JT and VEC: Open Standards as Enablers for Upcoming Harness Engineering Use Cases

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prostep JT Day | Wolfsburg | 05.11.2018
# Challenges

## Complexity / Variant Management

Growing amount of theoretical possible variants for harness wiring (German market)

<table>
<thead>
<tr>
<th></th>
<th>Golf 1</th>
<th>Golf 2</th>
<th>Golf 3</th>
<th>Golf 4</th>
<th>Golf 5</th>
<th>Golf 6</th>
<th>Golf 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>462</td>
<td>679,552</td>
<td>~16,3 m</td>
<td>~9 bn</td>
<td>~16 bn</td>
<td>~63,7 bn</td>
<td>~425 bn</td>
</tr>
</tbody>
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prostep JT Day, Wolfsburg
Challenges
Handling

Paper size: 12,39 m x 1,682 m

Assembly line with formboards (Sumitomo Electric Bordnetze SE)
Challenges
Configurability

180% representation

100% representation, vehicle-specific

The 3D design data comprises all geometric variants and has to be refined for every vehicle configuration (Lamando)
New Challenges

Automated Driving & Parking
• Safeguarding functions
• Focus on functional safety

Electrification
• Electromagnetic compatibility
• Fuse plan for high-voltage systems

Digitalization
• Virtual prototype-based development
• Virtual validation & simulation
• Mixed Reality use cases
System Landscape
VOBES – Volkswagen Electric System Development Process (simplified)

Data format VEC

EBCA

ELENA

LDorado + DiÄD

Data format JT

CATIA V5-6 + DMU

PDM

Drawing

VEC Vehicle Electric Container
JT Jupiter Tessellation

electric42
System Landscape
Analysis of JT data shown by DMU viewing tool

- The 3D model design is based on the circuit diagram and package space
- The JT does not contain electrological information
- For evaluation purposes the 2D drawing has to be considered
Targets to enhance the current System Landscape

Supporting the design process

- 3D visualization in the VOBES tool chain
- Search and visualization of all technical objects of the electrical system
- Filtering of variants
- Representation of the routing in the design context

Supporting the data supply chain

- 100% representation supplied by the PDM system, e.g. for pre-production center or digital mock-up and validation

180% design data

Customer 1
Customer 2
Customer 3
Solution scope

Constraints

• Management of 3D wiring harness data for validation and downstream processes in the PDM system
• JT-based viewing of vehicle design context
• Usage of VEC data format in VOBES
• Integration in central conversion services at VOLKSWAGEN

Out of scope

• Development of a variant condition configurator
• Change of the data, e.g. design changes
Approach

Visualization of different processes

• Definition of a simple, neutral meta description for product structures
• Definition of an interface between product structure information and JT visualization

Converter

• Conversion of the complete VEC description of the wiring harness into a JT with embedded VEC description
• Selection of subsets possible

Viewer

• Additional navigation by graphical user interface for a JT viewer to manage the selection of objects to be visualized
• Filtering for 100% configurations possible
• Routing can be highlighted
3D viewer for electrological objects
Highlighting single objects

Search objects
Display meta information
Display referenced objects
Highlight selected objects
3D viewer for electrological objects
Highlighting of referenced objects
Use cases

Customer-oriented data
Configurable harness wiring data and specific 100% data for pre-production center, digital mock-up and validation

Package analysis
Analysis of the electrical system considering electrological aspects within the package context, e.g. electromagnetic compatibility

Offline information
User assistance during summer and winter road tests. Assistance in troubleshooting, e.g. after-sales service
Summary

Use cases where the geometric position of the electrological function is relevant can be reviewed in context of the vehicle geometry.

JT
The requirement to use the possibility of visualization/analysis in a PDM/DMU viewer environment leads to the selection of the JT format published by ISO 14306:2012.

VEC
The electrical system is described in VEC format published by VDA 4968.

The interface of VEC and JT data format forms the added value for designers and customers of wiring harness data.