A MODULAR SIMULATION PROCESS AND DATA MANAGEMENT SOLUTION USING HYPERWORKS, MODELCENTER AND SIMDATA MANAGER

Presented by:
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ACKNOWLEDGMENT

Work developed and originally presented by:

- Ilya Tolchinsky – Phoenix Integration
- Albrecht Pfaff – PDTec
- Jean-Baptiste Mouillet – Altair Engineering

- Webinar: www.altairhyperworks.com

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AGENDA

- Introduction
- Altair HyperWorks
- ModelCenter
- SimData Manager
- Workflow demonstration
- Conclusion

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INTRODUCTION

Altair Partner Alliance Synergy

HyperWorks	• CAE simulation platform • Modeling and Visualization • Multiphysics Solver Technology
ModelCenter	• Advanced Process Integration • Design Space Exploration • Supports CAD parametrization
SimData Manager	• Simulation Data Management • Traceability

Altair

PHOENIX® INTEGRATION

PIDITec.

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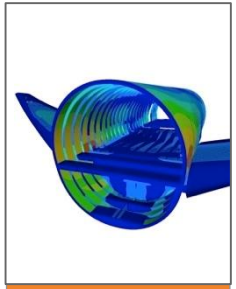
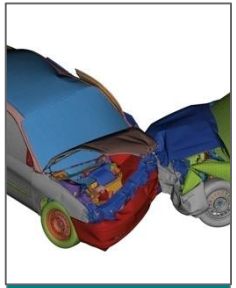
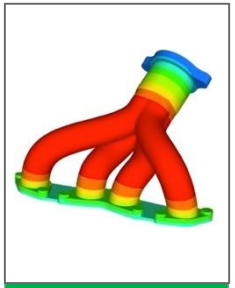
ALTAIR SOLVER TECHNOLOGY



Structural Analysis

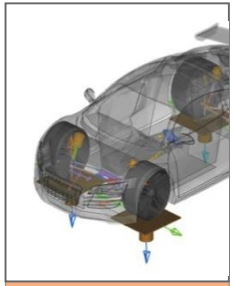


Crash, Safety, Impact & Blast

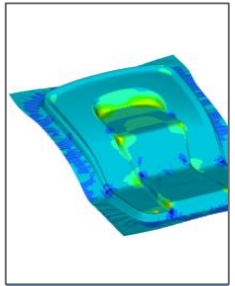


Thermal Analysis

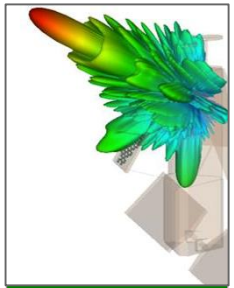
Fluid Dynamics



Systems Simulation



Manufacturing Simulation



Electro-Magnetics

Multiphysics Analysis and Optimization

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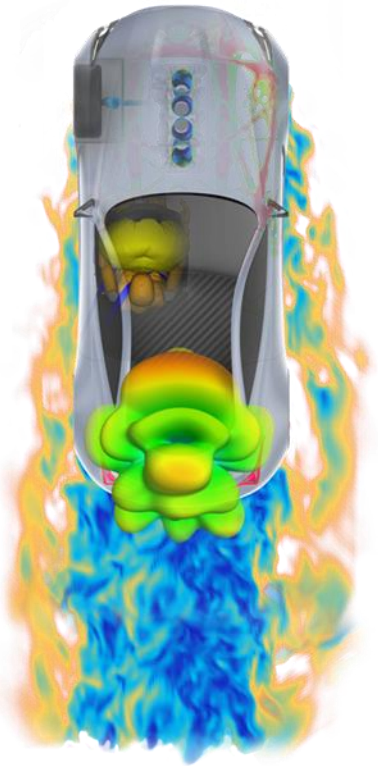
MULTIPHYSICS AND MULTI-DISCIPLINARY DESIGN

Most design processes need to take into account multiple physics

- Example: Cars
  - Structure (Vibration/ Crash/ Fatigue…)
  - CFD (Aeroacoustics/ Aerodynamic Characteristics)
  - High Frequency EM (Adas)
  - Low Frequency EM (Motors)
  - Electric Engines/ Batteries (E-mobility)

Physics Interact :

- Directly: Multiphysics
- Indirectly: Conflicting Requirements
  - Shared Design Variables
  - Optimization to find good compromises



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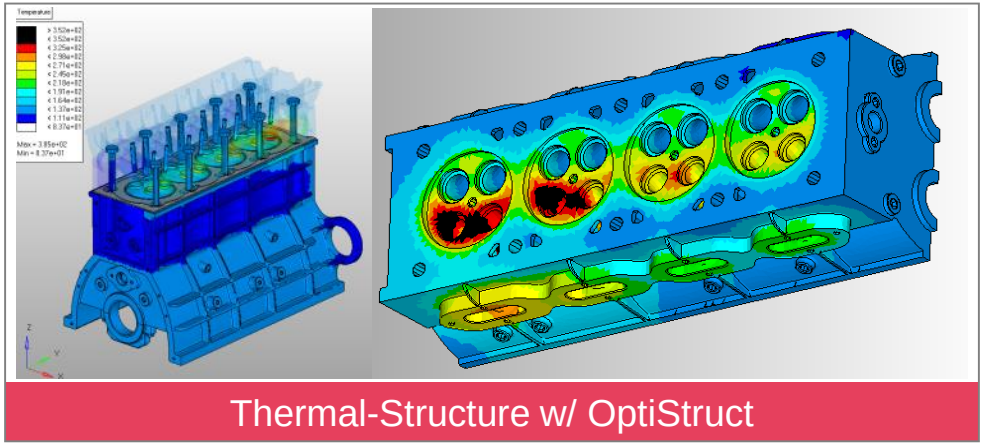
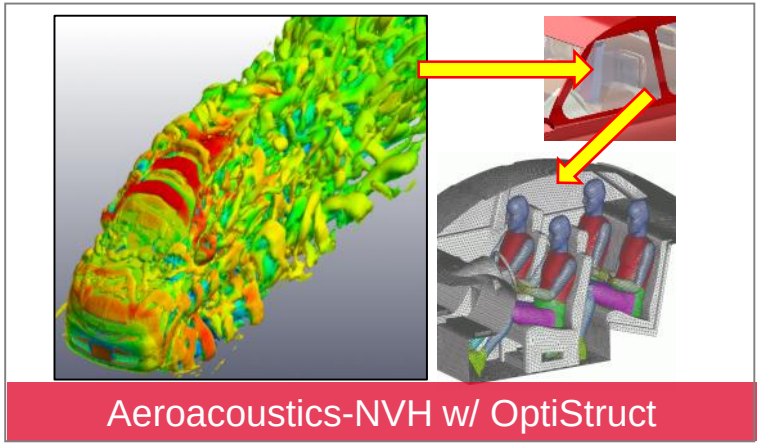
MULTI-PHYSICS SOLUTIONS: COUPLING

- Sequential Coupling (Applied initial and boundary conditions)
- Modal Coupling (Component Mode Synthesis)
- Direct Coupling (Co-Simulation)



Thermal-Structure w/ OptiStruct



Aeroacoustics-NVH w/ OptiStruct

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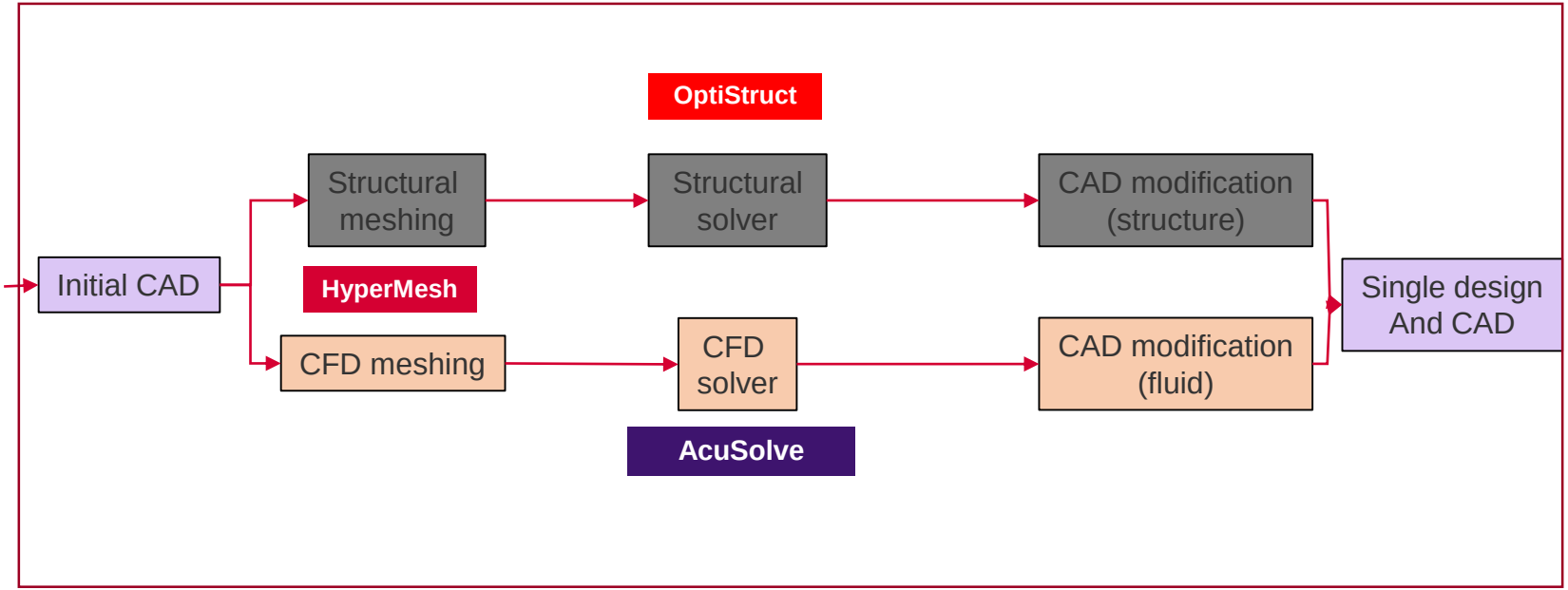
MULTIPHYSICS AND MULTI-DISCIPLINARY DESIGN



(Share design variables between physics)

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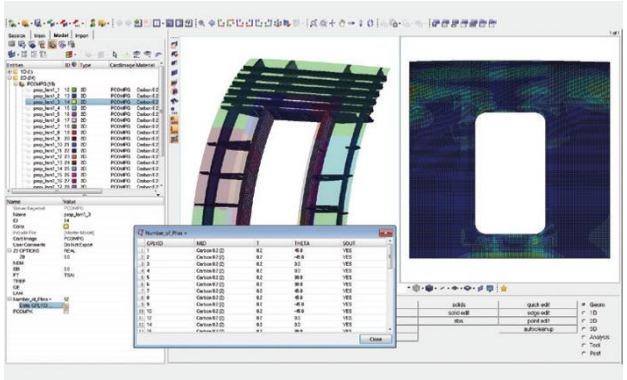
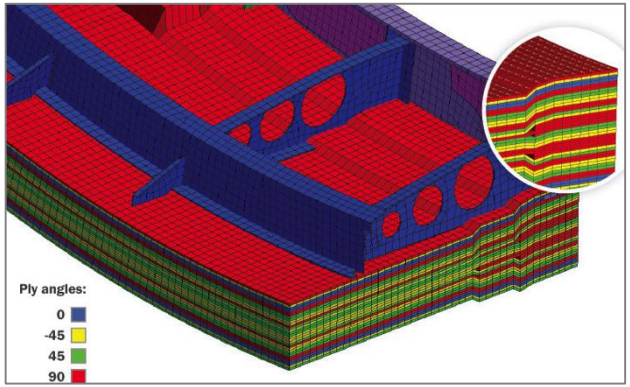
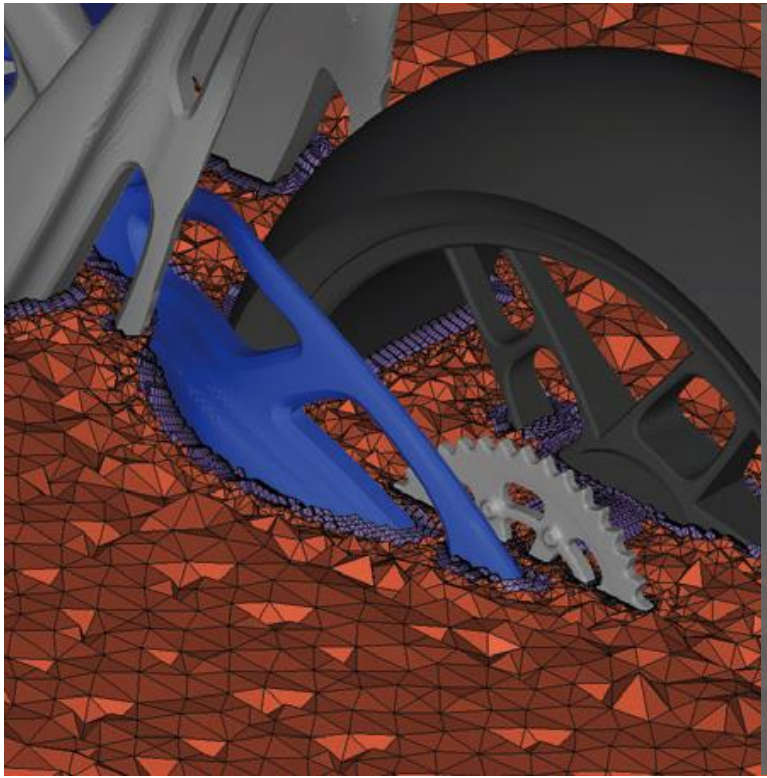
HYPERMESH







Altair HyperMesh is a high-performance finite-element pre-processor that provides a highly interactive and visual environment to analyse product design performance.

With the broadest set of direct interfaces to commercial CAD and CAE systems and a rich suite of easy-to-use tools to build and edit CAE models, HyperMesh provides a proven, consistent analysis platform for the entire enterprise.

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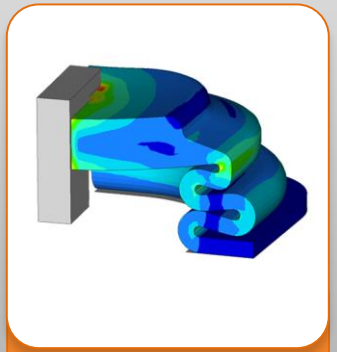
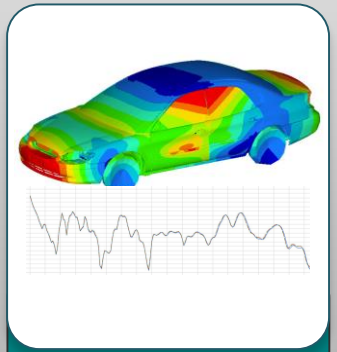
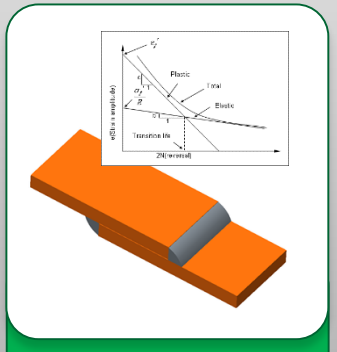
OPTISTRUCT



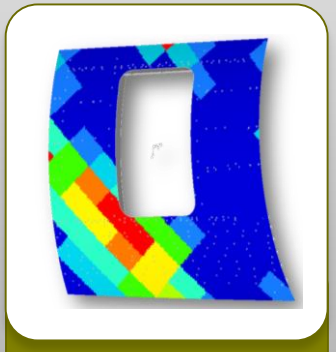
Statics and Dynamics



Vibrations and Acoustics



Durability and Fatigue



Materials and Manufacturability

Multiphysics

Optimization

Large Scale Computing and Parallelization

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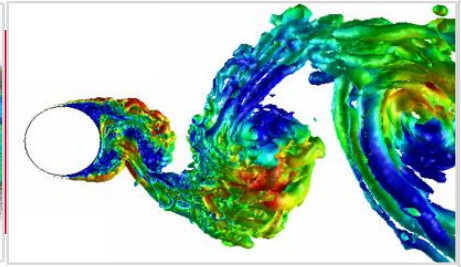
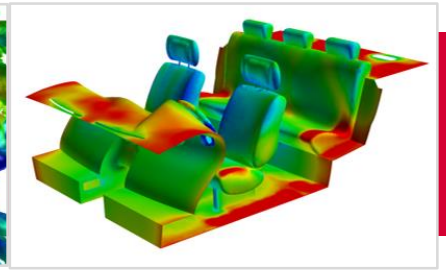
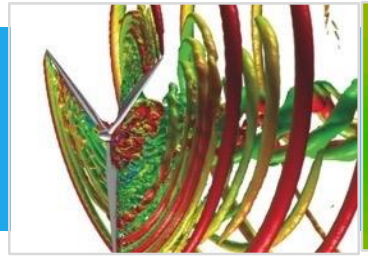
ACUSOLVE

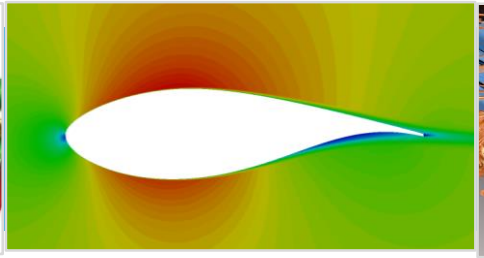


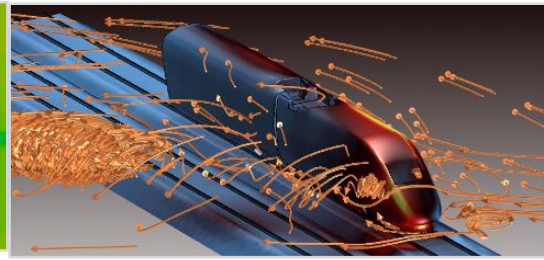


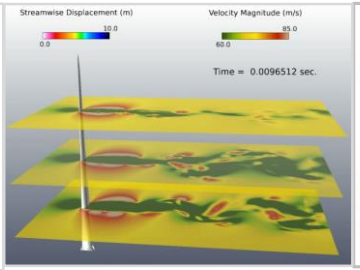
Speed

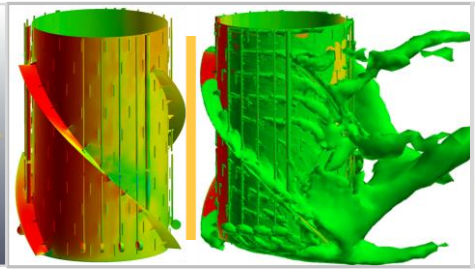
Accuracy

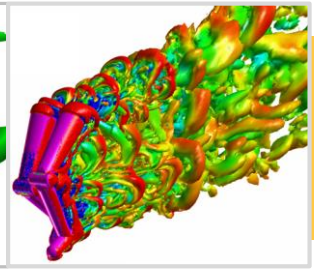












Robustness

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ModelCenter® Integrate

DRIVES PRODUCTIVITY

Accurately execute more simulations in less time, with fewer resources »

ModelCenter® Explore

DRIVES INNOVATION

Understand the design space, make better decisions, and find optimal solutions »

ModelCenter® MBSEPak

ENABLES MBSE

Integrate your SysML architectural model with engineering analysis tools »

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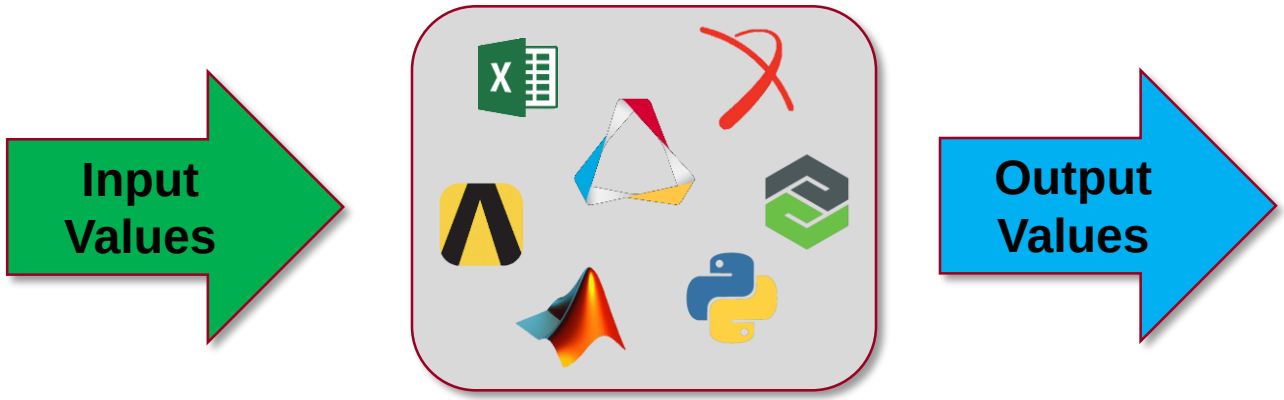
AUTOMATE ANY SOFTWARE TOOL



- Automate any software tool
- Vendor neutral

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MODELCENTER

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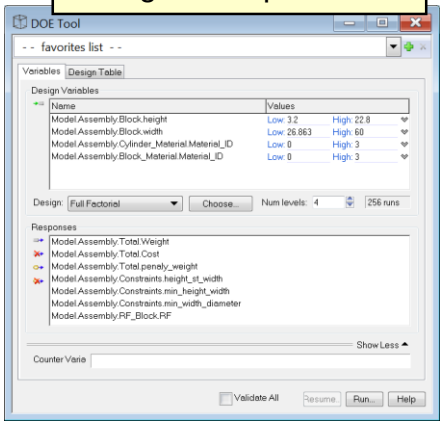
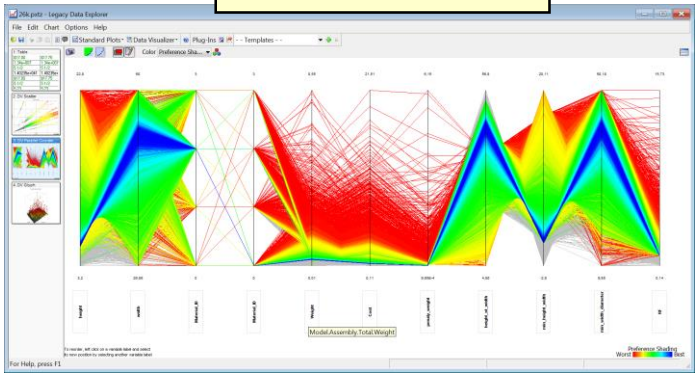
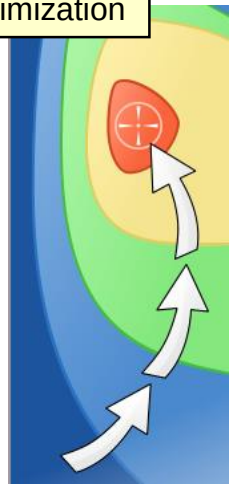
Design Of Experiments



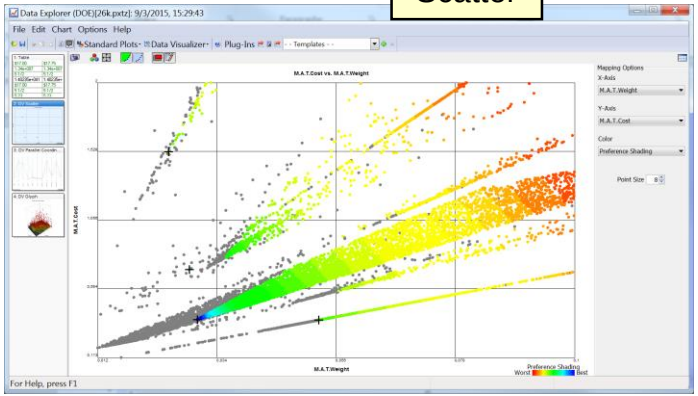
Parallel Coordinates



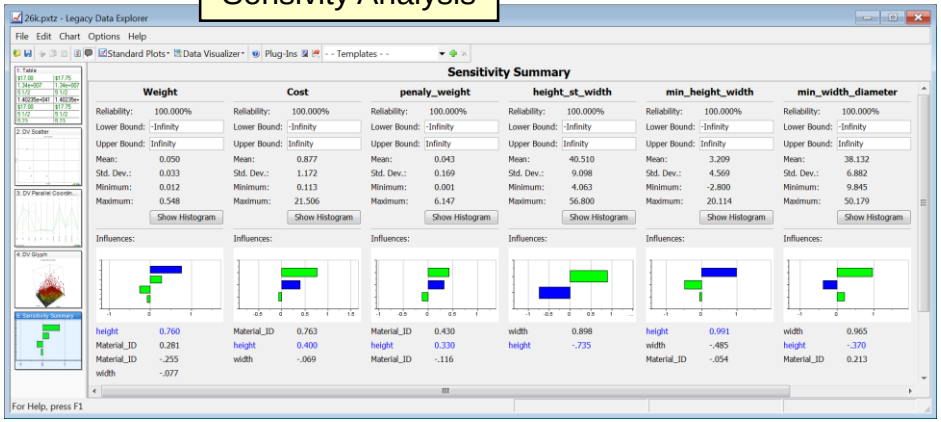
Optimization



Scatter



Sensivity Analysis



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PDTEC

- ✓ MANAGE the constantly increasing CAE data in a structured (IT) environment
- ✓ SHARE CAE data across multiple teams, disciplines, locations, suppliers,…
- ✓ LINK CAD & CAE data for simultaneous development
- ✓ MAP CAD models to CAE assemblies
- ✓ RE-USE FE-models, minimize redundancy
- ✓ TRACK and trace the CAE data, simulation results, variants, versions,…
- ✓ AUTOMATE simulation process (e.g. reporting)

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PDTEC

- ✓ CAPTURE the knowledge of simulations
- ✓ KEEP simulation results accessible (compliance)
- ✓ REDUCE simulation data (delete rules)
- ✓ PROTECT the company IP
- ✓ INCREASE engineering capacity & efficiency
- ✓ IMPROVE simulation quality

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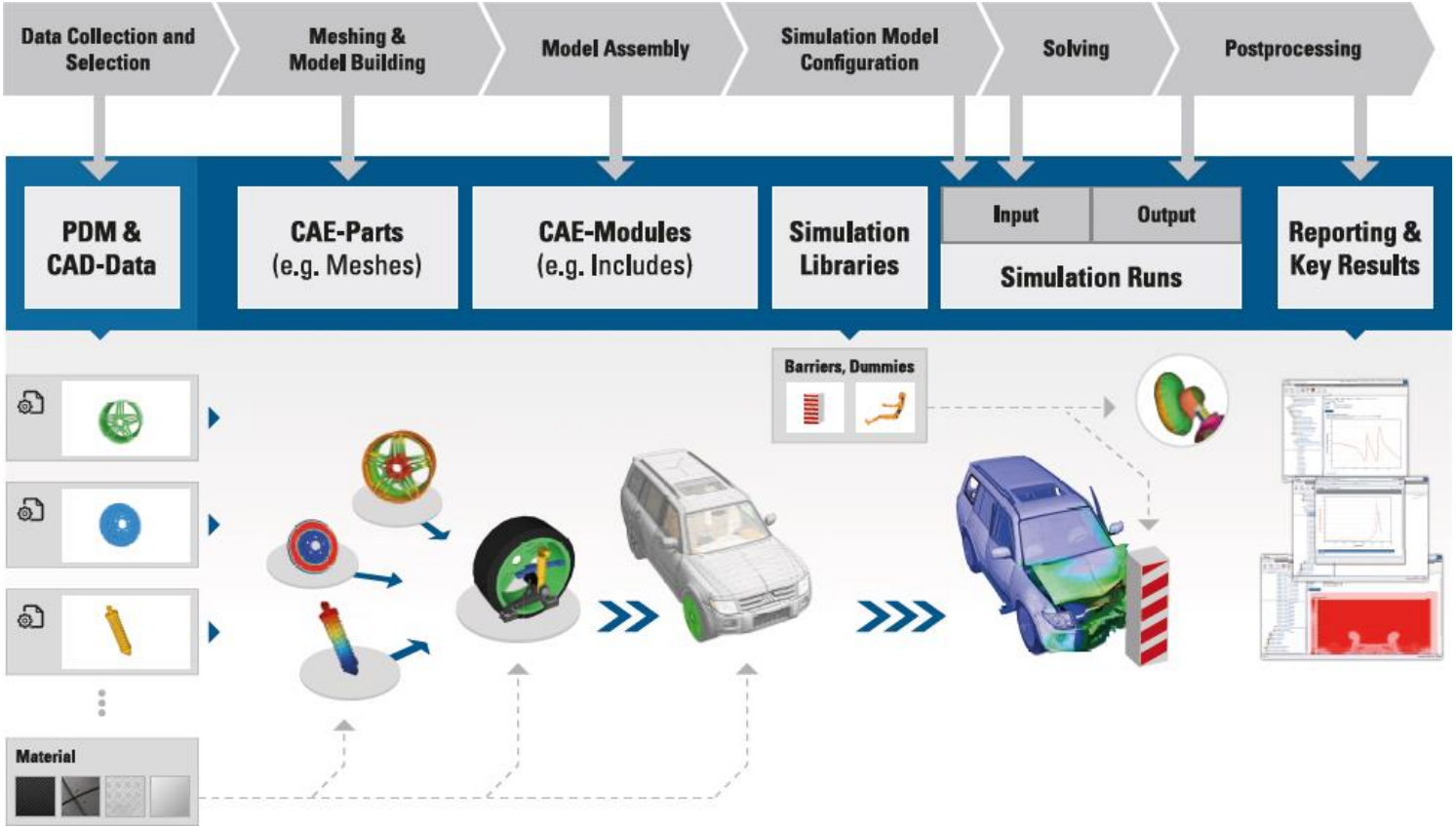
PDTEC



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CONCLUSIONS

Accurate simulation results

→ Efficient model creation, fast/accurate results

Proper process description and definition

→ Efficient integration of simulation tools

Manage data during process

→ Efficient data management and traceability