



# network bulletin

Issue 4 - December 2008

Thirty-two of Europe's leading automotive companies joined forces to launch the AUTOSIM project. This project, funded by the European Commission, cost 600.000 Euros, and lasted three years (September 2005–August 2008). It was managed by NAFEMS and CAEvolution.

The intent of AUTOSIM was to provide conceptual contributions that will enable the entire European automotive industry to make more effective use of engineering simulation techniques, particularly in structural analysis and computational fluid dynamics.

The project consortium included OEMs, Tier 1 and Tier 2 suppliers, consultants, researchers, and software developers. AUTOSIM had two complementary aims: firstly, to develop Best Practice, and secondly, to identify the most promising potential Breakthrough Technology.



*AUTOSIM project members (part) in Birmingham, UK*

These aims and objectives have been examined under three following key technology areas:

- Integration of simulation into the development process
- Materials characterisation
- Improved confidence in the use of simulation

During the project, the members of the AUTOSIM consortium reviewed the current analytical procedures and research strategies and developed a preliminary set of guidelines for Best Practice and Breakthrough Technology. They consulted with the wider automotive industry worldwide to gain feedback on the preliminary documents in order to produce final findings. These findings will be disseminated internationally throughout the automotive industry. The general objectives of AUTOSIM were as follows:

- Facilitate the use of advanced simulation and data management and its integration into the design process.
- Improve the quality, confidence level, and robustness of modelling and simulation.
- Investigate the use of different, relatively new materials for different applications.

- Investigate material laws and material data in different design stages.
- Improve technology and the transfer of knowledge (training programs and education).
- Identify technology gaps and areas where further research is needed.

With these aims in mind, AUTOSIM should make a substantial contribution toward advancing design techniques by increasing the efficiency and quality of simulation.

The project report „Current & Future Technologies in Automotive Engineering Simulation (CAE)“ makes continued references to the strong inter-relationship among the three key technology areas because:

- Quality of material data affects confidence.
- Effects of material law selection impacts integration.
- Model sizes must be balanced within accuracy, predictability, and cost, bridging the gap between integration and confidence.

A printed version of the project report was sent to all NAFEMS members. The document can be ordered under the NAFEMS Order Ref: R0097.



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The findings of the project have been compiled in to a series of reports which are listed below.

Further details of the various topics discussed can also be discovered by examining the various **presentations** made during the project:

<http://www.nafems.org/projects/autosim/meetings/>.

### Summary Reports

**autosim\_technical\_report.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/autosim\\_technical\\_report.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/autosim_technical_report.pdf)

**autosim\_brief\_summary.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/autosim\\_brief\\_summary.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/autosim_brief_summary.pdf)

**autosim\_summary\_presentation.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/autosim\\_summary\\_presentation.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/autosim_summary_presentation.pdf)

### Webinar

A webinar was held to report the project findings. A recording of the webinar and a copy of the webinar slides are available:

**autosim\_webinar\_slides.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/autosim\\_webinar\\_slides.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/autosim_webinar_slides.pdf)

**AUTOSIM Webinar Recording (Audio / Video)**

<http://www.nafems.org/projects/autosim/meetings/autosimwebinar08/>

### Consultation

A consultation document was produced, which summarised the views of the consortium members. The contents of this document were explained during the webinar which was attended by 271 representatives of the automotive industry from around the world. Participants in this webinar, and others, were then encouraged to read the consultation document and complete an on-line survey in order to collect their feedback.

285 people completed the questionnaire. The results of their feedback, and an accompanying commentary, are contained in the reports detailed below:

**consultation\_report.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/consultation\\_report.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/consultation_report.pdf)

**consultation\_report\_appendix\_1.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/consultation\\_report\\_appendix\\_1.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/consultation_report_appendix_1.pdf)

**consultation\_report\_appendix\_2.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/consultation\\_report\\_appendix\\_2.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/consultation_report_appendix_2.pdf)

**consultation\_report\_appendix\_3.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/consultation\\_report\\_appendix\\_3.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/consultation_report_appendix_3.pdf)

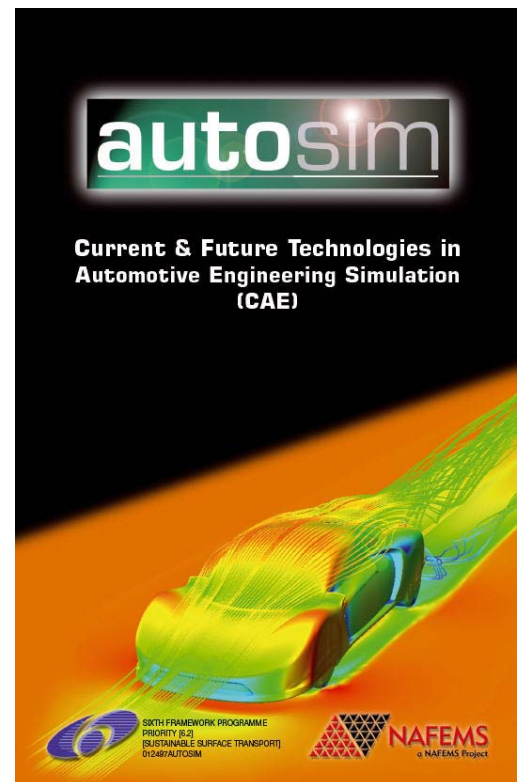
**consultation\_report\_appendix\_5.pdf**

[http://www.autosim.org/downloads/AUTOSIM\\_Deliverables/consultation\\_report\\_appendix\\_5.pdf](http://www.autosim.org/downloads/AUTOSIM_Deliverables/consultation_report_appendix_5.pdf)

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8. Appendix 1: Glossary of Terms



NAFEMS Order Ref: R0097

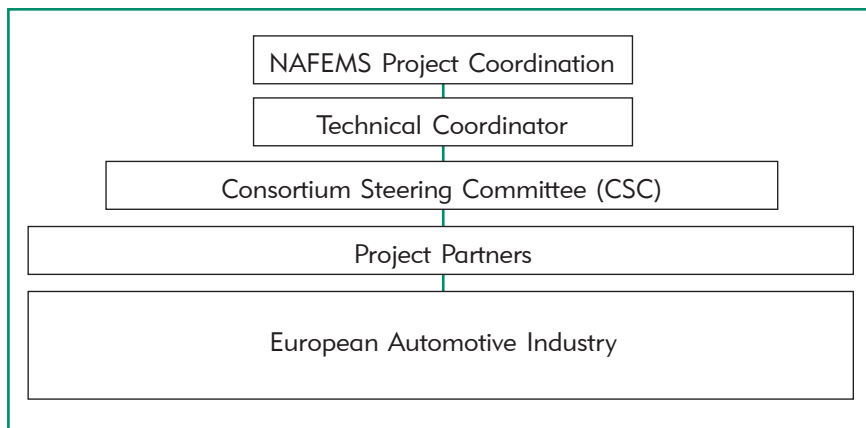
## PROJECT OBJECTIVES

The broad objectives of AUTOSIM can be summarised as follows:

- To improve the quality and robustness of modelling and simulation in the European automotive industry within an integrated design and product development environment.
- To facilitate the use of advanced simulation technologies (finite element analysis, computational fluid dynamics, and related methods) within a multi-site, multi-organisational environment.
- To improve technology and knowledge transfer between engineering practitioners within the automotive industry.
- To identify potential breakthrough technologies which could have a profound effect on the use of simulation techniques for automotive applications.
- To identify technology gaps and areas where RTD activity is needed.

The detailed objectives are:

- To assemble and collate information which is focused on current practices in the application of modelling and simulation technology in the European automotive industry.
- To define best practices and standard procedures for the use of modelling and simulation.
- To identify barriers between current practices and best practices.
- To issue guidelines to help overcome the barriers.
- To ascertain areas in which breakthrough technologies could be of greatest use and prioritise their importance.
- To establish the current state of the art and its readiness to become state of practice.
- To promote RTD projects to address identified requirements.
- To actively and widely disseminate information about all the aspects listed above within the European automotive industry.



*General structure of the Autosim project*

## CONSORTIUM MEMBERS

The Consortium members are drawn principally from industry, but there is also strong participation from research organisations, as well as representatives of the major software developers and vendors. Several tier 1 European automotive companies are represented, together with their tier 2 subcontractors and RTD suppliers. Collectively, it is estimated that their RTD spend in areas involving simulation is several hundred million euro per annum.

The consortium is comprised of companies from a wide geographical and cultural base who have extensive expertise in all of the major areas of automotive design.

NAFEMS	UK	EASi Engineering	D
Renault	F	Robert Bosch GmbH	D
Engin Soft Trading	I	Tarrc	UK
Labein	E	MSC Software	F
CAEvolution	D	Mecas ESI	CZ
PSA Peugeot Citroen	F	Micado	F
Volvo Powertrain	S	P+Z Engineering	D
Faurecia	F	Pankl	A
Herbertus	E	DYNAmore	D
UTS-Comau	I	LMS	B
Abaqus Europe BV	NL	Componenta Pistons	FI
Imamoter Institute	I	Inprosim	D
Cadferm	D	Univ. of Manchester	UK
Arsenal Research	A	CD-adapco	D
TRL	UK	TWT	D
SFE GmbH	D	VIF	A

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[www.nafems.org](http://www.nafems.org)

	Integration	Materials	Confidence
Best Practices	Technology Leader 1	Technology Leader 2	Technology Leader 3
Breakthrough Technologies	Technology Leader 4	Technology Leader 5	Technology Leader 6
	Rapporteur 1	Rapporteur 2	Rapporteur 3

Topics and responsibility structure

## TOPICS & RESPONSIBILITIES

At the first meeting of the Consortium Steering Committee (CSC) in Munich on November 30<sup>th</sup> 2005, a series of initial suggestions for topics to be covered by the project were developed.

An initial plan of the responsibilities for these topics was also drafted.

Initial Suggestions for Topics Autosim Should Cover

### Integration

- Process integration
- Integration with suppliers
- Up front simulation
- Integration with CAD
- Simulation data management
- Optimisation

### Materials

- Composites, foams, new materials
- Fracture mechanics & durability
- Manufacturing simulation
- Constitutive models and material data
- Modelling connections

### Confidence

- Uncertainty / stochastics
- Robustness
- Validation
- How to eliminate 1 gateway?
- Correlation with test
- Standardisation

## What are Best Practises and Breakthrough Technologie?

### Best Practice

is defined as „How we currently make the best use of available technologies and procedures to tackle engineering problems with near-optimum results.“

### Breakthrough Technologies

is defined as „Novel or revolutionary technologies and procedures required to successfully solve the engineering problems in our future vision“.

*Definition by the Autosim Consortium Steering Committee, 2006*

## RELEVANT WEBSITES

### [www.fe-net.org](http://www.fe-net.org)

Website of the NAFEMS Coordinated FENet project, which was completed in July 2005. Of particular interest to the autosim project will be the findings of the Land Transport sector

### [www.simdat.org](http://www.simdat.org)

SIMDAT focuses on four application areas: product design in the automotive, aerospace and pharma industry as well as service provision in meteorology.

### [www.eucar.be](http://www.eucar.be)

EUCAR developed an Automotive R&TD Master Plan in 2000 in order to define a European approach to technologies for automotive develop-

ment. In 2001, a Position Paper was published, presenting the major R&D challenges the automotive industry. The members of EUCAR represent the major European motor vehicle manufacturers: BMW Group, DaimlerChrysler, Fiat, Ford in Europe, Opel, Porsche, PSA Peugeot-Citroën, Renault, Volkswagen Group, Volvo.

### Cars21

The CARS 21 High Level Group has adopted a 10 year roadmap for a competitive EU car industry. The Group has agreed on a number of recommendations to make cars cleaner, safer and to simplify the legal environment for EU car makers.



## OVERVIEW

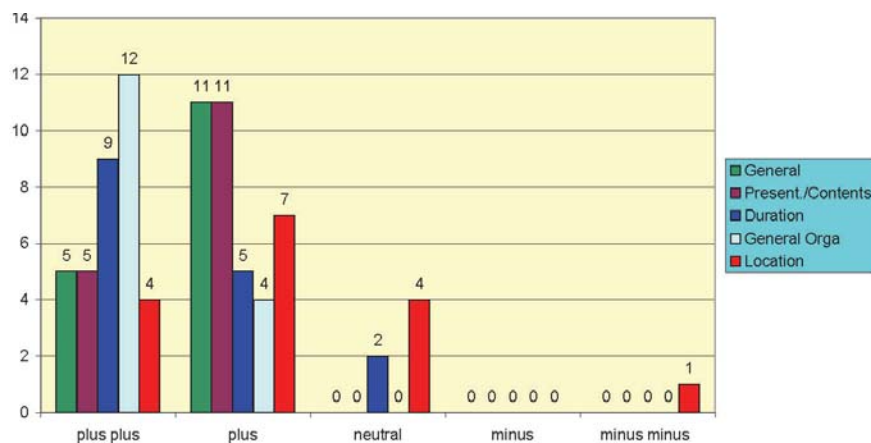
Workshops were open to all who are involved in numerical simulation methods in the automotive industry, and contributions from industry, research and academia are positively encouraged.

Project start	September 1, 2005	
1 <sup>st</sup> CSC meeting	November 30, 2005	Munich, Germany
1 <sup>st</sup> Autosim workshop	January 17 - 18, 2006	Barcelona, Spain
2 <sup>nd</sup> CSC meeting	January 18, 2006	Barcelona, Spain
2 <sup>nd</sup> Autosim workshop	May 4 - 5, 2006	Sonnenhausen/Munich, Germany
3 <sup>rd</sup> CSC meeting	May 4 & 5, 2006	Sonnenhausen/Munich, Germany
3 <sup>rd</sup> Autosim workshop	November 23 - 24, 2006	Lisbon, Portugal
4 <sup>th</sup> CSC meeting	November 23 & 24, 2006	Lisbon, Portugal
5 <sup>th</sup> CSC meeting	January 23, 2007	Graz, Austria
4 <sup>th</sup> Workshop	July 5 - 6, 2007	Paris, France
6 <sup>th</sup> CSC meeting	July 5 & 6, 2007	Paris, France
5 <sup>th</sup> Workshop	Nov 15 - 16	Bilbao, Spain
7 <sup>th</sup> CSC meeting	Nov 15 & 16	Bilbao, Spain
Autosim Webinar	April 3, 2008	worldwide
8 <sup>th</sup> CSC meeting	April 21, 2008	Birmingham, UK
6 <sup>th</sup> Workshop	April 22 - 23, 2008	Birmingham, UK
9 <sup>th</sup> CSC meeting	July 20, 2008	Mestre, Venice, I

6<sup>th</sup> AUTOSIM WORKSHOP

The workshop was held 22<sup>nd</sup> - 23<sup>rd</sup> of April 2008, in Birmingham, UK

45 delegates attended this final AUTOSIM workshop. The agenda as well as presentations can be downloaded at [www.autosim.org](http://www.autosim.org).



Results from Feedback Forms



Birmingham BullRing

## Acknowledgment

As overall coordinator of the AUTOSIM project, NAFEMS would like to take this opportunity to record a note of thanks to the **many contributors**.

In addition to a grateful acknowledgement of the significant input from all those who **actively participated in the Technical Workshops** of the project, and thereby provided the material on which the very useful final summary report has been based, NAFEMS would like to draw particular attention to the substantial efforts of the project leaders, in particular:

Hans Sippel of CAEvolution, the **Technical Coordinator** of the project, as well as Trevor Dutton of Dutton Simulation (via NAFEMS), Raimund Schweiger of TechnoStar Europe (via CAEvolution) and Mike Neale of TRL, who diligently performed the onerous role of **project rapporteurs**,

And the **Technology Leaders**:

Jean-Marc Crepel	Renault
Gino Duffett	Herbertus
Günther Fabian	Virtuelles Fahrzeug
Elizabeth Fournier	Renault
Marian Gutierrez	Labein
Fabiano Maggio	Enginsoft
Alfred Moser	Virtuelles Fahrzeug
Stefan Paulke	P+Z Engineering
Sergio Sarti	Enginsoft
Thomas Schneider	P+Z Engineering
Klaus Zamazal	Virtuelles Fahrzeug

The Consortium Steering Committee was made up of representatives from:

CAEvolution	EnginSoft	Fundación LABEIN
Herbertus	NAFEMS	P&Z Engineering
Renault	TRL	VIF

And of course many thanks to the other **Consortium Member Companies**.

The consortium would also like to record a **special note of thanks to Professor Erich Schelkle** from Dr. Ing. h.c. F. Porsche AG (via CAEvolution) who provided a substantial amount of invaluable input to the project.



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