



network bulletin

Issue 2 - May 2007

This issue includes reports of the 2nd and the 3rd Autosim workshops (overview)



Workshop delegates in Sonnenhausen near Munich

Autosim EC funded project to unite the European automotive industry has been launched

Thirty-two of Europe's leading automotive companies have joined forces to launch the EC funded Autosim project, which will ensure that the entire European automotive industry is making the most effective use of engineering simulation techniques.

The three-year project is supported by 600,000 euro of funding from the European Commission and is coordinated by NAFEMS, the International Association for the Engineering Analysis Community, an independent not-for-profit membership organization with more than 700 member organisations in over 30 different countries. The scope of NAFEMS activities encompasses all simulation technology, including Finite Element Analysis (FEA), and Computational Fluid Dynamics (CFD).

The project consortium consists of 32 companies from throughout Europe, each having a significant interest in

the use of simulation within the automotive industry. They include OEMs, Tier 1 and Tier 2 suppliers, consultants, researchers and software developers.

The fundamental objective of Autosim is to promote better and more effective use of simulation technology in the European Automotive industry. It has two complementary aims: firstly to develop best practices and secondly to identify the most promising potential breakthrough technologies of the future. These aims and objectives will be examined under three primary themes:

- **Integration of simulation into the development process**
- **Materials characterization**
- **Improving confidence in the use of simulation**

In order to address these issues, Autosim has established an international team of leading experts representing much of the European automotive industry. They will develop a preliminary set of best practice guidelines, standard analytical procedures

and research strategies. They will then consult with the wider automotive industry to gain feedback on these preliminary documents, in order to produce final documents which aim to provide definitive guidelines from an authoritative and credible voice.

These final versions will be disseminated internationally throughout the automotive industry. Their adoption will increase the efficiency and improve the quality of simulation, increase the efficiency of the supply chain, enable simulation to be practiced more effectively by a broad range of personnel, coordinate ongoing research by providing a focused set of priorities, assist industry to plan its future implementation strategy for simulation.

With these actions, Autosim will make a substantial contribution to the advance of design techniques in the European automotive industry.

For further information visit www.autosim.org



Contents

Autosim EC funded project to unite the European automotive industry has been launched	Page 1
Objectives / Partners	Pages 2 - 3
Meetings and Workshops	Pages 4 - 7
- Overview	
- 2 nd Autosim Workshop Report	
- 3 rd Autosim Workshop Report	
Feedback Form	Page 8



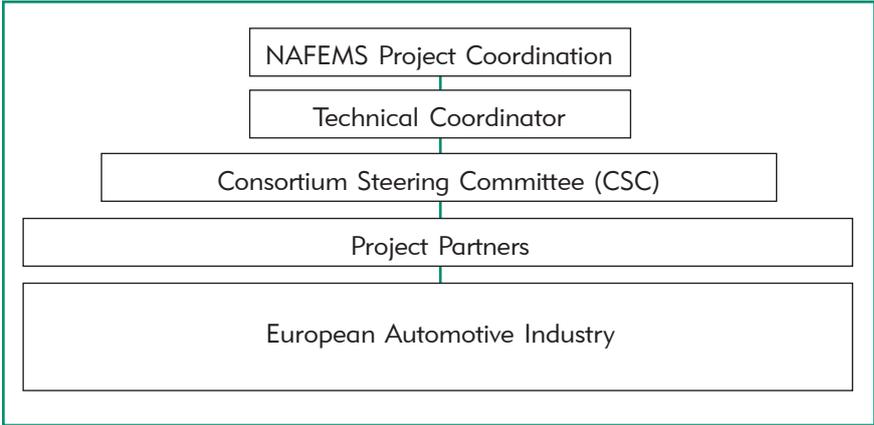
PROJECT OBJECTIVES

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	Pankl	A
Faurecia	F	DYNAmore	D
Herbertus	E	LMS	B
UTS-Comau	I	Componenta Pistons	FI
Abaqus Europe BV	NL	Inprosim	D
Imamoter Institute	I	Univ. of Manchester	UK
Cadferm	D	CD-adapco	D
Arsenal Research	A	TWT	D
TRL	UK	VIF	A

CONTACT

- Event coordination / dissemination: roger.oswald@autosim.org
- Project coordination: info@autosim.org
- NAFEMS: Tel: +44 13 55 22 56 88
Fax: +44 13 55 24 91 42
www.autosim.org
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 30th 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

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

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

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

Project start	September 1, 2005	
1 st CSC meeting	November 30, 2005	Munich, Germany
1 st Autosim workshop	January 17 - 18, 2006	Barcelona, Spain
2 nd CSC meeting	January 18, 2006	Barcelona, Spain
2 nd Autosim workshop	May 4 - 5, 2006	Sonnenhausen/Munich, Germany
3 rd CSC meeting	May 4 & 5, 2006	Sonnenhausen/Munich, Germany
3 rd Autosim workshop	November 23 - 24, 2006	Lisbon, Portugal
4 th CSC meeting	November 23 & 24, 2006	Lisbon, Portugal
5 th CSC meeting	January 23, 2007	Graz, Austria
Next meetings:		
4 th Workshop	July 5 - 6, 2007	Paris, France
6 th CSC meeting	July 5 & 6, 2007	Paris, France
5 th Workshop	Nov 15 - 16	Bilbao, Spain
7 th CSC meeting	Nov 15 & 16	Bilbao, Spain
6 th Workshop	scheduled for May 2008	planned in UK
8 th CSC meeting	scheduled for May 2008	planned in UK
9 th CSC meeting	scheduled for August 2008	n.n.

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

2nd AUTOSIM WORKSHOP

The workshop was held 4th - 5th of May 2006 at the Manor of Sonnenhausen – near Munich, Germany

The 1st technical workshop in Barcelona on 17th / 18th January 2006 aimed to:

- Introduce the project to the participants and the participants to one another.
- Form initial views and tackle priority issues by having presentations and discussions about them.
- Work on a questionnaire for all of the 3 technology areas. This questionnaire was worked out and distributed after the Barcelona meeting.

The 2nd technical workshop in Sonnenhausen/Munich focused on:

- Consolidation of the discussions of the 1st workshop considering also the results of the collected questionnaires.
- Breakout sessions into smaller working groups with the aim to make progress with the Technology Priority Plan within smaller teams by identifying the

current practices as well as leading edge technology. This was fully accomplished and the consortium decided to continue with this kind of meeting structure (= plenary sessions with formal paper presentations and discussions as well as with breakout sessions).

Results

• Presentations and questionnaires

- A short description of the formal paper presentations can be found in the detailed report about the 2nd workshop. Most of the presentations were also up-loaded onto the Autosim webpage.
- The results of the questionnaires are published on the web as well. The consortium followed the quotation as it was done in the Fenet project. The respondents were asked to score the topics with three indices along with a weighting factor from 0 – 9:
 - Technology Readiness Level (TRL)
 - State of Practice (SoP)
 - Priority Level Index (PLI)

The Rapporteurs and Technology Leaders summarized the results in bubble chart representations. The paper presentations and results of the questionnaires were used in the breakout sessions as a starting point for discussions.

• Breakout sessions

Integration

In the breakout session about Integration common and specific glossary terms have been discussed and defined (“Best Practice”, “Breakthrough Technologies”, “Up-front Simulation” and “Virtual Prototype”). This will be extended as it was noted that an Integration glossary would be useful. The generic product development process firstly discussed in Barcelona was updated.

A first preliminary collection of topics for BP (like “CAD integrated tools”, “CAX data integration” etc) - and BT (like “conceptual simulation tools”, “knowledge data mining”) technologies have been identified (for more details please refer to the 2nd WS report).

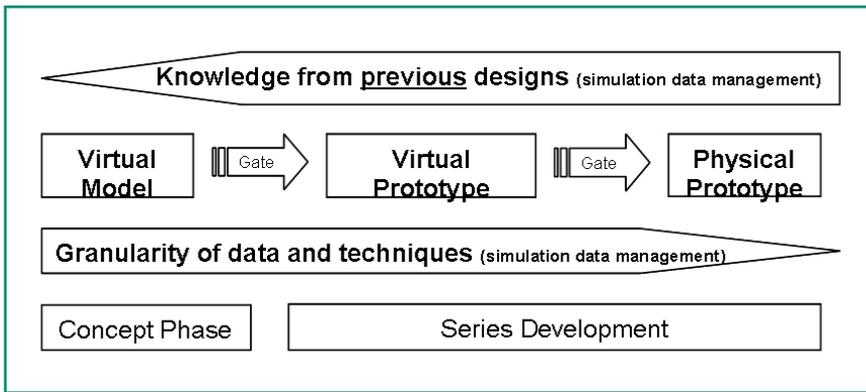


Fig. 1 Product development process

It has been agreed that other topics like "performance issues", "coupled simulation", "necessary cultural change management" etc cannot be covered in detail in Autosim-Integration due to time and budget reasons, despite the fact that they are also important.

Way forward

A more detailed report about BP and BT was compiled and circulated. This report served for the preparation of the workshop in Lisbon.

Materials Characterisation

For the Materials Characterisation technology area it was proposed to use the results of the questionnaire to identify those Materials issues which are critical for both improved Integration and increased Confidence.

An important point of discussion also was whether it would make sense to invite people from material suppliers and to focus on material models rather than material data. These discussions were ongoing and were addressed in Lisbon as well.

Based on the questionnaire results discussions were started identifying the definition of BP. A matrix concept was proposed to indicate which topics from the area of "material data", "material modelling", "modelling connections", "manufacturing simulation" were relevant for which type

of material e.g. Aluminium, Magnesium, Composites, foams etc. Different matrices for different types of loading were proposed. The matrix for quasi-static loading was filled out during the workshop.

Way forward

The matrices for the load-cases "short term transient", "long term transient" and "cyclic" were finalized as well in the meantime and distributed. It was hoped that this will allow the identification of key topics for presentations at the next meeting (may be by external speakers).

Confidence

Inline with the result of the questionnaire 14 Confidence issues have been prioritized and it was agreed to focus on four principle themes in Confidence: "the physical model", "staff training", "data validity" and the "digital model".

Way forward

In the Consortium Steering Committee (CSC) it was decided to develop a survey that could be used to establish the specific Best Practices and identifiable Breakthrough Technologies in the four principle CAE areas agreed on in the breakout session. It was agreed that this would be forwarded to the Autosim project members who attended the Confidence breakout session only and the results would be collated for the next Autosim meeting.

• Strong Interrelationship of the three key technology areas

Continued reference was made to overlapping subjects between the three key technology areas. Among others the following items have been addressed:

- The subject "Virtual Testing & Certification" will be coordinated between Integration & Confidence.
- Quality of Material data impacts Confidence as well.
- Effects of Material forming impacts Integration.
- In Confidence one big issue is CAD / CAE integration and the access of CAD data (de-featuring etc) in general as well as the application of optimisation tools in terms of e.g. model size, time and cost. Model sizes need to be balanced in terms of accuracy, predictability and cost. This immediately bridges the gap to Integration.

Based on

„Report from the 2nd Autosim Technology Workshop, Sonnenhausen (Munich), May 4th 2006“

by T. Morris, H. Sippel, R. Schweiger, T. Dutton, M. Neale

3rd AUTOSIM WORKSHOP

The workshop was held 23rd - 24th of November 2006 in Lisbon, Portugal

Target of the 3rd Workshop was the formulation of a "first preliminary catalogue" of BP and BT for further refinement. This was achieved by presentations of "external people" who shared their views in extensive breakout sessions as well.

Results

• Presentations

A short description of the formal paper presentations can be found in the detailed report about the 3rd workshop. All of the presentations were also uploaded onto the Autosim webpage.

• Breakout sessions

Integration

In the breakout session about Integration there was wide agreement that Up-Front Simulation is a key driving force in new product development. This requires – at least partially – a paradigm shift in terms of adapted processes, need for new tools and mental behaviour. Whereas Best Practices might be characterized by Simulation Data Management (incl. Data- and Method Knowledge capture) as well as CAx Integration (CAD / CAE / CAM and CAT), Breakthrough Technologies should enable the reduction of product development time (Statement Porsche: from currently 25-30 months down to 18-24 months; also see figure 1)

Way forward

An update of the detailed report from September 2006 was provided by end of January and circulated for further comment. All participants (of the Lisbon breakout session) on Integration were invited to provide a short description on their view on BP – what works specifically well.

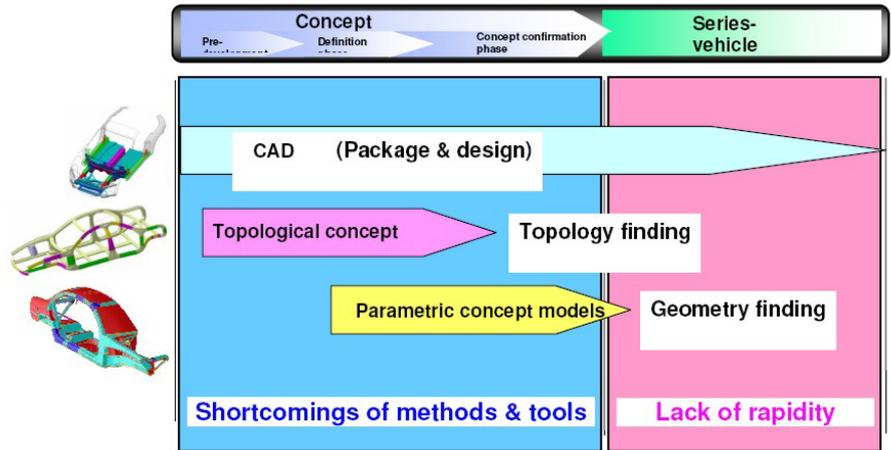


Fig. 1 Product development process identifying bottlenecks and opportunities (with courtesy Dr. Ing. h.c. Porsche AG)

Materials Characterisation

Also the intention of Materials Characterisation technology was to arrive at a small set of topics for detailed investigation. Firstly seven topics were thrown out of the review of the questionnaire against 4 classes of loadings (see below and figure 2).

These four topics were also selected as the automotive companies have strong obligations in relation to crash, e.g. in terms of

- legal and liability issues (more and more load cases to consider)
- cost of testing prototypes

- pedestrian and occupant safety (performance of non-metals critical)

It was further proposed to assess "Cost of CAE" versus "Confidence and Up-Front Loading". This might help to judge where simpler material models might be sufficient to increase the turn-around of analysis and keep cost to a minimum. This also will help to identify where BP Technologies fall short and where BT Technologies are required.

Way forward

An invitation document shall be prepared for the next workshop in terms

MATERIALS Matrix:

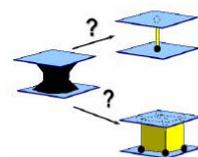
Ultra High Strength Steels, Strain Rate Sensitivity, Composites, Failure/ Fracture/ Damage, Effects of Forming, Material Laws for Non-Metals, Modelling Connections

against 4 classes of loadings

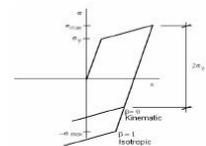
static, short & long term transient, cyclic



1. New materials: foams, composites etc



2. Connectors



3. Fracture & Failure
4. Manufacturing

Fig 2: Selection of four main topics (marked in blue)

of fibre-reinforced plastics under crash loading and will be sent to OEMs and Tier1 suppliers asking for input. It is hoped to discover current practice and from this identify BP- and from that BP technologies.

Confidence

In the period between the 2nd and 3rd workshop a Confidence survey was written and distributed and summarized in the first Lisbon workshop. The aim was to collect feedback from the attendees of the breakout session in terms of "the physical model", "staff training", "data validity" and the "digital model". These were the four principle themes on which the Munich workshop was agreed.

The main points arising from the discussion were as follows (see below):

- Physical Model

Best Practices:

Model validation remains up to the individual and/or the organization to decide as this is strongly dependent on model predictions, available data, level of time, resources etc.

Breakthrough:

Confidence advances with historical capitalisation of previous work. One recommended BT technology could be the "compression" of coupled physical phenomena in terms of identifying alternative physical quantities which can be accessed / used for model validation.

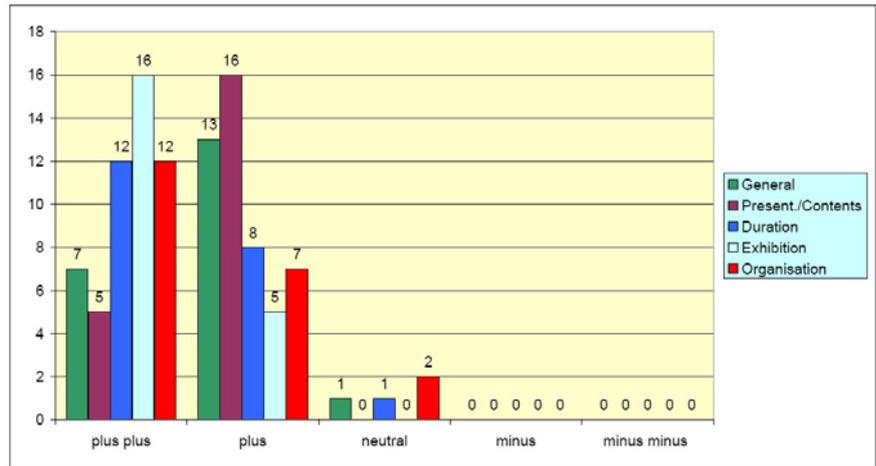
- Staff training

Best Practices:

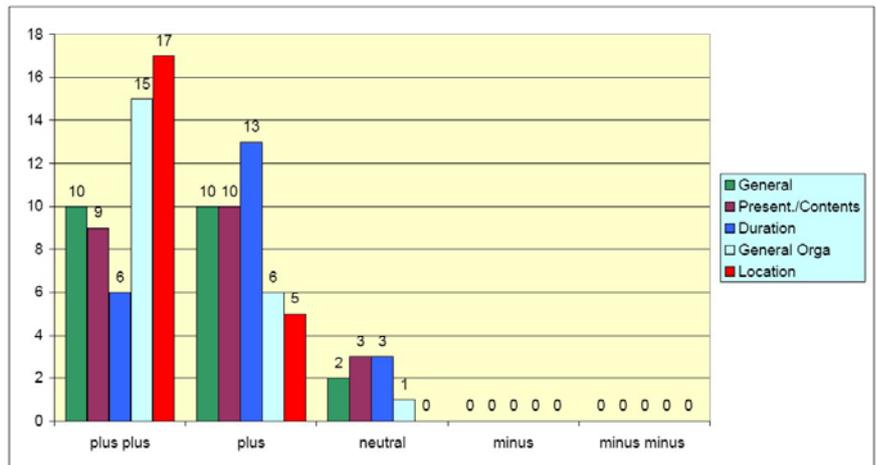
Analysts need to have a basic understanding of the physics and of the CAE tool they are using. Measurable levels of the competencies of an analyst could be through a Chartered Engineering Scheme.

Breakthrough:

Staff training could be improved by independent organizations like NAFEMS with non-code-specific on-line and / or video trainings. Managers of analysts need to be made



Results from the Sonnenhausen (near Munich) feedback form



Results from the Lisbon feedback form

aware of the necessities of training, otherwise new technologies will not be applied.

- Digital Model

Best Practices:

Large models (like in CFD) require intelligent adaptive meshing tools and suitable hardware facilities (out-sourcing of runs to companies with these facilities?).

Breakthrough:

Having mesh generation software for users to develop and store mesh quality checks which could be optimized for specific solving or analysis method (FEA, CFD etc.)

Way forward

A further refinement of the topics above shall be conducted. Invitations for key note speakers would be helpful.

- **Strong Interrelationship of the three key technology areas**

Continued reference was made to overlapping subjects between the three key technology areas.

Based on

„Report from the 3rd AUTOSIM Technology Workshop, Lisbon , November 23rd and 24th 2006“ by T. Morris, H. Sippel, R. Schweiger, T. Dutton, M. Neale

I am interested in the Autosim project.

- Please put me on the mailing list.

I would like to contribute with a presentation to the following workshop(s)

- 4th Workshop, July 5 - 6, 2007 Paris, France
- 5th Workshop, Nov 15 - 16 Bilbao, Spain
- 6th Workshop, scheduled for May 2008 planned in UK

I am interested in NAFEMS. Please provide further information

- Membership
- Seminars
- Certification „Registered Analyst“
- EC-Projekts
- FEM Magazine „Benchmark“
- World Congress

Sender

Title _____ Name _____

Company _____

Address _____

_____ Country _____

Tel. No. _____ Fax. No. _____

e-mail: _____ Date, Signature _____

PLEASE COMPLETE AND SEND OR FAX TO

**Autosim Event Coordination - NAFEMS:
Schillerstrasse 6
D-85567 Grafing, Germany**

**Phone +49 - (0) 80 92 - 8 35 50
Fax +49 - (0) 80 92 - 8 35 51**

**info@autosim.org
www.autosim.org**