Virtual Machine Model (VMM)

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Motivation

Introduction of AUDI departments

JT use cases in production planning
- Our main use cases
- Use case: Supplier integration - Machine model exchange

Virtual Machine Model
- Data formats
- Layers: Data format, Data model, Process

Conclusion
Our Motivation for the Project Virtual Machine Model (VMM)

**Awareness**
- Increase the awareness in production area for standard process formats like JT and STEP AP242 (XML)

**Neutral Formats**
- Usage of neutral data formats instead of proprietary formats
- High availability of engineering data for longterm usage
- Ensuring the data supply for a heterogenous system environment

**Data Exchange**
- Strengthen the data exchange between OEM and supplier
We plan, build and run as DevOps client & server applications for the product process. Therefore we support the DMU teams and use cases for geometry, functions and features by boosting the processes, methods and tools.

**Lifecycle Management**
Supporting operations of DMU IT tools, 3D-Viewing, design tool integrated simulation and virtual development

**Consulting**
First contact for AUDI R&D departments for geometric validation. Participation in K-PDM project e.g. CF6 DMU.

**Projects**
Software development and enhancement of IT tools and processes for geometric and functional validation based on virtual technologies.

**3rd Level Support**
Securing the support for the DMU applications in addition to AMS inclusive licensing.
We develop, plan and implement innovative, economical and sustainable productions of powertrain systems, chassis and structural parts for the Audi AG and the entire VW Group.
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<th>Planning phase</th>
<th>Commissioning phase</th>
<th>Production phase</th>
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- **Product cycle:** 5-7 years
- **Machine lifetime:** ~20 years

JT use cases in production planning
Use case: Supplier integration - Machine model exchange

Geometry
Kinematics
Fluidic
Electric
Control
Dynamics

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JT use cases in production planning
Use case: Supplier integration - Machine model exchange
JT use cases in production planning
Use case: Supplier integration - Machine model exchange

Evaluation ➔ Sheet of specification ➔ Proof of Concept ➔ Extension to further use case ➔ Standardization

Mountability

Design review
Virtual Machine Model
Data formats

**Project Goals**
- Usage of standardized and open process formats
- Overview of neutral process formats for necessary use cases
- Securing supply of production applications with required data

**Process Formats**
- Focus on visualization of geometry
- Usage in CAx tools with highly automated processing of contents
- **Examples:** JT; IGES; STEP AP 214, 242; etc.

**Structure Formats**
- Life cycle long transport of process specific structure and meta data
- No mandatory geometry fixation, but addition through geometry possible
- **Examples:** STEP AP 242 (XML); CAEX etc.

**Combination of structure and process formats**
- Isolation of structure and meta data of geometry information
- Reason for partitioning of information: direct administration of structure and meta data in PDM system while geometry will be referenced.
Virtual Machine Model
Layers: Data format, Data model, Process

Different layers for an integrated view

Data format layer
- Geometry
- Kinematics
- Fluidic
- Electric
- Control
- Dynamics

Data model layer
- Part
- Rev
- Attributes
- Electric
- Geometry
- Assembly
- Process
- Application

Process layer
- Application
- Process
- Process
- Process

Data format layer:
- STEP AP 214
- JT
- IGES
- STEP AP 242
- Collada
- STEP AP 2110
- STEP AP 212
- PLCOOpen
- MathML
- FMI
- CAEX
- STEP AP242 XML

Data model layer:
- Part
- Rev
- Attributes
- Part Rev
- Data
- Electric
- Geometry
- Assembly
- Process
- Application
Conclusion

MOTIVATION

- Independence from proprietary formats and programs
- Support of different use cases alongside the whole planning process

STATUS

- Evaluation and deployment in realization projects
- Geometry: JT and STEP AP214/242 in sheet of specifications

OUTLOOK

- Analysis and recommendation of standard formats for the different domains & use cases in evaluation
- Concept for data model
Thank you very much for your attention!

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