

SIMULATION-DRIVEN LIGHTWEIGHT DESIGN FOR AUTOMOTIVE STRUCTURES

Our Vision

Altair transforms design and decision making
by applying simulation, machine learning and optimization
throughout product lifecycles.



About Altair

\$396M

FY18
Revenue

2,500+

Engineers,
scientists, and
creative thinkers

60,000+

Users

1985

Founded and
headquartered in
Troy, MI US

8,000+

Customers
Globally

81

Offices in
25 Countries

100+

Software
products

A Simulation-Centric Portfolio for Design, Data Analytics, Cloud and AI.



8,000+ Customers Worldwide

Automotive



Aerospace



Financial Services



Government



Heavy Equipment



Life/Earth Sciences



Retail



Consumer Goods



Energy



Architecture





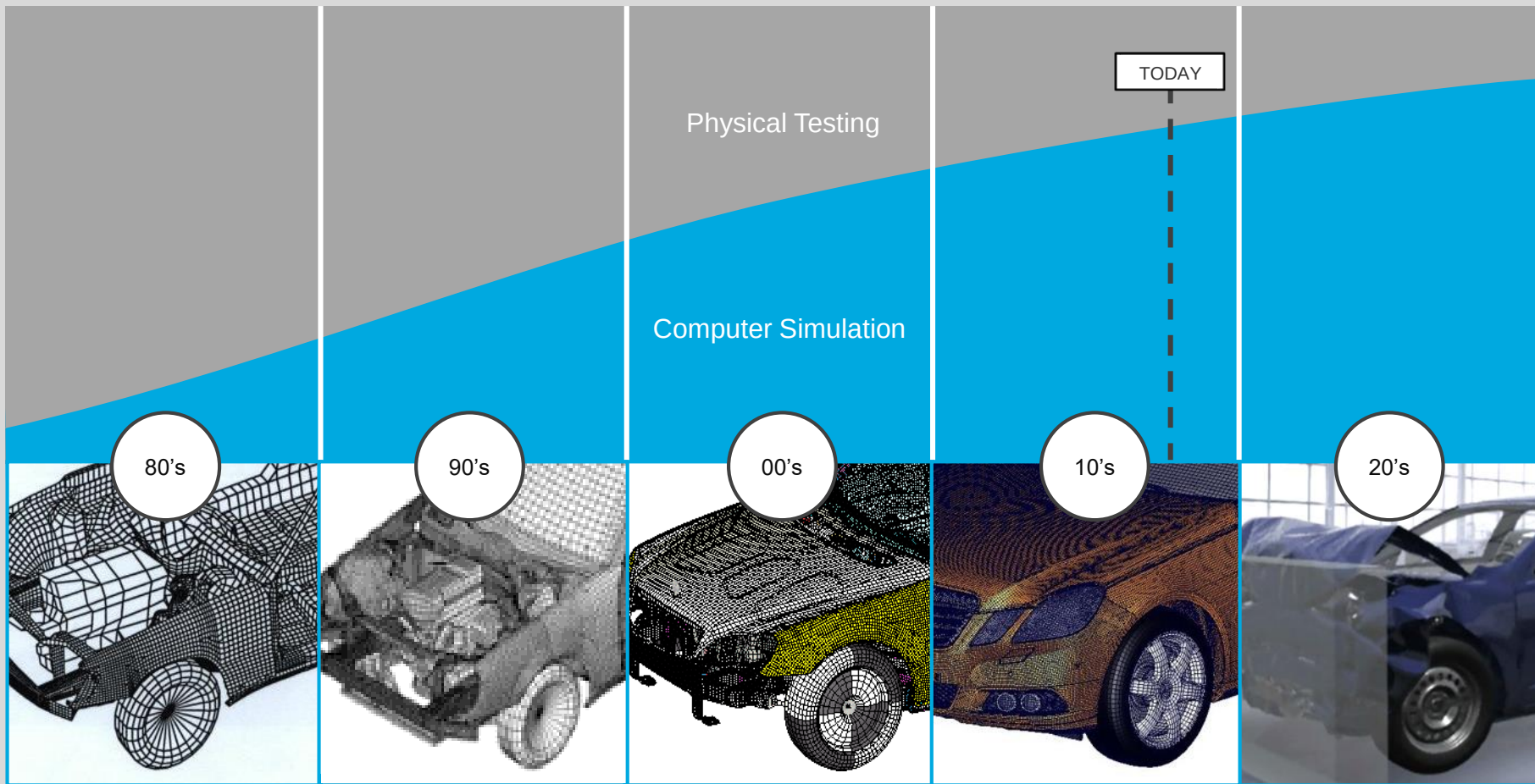
..... E-MOBILITY

Transportation OEM need sustainable technologies to meet customer demands:
Safer, Lighter, Greener, Smarter Vehicles



Product Validation

Crash Simulation



25k Elements

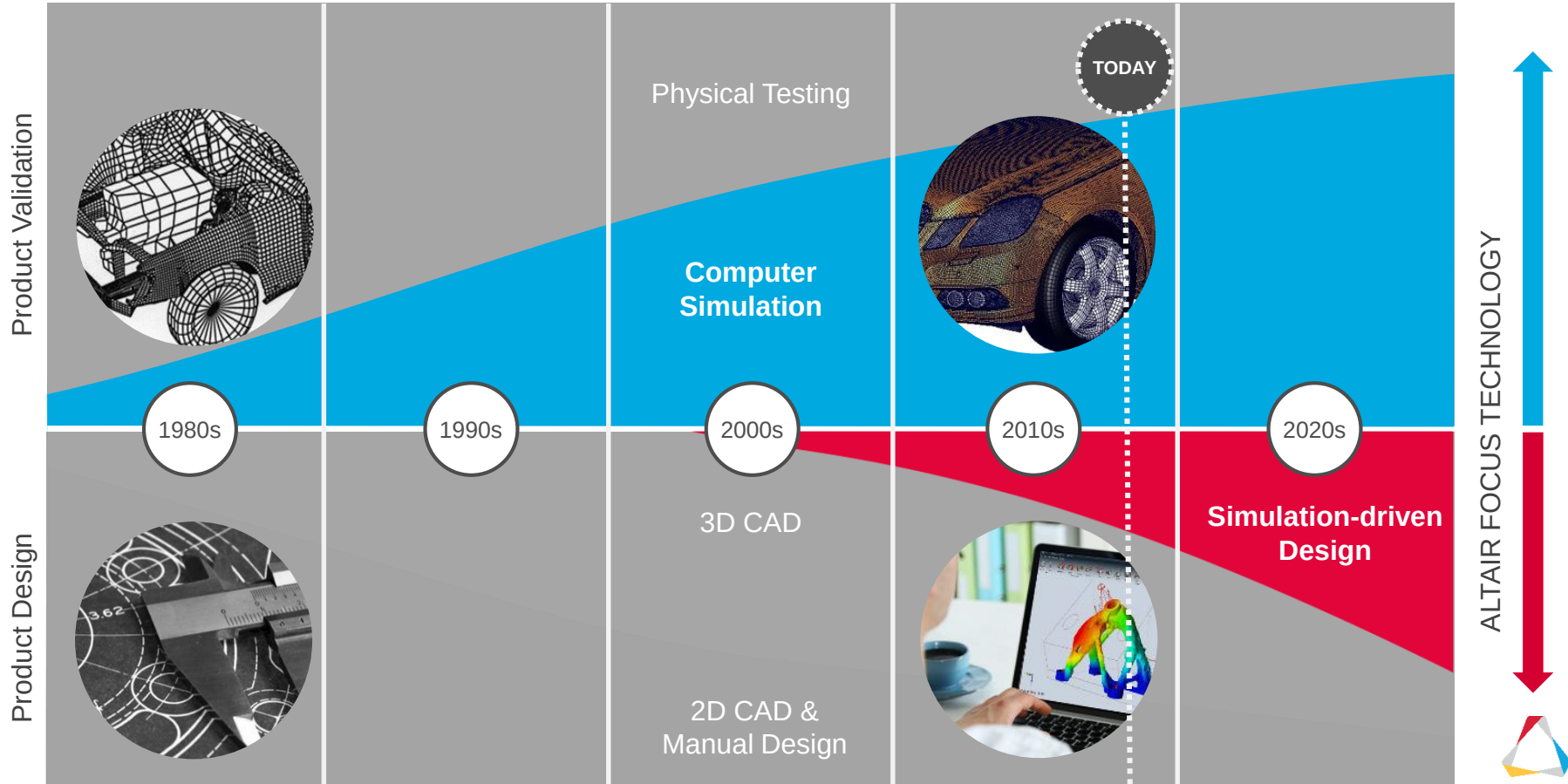
75k Elements

250k Elements

3M Elements

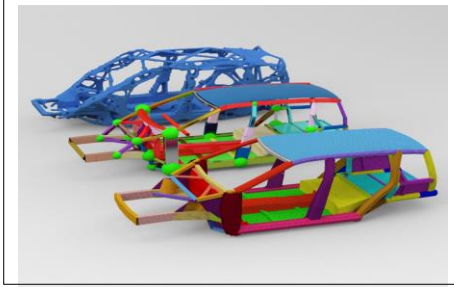
+20M Elements

SIMULATION-DRIVEN DESIGN – AN OVERVIEW

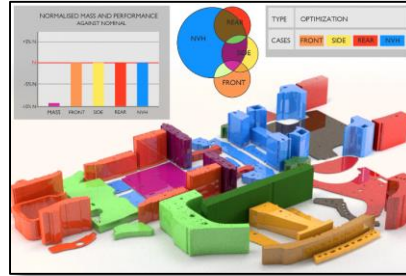


SIMULATION DRIVEN INNOVATION

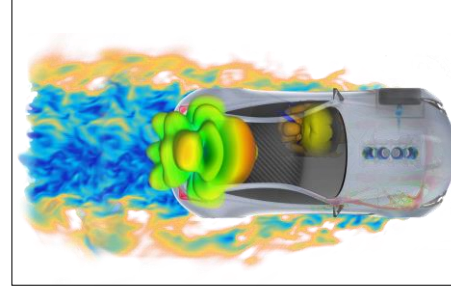
Exhaustive Design Exploration



Model Based Multiphysics Optimization



Powerful Modeling & Visualization



Cloud Collaboration & Data Intelligence



High Performance Computing

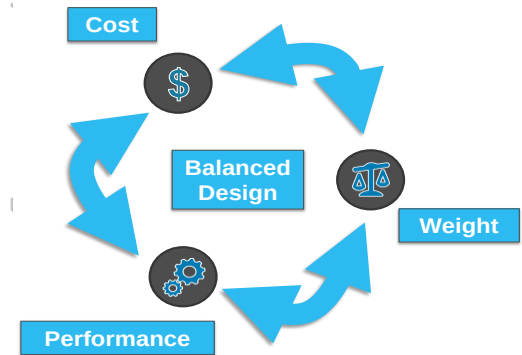
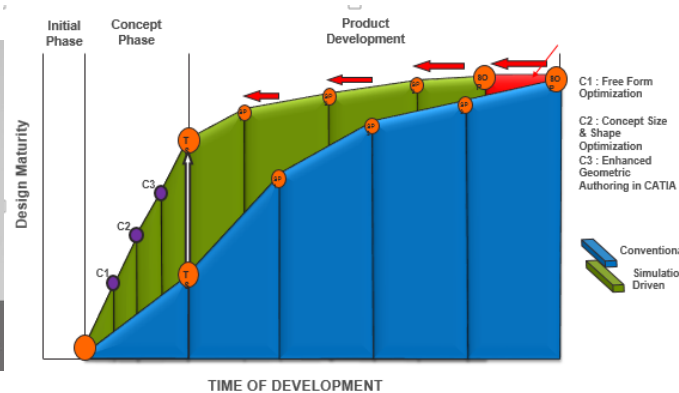
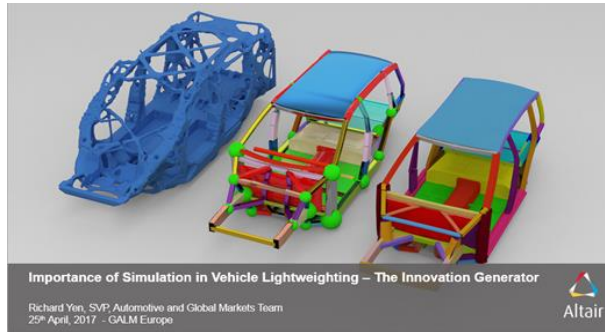
Value-based Business Model

Global Expertise



SOLUTIONS TO THE CHALLENGES OF BODY ARCHITECTURE

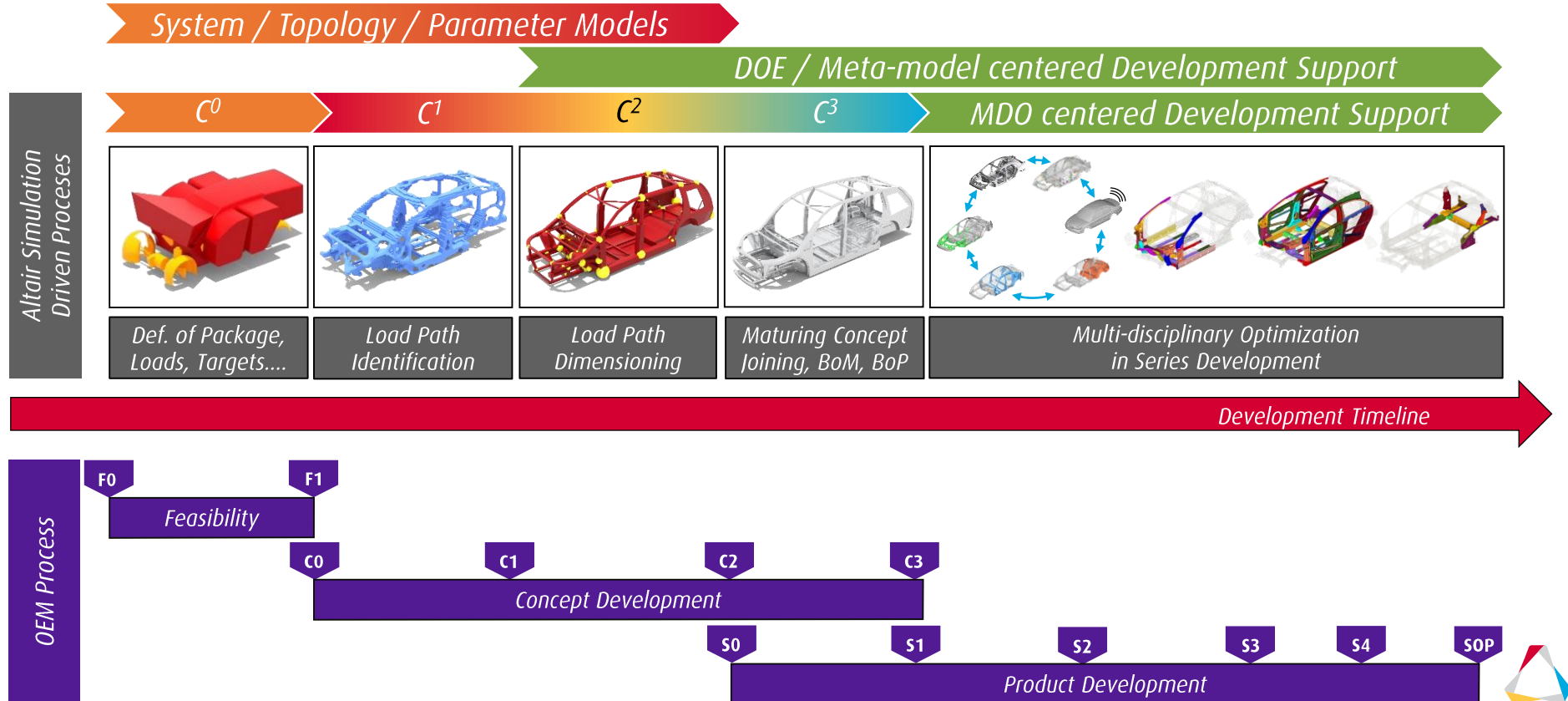
- 1 **Increase Design Maturity in Concept Phase**
- 2 **Provide Efficient Platforms for Design Exploration**
- 3 **Balance Design for Cost, Weight and Performance**
- 4 **Enable Culture of Innovation and Engagement Model**

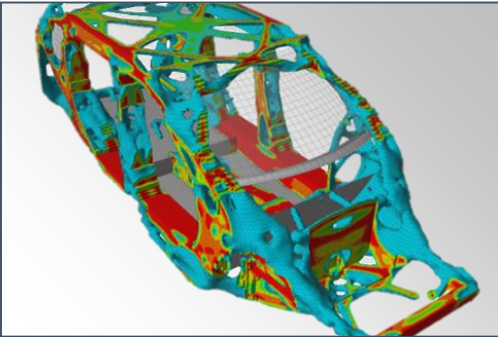
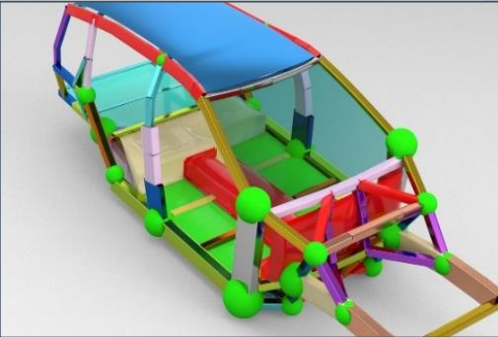
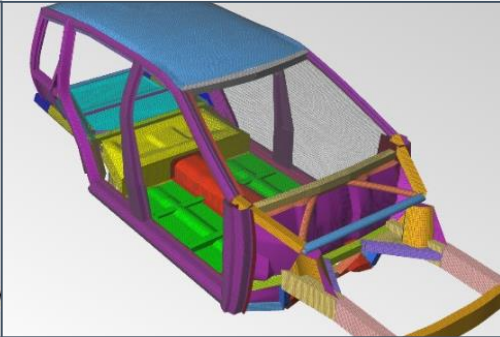


Lead Time Reduction through Multidisciplinary Optimization



SIMULATION-DRIVEN DESIGN & LIGHT WEIGHTING PROCESSES

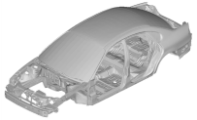


		
C1	C2	C3
Identification of Optimum Structural Layout using Free Form Models	Rapid Optimum Sizing of Idealized Sections & Joints using Low Fidelity Models	Detailed Optimum Sizing of Manufacturable Sections & Joints using High Fidelity Models

MULTI-DISCIPLINARY OPTIMIZATION – GENERAL OVERVIEW

MDO Process Execution Time Line

Baseline Body

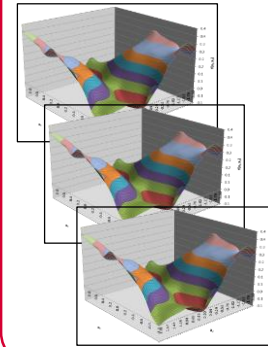


Study Preparation

- Import of Models
- Synchronization
- Definition of DVs
- Definition of Resp.
- Setup of DOE

**CRASH
FRONT RIGID BARRIER**

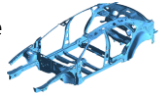
**Meta Model
Generation**



Targets / DV Bounds

Optimization

Up-Gauge



Down-Gauge



Validation

Study Result: • - X kg Body Mass
• Improved Design Balance

Preprocessing

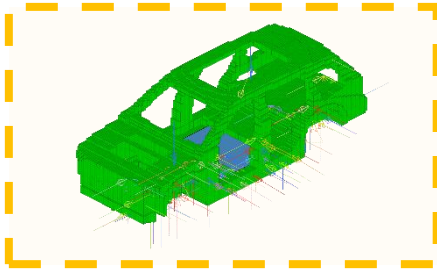
Execute DOE

Postprocessing



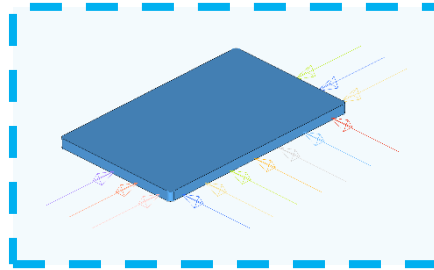
Sub Problem 1

Model 1 : Vehicle Load Cases



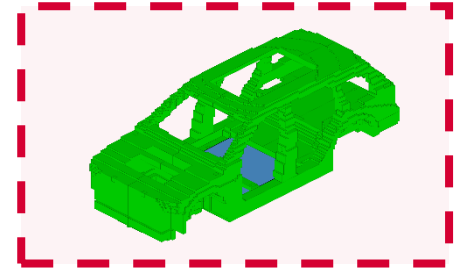
Sub Problem 2

Model 2 : Battery Load Cases

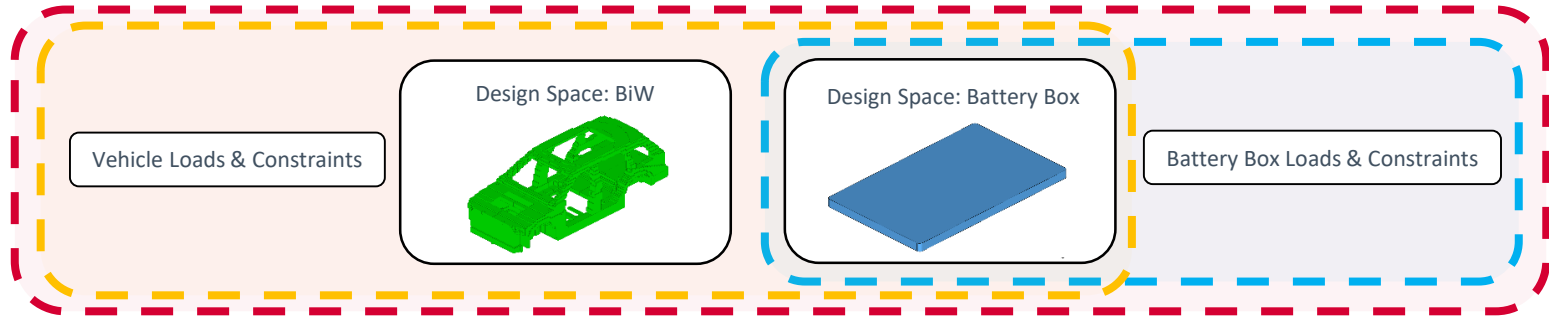


Complete Problem

Multi Objective Optimization Problem

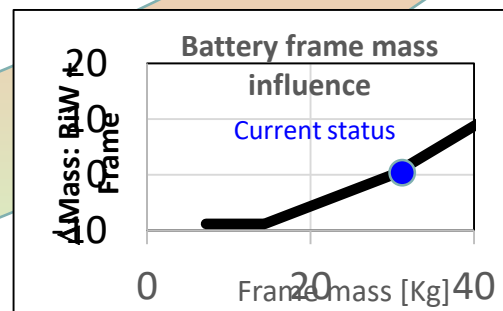
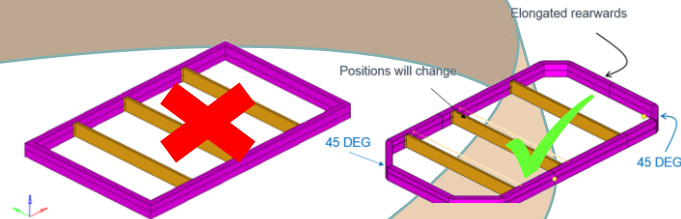


Venn Diagram



C²: Maturing & Trade-Off

C²: Maturing & Trade-Off



Important to keep battery frame mass as low as possible

Ferrari



Ferrari, Altair Product Design team up for next-gen vehicle platform

July 27, 2016 @ 2:52 pm
Jack Walsworth



Ferrari is teaming up with longtime design, engineering and software partner Altair Product Design to create the company's next-generation vehicle platform.

The new platform will be the basis for several new flagship vehicle derivatives, Altair said today, noting that it has worked with Ferrari for more than a decade.

The next-generation platform is 15 percent lighter, while enhancing crash, noise, vibration and harshness and other performance attributes by more than 20 percent, Altair said.

Altair designers and engineers worked at Ferrari's vehicle development center in Italy alongside Ferrari's design, engineering and manufacturing teams to create the platform.

Royston Jones, Altair Product Design's global chief technology officer, said the platform's "massive deployment of structural optimization" and "optimum material layout" will result in "outstanding weight/performance characteristics."

You can reach Jack Walsworth at jwalsworth@crain.com - Follow Jack on Twitter: <http://www.twitter.com/jackwalsworth>



Maximilian Szwaj
Director Innovation at
Ferrari

speaking at the 2014
European ATC about Altair's
implementation of the C123
optimization process.

HyperWorks optimization technology to minimize the mass of Ferrari's new vehicle variants

DAIMLER



Thomas Spoida / Daimler AG

Rohbauentwicklung in der frühen Phase



„Direct Integration of Optimization and CAD necessary“

“Less Weight due to better Concept”

“Higher Maturity”

**Thomas Spoida
Development Engineer
at Daimler**

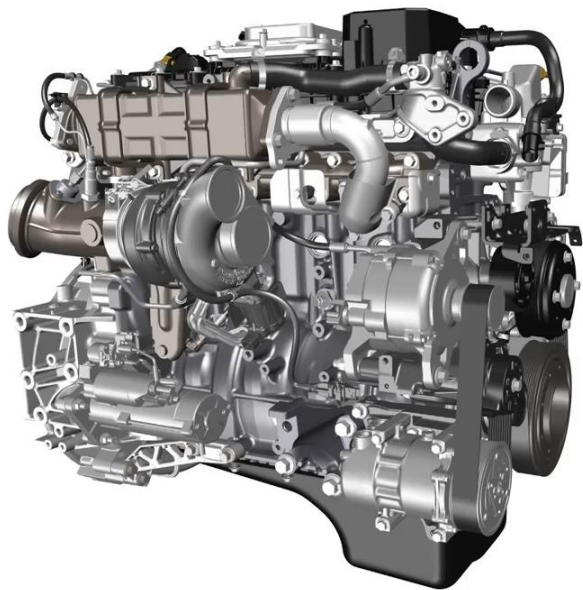
speaking at the 2016
Automotive Circle – Simulation
Conference about Integration
of the Altair C123 process

Altair support early concept development at Daimler using Simulation Driven Design



Simulation-Driven Design

**RENAULT
TRUCKS**



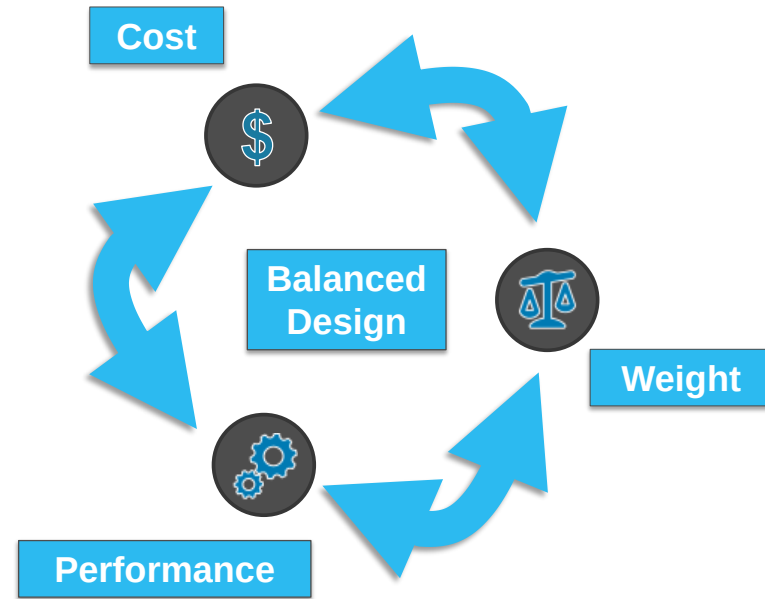
“Additive manufacturing releases us from constraints and unlocks the creativity of engineers.”

Damien Lemasson, Project Manager, Renault Trucks

TAKEAWAYS

*Altair's **Innovative Simulation Driven Design** Process increases your confidence on lead time reduction*

- *Early and permanent **focus on weight** as a development attribute*
- *Active management of the **design balance***
- *Increased **maturity** of design*
- *More **informed design decisions***



Thank You

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