Overview of EN 9300 LOTAR standards for long term archiving and retrieval of digital technical product information

By Jean-Yves DELAUNAY: Airbus
The problem:
From 2D drawing to 3D Model Based definition

Manual Drawing

Computer as
Electronic pencil

Geometry
Modelling

Digital Model is the master

3D Product Modelling

3D MB Design

3D MB Manufacturing

3D MB Support
3D product model is direct input to manufacture
Drawing is not the basis of manufacture

3D product model is direct input to inspection
Drawing is not the basis of inspection
Rates of Change of technologies versus the longevity of an aerospace product

- Life of Operating System: 18 months
- Life of Computer: 3 years
- Time between CAD Versions: 6 months
- Life of CAD System: 10 years
- Life of aerospace Product: 70 years +

(time)
An Example of Generation Change
The question with no trusted answer

“How can I ensure there is no semantic alteration in my 3D Model Definition for decades despite obsolescence and major migration of native data every 10 years ???”

Goal of the LOTAR International project, initiated by the American and European Aerospace and Defense manufacturers

Results can be used by other industries
The LOTAR project: To support the **longevity** of Aerospace & Defense 3D Model based definition

- CAD S/W versions change every **6 to 12 months**, CAD generations change every **10 years**.
- Aircraft lifecycle of **70+ years**
- The Lifecycle of software & hardware is short compared to the lifecycle of an aircraft or a defence system (nuclear missile, ...)

Repositories

- **Ingest**
- **Preservation Planning**
- **Repository**
- **Retrieve**
The project goal is to *develop, publish and maintain standards* designed to provide the capability *to archive and retrieve digital product and technical information*, including 3D CAD and PDM data, in a *standard neutral form* that can be read and reused throughout the product lifecycle, independent of changes in the IT application environment originally used for creation.

The standards are published as EN/NAS(*) 9300 series and cover both the information content as well as the processes required to ingest, store, administer, manage and access the information.

(*): EN – European Standard (Norm); NAS – National Aerospace Standard

http://lotar-international.org
Motivation for LOTAR

Meeting the **legal and business requirements** of the aerospace & defense industry:

- **Legal Requirements**
  - Product Liability
  - Certification

- **Business Requirements**
  - Support in operation
  - Reuse (Design)
  - Other

- **Use cases**

EN/NAS 9300 considers requirements coming from:
- Legal and certification rules
- Regulations on long term archiving of technical documentation
- Reuse
- Support in operation

Additional to legal demands, there are industry established standards, company specific rules and recommendations.

The standard defines architecture, processes & data formats to fulfill these requirements.
## LOTAR Member Companies 2018

### Europe
- AFNeT
- Airbus
- Airbus Helicopter
- Airbus Defense & Space
- SAFRAN Engine
- BAE Systems (*)

### Americas
- Boeing
- Embraer
- General Electric
- Goodrich
- Gulfstream
- Lockheed Martin
- Sandia National Labs

In charge of US Nuclear weapons Systems

http://www.sandia.gov/
## Status of use of NAS/EN 9300 by LOTAR members

<table>
<thead>
<tr>
<th>A&amp;D company</th>
<th>Area of application</th>
<th>Scope</th>
<th>NAS / EN 9300 LOTAR parts (CAD)</th>
<th>ISO formats</th>
<th>Project status</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>CAD 3D exact geometry</td>
<td>CAD 3D tessellated geometry</td>
<td>CAD 3D PMI</td>
</tr>
<tr>
<td>Airbus</td>
<td>A350</td>
<td>3D electrical harness installation</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>EADS</td>
<td>&quot;Full 3D&quot; model based</td>
<td></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Dassault-Aviation</td>
<td>Falcon 7X</td>
<td>complete definition of the aircraft (airframe, brackets, pipes, harness)</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Snecma</td>
<td>New parts of engines</td>
<td>3D definition with PMI of new mechanical part</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Boeing</td>
<td>787</td>
<td>3D definition with PMI with assemblies</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Gulfstream</td>
<td>G650</td>
<td>3D mBD mechanical, electrical and composite</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Lockheed-Martin</td>
<td>F35</td>
<td>3D mBD mechanical, electrical and composite</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
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<tr>
<td>EMBRAER</td>
<td>Legacy 450 &amp; Legacy 500</td>
<td>complete definition of the aircraft</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Legend:**
- **PLANNED**: project planned
- **DEV**: project in development
- **PROD**: project on production

(*) Plan to migrate to STEP AP 242 ed1 when possible
LOTAR Standard Foundation
ISO 14721:2003 (OAIS)

- "Open Archive Information System" (OAIS) Reference Model is the basis of the LOTAR processes
- Developed by Aerospace and Defense Industry
- Extended to meet the specific requirements of LOTAR

- As neutral data format for the archives, ISO 10303 (STEP) has been chosen since it is the most advanced open format, completed by other formats when requested
A distinctive feature of the combined use of LOTAR and STEP is the use of **Validation Properties**

Validation Properties are *key characteristics of a digital model* that help to ensure consistency of the data.

They are computed by the exporting system and included as key-value pairs in the STEP file.

Any importing system will compare its import results with these properties and thus determine success of the data transfer.
# LOTAR International project WGs on a page

<table>
<thead>
<tr>
<th>Advanced Manufacturing: composite (Additive Manuf.)</th>
<th>Wiring Harness</th>
<th>Engineering Analysis and Simulation</th>
<th>Model Based Systems Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAS/EN 9300 3XX</strong> (ISO AP242)</td>
<td><strong>NAS/EN 9300 4XX</strong> (ISO AP242 ed2)</td>
<td><strong>NAS/EN 9300 6XX</strong> (ISO AP209 ed2)</td>
<td><strong>NAS/EN 9300 5XX</strong> (ISO AP239 – AP239 MoSSEC, SysML, FMI, etc)</td>
</tr>
<tr>
<td><img src="image1.png" alt="Advanced Manufacturing" /></td>
<td><img src="image2.png" alt="Wiring Harness" /></td>
<td><img src="image3.png" alt="Engineering Analysis and Simulation" /></td>
<td><img src="image4.png" alt="Model Based Systems Engineering" /></td>
</tr>
<tr>
<td>Launch 2009</td>
<td>Launch 2012</td>
<td>Launch 2014</td>
<td>Planned launch 2018</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechanical CAD 3D with PMI (Product &amp; Manufacturing Information)</th>
<th>3D visualization</th>
<th>Product Data Management (PDM)</th>
<th>Meta data for archive package</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>NAS/EN 9300 1XX</strong> (ISO AP242)</td>
<td><strong>3D visualization</strong></td>
<td><strong>NAS/EN 9300 2XX</strong> (ISO AP242 ed2 – AP239 ed3)</td>
<td><strong>NAS/EN 9300 4XX</strong> (ISO AP242 ed2 – AP239 ed3)</td>
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<td><img src="image5.png" alt="Mechanical CAD 3D with PMI" /></td>
<td><img src="image6.png" alt="3D visualization" /></td>
<td><img src="image7.png" alt="Product Data Management (PDM)" /></td>
<td><img src="image8.png" alt="Meta data for archive package" /></td>
</tr>
</tbody>
</table>

Basic and processes parts not illustrated
LOTAR International activities overview
7 technical Working Groups

- 3D Mechanical / PMI
- PDM / PLM
- Adv. Mfg & Composite
- Electrical
- 3D Visualization
- Meta data for archive packages
- Engineering Analysis & Simulation

Description of a LOTAR WG web page
- Goals and Objectives
- Associated LOTAR use cases
- LOTAR Family of Standards
- Associated ISO 10303 Information Models
- Meetings & teleconferences
- Accomplishments
- Related standardization projects

http://www.lotar-international.org/lotar-workgroups.html
LOTAR international meetings in 2018

- **1\textsuperscript{st} meeting:** (11) 12\textsuperscript{th} – 15\textsuperscript{th} of March, Asheville – NC, USA
- **2\textsuperscript{nd} meeting:** (18) 19\textsuperscript{th} – 21\textsuperscript{st} of June, Toulouse, France
- **3\textsuperscript{rd} meeting:** (23) 24\textsuperscript{th} – 27\textsuperscript{th} of September, USA
- **4\textsuperscript{th} meeting:** (10) 11\textsuperscript{th} – 13\textsuperscript{th} of December, Darmstadt, Germany
Interdependancies between PLM interoperability Business requirements, LOTAR standards, STEP standards, and associated Implementer Forums

(*) completed by other open international standards, such as: SysML, FMU/FMI,
Overview of LOTAR standards & links with associated ISO standards for information models

NAS / EN 9300 LOTAR standards per technical domains

Need to ensure the longevity / enhancement of the STEP standards development infrastructure as part of the preservation plan.
Overview of ISO 10303 STEP AP242 edition 2
“Managed Model Based 3D Engineering”

PDM – Configuration Management
Part identification, Physical part
Characteristics, Document Management
General management information
Activity & work management, Delta change
Approval and certification
Effectivity, Specification, Breakdown, configuration
Project Management, Contract Management.

Requirements, Validation & Verification
Production Rules
Process Planning
Analysis management

Interface management

Electrical Wiring Harness

Additive Manufacturing

3D scan

STEP AP242 ed2 DIS ballot started mid June 2018
The longevity of digital A&D product information for the duration of the products' life is complex and has to fulfill regulations authorities. It may exceed 50 to 70 years.

US and EU A&D industries develop the LOTAR standard to answer to this need. The fundamental principles are: use of ISO OAIS, use of neutral information models, with the appropriate rules of valid. & verification of conversion in the neutral format.

NAS/EN9300 standards are organized by technical disciplines, and cover: - Mechanical, - PDM-CM, - Composite, - Elec. Wiring Systems, - MBSE, - Eng. Analysis & Simulation, etc.


Importance for the manufacturing industries to participate to the Implementer Forums in charge of PLM interoperability test rounds of COTS PLM providers interfaces.

Opportunities for cooperation of LOTAR international with other industries sharing the same challenges and approaches.
Any questions?

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Back up slides
### AFNeT – prostep ivip STEP AP242 Day on the 17th of Oct., 2018, hosted by Airbus, Toulouse

<table>
<thead>
<tr>
<th>Start</th>
<th>End</th>
<th>Time</th>
<th>Item</th>
<th>Presenter/All</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM</td>
<td>9:30 AM</td>
<td>0:30</td>
<td>Coffee</td>
<td></td>
</tr>
<tr>
<td>9:30 AM</td>
<td>9:40 AM</td>
<td>0:10</td>
<td>Introduction of the day</td>
<td>J. Brangé (AFNeT) &amp; A. Plouga (prostep ivip)</td>
</tr>
<tr>
<td>9:40 AM</td>
<td>10:05 AM</td>
<td>0:25</td>
<td>Keynotes of Airbus (Overview of A&amp;D PLM Action Group “Minimum reqs. For 3D MBD” white paper)</td>
<td>Airbus (Jean Pierre SOLUY)</td>
</tr>
<tr>
<td>10:05 AM</td>
<td>10:35 AM</td>
<td>0:30</td>
<td>AP242 ed2 development, testing and benchmarks</td>
<td>JY Delaunay (Airbus) &amp; M. Nagler (BMW) (tbc)</td>
</tr>
<tr>
<td>10:35 AM</td>
<td>12:45 PM</td>
<td>2:10</td>
<td>Status of all vendors: 10” (AP242 coverage and roadmap + 1 highlight)</td>
<td>Core Technology, Dassault Systems, Datalink, Elysium, IFI, Jobine, Steptools, Thermex - tbc: Siemens PLM, Tecsoft, PTC</td>
</tr>
<tr>
<td>12:45 PM</td>
<td>2:15 PM</td>
<td>1:30</td>
<td>Lunch</td>
<td></td>
</tr>
<tr>
<td>2:15 PM</td>
<td>2:35 PM</td>
<td>0:20</td>
<td>Use of AP242 by Safran for 3D semantic Geometric Dimensions and Tolerances</td>
<td>Safran - Lenin Sevilla Garcia</td>
</tr>
<tr>
<td>2:35 PM</td>
<td>2:50 PM</td>
<td>0:15</td>
<td>STEP AP242 on the cloud: Boostaerospace Airdesign</td>
<td>P. Faure (BoostAerospace)</td>
</tr>
<tr>
<td>2:50 PM</td>
<td>3:05 PM</td>
<td>0:15</td>
<td>Business value &amp; implementation roadmap of AP242 ed2 for elec. wiring harness</td>
<td>S. Hernal (Cimpa)</td>
</tr>
<tr>
<td>3:05 PM</td>
<td>3:30 PM</td>
<td>0:25</td>
<td>A&amp;D PLM Action Group recommendations on AP242 (TBC)</td>
<td></td>
</tr>
<tr>
<td>3:30 PM</td>
<td>4:00 PM</td>
<td>0:30</td>
<td>Coffee break</td>
<td></td>
</tr>
<tr>
<td>4:00 PM</td>
<td>4:15 PM</td>
<td>0:15</td>
<td>Kinematics based on AP242 demonstration</td>
<td>Rolf BOSSÉ - (Daimler with Tecsys)</td>
</tr>
<tr>
<td>4:15 PM</td>
<td>4:35 PM</td>
<td>0:20</td>
<td>New opportunities for deployment of STEP AP242 capabilities • Capabilities for exchange of PDM “As design” and “As built” product structure and delta change • 3D working instruction • Use case for exchange and LT archiving of Req, V&amp;V information for traceability • Digital thread for 3D MM definition to NC machining and 3D metrology</td>
<td></td>
</tr>
<tr>
<td>4:35 PM</td>
<td>4:50 PM</td>
<td>0:15</td>
<td>Industry use case (SNCF)</td>
<td>SNCF (tbc)</td>
</tr>
<tr>
<td>4:50 PM</td>
<td>5:10 PM</td>
<td>0:20</td>
<td>Digital continuity for end to end design to manufacturing</td>
<td>T. Chevalier (Airbus) (tbc)</td>
</tr>
<tr>
<td>5:10 PM</td>
<td>5:16 PM</td>
<td>0:06</td>
<td>Wrap up and end of the meeting</td>
<td>J. Brangé (AFNeT) &amp; A. Plouga (prostep ivip)</td>
</tr>
</tbody>
</table>

Invitations to be sent by AFNeT and prostep ivip before end of June 2018
LOTAR International project
2018 WBS

WP0: Project Management

WP1: Development of Basic Parts

WP2: Development of Common Process Parts

WP3: Development of Data Domain Specific Parts

WP4: Implementation of Pilot Projects

WP5: Development of LOTAR Rec. Practices

WP6: Harmonization (AIA, ASD, PDES Inc, ProSTEP IVIP, ISO, CAX Impl. Forum, …)

WP7: Communication (FAA, EASA, … IT Vendors, Standardization)

Standardization projects

- STEP AP 242 ed2
- STEP AP239 ed3
- PDM Harmo. AP242 ed2 / AP239 ed3

Implementer Forums

- CAx IF
- PDM IF (xDM IF in preparation)

Essential for the LOTAR PDM WG

Start in S2 2018

New business model in preparation for 2019
LOTAR WG: 3D Mechanical CAD with PMI (EN/NAS 9300-1xx)

**Scope:**
- Exchange and archiving of 3D Geometry via STEP
- Provision of Validation Properties and User Defined Attributes
- Transfer of PMI (Product & Manufacturing Information) as:
  - Representation (machine-consumable, reusable)
  - Graphic Presentation (human-readable)

**Deliverables(*):**
- **Parts:**
  - 100 (Common Concepts)
  - 110 (Explicit 3D Geometry),
  - 115 (CAD Assembly Structure),
  - 120 (PMI Graphic Presentation),
  - 121 (PMI Semantic Representation),
  - 122 (Machining Features),
  - 125 (Assembly PMI Graphic Pres.)
  - 126 (Assembly PMI Semantic Representation)

- Comprehensive suite of test models
- Numerous pilot projects in cooperation with the CAx-IF
- Support of STEP AP242 development and associated Recommended Practices

(*): Accomplished or in work; more planned
LOTAR WG: PDM (EN/NAS 9300-2xx)

Scope:
- Archive and retrieve Product Data Management information in a standard neutral form that can be read and reused throughout the product lifecycle.
- Preservation of digital PDM information along the product lifecycle: in development, as designed, as planned, as delivered and as maintained.

Deliverables(*):
- Part 200 fundamentals & concepts for LTA of PDM data
- Part 210 as designed (ed. 2 incl. effectivities)
- Part 220 as planned (cancelled)
- Part 230 as built (dependency on Part 210)
- Part 240 Product Management Data In-development (including prelim design review, critical design review, FAI, etc.),
- Part 250 Change documentation

(*): Accomplished or in work; more planned
LOTAR WG: Advanced Manufacturing
: Composite Design, Additive Manufacturing, etc
(EN/NAS 9300-3xx)

- **Scope:**
  - Preservation of New information required in STEP data model for Composite design and Additive manufacturing:

- **Organic Shapes and Surface Models**
  - Design Tools –
  - Representation Formats
  - Preservation of CAD 3D tessellated solids
  - 3D composite structures information such as Sequences, Plies, Cores, Material properties, Rosette, Orientation…
  - Preservation of CAD 3D tessellated solids

- **Deliverables(*)**: 
  - Parts 300 (Common Concepts), 310 Ed.1 (“exact implicit” – Ply Definition), 310 Ed.2 (“approximate explicit” – 3D Tess. Solid)
  - Support of STEP AP242 Development and associated Recommended Practices
  - Prototype part developed to anticipate future structures in order to demonstrate concepts
  - Independent tests of CAD tools for the purpose of interoperability

(*): Accomplished or in work; more planned
LOTAR WG: Electric Harness (EN/NAS 9300-4xx)

Scope:
- Preservation of digital electrical harness models for
  - Design
  - Certification
  - Manufacturing
  - Support

Deliverables(*):
- Part 400 (Common Concepts),
- Part 410 (Physical harness definition for design & construction)
- Preparation of test cases for physical electrical harness definition
- Preparation of business requirements and use cases for extension of STEP AP 242 ED2 to include Electrical Harness Data
- Coordination with other standardization projects related to electrical harness
  - STEP AP 210, AP239, VDA VEC, etc.

(*) Accomplished or in work; more planned
LOTAR WG “Engineering Analysis & Simulation” (EN/NAS 9300-5xx)

• Start of the LOTAR working group for “Engineering Analysis and Simulation” in 2014
• Scope: Preservation of Simulation and Analysis information
• Deliverables(*):
  – Parts 600 (Fund. & Concepts),
  – Part 610 “LTA & R. of “Simulation Data Management”
  – Part 620 “LTA & R. of Structural Analysis information”
• Coordination with other standardization projects related to S & A (ISO STEP AP209)
• Scope of ISO STEP AP 209 ed2 “Multi-Disciplinary Analysis and Design”
  • Structural analysis
  • Computational Fluid Dynamic

http://www.ap209.org/

• Start of pilots for exchange / LTA of structural analysis models
• Launch of the CAE IF in Q3 2017, part of the CAx Implementer Forum
• Preparation of a permanent MoU with NAFEMS (USA, Europe)
LOTAR “Engineering Analysis and Simulation” Overview on a page

Why: Business Need
In an environment of rapidly changing software and hardware, a general requirement exists for access to and viability of digitally formatted engineering assets over the life of the product

- Legal drivers
  - Cover certification needs
  - Support litigation
  - Support accident investigations
- Engineering, design & customer support drivers
  - Evaluate changes/improvements
  - Engineer derivatives/conversions
  - Extend payload/range/performance
  - Address customer questions
- Evaluate damage
- Capture knowledge
- Increase business capability

How: Primary Technical Approach
ISO STEP AP209 ed2
“Multi-disciplinary analysis and design”
5, 10, 15, 20, 30,…, or more years

When & What*:
Phase 1 Schedule: 2015-2018
Phase 1 Scope: Vehicle-level model & loads employing linear static FEA

Users & Member companies
Requirements
PDES, Inc., ProSTEP iViP, AFNeT
AP209 ed2 development
CAX-IF & CAE vendors
Translator development & testing
NAFEMS, NIST, more
Additional collaboration

LOTAR International EAS Working Group
Overall project orchestration; User requirements; Test models; LOTAR EAS standard development (NAS/EN 9300-6xx)

*EAS scope is broad. Other analysis types and disciplines to be addressed in subsequent phases
Context:
- PDES MBSE WG has developed a LOTAR NWI related to the long term archiving of Systems Engineering data (LOTAR P5XX family of specifications).
- Business value has been assessed and discussions are on-going with external groups (e.g. INCOSE, NAFEMS).
- The industry is in a phase of transition where many of the traditional documentation deliverables are best represented by models. The development and utilization of data and tool standards is also in transition resulting in widespread variation in how the models are created and preserved.
- This project will accelerate the development of common principles and supporting applications needed for implementation.

Proposed title and scope for the domain:
- Proposed title: Model Based Systems Engineering
- Scope: requirements, verification, validation, simulations, analysis, functional and logical architectures, software, test/qualification data, certification data (open-ended list)
- Identified use cases: see next slide
Application of Standards: To-Be-View

Life Cycle

Requirements

Functional Architecture

Logical Architecture

Logical BOM Specifications

ReqIF

Regulatory
Operational
Market Specific
Performance
Environmental
Design
Suitability
Verification

Functional Analysis
System Behavior
(Intent, State)
Energy Sources
Communications,
Signaling
Operational Services

ICD-Interface Control
Performance Analysis
Loadable SW
Network Config
Network Analysis
Subsystem Integration
Mass Properties

Schematics
Component IDs
Physical
Characteristics

Electrical Definition
Wire Topography
Equipment Centers
Wire Design

Supplier Data Deliverables
SCD Development
Subsystem Definition
Performance Analysis
Component Qualification

ICD Meta Model, Modelica
SysML, AADL, FMI, XMI

OSLC
Ontology

AP239
AP233
MoSSEC

OSLC
Ontology

XMI

AP239
AP233
MoSSEC

ReqIF

ICD Meta Model, Modelica
SysML, AADL, FMI, XMI

OSLC
Ontology

XMI

AP239
AP233
MoSSEC
Access to LOTAR 2017 annual report and to LOTAR Dec. 2017 and 2018 March meeting reports

LOTAR 2018 1st Qtr. Wi Summary

LOTAR 2018 Year-end Report

Version 1.0, 12.14.2017

LOTAR Year-end Report

Version 1.0, 12.14.2017

Annual Report of LOTAR International for 2017

LOTAR is a project group managed under the AIA, AASD-EC, ISCDP, Inc., and its host consortium. The project goal is to develop, test, pilot, publish and maintain standards designed to provide the capacity to access and exchange information, including CAD/DXF, COMSOL, HFC, Electric, Engineers Mathematics and Analysis, and 3D visualization data. A standard form that can be read and used by multiple software tools and programmed to interface and automatically transfer changes into other tools is easily and efficiently used for the creation. The multi-platform content covers the information content as the processes required to ingest, store, publish, manage and access the information is published as EN1930 9502.

Tasks

- Developing a standard and a standard for archival and retrieval of product technical data.
- Standardization of methods, process modules and data models.
- Providing process, modules, process models and data models to enable long-term archiving and retrieval of 3D CAD with PHP, POM, 3D Composite Design, Electric, Engineers Mathematics and Analysis, and 3D Visualization and other types of data.
- Development of recommendations for practices for long-term archiving of relevant data in the industry.
- Development of business/industry/standard solution based on user requirements by close cooperation with the CAFxP and the sponsored pilot project.

Milestones 2017

- The Basic and Common Parts team continued and submitted Parts 02/03 T & references and P20627 "Governance and Planning" for their initial two-month task.
- The 3D Mechanical & Pilot WP completed three proof of concept prototypes (POC) through the CAE Interactive. "CAE3D Interact." This activity completes P2020 "Bentham Archiving & Retrieval of 3D CAD with Geometry and Surface Viewpoint" and P2020 "Competence, Competence in 3D CAD with Geometry and Surface Viewpoint".
- Initial work on the related extensions of Step 2020, completing the task that was initiated for D01 publication. A new activity was started to define requirements, processed and recommended practices for houses and partners. This activity will produce Part 13 "Electronic Engineering Design, Specifications & Concept of LTA Information Information," which will be published as a D01 publication. The D01 draft was published on May 11, 2018.
- Preparation of the final report to complete the project.
- Completion of the final report for the project.
- Preparation of the final report for the project.
- Completion of the final report for the project.

LOTAR 2018 2nd Qtr. Wi Summary

LOTAR 2018 Year-end Report

Version 1.0, 12.14.2017

LOTAR Year-end Report

Version 1.0, 12.14.2017

Annual Report of LOTAR International for 2017

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Tasks

- Developing a standard and a standard for archival and retrieval of product technical data.
- Standardization of methods, process modules and data models.
- Providing process, modules, process models and data models to enable long-term archiving and retrieval of 3D CAD with PHP, POM, 3D Composite Design, Electric, Engineers Mathematics and Analysis, and 3D Visualization and other types of data.
- Development of recommendations for practices for long-term archiving of relevant data in the industry.
- Development of business/industry/standard solution based on user requirements by close cooperation with the CAFxP and the sponsored pilot project.

Milestones 2017

- The Basic and Common Parts team continued and submitted Parts 02/03 T & references and P20627 "Governance and Planning" for their initial two-month task.
- The 3D Mechanical & Pilot WP completed three proof of concept prototypes (POC) through the CAE Interactive. "CAE3D Interact." This activity completes P2020 "Bentham Archiving & Retrieval of 3D CAD with Geometry and Surface Viewpoint" and P2020 "Competence, Competence in 3D CAD with Geometry and Surface Viewpoint".
- Initial work on the related extensions of Step 2020, completing the task that was initiated for D01 publication. A new activity was started to define requirements, processed and recommended practices for houses and partners. This activity will produce Part 13 "Electronic Engineering Design, Specifications & Concept of LTA Information Information," which will be published as a D01 publication. The D01 draft was published on May 11, 2018.
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LOTAR 2018 3rd Qtr. Wi Summary

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Overview of 2018 activities

- **Preparation of the ballots:** P300 and 310 for composite design, part 500 and 520 for Structural Analysis

- **Publication of several parts of the LOTAR standard in 2018:** P7 ed3, P20, P120 ed2, P121, 125

- **Mechanical & PMI WG:** will cover LT Archiving of 3D PMI semantic data as well as assembly-related information, will prepare new parts for 3D definitions to include machining features, will continue to monitor the progress of AP242 works for holes and fasteners, with the start of a pilot in S1 2018.

- **PDM WG:** restart of the WG dependent on the progress of development of AP239 ed3 and of its harmonization with AP242 ed2. Planned restart of the meta data WG; continuation of contributions to the PDM-IF.

- **Composites workgroup** will finish the Part 300 “Fundamental concepts”, and the part 310, to be sent for ballot before end of 2018. Work on validation properties, and conduct pilots in this domain.

- **Electric Harness WG:** will prepare the draft part 400: “Fundamental & concepts” and part 410 ”Physical Elec. Harness for design & construction”. Continuation of the spec. of validation properties, will provide public test cases for the AP242 ed2 pilot project. Support to the launch of the Electrical Implementer Forum in S2 2018 / 2019

- **EAS group:** will draft the 1st standard parts 600 and 620 for this domain, and also support broader testing of STEP AP209 ed2 CAE interfaces, first in LOTAR pilot, then in the CAE Implementor Forum. Finalization of the LOTAR EAS MoU with PDES Inc, AFNeT, prostep iViP and NAFEMS.

- **Prep. of the start of the MBSE WG:** sending of the New Work Item for creation of the MBSE WG in Apr. 2018; expected answer for the June LOTAR meeting