. These requirements may be derived from the customer’s statement of work (SOW), or other input requirements provided by the end user.

S1000D Data Modules

S1000D data modules are discrete packets of information. They comprise a complete publication when issued together with other data (e.g., multimedia, graphics, et al.). S1000D technical publications are an ordered collection of data modules and software which enables a user to navigate through them. Each data module is uniquely identified by its Data Module Code (DMC) and issue data. Since data module contents should be unique, their modularized format enables information re-use. They can be included in any relevant publication and managed independently from each other.



1000D Data Modules

DTB has authored S1000D data modules for the following information types:

| DOCUMENT TYPE | DESCRIPTION |
|---|--|
| Crew | This information type includes: flight reference card, crew/operator drills and sub-drills, logical operational steps for crewmen to perform, challenges and responses within operational steps, and closing procedures. |
| Descriptive | The descriptive DTD captures and represents descriptive information. The equipment's product structure informs the level of specificity in the Descriptive DM. DTB uses the product breakdown information provided by the customer to determine the appropriate degree of specificity. |
| Fault | This information type captures data on faults and fault diagnosis including: fault isolation and possible/detectable/observable equipment failure modes, fault isolation procedures, references to the corrective maintenance procedural data module, fault item probability factors, and least replaceable or shop replaceable units. |
| IPD | Illustrated Parts Data content is typically populated programmatically from the output of the customer's resource management system. DTB can import and convert these data into applicable S1000D elements. |
| Procedural | The Procedural DM captures operational and maintenance tasks associated with the equipment using steps that to describe the sequence of the procedure. The equipment's product structure informs the level of specificity in the Procedural DM. DTB uses the product breakdown information provided by the customer to determine the appropriate degree of specificity. Product structure "zones" represent the focus for a given set of steps or DM. |
| Schedule | The Maintenance Planning DM provides for capturing three broad types of information: groups of maintenance tasks, individual tasks, and periodic maintenance and lifecycle details for equipment. Therefore, three types of data modules are used to capture such information as scheduled preventive maintenance and upkeep: Scheduled and Unscheduled Checks, Maintenance/Inspection Task Lists, and Time Limits. |
| Wiring Flow Diagrams Wiring Data | To support fault isolation and maintenance of electrical systems by skilled personnel, S1000D Wiring data modules contain information describing the equipment's electrical circuits. |
| Data Dispatch Note | Data Dispatch Notes (DDN)s provide metadata describing a transfer of data modules from one organization to another as an S1000D CSDB interchange (transfer) package. A DDN consists of two key parts: a set of data describing the transfer and a list of the data modules and/or illustrations that are being supplied. Together with the Data Module List (see next), these two modules can be used to transfer complete or partial technical publication project CSDB to adjacent or correlated agencies. |
| Data Module List | Lists DMs included in a transfer package and includes: a CSDB Status List, a complete DMRL, or a partial DMRL. References to other DMLs are accomplished using the <dmlref> element. |
| Process Module | The Process Module delivers the punch of S1000D. Its strength lies in the ability to define variables to be used in a state table, within the IETP, that determine the logical flow of Data Module presentation to the end user. This flow can be prescribed to allow the end user to traverse an ordered set of DMs, or it can be altered in realtime by the end user's answer to a query generated by the IETP, or the flow can be adjusted in response to an event raised by the equipment's condition. |



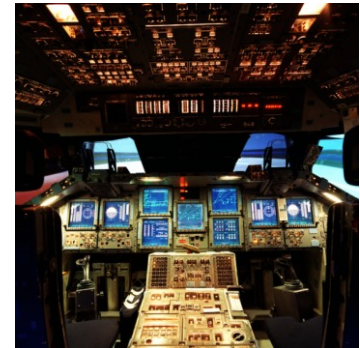
S1000D Capabilities and Project Management

Data Management

S1000D Common Source Database (CSDB)

ASD S1000D defines a Common Source Database (CSDB) as “an information store of data modules required to produce the technical publications for an air vehicle and its support equipment. The information is stored by breaking it down into readily accessible units called data modules.” In fact, several databases represent the outcome of a successful S1000D authoring and content delivery project: the Common Source Database (CSDB), the Delivered Publications Database (DPDB), and the Final Publications Database (FPDB).

- Delivered Publications Database (DPDB): The DPDB is a subset of the CSDB, which contains the data modules the customer requires for a particular customer or publication.
- Final Publications Database (FPDB): S1000D technical publication production process generates the Final Publications Database (FPDB). This process outputs a collection of data files that activate links by containing the information required by the output software package to interpret the source and destination nodes of links (supported by the W3C’s Xlink XML recommendation). The purpose of the FPDB is to house a completed version of the technical publication with the necessary links between elements in the data modules resolved. The DPDB is used as input to this process and together with the linkbase creates the FPDB. An Interactive Electronic Technical Publication (IETP) is produced by loading the FPDB into an appropriate “viewer” software.



S1000D Applicability

The Data Module Code (DMC) defines which end item a data module refers to and the information type. However, that end item may have a number of variants or be at different modification states. In these cases it is useful to indicate the equipment versions to which the data module applies. The S1000D applicability constructs are used to filter information about the equipment variants to which the information in a data module applies. A system of applicability tables allows publications to provide a wide variety of customized information solutions to end users depending on their needs.

S1000D Security

Specific attributes define the security classification for the data module. Possible classifications are shown in the table (right). A data module is usually assigned the security classification of the highest level of information contained within the data module (including illustrations).

| Class | Definition |
|----------|-----------------------|
| Class 01 | Unclassified |
| Class 02 | Confidential |
| Class 03 | Restricted |
| Class 04 | Secret |
| Class 05 | Top Secret |
| Class 06 | Confidential (Atomic) |
| Class 07 | Secret (Atomic) |
| Class 08 | Top Secret (Atomic) |
| Class 09 | Not used |



Quality Assurance

The quality assurance status of the data module is indicated by the element <qa> and may include at least one of the following three elements:

- The element <unverif> (unverified) identifies that the data module is a draft, which has not yet been checked for technical accuracy and safe use.
- The element <firstver> (first verification) identifies that the data module has been signed-off by the design authority as being technically accurate and permits the efficient and safe operation and maintenance of the system/equipment by the customer.
- The element <secover> (second verification) identifies that the data module has been signed-off by the customer to verify the technical information it contains is suitable for use by customer personnel.

Data modules can only go to second verification if they have passed first verification. When used, the <firstver type=""> and <secover type=""> elements shall contain one of the attribute values "tabtop", "onobject", or "ttandoo".

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Table-Top: Data modules that have the attribute type of the element <firstver> or <secover> set to "tabtop" indicates table top verification has taken place. This is a cross-verification step without the physical presence of the associated equipment or system. DTB recommends a CSDB workflow, which includes a Table-Top review cycle between the Distribution and Posting of the DMs. After all technical publication project deliverables are housed in the CSDB, the entire system would be printed to hard copy and a Table-Top review accomplished with updates incorporated before the project is posted for final delivery.

On-Object: Data modules that have the attribute type of the element <firstver> or <secover> set "onobject" indicates an on object verification has taken place. This is verification by practical demonstration of the procedure. In many cases it is prudent for the customer to provide an on-object verification of the completed CSDB or FPDB; however, DTB may not be involved in this process other than to address issues which arise from the review.

Both: Data modules that have the attribute type of the element <firstver> or <secover> set "ttandoo" indicates that both table top and on-object verifications have been performed.



S1000D Capabilities and Project Management

Delivery

S1000D CSDB/FPDB Delivery:

The production of the final deliverable EITP and print version of the S1000D CSDB/FPDB is accomplished through the use of customized software and production processes. This allows DTB to tailor the deliverable to the customer's needs and ensures that the product meets the customer's quality goals.

DTB relies on S1000D tools which interoperate with its publishing environment to create an IETP package compliant with S1000D. These tools also create Adobe Portable Document Format (PDF) output used for printing the S1000D DMs according to the structure outlined in the S1000D Publication Module.

DTB's CSDB management software provides traditional paper-based publication production and controls the generation of List of Effective Pages (LOEP), Table of Contents (TOC), List of Figures (LOF), Indexes, and partial or full page revision issuance with applicability. For source XML S1000D data, DTB has available print rendering engines based on XSL:FO technology and Java-based utilities to produce PDF output.

The customer may choose the end user IETP browsing software or have DTB suggest one of several available COTS browsers. DTB's processes ensure that all data within the CSDB/FPDB are compliant to the ASD/AIA S1000D standard thus ensuring the best fit for the customer's selected IETP browser. DTB's leadership position as a provider of intelligent graphics enhances its capabilities to deliver a fully-integrated IETP conveying the customer's text and graphic information accurately and immediately to the end user.



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