AFNeT – prostep ivip STEP AP242 Day

Electrical Wiring Harness interoperability capabilities

27th of November 2019

Airbus, Hamburg

Presentation by Sophie Hérail (CIMPA subcontractor for AIRBUS)
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Business values for Electrical Harness interoperability

- New aerospace product increasingly include complex electrical system and harnesses.
- There was no international standard available for electrical harness information interoperability.
- With STEP AP242 ed2, the goal is to ensure the availability of interoperability functionality for the electrical harnesses and wiring systems in the following areas:
  - **Interoperability** between functional and physical harness design
  - **Long term archiving and retrieval** of physical harness for: Certification, Support in operation, Reuse.
  - Ease downstream process in the **extended enterprise**,
  - **Migration** of legacy data to new electrical harness systems,
  - Support interoperability of **multi-discipline model-based design**.

More and more electrical systems in aerospace products
Electrical design information flow:
Examples of different applications involved

Lot of electrical harness disciplines using different tools that need to interoperate
STEP AP242 ed2 for Electrical Harness interoperability

Overview & target

- CAD 3D Elec. harness design exchange in the EE
- Conversion for 3D light Visualization
- Preliminary inst. Design
- 3D Electrical Harness design definition with semantic
- Functional definition
- Elec. Harness L-T Archiving & Retrieval
- Simulation
- 3D Elec harness Test & Manufacturing
- Conversion for 3D light Visualization
- Heterogeneous COTS applications
Introduction – Scope of STEP AP242 ed2

Scope:
- Physical electrical harness model for design & construction,
- Electrical functional connectivity information (wire list)

Main extension of STEP AP242 ed2: Electrical Wiring Harness design

STEP AP242 ed2 for Electrical Harness – Scope of edition 2

Electrical harness design (2D, 3D...)

Connectivity information: Wire List...

Formboard

Electrical devices: connectors, backshelves, splices, braid, wrap, terminals...

Scope: focus on physical electrical harness (topology, wires, lengths, protections...
5 Years roadmap for Electrical Harness interoperability based on STEP AP242 editions

- STEP AP242 ed2 DIS-2 successfully balloted beg. of October => planned to be an International standard in Q1 2020.
- Launch of the PDES Inc. – AFNet EWIS Interoperability Forum in April 2019
- 2020: preparation of the AP242 ed3 White Paper

### 5 years roadmap for LTA&R of Electrical Harness

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**CD**: Committee Draft  
**DIS**: Draft  
**IS**: International Standard  
**D2**: DIS 2

**AP242 ed2 planned to be an International Standard in S1 2020**
Domain Model overview of AP242 ed2 Electrical Harness model

- **Routing & protection information**
- **Equipotential & physical connection**

**Wire list & Part List**

**CrossSectionalPart ShapeElement**
- **CrossSectionalGroup ShapeElement**
- **CrossSectionalAlternative ShapeElement**

**Part Connectivity Definition**
- **AssemblyShape joint**
- **AssemblyShape joint item relationship**

**Joint types:**
- bolted_connection
- circular_compressed_crimped_connection
- crimped_connection
- glued_connection
- screwed_connection

**Harness Assembly**
- **F/P/V/Wiring Harness Assembly Design**

**NextAssembly OccurrenceUsage**
- **Assembly structure**

**Routing & Protection Information**

**Equipotential & Physical Connection**

**Wire list & Part List**

**Harness Assembly**
- **F/P/V/Wiring Harness Assembly Design**

**Routing & Protection Information**

**Equipotential & Physical Connection**

**Wire list & Part List**
The Electrical Harness Domain Model Technical Capability is consistent with other domain in the scope of AP242 ed2 (PDM, Kinematic, composite, PMI...) & covers Wiring Harness design information to manufacture the harness.

**STEP AP242 ed2 = Integrated model across several domains**
Overview of the STEP AP242 ed2 Electrical Harness tutorial V2

Version 2 of the tutorial available to help vendors to implement Electrical Domain Model capability => basis of future recommended practices

Tutorial as the basis for future recommended practices of CAx IF “Electrical” WG
Two LOTAR pilots based on STEP AP242 ed2 from 2016 to 2019

CATIA V5 ⇒ STEP AP242 ed2

UG-NX ⇒ STEP AP242 ed2

**Goal:** check and improve STEP AP242 ed2 data model (scope, perimeter…)

**LOTAR Electrical Harness Support**
- New XSD
- Import/Export Electrical Harness data
- New concept to integrate

- Work in collaboration with Lotar Electrical Harness WorkGroup

**Pilot: Electrical Harness (UG-NX to AP242 BO XML)**

**Summary - Frame of the pilot**
- Started on end 2016
- Based on schema, tutorial, example, of LOTAR work-group ad hoc
- And LOTAR test case, modelled with UG-NX
- To propose & implement a mapping; to identify issues, limitations, drawbacks, if any
- To check which validation properties can apply

- Working on harness assembly designed with UG-NX, including harness and terminal components with connectivities
Dassault Systemes plans to support AP242 ed2 for electrical harness (started in 2019)
Launch of the EWIS-IF in 2019 with a 1st test round started in September 2019

Website:
http://www.cax-if.eu/ewis/ewis_introduction.php

- **16 April 2019**: Launch of the EWIS-IF User Group
- **25 June**: Presentation to electrical vendors
- **28 August**: 1st AP242 ed2 electrical harness training session done to vendors
- **12 Sept.**: Launch of the EWIS-IF Impl. Group
  And start of the 1st test round
The objectives of the EWIS (Electrical Wiring Interconnection System) Interoperability Forum are to speed up the development of Electrical wiring harness information data interfaces based on ISO 10303 AP242 ed2.

The EWIS-IF is composed of industries representatives (the users) and electrical tools providers (the implementers) that will work together to improve STEP AP242 ed2 electrical translator quality and decrease translator time-to-market.
EWIS Interoperability Forum status: Launch of the 1st test round in Sept. 2019

Functionalities tested in this round relates to:

- **Electrical Harness assembly structure & BoM:**
  - Electrical parts (wire, cable, connector, lug...)
  - Electrical Harness assembly
  - Electrical part occurrences

- **Electrical Harness topology (simple)**
  - Branches and nodes

**Participants**

**Users**
- Gulfstream
- Airbus Group
- Boeing
- Safran Electrical Power
- Fokker Elmo

**Electrical vendors**
- EMCos
- CoreTechnologie
- Datakit
  *Planned or in progress*
- Dassault Systemes
- Siemens PLM
- Aucotec

1st test round started in September with 5 industries and 3 vendors involved
EWIS-IF 2019/2020 Planning

- Physical meetings in parallel of the CAx-IF meetings
- The 1st test round of the EWIS-IF has started in September 2019
- Results of the 1st test round expected to be presented in March 2020, in Toulouse
- 2 Test Rounds are planned in 2020

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Face to Face meeting: ▼ - Kickoff conflcal: ▲ - Confcals: ●

2020: results of the 1st test round (March) & next test rounds
Preparation of the requirements and scope for AP242 ed3

STEP AP242 edition3 project is in preparation, planned to be launched in S2 2019.

Some potential extensions have already been identified for electrical domain:

- Equipotential / signal concepts
  - Link to electrical harness simulation (e.g. voltage drop, etc.)
- Functional information: logical link, function, net...
- EWIS requirements, safety rules,...
- Electrical libraries
- Optical fibre specificities
- Manufacturing process (form board, equipment list, wire list),

Some potential extensions already identified: industries to provide their needs!
Summary – next actions

- AP242 ed2 publication as an International Standard in 2020

- EWIS-IF 2020 plans
  - Identification of 2020 priorities of implementation of STEP AP242 ed2 Elec. Harness interfaces through the definition of use cases & test cases
  - Running of the test rounds planned in 2020 according to Users priorities
  - Strengthen Elec. Harness software editors involvement in the implementer group: Dassault Systèmes, Siemens (tbc)

- Prepare the white paper of AP242 ed3 to extend the scope of wiring harness interoperability according to priorities and level of support of the industries
THANKS FOR YOUR ATTENTION

Sophie Hérail
CIMPA (subcontractor of AIRBUS)