LOTAR International Project Report for 2024

Aircraft have very long lifecycles. There can be 80 years between the initial design for a new program and the end of life of the last one delivered. Throughout the product lifecycle, the data defined for archiving and retrieval must be provided in a standardized format that can be read and reused regardless of changes to the original IT environment. Ensuring this is the goal of LOTAR.

LOTAR is a project under the joint auspices of the aerospace industry association AIA and ASD, as well as PDES, Inc. and prostep ivip. It aims to develop, implement, test, pilot, publish, and maintain standards for long-term archiving and retrieval of digital product and technical information. This includes CAD and PDM data, composites, wire harnesses, MBSE artifacts, and CAE simulation data. The multi-part standard describes both the information content and the processes for recording, storing, managing, and accessing information. The documents are published as parts of the EN/NAS-9300 series of standards.

Focal Points & Concrete Results 2024

Basic & Common (B&C) Process Parts:

The B&C Workgroup submitted the LOTAR Overview Data Flow (Part 010) for external ballot to ASD and AIA and responded to change requests from the publication ballot for LOTAR Fundamentals and Concepts (Part 003). The working group has onboarded new team members supporting LOTAR Requirements (Part 002) and the work on LOTAR Metadata (Part 021).

3D Mechanical CAD with PMI:

The team continued the systematic review of its domain-specific documents. External ballot comments for Part 100 (3D CAD Fundamentals) were resolved. The new edition of Part 110 (3D Geometry) is ready for publication ballot, and Part 120 (Graphic PMI) has been reviewed and confirmed as-is. Currently, the 3rd pilot project for Assembly Product Manufacturing Information based on AP242 Edition 4 XML is ongoing.

PLM:

The PLM Workgroup made significant headway on the LOTAR standard for product data in the "as planned" stage (Part 230), particularly with regard to aligning PLM concepts with the STEP standard. The team reviewed comments from the external publication ballot of Product Data in the "as designed" stage (Part 210) and initiated a prototyping activity to test the Product Structure Validation Property standard (Part 205). The definition of common use cases with the PDM Interoperability Forum was continued.

Composites:

The Composites WG provided support for enhancements to the composite data model for AP242 Ed. 4, which included the addition of limited length and application indicators (LLAI) and an update to composite material recommended practices. The team provided support for a joint project with WG15 (STEP-NC/AP238) for the use of AP242 composite data in downstream manufacturing and NC processes for automated layup. The workgroup continued efforts to draft the Principles and Concepts for Long-term Archiving Requirements for Composite Data (Part 300).

Electrical Wire Harness:

The Electrical Workgroup's objective is to identify and maintain the data necessary for defining a wiring harness. The design and analysis processes must encompass both electrical (ECAD) and mechanical (MCAD) data. The team's primary focus was on the Electrical Harness contents of the AP242 Domain Model, and they provided support for the activities of the Interoperability Forum for Electrical Wiring Interconnection Systems (EWIS-IF).

MBSE:

In 2024, the MBSE working group's efforts focused on finalizing Part 500, the fundamentals and concepts for long term archiving and retrieval of MBSE information. We updated our prototypes emphasizing Part 515, and the definition of a Model Report. Worked with the Modelica Association, referencing the FMI layered standards (FMI-LS-Ref), and UC3M to demonstrate formalized schemas for building ontologies to verify digital links and traceable requirements. To address the industry's needs for MBSE standards, and to develop the capabilities needed for future P5XX documents, the group formally launched the MBSE integration Forum (MBSE-iF). We actively participated in GPDIS with presentations aligned with these MBSE-iF initiatives.

Organizational / Technical Challenges

The past year has been challenging for the aerospace industry, particularly due to budgetary constraints and travel restrictions. This has affected on-site participation at the LOTAR workshops. Some topics have been deferred due to reduced funding and limited availability of subject matter experts. Cooperation with ASD and AIA has been vastly improved. The LOTAR standard document balloting and status reporting processes have been streamlined, allowing for more efficient handling of the numerous documents currently in publication.

What is Planned for 2025

This year will see the working groups doing lots of detailed work. The Basic & Common Parts Workgroup will publish revised LOTAR Parts and work on a new LOTAR Metadata document. The 3D Mechanical team will review existing documents and create two new standard parts for Semantic PMI and structural joins.

The PLM team's objective is to complete the work on Product Data in the "as planned" stage. In the Composites area, the domain's fundamentals and concepts document (Part 300) will be finalized, and new concepts will be defined for inclusion in AP242 Edition 5. The electrics team plans to complete the basics and concepts for archiving electrical signing data and define requirements for archiving physical wire harnesses for signing and design purposes.

The MBSE WG expects to complete the draft for Part 520 (System Simulation) in Q1 2025 and will continue to formalize the relationships with multiple industry partners and Standards Develop Organizations, including most recently OMG's CASCaDE project. With a focus on industry collaboration, the team will continue to coordinate development plans and results with academia and other consortia such as prostep ivip, NAFEMS, Modelica Assoc., INCOSE, A&D PLM AG, DoD representatives, and OMG.

Project Coordination Team's Statement:

Jochen Boy, PROSTEP: "Despite the organizational challenges, we successfully updated and published several LOTAR standard documents. It is encouraging to see the motivated project members working collaboratively, leveraging the multifaceted LOTAR project structure to maintain momentum despite current impediments. This team spirit greatly facilitates coordination tasks."

Project Chairs' Statement:

Bernd Feldvoss, Airbus: "One particularly noteworthy achievement was the March workshop in Darmstadt, where representatives from LOTAR, JT-IF, CAx-IF, and PDM-IF were brought together to collaborate on External Element References. This resulted in a successful integration of standards across formats and industries. This was continued during the fall workshop with QiF. A significant objective for 2025 is to engage new member companies, which will also enable us to explore new topics such as long-term archiving of electronics data and software."

Participants

Europe: Airbus Commercial Aircraft, Airbus Defence & Space, Leonardo

Americas: The Boeing Company, Embraer, GE, Gulfstream, Lockheed Martin, Raytheon Technologies

Project Leadership Team:

Project Chair Europe
Bernd Feldvoss
Airbus
bernd.feldvoss@airbus.com

Project Chair Americas
Jeff Klein
The Boeing Company
jeff.r.klein@boeing.com

Project Coordinator Europe
Jochen Boy
PROSTEP AG
jochen.boy@prostep.com

Project Coordinators Americas
Jeff Holmlund
Lockheed Martin
jeffrey.a.holmlund@lmco.com