Bridging the Gap Between Testing, Design & Simulations through ICME Materials Data Management

Presented by: Nicolas Jalbert
ICME Context
What is MaterialCenter?

✓ A software solution for material data management across the enterprise

Easy access to single source in-house materials

Full traceability and pedigree across tests, design, materials, CAE

Connections to CAD, CAE and PLM
MaterialCenter Value Proposition

**Ensure consistency**
- Design
  - Access to centralized design & material specs, globally
  - Integration with Catia, NX, and Creo for part assignments

**Ensure quality**
- Simulation
  - Manage all CAE models & export to any solver
  - Integration with Patran, Ansys, Abaqus, HM, ANSA

**Ensure traceability**
- Manufacturing
  - Manage and trace complex manufacturing processes
  - AM: Builds, machines, parts, tests, powders

**Save data, time & money**
- M&P
  - Capture all test data for any materials:
  - Tensile, Fatigue, Creep, NDT...
  - Metals, Composites, Polymers...

- Analyze, plot and optimize
- Compare and export
- Approval process
Material risk → Material strategy

- Test data
- Virtual data
- Analysis data
- Design specifications
- Corporate standard materials
- Complete material and process tracking
- Additive Manufacturing
- RTM, molding, casting
- CAS and Compositions
- Compliance check
- ROHS, REACH
- Access control
- Version control
- Simulation models
- ICME support
- FEA export
- Access, search, compare, export
- Single source
- ✓ Complete material and process tracking
- ✓ Additive Manufacturing
- ✓ RTM, molding, casting
- ✓ CAS and Compositions
- ✓ Compliance check
- ✓ ROHS, REACH
- ✓ Access control
- ✓ Version control
- ✓ Simulation models
- ✓ ICME support
- ✓ FEA export
- ✓ Access, search, compare, export
- ✓ Single source
- Web application
- ✓ Complete material and process tracking
- ✓ Additive Manufacturing
- ✓ RTM, molding, casting
- ✓ CAS and Compositions
- ✓ Compliance check
- ✓ ROHS, REACH
- ✓ Access control
- ✓ Version control
- ✓ Simulation models
- ✓ ICME support
- ✓ FEA export
- ✓ Access, search, compare, export
- ✓ Single source
- Web application
What is the cost?

Data loss and breach, on average $4 Million/year*

1.8 hours per day is spent searching for information*

Inefficient R&D, increased time to market

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Costly product failures

Incorrect simulations → Incorrect predictions → Incorrect design

Million dollar fines and imprisonment

Material failure is root cause of many medical device recalls

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Reference Data from Commercial Vendors

- **Site License – Unlimited Usage**

- MMPDS Aerospace Metals
- ASM Handbook
- MIL-HDBK-17 Composites
- JAHM Temperature Dependent
- NCAMP Polymer Matrix Composites
- PMC90 Polymer Matrix Composites

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**Coming up – July 2020**

- Senvol – Polymer and Metal Additive Manufacturing
The MaterialCenter Offer

**Software**
- MaterialCenter server
- MaterialCenter concurrent licenses
- Excel, CAD & CAE plugins licenses
- Price Models:
  - Lease
  - Paid-up
  - MSC One tokens

**Services**
- Technical expertise and user training
- Tailored configuration to customer’s requirements
- External tools, excel import templates, CAE cards…

**Reference data**
- Unlimited use
- Databases available:
  - MMPDS
  - JAHM
  - MIL-HDBK
  - NCAMP
  - ASM
  - PMC90
  - Senvol
Automotive Use-Cases
How can you reduce data loss in your company and quickly share information in a secure manner?
A day in the life of an automotive engineer, from test data to CAE

1. Import, store and retrieve test & design data
   - Import material records
   - Retrieve data in MaterialCenter
   - Traceability
   - Compare test records
   - Analysis via plotting tools

Generate CAE material cards & direct retrieval in target solver interface
- Lookup candidate materials in MC
- Generate material cards
- Retrieve directly in Abaqus interface
- Compatibility with CAD/CAE software

Ensure material data is good for use with compliance checks
- Import composition & chemistry data
- Perform cross-checks with compliance tool
- Validate for use

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Key takeaway – Part 1

1.8 hours per day is spent searching for information*

Find your data in minutes

Data loss and breach, on average $4 Million/year*

Safe and centralized repository for all your data
How can engineers get access to reliable high-quality approved data to ensure accurate analysis?
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3. Ensure material data is good for use with compliance checks
   - Import composition & chemistry data
   - Perform cross-checks with compliance tool
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iPoint

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Simulation Environment for Automotive

**Safety/ Crash**
- LS-Dyna
  - MAT24, MAT48, MAT240, MAT75, MAT83
- Radioss
  - LAW27, LAW29, LAW36, LAW33, LAW42, LAW70

**Chassis**
- LS-Dyna
  - MAT24, MAT89
- Abaqus
  - Elastic Plastic

**Powertrain**
- Abaqus
  - Isotropic, Isotropic Strain
- Nastran
  - Isotropic, Isotropic Strain

**Thermal Analysis**
- TAI Therm
- Fluent

**Stamping**
- LS Dyna
- Autoform
- Simufact Forming

**Materials Engineering**
- Manage Test Data
- Design Specifications and Minimum Values
- Workflows, Approval for new test data
Key takeaway – Part 2

Incorrect simulations → Incorrect predictions → Incorrect design

Accurate simulations with high quality material data

Automatic mat. Card generation, retrievable in solvers’ interface
How can I ensure my materials are always compliant with the latest international norms?
A day in the life of an automotive engineer, from test data to CAE

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3. Ensure material data is good for use with compliance checks

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iPoint
Complete Compliance Management Package

1. Create single materials & compliance source
   ✓ Secure, internal web app
   ✓ Complete traceability
   ✓ Access & version control

2. Run instant compliance checks
   ✓ Always latest information:
     ✓ REACH, RoHS, SVHC
     ✓ LCA / GHG Emission Data
     ✓ Recycled Content

3. Latest material compliance status and properties for entire organization
<table>
<thead>
<tr>
<th>Material Type</th>
<th>Class</th>
<th>Sub Class</th>
<th>Design</th>
<th>Form</th>
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**Import compliance data**
Key takeaway – Part 3

Million dollar fines and imprisonment

Accurate and repeated data cross-checks, against up to date references
Discussion
### MaterialCenter Value Proposition

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