7 BEFORE REALITY

CONFERENCE

30 MAY - 1 JUNE 2017

THE MET HOTEL
THESSALONIKI, GREECE

programme & abstracts

BETA
SIMULATION SOLUTIONS

7th BEFORE REALITY CONFERENCE

30 May - 01June, 2017, The MET HOTEL, Thessaloniki, Greece

Conference Guide

Contents

Welcome

Welcome to the 7th BEFORE REALITY Conference.

Thank you for honoring us with your participation to our biennial appointment and for contributing in making this event a milestone for the world wide CAE community.

We at BETA remain loyal to **our mission** to enable engineers to deliver results of high value and we continue to offer state-of-the-art, high-performance software and best-in-class services. **Our passion** for engineering, our drive for excellence, and our loyalty to customers and partners, are the key ingredients of our success. We embody our mission and values to our flagship products and brand new software by creating breakthrough advances. In this years' conference you will be introduced to the results of our ongoing efforts to address complexity in the CAE processes.

You may have noticed the changes in **our corporate logo and profile**. This is the result of a process that aims to capture and communicate our evolution as an organization while same time confirm our commitment to our founding identity, motivation, and values. Thus, our new logo is paired with a new symbol, which maintains the familiar legacy β, embraced by a more mature, robust, yet, always loyal to its roots capital B.

During the three days of the conference, more than 80 **presentations** sessions will outline our achievements and the latest advances in simulation strategies, methodology, techniques, and applications related to our products.
This year, we added in the event's agenda more than 20 scheduled **demo sessions**, focused on carefully selected application domains, which highlight the latest ground breaking functionality and implementations of our software.
Additionally, in the **technology gallery**, you will have the opportunity to engage in private or open technical discussions, and demonstrations with our executive, development, and service engineers and promote your interests and requests for future developments.

We take the opportunity to express **our gratitude** to all those who contributed with technical papers and presentation, and especially to Mr. Yair Soffair from Elbit Systems Electro-Optics Elop, who honored us by joining our event as a keynote speaker.

Don't hesitate to download our **application for mobile devices**, with which you can plan your attendance to the presentations of your preference.

We are waiting for you to join us and celebrate together our reunion at the **Greek Night**, on Wednesday evening.

We wish you a pleasant and beneficial stay during the conference and we are looking forward to seeing you to our next conference in 2019.


Programme

Registration

Pre-Registration MONDAY, MAY 29	
16:30 - 18:30	**Pre-Registration** | *The MET Hotel Lobby*

Registration TUESDAY, MAY 30	
8:30 -	**Registration** | *The MET Hotel Lobby*

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The Agenda at a glance

TUESDAY, MAY 30		
9:00 - 10:30	Conference kick-off and Plenary session	Maistros A + B
10:30 - 11:00	Coffee Break & Technical discussions	Technology Gallery - Foyer
11:00 - 13:00	Plenary session	Maistros A + B
13:00 - 14:30	Lunch	The MET Hotel Restaurant
14:30 - 15:30	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
15:30 - 16:00	Coffee Break & Technical discussions	Technology Gallery - Foyer
16:00 - 17:00	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
17:00 - 18:30	Technical discussions demonstrations and meetings	Technology Gallery - Foyer
20:00 - 21:30	Dinner	The MET Hotel Restaurant

WEDNESDAY, MAY 31		
9:00 - 10:30	Plenary session	Maistros A + B
10:30 - 11:00	Coffee Break & Technical discussions	Technology Gallery - Foyer
11:00 - 13:00	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
13:00 - 13:15	Group-photo shooting	
13:15 - 14:30	Lunch	The MET Hotel Restaurant
14:30 - 15:30	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
15:30 - 16:00	Coffee Break & Technical discussions	Technology Gallery - Foyer
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17:00 - 18:30	Technical discussions demonstrations and meetings	Technology Gallery - Foyer
20:30 -	Dinner - Social Event: “Greek Night“	“Fix live”, 26th October str. No. 15

THURSDAY, JUNE 1		
9:00 - 10:30	Plenary session	Maistros A + B
10:30 - 11:00	Coffee Break & Technical discussions	Technology Gallery - Foyer
11:00 - 13:00	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
13:00 - 14:30	Lunch	The MET Hotel Restaurant
14:30 - 15:30	Breakout Presentations Technical update demos	Maistros A, Maistros B, Sirocco, Zephyros Maistros C, Maistros D
15:30 - 15:45	Closing Remarks	Maistros A
15:45 - 17:00	Farewell discussions and meetings	Technology Gallery - Foyer
20:00 - 21:30	Dinner	The MET Hotel Restaurant

Agenda

TUESDAY, MAY 30 - Morning Sessions

	Session 1 | Maistros A + B Moderator: Chryssa Sferidou
9:00 - 9:10	**Conference kick-off - Welcome** Chryssa Sferidou BETA CAE Systems SA, Greece
9:10 - 9:20	**Opening speech** Dimitris Angelis, Chairman BETA CAE Systems SA, Greece
9:20 - 9:30	**Keynote speech: Why to simulate… more?** Dr.-Ing. Sam Saltiel, CCO BETA CAE Systems International AG, Switzerland
9:30 - 10:30	**Latest developments & New Products in BETA's product line** Chryssa Sferidou BETA CAE Systems SA, Greece
10:30 - 11:00	**Coffee Break & Technical discussions** | Technology Gallery - Foyer
	Session 2 | Maistros A + B Moderator: Eva Ioannou
11:00 - 11:30	**Future developments in BETA's product line product line** Lambros Rorris BETA CAE Systems International AG, Switzerland
11:30 - 12:00	**Keynote speech: Challenges and solutions in the simulation process for advanced electro-optics technology - Implementing ANSA & META in Elbit Systems Electro-Optics Elop** Yair Soffair Elbit Systems Electro-Optics El Op., Israel
12:00 - 12:30	**From Model Assembly to Load-case Set-up: a holistic approach** [1]I. Makropoulou*, [2]G. Nikolaidis, [2]L. Rorris [1]BETA CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland
12:30 - 13:00	**KOMVOS - SDM Console: The innovative Simulation Data Management platform** [1]Athanasios Fassas*, [2]Georgios Nikolaidis [1]BETA CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland
13:00 - 14:30	**Lunch** | The MET Hotel Restaurant

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TUESDAY, MAY 30 - Afternoon Sessions

	Session 3A | Maistros A Moderator: Stelios Seitanis	**Session 3B** | Maistros B Moderator: Nikos Trakatelis	**Session 3C** | Sirocco Moderator: Vangelis Skaperdas
14:30 - 15:00	**Implementation of a Simulation Data Management system at CEVT** [1]Niclas Dagson*, [2]Irene Makropoulou, [2]Menelaos Pappas [1]China Euro Vehicle Technology (CEVT) AB, Sweden [2]BETA CAE Systems SA, Greece	**Vehicle tire simulation modelling** Athanasios Papadopoulos*, Apostolos Mitroglou BETA CAE Systems SA, Greece	**The challenge of many different applications solved by ANSA** Tom Fahner*, Roland Broers Actiflow, The Netherlands
15:00 - 15:30	**Model build-up made easy: A process proposal, based on the SDM Console** Michael Tryfonidis BETA CAE Systems SA, Greece	**A Process for creating, managing and deploying materials in ANSA** [1]Hubert Lobo*,[1]Eric Strong*, [2]Yianni Kolokythas [1]Matereality, USA [2]BETA CAE Systems SA, Greece	**Initial CFD simulations from the AIAA high-lift prediction workshops using ANSA unstructured meshes** [1]Neil Ashton*, [2]Vangelis Skaperdas [1]University of Oxford, UK [2]BETA CAE Systems SA, Greece
15:30 - 16:00	**Coffee Break & Technical discussions** | Technology Gallery - Foyer		
	Session 4A | Maistros A Moderator: Stelios Seitanis	**Session 4B** | Maistros B Moderator: Nikos Trakatelis	**Session 4C** | Sirocco Moderator: Vangelis Skaperdas
16:00 - 16:30	**PSA / BETA partnership for assembly** Franck Norreel PSA Groupe, France	**Design and development of a prototype electric vehicle's chassis** Georgios Koumartzakis, Polychronis Spanoudakis*, Nikolaos C. Tsourveloudis School of Production Engineering and Management Technical University of Crete, Greece	**Aerodynamic optimization of a formula student car** [1]Argyrios Apostolidis*, [1]Athanasios Mattas, [1]Aggelos Gaitanis, [2]Nikolaos Christodoulou [1]Aristotle Racing Team, Greece, [2]BETA CAE Systems SA, Greece
16:30 - 17:00	**Comprehensive management of Simulation Runs with ANSA, META and SPDRM** [1]Irene Makropoulou, [1]Menelaos Pappas*, [1]Antonis Perifanis*, [2]George Nikolaidis [1]BETA CAE Systems SA, Greece, [2]BETA CAE Systems International AG, Switzerland	**ANSA/META for Durability & Fatigue analyses** Christos Tegos*, Ioannis Asaniotis BETA CAE Systems SA, Greece	**Latest enhancements in Pre- and post-processing solutions for CFD** Vangelis Skaperdas BETA CAE Systems SA, Greece
17:00 - 18:30	**Technical discussions, demonstrations and meetings** | Technology Gallery - Foyer		
20:00 - 21:30	**Dinner** | The MET Hotel Restaurant		

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Session 3D | Zephyros Moderator: Vangelis Karatsis	**Demo 3** | Maistros C	**Demo 3** | Maistros D	
Mesh generation of biomechanics geometries Samuel Gómez*, Alfonso Santiago, Oriol Lehmkuhl, Herbert Owen Barcelona Supercomputing Center, Spain	**ANSA Kinetics Solver: Latest Development and use cases** A. Paraschoudis		14:30 - 15:00
Equine science using BETA CAE Software [1]Nicolina Eklund*,[1]Erika Engdahl,[1]Fanny Apelgren,[1]Johanna Renman, [2]Milton Eduardo Peña,[1]Magnus Karlsteen [1]Chalmers University of Technology, Department of Physics, Sweden [2]BETA CAE Nordic AB, Sweden			15:00 - 15:30
			15:30 - 16:00
Session 4D | Zephyros Moderator: Vangelis Karatsis	**Demo 4** | Maistros C	**Demo 4** | Maistros D	
Automation in morphing finite element model of a detailed baseline human spine to a patient specific spine [1]Ravi Nimbalkar*,[1]Raghu Suravaram,[1]Deepak Lokesha, [2]Jobin D. John, [2]Narayan Yoganandan, [2]Mike W. J. Arun [1]BETA CAE Systems USA Inc., USA [2]Medical College of Wisconsin, USA	**Design and Implementation of Robust User Toolbars in Synergy with Python Scripting** A. Radopoulos	**ACP-OpDesign: Optimal Design Gateway : Reveal the path to optimized products** A. Kaloudis, Th. Sarigiannis	16:00 - 16:30
Usage of BETA CAE tools for a biomechanical approach to ergonomic comfort design for seating Océane Lançon, Ioana Albert, Daniel Rickert ALTEN Sweden, Sweden	**Technical Update on NVH Solutions** G. Skouvaklis		16:30 - 17:00
			17:00 - 18:30
			20:00 - 21:30

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WEDNESDAY, MAY 31 - Morning Sessions

	Session 5 | Maistros A + B Moderator: Kostis Kiouptsidis		
9:00 - 9:30	**From reality to virtuality: Large scale computed tomography data for the CAD-CAE evaluation of a MINI©** Michael Tryfonidis*, Petros Michailidis BETA CAE Systems SA, Greece		
9:30 - 10:00	**Game-changing functionality for meshing** D. Zafeiropoulos BETA CAE Systems International AG, Switzerland		
10:00 - 10:30	**How to fit an analysis in a few hundred MBs** Antonis Perifanis*, Stelios Karapantazis BETA CAE Systems SA, Greece		
10:30 - 11:00	**Coffee Break & Technical discussions** | Technology Gallery - Foyer		
	Session 6A | Maistros A Moderator: Tasos Sarridis	**Session 6B** | Maistros B Moderator: Thanasis Fokilidis	**Session 6C** | Sirocco Moderator: Nikos Christodoulou
11:00 - 11:30	**Pre-test and correlation tools for NVH in META** Samuel Nacivet PSA Groupe, France	**Keynote speech: Where ASEAN and East Asia NCAPs are heading** Sadayuki Ujihashi BETA CAE Systems Japan Inc., Japan	**Application of ANSA morphing and optimization tools to automotive HVAC system** Giovanni Lombardi, Luca Cinquanta*, Marco Maganzi Università di Pisa, Italy
11:30 - 12:00	**Transfer path summation tool** [1]Mikael Hallqvist*, [2]Milton Eduardo Peña [1]Volvo Car Corporation/NVH Center, Sweden [2]BETA CAE Nordic AB, Sweden	**Comprehensive Safety CAE for the all-new Volvo S90/V90/V90CC** Mathias Retzlaff*, P-A Eggertsen, Johan Jergeus, Ingrid Jenshagen, Michelle Khoo, Domenico Macri, Ulf Westberg Volvo Car Corporation, Sweden	**Investigation of the sealing method for a new concept rotary engine** Savvas Savvakis*, Georgios Traskas theSARMproject, Greece
12:00 - 12:30	**Force based Squeak & Rattle assessment** [1]P. Sabiniarz, [2]Y. Wardi*, [3]M. Moridnejad, [4]J. Huang, [5]Th. Fokilidis, [2]J. Weber* [1]ÅF, Sweden [2]China Euro Vehicle Technology (CEVT) AB, Sweden [3]Volvo Car Corporation, Sweden [4]Geely, China [5]BETA CAE Systems SA, Greece	**Bonnet buckling FE optimization due to new pedestrian requirements in the SEAT Ateca** [1]A. Segura Santillana*, [2]C. Arregui-Dalmases, [1]J. Luzon-Narro, [1]J. Manuel Iglesias Bermudez [1]Seat Centro Técnico, Spain, [2]Universitat Politècnica de Catalunya, Spain	**Influence of micro-CT extracted 3D porous media geometries on CFD simulation results** [1]M. Aboukhedr*,[1,2]N Mitroglou,[1]M. Gavaises, [3]K. Vogiatzaki [1]School of Math. Comp. Science and Engineering, City University London, UK [2]BETA CAE Systems UK Ltd, UK [3]Advanced Engineering Centre, University of Brighton, UK
12:30 - 13:00	**Development of a tool for the acoustic-calculation of mechanical systems** Peter Stamerjohanns Star Acoustics UG, Germany	**Automotive bonnet design - ANSA capabilities to enhance the accuracy of the FE simulation results** Pawel Sobczak*, Arnaud Freyburger csi entwicklungstechnik GmbH, Germany	**X-ray micro-computed tomography for liquid volume fraction measurements and cavitation erosion investigation** [1]N. Mitroglou*, [3]M. Lorenzi, [3]M. Santini, [2]M. Gavaises [1]BETA CAE Systems UK Ltd., UK [2]School of Math. Comp. Science and Engineering, City University London, UK [3]Department of Engineering and Applied Sciences, University of Bergamo, Italy
13:00 - 13:15	**Group-photo shooting**		
13:15 - 14:30	**Lunch** | The MET Hotel Restaurant		

			9:00 - 9:30
			9:30 - 10:00
			10:00 - 10:30
			10:30 - 11:00
Session 6D | Zephyros Moderator: Ioannis Asaniotis	**Demo 6** | Maistros C	**Demo 6** | Maistros D	
Analysis process automation within VPD BRAÅS Pierre Orvegren Volvo Construction Equipment, Sweden	**Model Update Techniques using Compare and the New Replace** S.Chatzikonstantinou		11:00 - 11:30
Automation of door dynamic simulation setup using ANSA Task Manager [1]Parameshwaran Pasupathy*, [2]Parag Nittur [1]BETA CAE Systems USA Inc, USA [2]Fiat Chrysler Automobiles, USA	**State-of-the-art methodology for model build and assembly** G. Haralampidis, A. Zografos		11:30 - 12:00
ANSA and EPILYSIS as a Linear Elastic Fracture Mechanics (LEFM) tool for 2D structures Federico Zaramella BETA CAE Italy Srl, Italy	**Process and Data Management for CAE Simulations** M. Pappas	**Feature Manager and its contribution in pre-processing** D. Zafeiropoulos	12:00 - 12:30
Solid element based fatigue analysis of weld joints: between the poles of effort and accuracy [1]Klaus Hofwimmer*, [2]Michael Tryfonidis, [3]Halvar Schmidt, [3]Thomas Bruder [1]Engineering Center Steyr GmbH & Co KG, Austria [2]BETA CAE Systems SA, Greece [3]BMW Group, Gernany	**KOMVOS- SDM Console highlights** A. Fassas, M. Tryfonidis	**Delivering production-ready ANSA extensions** Y. Kolokythas	12:30 - 13:00
			13:00 - 13:15
			13:15 - 14:30

WEDNESDAY, MAY 31 - Afternoon Sessions

	Session 7A | Maistros A Moderator: Vasilis Pavlidis	**Session 7B** | Maistros B Moderator: Eva Iordanidou	**Session 7C** | Sirocco Moderator: Konstantinos Haliskos
14:30 - 15:00	**Honda approach to automate the NV CAE process** [1]Haruki Kubokawa*, [2]Kazuhiko Inada, [3]Irene Makropoulou, [3]Stergios Chatzikonstantinou [1]Honda R&D Co., Ltd, Japan [2]BETA CAE Systems Japan Inc., Japan [3]BETA CAE Systems SA, Greece	**Working with the built in pedestrian toolbars and custom tool bars in ANSA and META at Volvo Cars Corporation** Ulf Westberg Volvo Car Corporation, Sweden	**Automation tool for underhood and underbody thermal simulation** Umesh Mallikarjunaiah*, Prakash Krishnaswamy Xitadel CAE Technologies, India
15:00 - 15:30	**Alternative meshing strategies for acoustic radiation: A case study** Anastasios Sarridis*, Evangelos Daviloudis, Michael Tryfonidis BETA CAE Systems SA, Greece	**Machine learning process to analyze big-data from crash simulations** Constantin Diez Adam Opel AG, Germany	**Sensitivity analysis of the dimensions and operating conditions of a new concept rotary engine** [1]Nikos Karakioulachis*,[1]Savvas Savvakis, [2]Zissis Samaras [1]theSARMproject, Greece [2]Laboratory of Applied Thermodynamics, Aristotle University of Thessaloniki, Greece
15:30 - 16:00	**Coffee Break & Technical discussions** | Technology Gallery - Foyer		
	Session 8A | Maistros A Moderator: Vasilis Pavlidis	**Session 8B** | Maistros B Moderator: Eva Iordanidou	**Session 8C** | Sirocco Moderator: Efi Chatzivasiloglou
16:00 - 16:30	**Reliability-based design optimization in random vibrations and aerodynamics** [1]Santosh Patil*,[1]Dimitrios Papadimitriou, [2]Zissimos Mourelatos,[1]John Skarakis,[1]Vishal Naidu [1]BETA CAE Systems USA Inc., USA [2]Oakland University, USA	**Combined Analysis of LS-DYNA crash-simulations and Crash-test scans** Stefan Mertler*, Lennart Jansen, Dominik Borsotto, Clemens-August Thole SIDACT GmbH, Germany	**Running ANSA and META in the Cloud** Iago Fernandez Gompute S.L.U., Spain
16:30 - 17:00	**Solutions for NVH** [1]Dimitris Daniel, [2]Vassilis Pavlidis, [2]Dimitris Siskos, [2]Kostas Skolarikis [1]BETA CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland	**Solutions for Crash and Safety** A. Fokilidis*, N. Tzolas BETA CAE Systems SA, Greece	**Efficient build-up of modular CFD models** K. Haliskos BETA CAE Systems SA, Greece
17:00 - 18:30	**Technical discussions, demonstrations and meetings** | Technology Gallery - Foyer		
20:30 -	**Dinner - Social Event: ‘‘Greek Night‘‘** | “Fix live”, 26th October str. No. 15		

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Session 7D | Zephyros Moderator: Serafim Chatzimoisiadis	**Demo 7** | Maistros C	**Demo 7** | Maistros D	
Active DOE© extension: DOE automation tool for multidisciplinary robust design optimization using stochastic analysis [1]Malik Kayupov*, [2]Ravi Nimbalkar,[2]Onkar Mande,[2]Joshua Sims,[2]Santosh Patil [1]DS SIMULIA, USA [2]BETA CAE Systems USA Inc., USA	**Advanced Durability Results Visualization, Analysis and Correlation** A. Radopoulos	**Mid-surfacing: a task for the "brave"? Not any more** D. Zafeiropoulos	14:30 - 15:00
Multi-objective design optimization of steel float by using ANSA Task Manager Burak Yegin*, Kadir Oray Aksoy Ford Otosan, Turkey			15:00 - 15:30
			15:30 - 16:00
Session 8D | Zephyros Moderator: Serafim Chatzimoisiadis	**Demo 8** | Maistros C	**Demo 8** | Maistros D	
Stamping die topology optimization by using ANSA result mapper Ural Keskin*, Burak Yegin, Kadir Akcan Ford Otosan, Turkey	**Data Management in post-processing: An interactive dashboard for results management** A. Perifanis, S. Chatzikonstantinou		16:00 - 16:30
A complete solution for topology and beam section optimization [1]G. Korbetis, [1]E. Kastrinakis, [2]G. Verros [1]BETA CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland			16:30 - 17:00
			17:00 - 18:30
			20:30 -

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THURSDAY, June 1 - Morning Sessions

	Session 9 | Maistros A + B Moderator: Stavros Kleidarias		
9:00 - 9:30	**Integration of virtual reality tools into the CAE development process** Andreas Pau Daimler AG, Germany		
9:30 - 10:00	**RETOMO: The key to 3D-modelling from CT-data of physical objects** Evangelos Karatsis*, Chryssa Sferidou BETA CAE Systems SA, Greece		
10:00 - 10:30	**Rendering developments in META** [1]Dimitrios Katramados*, [2]Dimitrios Siskos [1]BETA-CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland		
10:30 - 11:00	**Coffee Break & Technical discussions** | Technology Gallery - Foyer		
	Session 10A | Maistros A Moderator: Yianni Kolokythas	**Session 10B** | Maistros B Moderator: Giannis Haralampidis	**Session 10C** | Sirocco Moderator: Nikolas Drivakos
11:00 - 11:30	**ANSA: Enabling innovative modelling practices** [1]Nick Kalargeros*, [2]Andrew Walton,[1]Peter Lumsden, [2]Kevin Lindsey [1]Jaguar Land Rover Limited, UK [2]FAR, UK	**The generation and maintenance of the 150% common model at CEVT** [1]Jesper Bäcklund*, [2]Giannis Haralampidis [1]China Euro Vehicle Technology (CEVT) AB, Sweden [2]BETA CAE Systems SA, Greece	**Evaluating visible permanent deformation using the improved rendering tool in META** Peter Gustavsson*, Jonas Elmered, Annika Lundberg Volvo Car Corporation, Sweden
11:30 - 12:00	**Python scripting in ANSA/META for automated tasks processing during vehicle development phases** [1]Tunç Uzun,[1]Heiko Wüstner, [2]Thanassis Fokilidis [1]Ford Werke GmbH/Ford of Europe, Germany [2]BETA CAE Systems SA, Greece	**Automatic generation of high-quality CAE model using ANSA** [1]Masahiko Yanagisawa, [2]Maiko Kato* [1]Hino Motors, Ltd., Japan [2]BETA CAE Systems Japan Inc., Japan	**FE Analysis on electric motor subjected to earthquake** [1]Sergio Macchiavello*,[1]Alessandro Bozzolo,[1]Claudio Brunetto, [2]Massimiliano Di Chiara [1]D'Appolonia S.p.A., Italy [2]Nidec ASI S.p.A., Italy
12:00 - 12:30	**Feature recognition and mesh generation for powertrain using ANSA script and C++ programs** [1]Hideki Ishikawa, [2]Koji Otani* [1]AW Engineering Co., Ltd., Japan [2]Integral Technology Co., Ltd., Japan	**FATXML - Data consistency in the CAE-Process chain** Thomas Deiters Volkswagen Osnabrück GmbH, Germany	**Finite element model updating of large scale steam turbine rotor** Alexandros Arailopoulos*, Dimitrios Giagopoulos Department of Mechanical Engineering, University of Western Macedonia, Greece
12:30 - 13:00	**Study on using geometric hashing in ANSA for shape recognition and data management** Marieswaran Ramasamy EASi Technologies, India	**χMCF: A standard for joint information, covering PLM** [1]G.Zhang, [2]M. Weinert, [3]C.Franke, [1]G. Tröndle, [1]Volkswagen AG, Germany [2]Ford-Werke GmbH, Germany, [3]PROSTEP AG, Germany	**FEM analysis of a handmade tubular metallic space frame for a Porsche 550 Spyder replica car** Ioannis Zyganitidis* BLAU EI E.E., Greece
13:00 - 14:30	**Lunch** | The MET Hotel Restaurant		

			9:00 - 9:30
			9:30 - 10:00
			10:00 - 10:30
			10:30 - 11:00
Session 10D | Zephyros Moderator: Dimitris Drougkas	**Demo 10** | Maistros C	**Demo 10** | Maistros D	
Advanced pre-processing tools for process simulation of carbon fiber sheet molding compounds in the automotive industry [1]V. Romanenko*,[1]M. Duhovic,[1]J. Hausmann, [2]M. Tryfonidis, [3]J. Eschl [1]Institut für Verbundwerkstoffe GmbH, Germany [2]BETA CAE Systems SA, Greece [3]BMW AG, Germany	**Brake Squeal Analysis with ANSA and META** I. Karypidis	**Feature Manager and its contribution in pre-processing** D. Zafeiropoulos	11:00 - 11:30
Design & optimization of carbonfiber-armored plastic parts with ANSA & META Thomas Wust Kube GmbH Ingenieurbüro, Germany	**Powertrain NVH post processing** A. Sarridis	**ANSA Kinetics Solver: Latest Development and use cases** A. Paraschoudis	11:30 - 12:00
Weight optimization of a F1 composite front wing [1]Ioannis Oxyzoglou*, [2]Ioannis Neratzis [1]Univeristy of Thessaly, Greece [2]BETA CAE Systems SA, Greece	**Model build up with A/LC points for NVH and use in Pre-Post** A. Klotsikas	**VIDEO processing - A Unified Environment For Processing Test Videos And Simulation Models** S. Kleidarias	12:00 - 12:30
	A complete solution for Squeak and Rattle Analysis T. Fokilidis	**Automated Post-Processing & Report-Generation for Standard Crash & Safety Tests Simulation** N. Tzolas	12:30 - 13:00
			13:00 - 14:30

THURSDAY, June 1 - Afternoon Sessions

	Session 11A | Maistros A Moderator: Ioannis Nerantzis	**Session 11B** | Maistros B Moderator: Argyrios Radopoulos	**Session 11C** | Sirocco Moderator: Panagiotis Fotopoulos
14:30 - 15:00	**CAE active model apps** Sunil Earla*, Santosh Patil, John Skarakis BETA CAE Systems USA Inc., USA	**ANSA pre-processing strategies for multiphysics simulation of motorcycle Helmet** Matteo Pischiutta*, Alberto Salvetti Nolangroup S.p.A., Italy	**Advanced post-processing of result from Moldflow/Moldex3D and extension** [1]Jing Jin*, [2]Chenling Jiang*, [3]Zhenyi Cao* [1]BASF /Performance Material, China [2]University of Victoria /Department Of Mechanical Engineering, Canada [3]BASF/Performance Material, China
15:00 - 15:30	**The state of the BETA development platform** [1]Yianni Kolokythas*, [2]Michael Giannakidis [1]BETA CAE Systems SA, Greece [2]BETA CAE Systems International AG, Switzerland	**Study of dynamic loads on fabric car cover using coupled fluid-structural analysis** Daniele Speziani*, Fabio Vicenza, Andrea Quartararo Phitec Ingegneria Srl, Italy	**The effect of porosity on the milling of metal foams** [1]N. Michailidis*, [2]S. Kombogiannis, [2]P. Charalampous, [3]G. Maliaris [1]Physical Metallurgy Laboratory, Aristotle University of Thessaloniki, Greece [2]Laboratory for Machine Tools and Manufacturing Engineering, Aristotle University of Thessaloniki, Greece [3]Mechatronics & Electromechanical Systems Automation Laboratory, Democritus University of Thrace, Greece
15:30 - 15:45	**Closing Remarks** | Maistros A		
15:45 - 17:00	**Farewell discussions and meetings** | Technology Gallery - Foyer		
20:00 - 21:30	**Dinner** | The MET Hotel Restaurant		

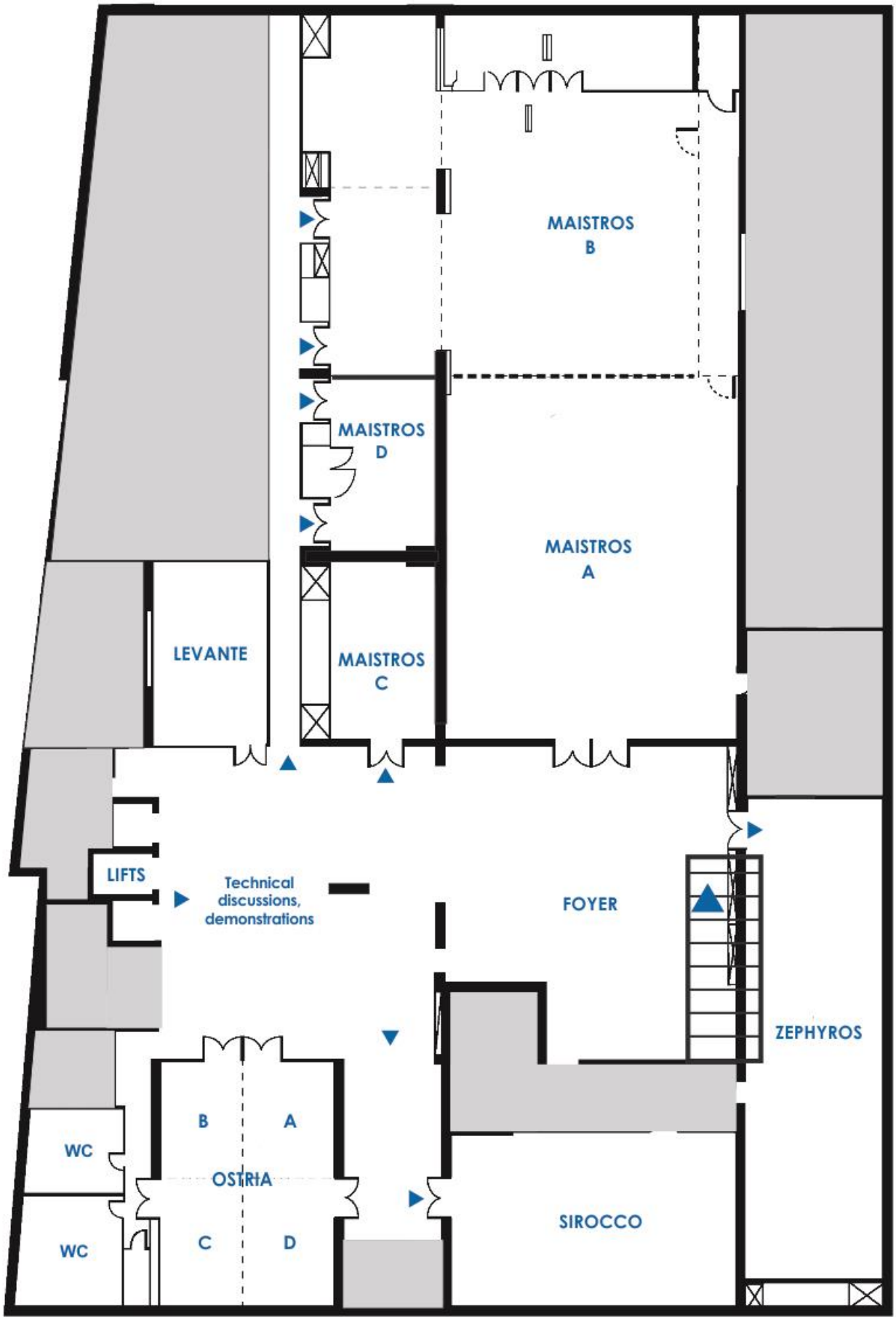
NOTES

Session 11D | Zephyros Moderator: George Kormpetis	**Demo 11** | Maistros C	**Demo 11** | Maistros D	
Reliability based robust design optimization of a Free-Fall-Life-Boat (FFLB) [1]Alberto Clarich, [1]Rosario F.M. Russo*, [2]Dimitris Drougkas [1]ESTECO SpA, Italy [2]BETA CAE Systems SA, Greece	**NVH Root cause analysis with NVH Console** V. Pavlidis	**Engineering evaluations through live reports** A. Perifanis, I. Karypidis	14:30 - 15:00
Utilizing ANSA and META scripting capabilities for propeller generation, evaluation and post processing [1]Efi Chatzivasiloglou*, [2]Lars Johansson [1]BETA CAE Nordic AB, Sweden [2]Volvo Penta, Sweden	**RETOMO: A quick and easy way from CT data back to CAE** P. Michailidis, G. Panagos	**Mid-surface: task for the "brave"? Not any more** D. Zafeiropoulos	15:00 - 15:30
			15:30 - 15:45
			15:45 - 17:00
			20:00 - 21:30

NOTES

Venue Plan

THE MET HOTEL, site map



Technology gallery

THE TECHNOLOGY GALLERY

The technology gallery (showroom) will be located at the foyer. It will offer participants a unique opportunity to interact with our Customers Service and Software Development engineers, and to discuss on current practices and requests for future software developments.

This technology gallery will be organized in different application areas and disciplines including:

- SPDRM / SDM / ANSA & META Data Management
- EPILYSIS solver / Kinetics Tool
- RETOMO
- CFD
- Durability
- Crash / Safety
- NVH
- Morphing / Optimization
- Composites
- VR : Virtual Reality post-processing
- ACP-OpDesign
- ANSA / META

Our Customers Service and Software Development engineers will be waiting to meet you at our gallery **throughout the conference,** and especially **during the coffee breaks** and the **dedicated sessions** taking place on Tuesday May 30 and Wednesday May 31 at 17:30 to 18:30.

Remote viewing will be also available to observe on your mobile the topics of your table of interest.

THE STANDS

SPDRM / SDM-Console / Data Management & Model Build

How can data and process management add value to CAE?
Visit us to see how our data and process management solutions can be integrated into your pre- and post-processing activities, creating a simulation environment that facilitates teamwork, data sharing, results assessment and decision making. Solutions offered through ANSA, META, SPDRM and KOMVOS are demonstrated here.

EPILYSIS solver / Kinetics Tool

Be introduced to EPILYSIS, the new structural analysis solver. This new member of the analysis-tools-family of BETA CAE Systems offers an easy-to-learn, cost effective option for an accurate and high performance solver.
It covers a range of needs for a general purpose solver, as it offers solutions for Structural Linear, Dynamic, and Non-Linear problems. For increased performance, special methods are followed for the analysis of large scale models, such as Automated Multilevel Sub-structuring (AMLS).
At the same stand, get closer to the latest developments in ANSA Kinetics solver. This MultiBody Dynamics analysis tool is totally integrated within ANSA, offering reduced cost and complexity in modeling and analysis processes. It allows the study of kinematic/dynamic behavior of mechanical systems that undergo large displacements and manipulates simple or complex mechanisms efficiently, according to their kinematics. Don't miss the latest features for flex bodies modelling and its related interface tools.

RETOMO

Be introduced to RETOMO, the key to 3D-modeling from CT-data of physical objects. Addressing the need of contemporary CAE community to embed new approaches, like Computer Tomography (CT) and the integration of its data into the CAE process, BETA CAE Systems brings forth new software, to support the role of CAE, especially concerning high-end complex structures with multi-material approaches.
This new software has been introduced in order to provide the capability of improving CAE based design, by adding CT to the correlation process.

CFD

We are looking forward to demonstrate our latest achievements in CFD pre- and post-processing.
Higher performance and more fine-tuned functionality is now offered within ANSA, with improved surface batch meshing and better quality surface wrapping.
Major advances in volume meshing include a fully functional polyhedral meshing algorithm that includes boundary layers and optimized structures to handle meshes of hundreds of millions of elements at significantly faster times and reduced memory requirements than before.
We also invite you to have a closer look to numerous advancements in post-processing with META. A broader range of supported results files, with new powerful visualization options, together with efficient data compression capabilities, are among the highlights to be shown.

Durability

Don’t miss the new pre- and post-processing capabilities that increase the performance of Durability simulation.
Modelling automation tools such as, the Test device Positioning Tool and the Simulation Runs through Model Browser, are some of the ANSA features in this field. The Stiffness Calculator, the Strain Gauges Tool, the Stress Linearization and the critical areas post-processing functionality are only some of the META capabilities that enhance our portfolio. Stop by in order to get familiar with the functionality offered.

Crash / Safety

We invite you to experience the latest pre- and post-processing capabilities for Crash and Safety, which constitute the most rapidly developed, advanced and complete toolkit for this discipline.
Among the latest offerings in ANSA, don’t miss the Dummy self-depenetration tool, the Dummy Marionette tool for LS-DYNA pre-simulation set-up, the Low-Speed test tool, the Safety Loadcase Generator as well as the Occupant Injury Criteria the Pedestrian the FMVSS201U and the IIHS post processing tools of META.
Furthermore, you will be informed about the latest development of ANSA Model Browser LoadCase set-up for Crash analysis.

NVH

If you are interested in our latest solutions from a wide range of effective tools dedicated to NVH analyses then don’t miss the opportunity to meet with our expert engineers in NVH.
Be quided through the easy creation of Nastran loadcases and model configuration through the newly introduced tool "Loadcase Assistant", which facilitates the build-up of the solver file.
Take advantage of A/LC_points as smart markers in assembly build and loadcasing setup. Template driven and ID independent loadcasing enables a robust model variant comparison.
Analysts can take advantages of usage of Nastran Super Elements which can be now created and managed from within an easy environment. Also FRF reduced representation of components can be crated to drive an FBS analysis in META.
Pre-test analysis techniques introduced in META which facilitate the determination of the measurement as well as the driving point (hammer position) locations in a test analysis.
Complicated NVH analyses are addressed with the NVH console where the capabilities for “what-if studies” and post-processing have been extended.
Calculation performance has been significantly improved satisfying the needs of big model assemblies. All these offered from within a refined user interface.
Powertrain analysts can benefit from the effective solutions in ANSA and META.
Operational data of run-ups coming from 3rd party measurement software can be directly used in the new load case assistant. The respective results can be plotted in META as Campbell diagrams from where orders can be extracted from the order tracking tool. Advanced exterior acoustic post-processing with Directivity plots and ERP analyses completes our portfolio for Powertrain NVH.

Morphing / Optimization

Visit us and find out how ANSA pre-processor and META post-processor in combination with all popular optimization codes provide a complete tool for optimization applications.
From concept design to final testing, ANSA & META package brings enormous performance and versatility to the optimization problem set-up.
The ability to control the model's shape using the ANSA Morphing Tool, ANSA model values and even complicated tasks such as batch meshing and model checking, makes the tool unique. The ANSA functionality for optimization workflows through the Task Manager, along with fast and versatile Morphing Box definition and manipulation functions are among this year's highlights.

Composites

The integrated laminated composite material modelling and analysis process is now further enhanced, with the addition of the support of solid composite elements, the shell-to-solid conversion, the incorporation of the Draping tool and the extension of the Composite Post toolbar. Visit this stand to be introduced to the most effective CAE toolset in this domain.

VR : Virtual Reality post-processing

Extending the capabilities of META post-processor, we offer Virtual Reality in post-processing. This is implemented with the support of the HTC VIVE VR headset to provide a unique experience in processing FEA results from a closer and more realistic perspective.
In the VR area visitors will have the opportunity to try the VR capabilities of META that include:

- Virtually walk-around a real size model of a vehicle and its side-impact simulation results.
- Physical focus on areas of the simulation model, e.g. walk into the cabin or even the engine compartment.
- Virtual walk-around a real size model of a vehicle and its CFD results.
- Physical focus on CFD results at areas of interest with the use of Cut Planes and Streamlines.

We are looking forward to demonstrate and discuss the developments in this area and also listen to your opinion and thoughts of how the VR capabilities could be integrated to your FEA workflow.

ACP-OpDesign

Be introduced or updated on the ACP OpDesign. The optimal Design Gateway which reveals the path to optimized products.
The ACP OpDesign revolutionizes the product design and development process through a holistic, performance driven method.
Based on the advanced SPDRM process management software of BETA CAE Systems, it captures ETA's Accelerated Concept to Product (ACP) Process and delivers a streamlined optimization-led design path.
It orchestrates the phases of product design and development and evaluates multiple design concepts under multi-disciplinary loads, through Topology, and Geometry, Grade & Gauge (3G) optimization.
It acts as an Optimization suite or led by design optimization, provide the tools to design products from concept.
ACP OpDesign is enabled by combining the power of ANSA's modeling capabilities with its connection with most well-known FEA solvers, Topology and Parametric Optimizers, and META's post-processing automation.

ANSA / META

Our engineers are looking forward to host you at the ANSA/META suite stands to demonstrate and discuss with you any topic regarding the capabilities of our software.
Enjoy among others the ANSA “Remote Viewer” on your mobile devices as well as the new Rendering feature of META.
Don’t hesitate to approach us and let us know about your questions and requests for development that will enhance our co-operation and products further.

PRIVATE MEETINGS

Refer to the secretariat to arrange a private meeting about your confident topics with our Customers Service and Software Development engineers.

Our staff will be pleased to make the appropriate arrangements.

Meeting rooms are subject to availability.


Greek night

THE "GREEK NIGHT"

As in our previous conferences, the social event "Greek Night" will further boost the interaction among the conference participants.

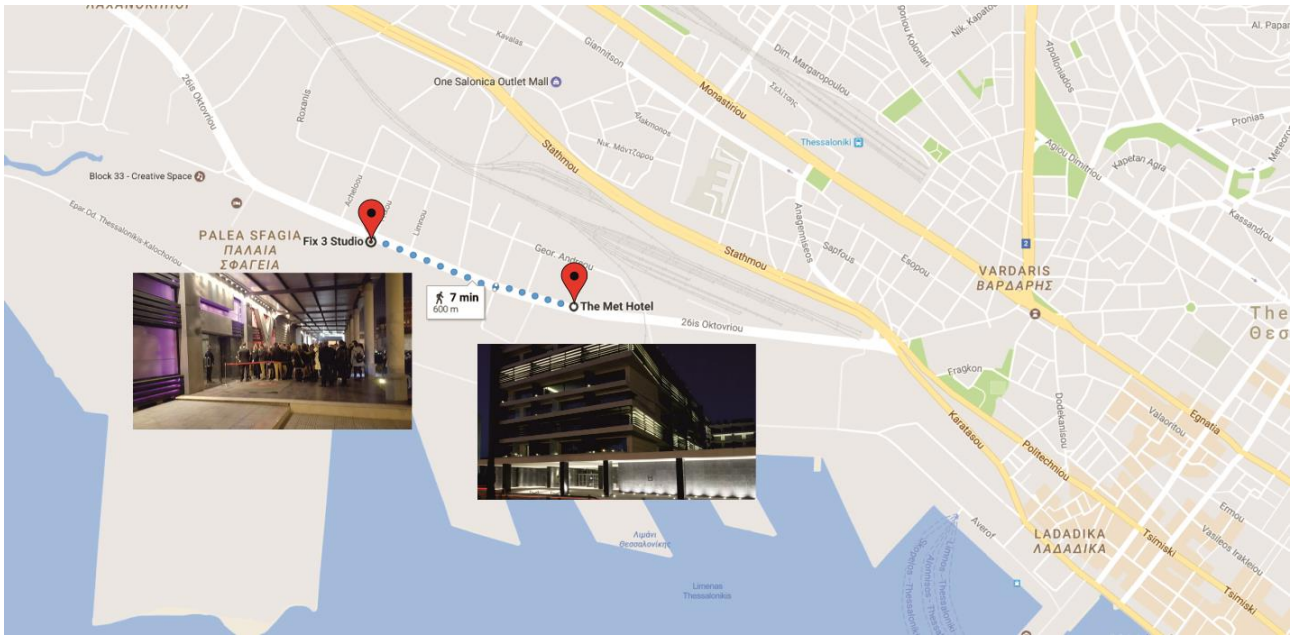
A music band will introduce you to the Greek tradition and the delicious buffet will travel you to the world of local gastronomy.

The event will take place on the **May 31st, 2017** at **8:30 pm.**

LOCATION & TRANSPOR-TATION

The location of the "Greek night" will be at the

FIX Live (26is Oktovriou 15, Thessaloniki 546 27)




Abstracts

Session 1

WHY TO SIMULATE… MORE?

Sam Saltiel
BETA CAE Systems International AG

ABSTRACT –
Which are the reasons that we are so strongly interested in predicting physical phenomena that have not occurred yet? This keynote message reveals the surprising profound reasons why we simulate and why we should run more simulations in order to enjoy its benefits.

Session 2

KEYNOTE SPEECH: CHALLENGES AND SOLUTIONS IN THE SIMULATION PROCESS FOR ADVANCED ELECTRO – OPTICS TECHNOLOGY - IMPLEMENTING ANSA & META IN ELBIT SYSTEMS ELECTRO-OPTICS ELOP

Yair Soffair
Elbit Systems Electro-Optics El Op., Israel

ABSTRACT –
The Opto-Mechanical field has unique demands besides the stress issue: minimum deflections and distortions due to vibrations, pressure and temperatures and minimum weight for airborne and hand-held applications:
Pressure differences distort the structure damaging image and optical performance.
Opto-mechanical structures subjected to Random Vibrations are also distorted due to natural frequencies and amplifications resulting in poor line of sight retention.
Thermal soaks and gradients on structures containing materials with different coefficients of thermal expansion cause deflection and optical elements distortion which reduce optical performance.

Those structures usually contain many parts with different materials connected by bolts and glue.
The strength, stiffness and weight are critical and structure optimization including parts replacements is often needed.
In order to reduce development time and TTM improving design quality and performance we started a benchmark for several pre/post processors including MSC/APEX, ALTAIR/HYPERMESH and BETA/ANSA & META to replace MSC/PATRAN.

The process was very intensive including courses, webex, hot line support and working with each software for actual projects.
Key issues, such as geometry clean-up, 2-D mesh, mid surface generation, volume meshing, connectors, NASTRAN interface, CFD mesh for FLUENT, thermo-elastic analysis, large models and post processing were examined.
We found ANSA & META as the best software and a very responsive developers team.
As we perform thermal analyses with MSC/NASTRAN solver we needed a thermal module for it in ANSA.

BETA was committed to develop this module according to our special needs and did it within few months with full collaboration with us.
This module works well and we are using it for our projects very successfully and we entered TEC (Thermo Electric Cooler) equations inside.
Some optimizations were done using TOSCA activated from ANSA menu.
Today, all the structural & thermal analysis engineers in ElOp are using ANSA & META as pre/post processor.
Our challenges for the future is to be familiar with the advanced features such as common model, configurations, post processing random results, scripting with python in order to reduce time in repeated processes, Kinetics and Additive Manufacturing optimization with TOSCA.

FROM MODEL ASSEMBLY TO LOAD-CASE SET-UP: A HOLISTIC APPROACH

[1]Irene Makropoulou[*], [2]George Nikolaidis, [2]Lambros Rorris
[1]BETA CAE Systems SA, Greece
[2]BETA CAE Systems International AG, Switzerland

KEYWORDS –
Model organization, includes assembly, simulations template, data management, simulation run composition

ABSTRACT
Contemporary product development poses great challenges to the CAE software vendors to deliver solutions that will boost productivity and reduce the simulation turnaround time. On one side, rich product lines, high product diversity and a multitude of simulated phenomena increase the complexity of the model handling and organization. On the other side, short development cycles require that CAE tasks are distributed and parallelized among different teams and individuals. Both these factors render the modularization of the CAE model more than necessary. But, is it possible to get the benefits of modularization without the downsides?

This contribution introduces a new simulation environment in ANSA for the composition of simulation runs in a modular, bottom-up approach, from subassemblies to higher-level assemblies, loadcases and simulation runs. This new environment integrates state-of-the-art technology for model assembly and loadcase application, and by making extensive use of a data management backbone, it delivers a concrete solution for quick and easy composition of the solver main files either “from scratch” or by modifying a previous simulation.

The presented simulation environment addresses a number of key challenges for modelling and analysis teams in the CAE community: How to assemble ready made, validated includes without modifying them during the creation of the connection elements? How to assemble files without loading them at all? How to avoid id conflicts between includes without keeping track of id ranges for each include? How to define loadcases by using library files that will first be adapted to the model and then be treated as “read-only” during the output of the main file? And also, how to capture the complete map of simulations that need to be carried-out on different model configurations without the need of complicated spreadsheets?

KOMVOS – SDM CONSOLE: THE INNOVATIVE SIMULATION DATA MANAGEMENT PLATFORM

[1]Athanasios Fassas[*], [2]Georgios Nikolaidis
[1]BETA CAE Systems SA, Greece
[2]BETA CAE Systems International AG, Switzerland

KEYWORDS –
SDM CONSOLE, ANSA, SDM, METAPOST

ABSTRACT –
The exchange of data between the Pre – Processor and a SDM System requires high user expertise in both sides, who should be in a steady direct communication in order to fulfill the trouble-free exchange of data. For this reason BETA CAE Systems introduced the SDM Console, which builds a direct interface between ANSA and 3rd party SDM systems and supports the CAE engineers along the whole process.

SDM Console is an innovative Simulation Data Management platform for the interactive browsing, visualization and handling of all data related to CAE analysis, from PDM extractions to simulation runs, key results and reports. With a user-friendly and intuitive interface that integrates a powerful 3D-viewer, SDM Console makes it possible to manipulate the CAE models, get information on their meta-data, generate model reports and access model statistics with no need for prior knowledge of ANSA, META or any other SDM system.

Being flexible and adaptable, SDM Console serves the function of a powerful front end for data search, navigation and collaboration that can be integrated in all CAE environments, since it performs equally well with all CAE data management systems: From the smaller-scale file based ANSA-DM to corporate solutions such as SPDRM or any other 3rd party SDM system, SDM Console can become the single reference point for the management of all CAE data.

The function of SDM Console spans beyond data browsing to data processing as well. Through this platform it is possible to initiate data processing tasks on-line, by integrating existing workflows with custom action calls, or export data packages for off-line processing. This particular capability makes it ideal for the preparation and delivery of data packages to external services suppliers.

Session 3A

IMPLEMENTATION OF A SIMULATION DATA MANAGEMENT SYSTEM AT CEVT

[1]Niclas Dagson[*], [2]Irene Makropoulou, [2]Menelaos Pappas
[1]China Euro Vehicle Technology (CEVT) AB, Sweden
[2]BETA CAE Systems SA, Greece

KEYWORDS –
CAE data management, CAE processes, automation, standardization

ABSTRACT
In the beginning the CAE data management and the CAE processes could be maintained by the CAE engineers themselves. The best practices were easy to share among just a handful of people and new employees could be trained on-the-fly. But, with such an exceptional growth rate in terms of number of employees, these processes soon generated a great workload for maintenance and training, and it also produces a great number of data on a daily basis. The constant strive to reduce the lead time for the CAE process was pushing the limits on what is possible to quality assure on a manual basis. The need for system support within CAE data management was found crucial.

CEVT conducted a study on the lead time of the CAE-process at that time. The study concluded that too much time was spend in the modelling phase of the CAE process and less on analyzing the results and developing countermeasure proposals.

In this context, BETA CAE System's SPDRM (Simulation Process Data and Resources Management) was selected as a process and data management system for CAE. Process-wise, SPDRM had to establish a basic infrastructure for the CAE-process with integrated process chains from geometry to reporting, offering flexible integration of various CAE-applications used in the CAE-process. From the data-perspective, SPDRM had to store data in a structured, efficient and quick-accessible way. Furthermore, the semi-automatic processes based on the best practice to give direct support for the CAE engineer e.g. during modelling of a sub-system.

This paper describes the first implementation of the SPDRM system for process and data management for some simulations disciplines e.g. Fuel Economy, Safety and NVH, starting from the requirements, going through the implementation steps and concluding with the description of the deliverables: A unified platform for the management of data and harmonized and standardized processes with more automated tasks, where reusability of partial models across the simulation disciplines is natural. All-in-all maximizing the CAE teams capability of delivering fast results - still maintaining high quality.

MODEL BUILD-UP MADE EASY: A PROCESS PROPOSAL BASED ON THE SDM CONSOLE

Michael Tryfonidis
BETA CAE Systems SA, Greece

KEYWORDS –
ANSA DM, SDM Console, Batch Meshing, Compare, Mid-Surfacing, META viewer

ABSTRACT –
The task of the engineer that administers the FE-Model build-up process is not only to collect all the source data from various OEM-specific source systems, but to supervise their very transformation into simulation models, many times in cooperation with internal/external engineering service suppliers, even multiple ones per project.

Existing process automation capabilities (such as cad-files conversion and batch meshing) combined with a data management facility (ANSA DM) help in saving pre-processing time, as well as in reusing model-data.

The amount of car derivatives as well as the load cases to be examined is increasing, leading into a big amount of simulation models that has to be generate. Therefore, the requirements of the build-up process need to reach another level, in order to increase productivity without dropping FE-model quality:

- Can the project administrator have access to OEM-specific source systems with features that speak his own CAE-language?
- And in such a way that even if somebody is not necessarily a specialist in terms of ANSA functionality, but just knows the basics (or even less then that), can nevertheless build cars with it?
- Still keeping the overview of the build-up process of multiple car derivatives, consisting of thousands of parts each, and is not overwhelmed by an avalanche of data and information?
- All this incorporated in one tool?

The answer to these questions is given in form of a process proposal for the model build-up phase in this paper. The key process steps will be outlined, giving emphasis to key tools such as the Compare Tool or the META Viewer. A key role in the FE-Administrator's job will play the SDM-Console, a control panel with a twist of project management qualities to it. Finally, the tangible merits of the new FE-model building process will be shown, as well as a brief look at what will follow as future developments.

Session 3B

VEHICLE TIRE SIMULATION MODELLING

Athanasios Papadopoulos*, Apostolos Mitroglou
BETA CAE Systems SA, Greece

KEYWORDS –
Topo, Mesh, Volume Mesh, Abaqus, META

ABSTRACT –
Tires are one of the most critical components of a vehicle.
In the last years FEA - simulations take increasingly active part to the Tires development, and they are used in combination with the experimental tests for the efficient Tire construction.
With the evolution of the FEA simulations, the companies can simulate all possible scenarios that a Tire will have to deal with, during its lifetime.

In the FEA simulations the tires are tested in 2D and 3D cases.

BETA CAE Systems provides a complete solution where the user can import the Tire geometry; create the surface and volume mesh according to specific parameters and finally set-up the boundary conditions for each possible scenario.

The main test cases in the FEA field are:
- tire inflation
- patch pressure
- curb strike
- Several scenarios that require Multiphysics analysis, like aqua-planning.

After the continuous recent development in ANSA, for the support of the required Abaqus Tire Modelling keywords, provides the ability to set-up several kind of Tire simulations through the BETA suite.

A PROCESS FOR CREATING, MANAGING AND DEPLOYING MATERIALS IN ANSA

[1]Hubert Lobo[*],[1]Eric Strong, [2]Yianni Kolokythas
[1]Matereality, USA
[2]BETA CAE Systems SA, Greece

KEYWORDS –
Materials information management; enterprise materials; master material file management

ABSTRACT –
Systems simulations involve material models for many materials. Since different kinds of simulations may be performed ranging from NVH to crash, such material files exist for a variety of solvers. It is a difficult task to ensure the self-consistency of material nomenclature for all these cases, such that the materials information is current and the right material files are used for each material. We present a system where materials information is uniformly deployed to CAD and CAE from libraries set up in Matereality. Consistent naming conventions and unit systems are used. Material files are linked to source material data for reference and traceability.

Session 3C

THE CHALLENGE OF MANY DIFFERENT APPLICATIONS SOLVED BY ANSA

Tom Fahner*, Roland Broers
Actiflow, The Netherlands

KEYWORDS –
Variety, workflow, challenge, CFD, consultancy

ABSTRACT –
Actiflow is a Dutch CFD Consultancy company involved in many markets. Although the application is almost always CFD, our clients stem from various markets and each market and company has their own specific requirements. This means a large variety in CAD models, a large variety in level of detail and a large variety in solver physics, which results in a large variety of mesh requirements.

The main challenge is to have a standard workflow that is flexible enough to handle the variety in projects that we see, while still resulting in an efficient time management. ANSA is the software packages that works, since the workflow is always similar, from CAD import to clean-up followed by surface meshing and volume meshing finally to output of the mesh and solver settings, with flexibility in all steps.

Important tools for clean-up and a clear interface with a lot of meshing options: ANSA provides us with the right set of tools to work with large differences in applications without having to reinvent the wheel every time. This bottom-up approach works very well and helps in communication between the engineers whenever they see a new model outside of their own specialty.

This presentation will show the large differences in our projects and how the repetition in the workflow in ANSA helps our engineers to get a good quality mesh in a short amount of time.

INITIAL CFD SIMULATIONS FROM THE AIAA HIGH-LIFT PREDICTION WORKSHOPS USING ANSA UNSTRUCTURED MESHES

[1]Neil Ashton[*], [2]Vangelis Skaperdas
[1]University of Oxford, UK
[2]BETA-CAE Systems SA, Greece

KEYWORDS –
Aerospace, ANSA, Turbulence Modelling, CFD

ABSTRACT–
This paper focuses on a recent University of Oxford – BETA-CAE Systems collaboration to participate in the American Institute of Aeronautics and Astronautics (AIAA) High-Lift Prediction . For these workshops, unstructured prismatic/tetrahedral grids up to 250 million cells were generated using ANSA v17.1.0 for both the NASA Common Research Model in high-lift configuration as well as a JAXA JSM model.

These meshes were simulated in STAR-CCM+ and OpenFOAM using both RANS and DDES methods. The purpose being to both assess the capabilities of ANSA, STAR and OpenFOAM for complex geometries as well as to assess the requirements for DDES. This workshop offers the chance to benchmark against major aerospace codes and see where further research is needed. The full paper will show details of a cross-code comparison as well as a detailed comparison against the available experimental data.

Session 3D

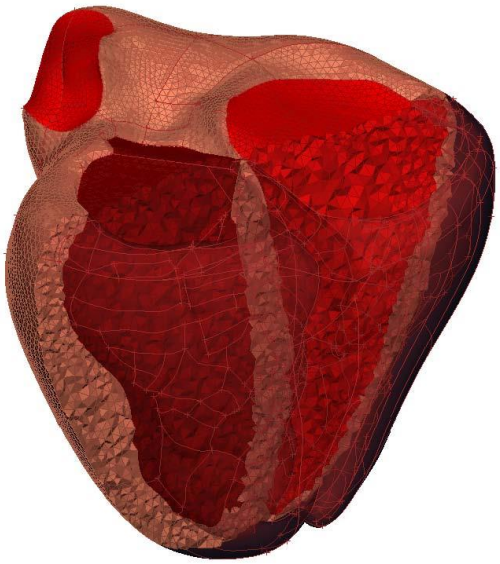
MESH GENERATION OF BIOMECHANICS GEOMETRIES

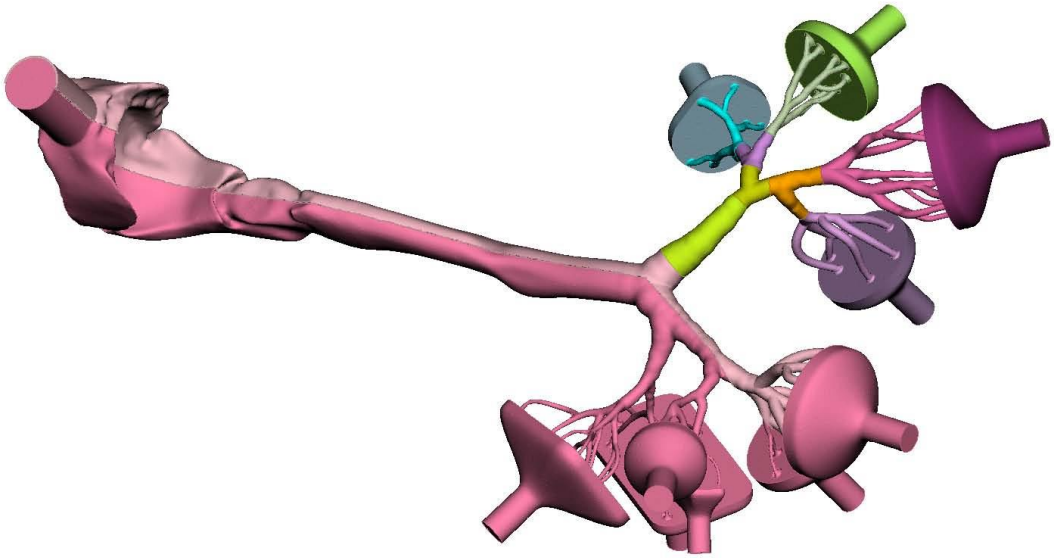
Samuel Gómez*, Alfonso Santiago, Oriol Lehmkuhl, Herbert Owen
Barcelona Supercomputing Center, Spain

KEYWORDS –
Pre-processing, High performance computing, CFD, Electromechanic, FSI

ABSTRACT–
Features and difficulties faced when mesh for biomechanical will be shown. Also, how it is influenced by the type of problem, depending on if it is a mechanical, fluid or fluid-structure interaction case. Additionally, its dependence on the order of the elements (1st order or 2nd order) and, finally, the importance of the kind of geometry (tessellation or CAD b-rep) from which the mesh was created. Furthermore, several cases, solved with Alya, the high order solver developed at Barcelona Supercomputing Center, will be exposed:

- The results of the electromechanic and FSI cases of the ventricles of a human heart.
- Different LES simulations of a respiratory system.





EQUINE SCIENCE USING BETA CAE SOFTWARE

[1]Nicolina Eklund[*], [1]Erika Engdahl, [1]Fanny Apelgren, [1]Johanna Renman, [2]Milton Eduardo Peña, [1]Magnus Karlsteen
[1]Chalmers University of Technology, Department of Physics, Sweden
[2]BETA CAE Nordic AB, Sweden

KEYWORDS –
Equine science, ANSA, RETOMO, META, Abaqus

ABSTRACT –
The equestrian world is evolving and the interest for more ergonomic and durable equipment is growing. To fulfil this need, methods to validate, improve and design new equipment is crucial. The purpose of this project was to develop such a method, by the use of software from BETA CAE Systems. The target was to study the effects exerted by the bridle on the neck of a horse, as a starting point for developing the method. A simplified 3D (Computer Aided Engineering) CAE model of a horse neck was generated by using RETOMO-tool for segmentation of medical CT-scan images. The model was pre-processed and prepared for the solver Abaqus by built-in functions in ANSA. META post-processor was used to examine the results of the simulations, showing how stress spreads around the neck by identifying areas with higher and lower stress concentrations. The outcome of the simulations provides a numerical evaluation for understanding mechanical effects on the neck of the horse, exerted by the bridle.

Session 4A

PSA/BETA PARTNERSHIP FOR ASSEMBLY

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PSA Groupe, France

KEYWORDS –
Assembly, Automation, A-Points, Connectors

ABSTRACT –
Following PSA's decision to choose ANSA as the pre-processing tool for Nastran & Radioss models, BETA & PSA collaborated to identify the best methodology to generate a complete assembly of models. This new PSA assembly process and ANSA v17 have been simultaneously developed with a common target: creation of a modern, effective and efficient process and all related infrastructure.
The process handles three main modelling stages:

1. Body welding assembly
   - The PLM system launches ANSA in batch mode to produce automatic meshes of parts.
   - The PLM system stores meshed representations of parts together with their meta-data (attributes).
   - While exporting mesh files, a "Synoptic" file is simultaneously exported, allowing automatic Body creation.
   - Benefit: Spotwelds and linear connections are fixed before model creation thanks to these files.

   Result is a fully automated welding assembly for Body, ready to run immediately at the beginning of model creation.
2. Bolt and other assemblies:
   - Bolts are decomposed in 2 "bolt" connections: 1 "screw" + 1 "nut".
   - Each bolt realization is associated to one Assembly Point (A-Point).
   - A connector is automatically created between A-Points if they respect PSA-assembly criteria.
3. Application : Automated Vehicle assembly for all disciplines and configurations :
   1. Assembly is "prepared" subsystem by subsystem, independently from complete model and from id management.
   2. Inter-subsystem connectivity is based on the automatic creation of connectors.

Next step: ANSA ⇔ SimManager connector:
- To compare Body model to PLM synoptics
- To synchronize subsystem model versions between ANSA and SimManager

COMPREHENSIVE MANAGEMENT OF SIMULATION RUNS WITH ANSA, META AND SPDRM

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KEYWORDS –
CAE tasks planning, task delegation, run composition, job submission, results management, interactive results dashboard

ABSTRACT –
The complete planning of CAE simulation activities is based on the list of analyses that need to be conducted on various configurations of the model at each project milestone. In all cases, the objective of the simulations is the assessment and improvement of performance attributes of the model at hand. This is achieved through the evaluation of hundreds or even thousands of simulation runs per attribute, thus, any advancement in the efficiency of this process has an immediate and considerable impact to the performance of the complete CAE team.

The management of simulation runs has been put under the microscope by several OEMs and software vendors, leading to substantial reduction of the CAE turnaround time by standardizing, systematizing and automating pre- and post-processing tasks. But is there more that can be done in this area?

This contribution explores the benefits and the value added to the management of simulation runs with the introduction of simulation data and process management in a simulation environment consisting of ANSA, META and SPDRM. This environment facilitates the planning of CAE tasks, enables their delegation to different users and teams, manages job submission and monitoring, automates the post-processing of run results and provides an interactive dashboard with summarized and comparative result information. The seamless integration of all simulation actors under a common data and process management environment is now possible and brings forth tremendous gains for the CAE teams.

Session 4B

DESIGN AND DEVELOPMENT OF A PROTOTYPE ELECTRIC VEHICLE'S CHASSIS

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KEYWORDS –
Chassis evaluation, linear static analysis, modal analysis, ANSA, EPILYSIS, META

ABSTRACT –
The automotive chassis is one of the most important structures of any self-propelled construction because of its multifaceted role on vehicle dynamic behavior. This paper presents the design and the development of a chassis, for the one-seated prototype electric vehicle "Louis", developed by Technical University of Crete Eco Racing (TUCER) team. The main target is to evaluate chassis deformation, based on static and modal analysis, in order to reduce weight and at the same time achieve adequate vehicle operation in a demanding low energy consumption race. The design is carried out based on specific standards and limitations set by the competition regulations. The modeling process is conducted using the ANSA pre-processor. The specifications of chassis materials linked to mechanical and physical properties are defined and set. Static loads are calculated and placed on the frame, in order to run the finite element analysis using the EPILYSIS solver and results are evaluated using META. A modal analysis is also set up and run, to determine the natural frequencies and the mode shapes of the chassis, so to partly understand the dynamic behavior of this structure. All above mentioned analyses are conducted for the 2014, 2015 and 2016 vehicles chassis. The results obtained provide a valuable insight on the evaluation procedure, final weight and factor of safety calculated. A significant reduction of weight is achieved and presented through the comparison of the three chassis versions.

ANSA/META FOR DURABILITY & FATIGUE ANALYSES

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KEYWORDS –
Durability, Fatigue, Analysis tools, Loadcase set-up, Spotwelds, Seamwelds

ABSTRACT –
It is commonly accepted that there are time-consuming tasks for the daily work of a Durability analyst. Same actions that should be repeated for numerous models as well as specific modelling steps which are load case dependent are encountered from BETA suite in such manner to address automation and achieve CAE time reduction in an efficient level. Among others, the tools are compliant to the most common solvers for durability analysis like Abaqus, Nastran, ANSYS and PERMAS in order to meet their requirements. Fatigue analysis as a part of the durability analysis plays also an important role during the development of structures. As numerous solvers and different methods exist, the CAE process of conducting fatigue analysis can hinder obstacles that can affect the quality of the results.

BETA CAE Systems, through the ANSA / META pre- and post- processors, offers different tools to cover all the multiple solution types required for advanced durability and fatigue analyses according to each solver.

This presentation will focus on the latest developments of ANSA & META for those analyses.

Session 4C

AERODYNAMIC OPTIMIZATION OF A FORMULA STUDENT CAR

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KEYWORDS –
CFD pre-processing, meshing, morphing, optimization, Formula Student

ABSTRACT –
Aristotle Racing Team has a ten-year history in Formula Student competitions, while in the last two years the team decided to evolve a complete aerodynamic package to vastly improve on-track performance.

The aerodynamic development of a Formula Student car has been proved to be a time-consuming process, which involves the design of numerous aerodynamic components using CAD software, geometry clean-up for mesh generation, model set-up, running of CFD simulations and finally result assessment. The efficiency of this loop defines the number of optimization increments, and hence the performance of the aerodynamic package. The use of ANSA meshing capabilities played a significant role in the minimization of the human time and the automation of the process, while preserving the quality of the results by the extensive use of the morphing tool.

In this paper three main studies were conducted using ANSA's morphing tool. The determination of the basic characteristics of the diffuser (length, angle and height), and of the relative position of the elements of both front and rear wings (slot gap and angle of attack), in conjunction with generation of an aerodynamic map for different front and rear ride heights, a vital datum for a detailed vehicle dynamics analysis.

In addition, the batch mesh, task optimization and scripting capabilities of ANSA allowed for a fully automated mesh generation and simulation of multiple design variants without any human interference, decreasing the time to a minimum.

LATEST ENHANCEMENTS IN PRE- AND POST-PROCESSING SOLUTIONS FOR CFD

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KEYWORDS –
CFD-meshing, pre-processing, post-processing, ANSA, META

ABSTRACT –
This presentation summarizes the latest developments of ANSA and META in the field of CFD, which allow them to excel in a very competitive market. A wide range of new features are presented, starting from improvements in the quality of surface batch meshing and surface wrapping to an enhanced powerful hex/polyhedral mesher with boundary layers, applicable to non-watertight surface data. A new smoothing algorithm introduced in Hexablock meshing tool, now allows the generation of even higher quality complex hexa meshes.

In addition, ANSA is now able to generate and handle meshes of several hundreds of millions of elements at significantly faster times and reduced memory needs than before, thanks to new optimized data structures. All these features, in combination with ANSA Data Management functionality, that allows the fast and efficient modular CFD models, offer engineers the needed solutions to their real problems.

In the field of post-processing, META now supports more native CFD formats, and offers enhanced graphics with new rendering options, improvements in Line Integral Convolution visualization as well as data compression to address the ever increasing size of CFD result data.

Session 4D

AUTOMATION IN MORPHING FINITE ELEMENT MODEL OF A DETAILED HUMAN SPINE TO A PATIENT SPECIFIC SPINE

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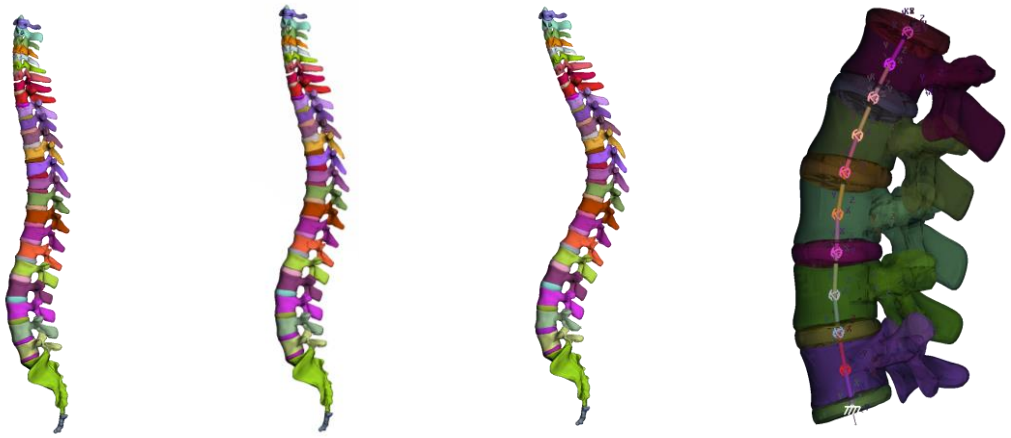
KEYWORDS –
ANSA Morphing, Automation, Human spine, Kinematics mechanism

ABSTRACT –
Finite element (FE) analysis has been extensively used to investigate clinical and injury biomechanics of the human spinal column. Anatomically accurate patient-specific FE models of spine have great potential to assist clinicians in treatment planning. However, such models typically require long development times and technically challenging mesh generation processes. These challenges make it impractical for clinicians to utilize this potential tool in their daily treatment planning process. This limitation warrants developing clinician-friendly tools with the ability to generate case-based patient specific models with least development times. This would assist clinicians in decision-making, resulting in better clinical outcomes.

This paper presents the unique techniques, tools, and automation methodology developed by BETA CAE Systems USA in collaboration with Medical College of Wisconsin. This methodology allowed a fast and easy way of morphing and adapting a generic baseline spine model to a specific spine of a given patient. The patient specific information obtained from CT scans were used in a template driven process for performing global and local shape changes. These models can then be used to study the outcomes of various surgical techniques, instrumentation, and device placement. These studies are expected to provide researchers and clinicians the insight that is difficult, if not impossible, to gain experimentally. ANSA morphing, automation, and kinematics tools were utilized in tandem with a graphical user interface to programmatically adapt the baseline spine model to a patient specific model. The baseline model development utilized robust ANSA tools such as Hexa Block solid meshing. This tool was used to build a pure hexahedral mesh and was incorporated in the optimization task to aid in DOE studies. Finally, the benefits of the new automation process in terms of significantly lowering the development times, ability to interactively morph the local surfaces of the vertebrae to represent local anatomical variations, and clinical accuracy achieved by the use of kinematics mechanism were demonstrated.



USAGE OF BETA CAE TOOLS FOR A BIOMECHANICAL APPROACH TO ERGONOMIC COMFORT DESIGN FOR SEATING

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KEYWORDS –
Biomechanics, modelling, ergonomic, comfort, seating

ABSTRACT–
The recent development in computational power and in modelling capability of Finite Element software offers greater opportunities for biomechanical simulation with industrial applications. Biomechanical simulations allow us to study the interactions between the human body and different apparatus. This technique is used, to a certain extent, in crash analysis with dynamical simulation of simplified dummy models. However, these models are not intended for the study of ergonomic comfort of seating.

This paper describes the modelling of more detailed and anatomically accurate FE models of human bodies using ANSA 17, to study automotive seats in terms of ergonomic and comfort. In order to achieve reasonable accuracy, it is important to develop anatomical models presenting complex bone structures, to differentiate tissues such as skin, fat and muscle, to account for anisotropy and non-linearity of these biological materials, to model proper contact interactions, and finally, to consider individual variabilities in terms of sizes, ages, genders and physiologies. The results from such analysis allow us to study strains and stresses inside the soft tissue, and thus enables a scientific approach to ergonomic design based on comfort and health analysis.

Biomechanical and computational-based design optimization of automotive seats could allow simple and fast improvements of user experiences.

Session 5

FROM REALITY TO VIRTUALITY: LARGE SCALE COMPUTED TOMOGRAPHY DATA FOR THE CAD-CAE EVALUATION OF A MINI©

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KEYWORDS –
Computed Tomography (CT), RETOMO, ANSA, 3D-Image processing, Non-destructive evaluation (NDE)

ABSTRACT –
The credibility of CAE, as an engineering domain, depends upon the precision with which Reality is simulated. In order for this to be assured, a high quality FE-model that resembles the manufactured car has to be build, which is quite a challenging task in itself. But accuracy becomes even more critical if simulation results need to be compared to the hardware test, especially if it is a destructive one.

Even though deviations of the abstract FE model from the CAD model are relatively easy to detect with powerful pre-processors, the engineer has no information about the deviations introduced in the real model during the manufacturing process. The OEM should assure that the simulated model is truly the one that has been manufactured, preferably before any physical testing takes place. Ideally, the two models, virtual and real one, should be able to be handled in such a way, that they are able to be compared. The expected comparison has to fulfil the basics: such as to point out any geometrical differences of interest from an engineering point of view, depending on the examined discipline.

In this paper, the results of such a comparison attempt will be presented. Reality is represented by a CT-Scan of a MINI©, courtesy of BMW Group, and the virtual model is represented by the respective CAD/CAE model, as it is used for CAE-purposes.

GAME-CHANGING FUNCTIONALITY FOR MESHING

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KEYWORDS –
Batch mesh, Mid-surface, Feature Manager

ABSTRACT –
ANSA version 18.0 introduces new concepts in the area of generating and manipulating FE-meshes, handling and treating design features during meshing, as well as a completely new approach in mid-surfacing of complex parts.
These advancements are tied together in one powerful and promising package that will enable users to save time, create more accurate meshes and have a better understanding and control of the mesh result. They will also have a direct impact in other pre-processing tasks like model assembly and design changing actions (morphing).
This presentation will guide you through new meshing strategies, show you different perspectives of existing functionality and give you some insight of what to expect from ANSA in the years to come.

HOW TO FIT AN ANALYSIS IN A FEW HUNDRED MBs

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KEYWORDS –
Compression, META, structural, CFD

ABSTRACT –
The need for storage space has increased significantly in the last years of simulation. The model size rises steadily while the number of versions examined has reached remarkably high levels. Engineering companies need to manage results files of several gigabytes and keep the history of model versions while the network load and the file system size place tight limits. The complexity of the data format does not allow conventional compression techniques to result in satisfactory solutions. To this end, META, the post processor of BETA Simulation Solutions, has developed a tool for the geometry and results compression of finite element and computational fluid dynamics models. The tool offers full control of the data accuracy stored and advanced parameterization per model component/part and per result. Furthermore, a light representation of the model can be stored additionally with the ability to effortlessly interchange between the original and the light representation on component/part level. This way, large models can be handled easily addressing the need for short loading times and efficient collaboration in global environments.

Session 6A

PRE-TEST AND CORRELATION TOOLS FOR NVH IN META

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KEYWORDS –
Pre-test, correlation, modal, frequency, MAC

ABSTRACT –
In the first part of this paper, the new capability of META 17.1 to define good positions for accelerometers and a driving point is achieved on a cradle example. It is a pre-test which is a numerical evaluation before experimental tests to ensure that the excitation is well positioned to excite modes on the frequency range of interest and the accelerometers are well positioned to be able to distinguish the contribution of each mode in the measurements. Notice that the numerical model is assumed representative.
In a second part, the benefit of LC points (Loadcase points, introduced by BETA in version 17.0) are evaluated to facilitate the work of correlation, which include in particular the transformation of models and results to be consistent (units and coordinate system) between numerical and experimental data.
In a last part, others capabilities of META for correlation (MAC, COMAC, MACCo, FDAC, FRAC and FRAC correlator) are illustrated. Two numerical models are compared according to a limited number of DOF selected in the first part. A modelling difference has been introduced and correlation tools are used to try to locate it.

TRANSFER PATH SUMMATION TOOL

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KEYWORDS –
NVH, TPA, Metapost, User Toolbar

ABSTRACT –
The NVH department at Volvo Car Corporation (VCC) uses in-house python scripts for METAPOST to post-process sound and vibration responses. Basically, the scripts take interface forces and transfer functions as input and sum up transfer path contributions. The in-house scripts have both, advantages, e.g. the possibility to plot many curves simultaneoulsly and to reuse previously defined input, and disadvantages, e.g. being an obstacle for first time users and limited speed performance.

In collaboration with BETA CAE Nordic a graphic user interface (GUI) has been developed, proceeding from the existing Volvo transfer path summation scripts. The aim has been to make the tool user friendly and combine the advantages of a text editor usage with the advantages from a GUI.

The GUI is based on the User Toolbar environment of METAPOST, but includes some advanced scripting which enables the possibility to copy and remove already defined input and plot requirements – stored in an external excel file – together with the response curves.

FORCE BASED SQUEAK & RATTLE ASSESSMENT

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KEYWORDS –
Squeak & Rattle simulation, time domain, modal transient analysis, stick-slip test, virtual development

ABSTRACT –
Squeak & Rattle is a nonlinear phenomenon. Most of the Squeak & Rattle simulation approaches are using a linear analysis in order to identify the limit when this type of nonlinearity starts to occur. In previous papers the relative displacement from a modal transient analysis in the critical interfaces has been used as assessment criteria for both squeak and rattle occurrence.
In this paper it is shown how the force in the critical interface can be used as additional assessment parameter for both phenomena, squeak and rattle. For the rattle assessment it is important to perform a pretension simulation. Different pretension approaches are presented. For the squeak assessment an enhanced evaluation of the Ziegler stick-slip test is performed.

By evaluating both the relative displacement and the force the usage of the modal transient analysis for S&R simulation becomes even more complete and consistent. The new approach is implemented both in the pre and post processing ANSA/META S&R toolbar (BETA), which resulted in an improved user interface.

The different aspects of this new approach are shown in detail on a cockpit and a tailgate assembly.

DEVELOPMENT OF A TOOL FOR THE ACOUSTIC - CALCULATION OF MECHANICAL SYSTEMS

Peter Stamerjohanns
Star Acoustics UG, Germany

ABSTRACT –
The presentation will announce the development of a new tool to optimize the calculation and evaluation of the acoustic behaviour of mechanical systems, especially drive-trains. The tool will help the designers to check the dynamic values of their models in a quick, easy and very accurate mannor. The tool will combine features of ANSA, EPILYSIS and META via a central database. The database will allow to build complex drive-train models in short period of time and to calculate and analyse the models in an automated procedure. Even for big models accurate results will be available in acceptable time, stored in small datafiles. The designers will get results from resonance-frequencies, radiated noise up to load-based stressvalues of interesting parts of their structure. Result-procedures will be available to create reports and to compare results with older or other models.

Session 6B

WHERE ASEAN AND EAST ASIA NCAPS ARE HEADING

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KEYWORDS –
Automobile, Safety, NCAP, ASEAN, East Asia

ABSTRACT –
The population of ASEAN is now around 620 millions that is more than EU and the number of automobiles manufactured every year in the region is approaching 5 millions which is one third of Japan and Korea at the moment however rapidly increasing.
Therefore the market in ASEAN will be getting more important for automobile manufacturers around the world.
Accordingly in the near future automobile manufacturers will have to tune the safety performance of their cars to fit with ASEAN NCAPs.
In the presentation it will be shown where ASEAN NCAPs are heading in association with NCAPs in East Asia.

COMPREHENSIVE SAFETY CAE FOR THE ALL-NEW VOLVO S90/V90/V90CC

Mathias Retzlaff*, P-A Eggertsen, Johan Jergeus, Ingrid Jenshagen, Michelle Khoo, Domenico Macri, Ulf Westberg
Volvo Car Corporation, Sweden

ABSTRACT–
Volvo Cars, the premium car maker, has cemented its position amongst the leaders of automotive safety innovation with its new S90 sedan and V90 wagon by being the first car maker to score a full six points in the Autonomous Emergency Braking for Pedestrians (AEB Pedestrian) test procedure and an overall 5 Star rating for both cars.

The S90/V90/V90CC cars are the second group of cars built on Volvo's SPA platform (Scalable Platform Architecture) and the development has continued to be very CAE oriented. New ways of working with CAE-tools and method development, such as windscreen modelling, new joining verification tests, head impact evaluation methods and pedestrian safety in early phases, have been developed in order to be capable of covering the complexity and accuracy of the CAE models.

BONNET BUCKLING FE OPTIMIZATION DUE TO NEW PEDESTRIAN REQUIREMENTS IN THE SEAT ATECA

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[1]J. Manuel Iglesias Bermudez
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[2] Universitat Politècnica de Catalunya, Spain

KEYWORDS –
FEM, Buckling, Local Stiffness, Finite model, Pedestrian Protection, Automation.

ABSTRACT –
The new requirements in the EURO NCAP rating led to important optimizations in the frontals car area designs. Additional efforts were required to reduce the stiffness in some strategic locations, increasing the collapsibility and improving the energy management.

The bonnet in the Seat Ateca had to face this new design challenge, finding new concepts that allow the designers to avoid local bucking problems, obtaining suitable accelerations curves for pedestrian head protection.

This FEM automation tool presented in this research has been proved to be essential in determining and analyzing a big number of bonnet surface points. Less aggressive definitions for the pedestrian protection requirement were implemented in the project taking into account the possible buckling surface problems.

AUTOMOTIVE BONNET DESIGN – ANSA CAPABILITIES TO ENHANCE THE ACCURACY OF THE FE SIMULATION RESULTS

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KEYWORDS –
Bonnet, pedestrian protection, wind-load / stiffness

ABSTRACT –
The growing pedestrian protection requirements are, in recent years, critical in the automotive product design process. Need to accurately and reliably represent bonnet behavior is vital for the new vehicle development. Not only
to successfully release the product into the market, achieve the lightweight design, but also to allow more challenging styling solutions.

This paper explains the influence of the aluminium stamping process (mainly material thinning) on the FE simulation results, ranging from pedestrian head impact performance to the quasi-static torsional stiffness analysis. This very detailed approach can improve the model accuracy (i.e component mass, HIC values or stress levels) and allows engineers to investigate the problem in more details.

Finally, the wind-load simulation will be taken into consideration. ANSA has capabilities to accurately transfer the results from CFD simulations onto the FE model. Furthermore the flexibility and intuitive user interface allows more detailed solution to the problem. Two different wind pressure mapping processes will be described and their results investigated in this paper.

Session 6C

APPLICATION OF ANSA MORPHING AND OPTIMIZATION TOOLS TO AUTOMOTIVE HVAC SYSTEM

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KEYWORDS –
Optimization, Morphing, CFD, Automotive, HVAC

ABSTRACT–
In automotive design, new optimization procedures, which can improve system internal aerodynamics are needed. In this field of application, the challenge is to choose a suitable parametrization of the typical complicated geometry and to modify the shape complaining with space constraints.

In this paper, two automatic optimization processes, with the aim of increase HVAC system efficiency, by means of reducing duct total pressure drop and improving outlet flow uniformity, are shown. The first one consists in generating many new duct designs using ANSA mesh morphing tools and analyse them with ANSYS Fluent®. The second one makes use of ANSYS Fluent adjoint solver sensitivity map to steer duct deformation by means of ANSA direct morphing tools. The two optimization methods are applied to a real car HVAC duct and CFD simulation results of optimized models are examined and compared with the original one.

INVESTIGATION OF THE SEALING METHOD FOR A NEW CONCEPT ROTARY ENGINE

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theSARMproject, Greece

KEYWORDS –
Engine, sealing, labyrinth, rotary, CFD

ABSTRACT –
The paper is about a new concept rotary engine whose power to weight ratio is up to 5 times higher than that of conventional engines and it has an up to 20% higher thermal efficiency than Otto engines. Like every rotary engine, one of its major challenge is the sealing between a moving and a stationary part. Purpose of this paper is the investigation of the most suitable labyrinth that could minimize the leakage during the combustion process between the combustion- (50 bar) and the compression-chamber (2 bar). The investigation uses a CFD analysis and it was based in the four most dominated labyrinth systems found in the literature. The conclusion of the investigation is that the sealing of gas-turbines for their blades is the most efficient one and this comes in line with the initial expectation that this engine has more common characteristics with a gas-turbine rather than a reciprocating or Wankel type engine.

INFLUENCE OF MICRO-CT EXTRACTED 3D POROUS MEDIA GEOMETRIES ON CFD SIMULATION RESULTS

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KEYWORDS –
Porous rock, micro-CT, ReTomo, surface extraction, OpenFoam

ABSTRACT –
Understanding the physical behaviour of fluid flow and transport in porous media with complex porous geometries is not trivial. Recently, it has become possible to obtain real 3D geometries for the pore system of real rocks using micro-Computed Tomography (micro-CT) data. In this work, a comparison has been attempted to demonstrate the impact of 3D surface pore geometries obtained from ReTomo versus open-source software on single- and multi-phase flow results. A number of porous geometries has been tested to show the effect of extracted mesh quality on volume mesh generation and pre-processing and subsequent CFD results. Results obtained at various flow rates demonstrated that ...

X-RAY MICRO-COMPUTED TOMOGRAPHY FOR LIQUID VOLUME FRACTION MEASUREMENTS AND CAVITATION EROSION INVESTIGATION

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KEYWORDS –
X-ray, micro-CT, cavitation, erosion, surface extraction

ABSTRACT –
The flow inside a purpose build enlarged single-orifice nozzle replica is investigated both experimentally and computationally. The nozzle is part of a closed-loop flow circuit and it has been designed to replicate the main flow pattern observed in high pressure Diesel injector nozzles, with focus on cavitation structures, their interaction with turbulence and the induced material erosion. The highly transient flow features that are taking place, such as cavity shedding, collapse and vortex cavitation, have become evident from the high-speed shadowgraphy images. Moreover, the vapour volume fraction inside the orifice has been quantified using time-averaged X-ray micro-computed tomography (micro-CT), which provides three-dimensional slices of the object and are used (a) to identify internal geometric features of the object, and (b) to distinguish between media of different densities, i.e. liquid and air/vapour. Results have been obtained at Reynolds and cavitation numbers similar to those of real-size injectors, using a variety of normal and de-gassed Diesel fuels. Good agreement for the cavitation extend inside the orifice is found between the micro-CT and the corresponding temporal mean 2D cavitation images, as captured by the high-speed camera. However, the internal 3D structure of the developing cavitation cloud reveals a non-symmetric hollow vapour cloud ring formed at the hole entrance. Finally, micro-CT enabled the reconstruction of the orifice surface, which provided locations of cavitation erosion sites developed after sufficient operation time. Results appear promising and pose challenges in both, realisation of quantitative measurements of cavitation vapour fraction inside an injection hole and the relevant tools for meaningful results post-processing.

Session 6D

ANALYSIS PROCESS AUTOMATION WITHIN VPD BRAÅS

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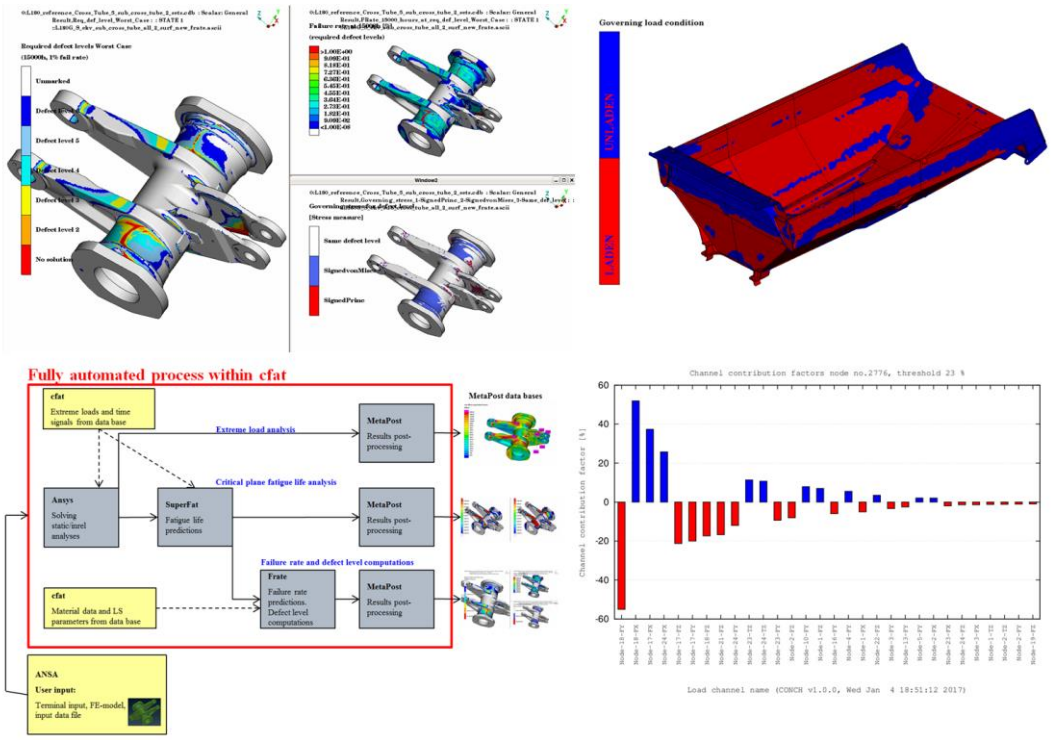
KEYWORDS –
Automation, fatigue, weld, cast

ABSTRACT –
The Braås VPD department, forming a part of Volvo Construction Equipment, has 15 full time employed engineers and offers a broad range of services within the field of Virtual Product Development. Support is given to development and advanced engineering projects by means of e.g. strength & durability and NVH analyses as well as Multi Body Simulations.

Strength & durability questions at issue occupy the majority of the engineering hours and spans over a broad range of different finite element analyses and subsequent evaluations:

- Static linear- and non-linear (weld-, cut edge- , cast fatigue, max load evaluation etc.)
- Transient dynamics (weld- cut edge fatigue etc.)
- Random vibration (weld- cut edge fatigue etc.)
- Quasi-static explicit (rubber strength and fatigue, ROPS evaluation, low speed collision with objects)
- Deformation and residual stress simulations of welding processes

Automation of complete analysis processes in order to increase efficiency, minimise user errors and decrease the amount of repetitive tasks, thereby releasing engineering hours, has been set as strategic goal within the department. Some of the already implemented processes will be presented in the paper. Furthermore, the paper will mediate a brief description of experiences gained in connection to the exchange of pre- and post-processing tools within the department.



AUTOMATION OF DOOR DYNAMIC SIMULATION SETUP USING ANSA TASK MANAGER

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KEYWORDS –
Dynamic Over Check, Abaqus, LSDYNA, ANSA Task Manager

ABSTRACT –
Simulation of door durability dynamic analysis using ANSA as a pre-processor is driven by a Standard Operating Procedure (SOP). It involves performing a set of tasks to convert a Static deck for an Abaqus run into a LS Dyna deck for dynamic simulation which needed to be performed manually. The tasks involve creation of linear and nonlinear springs, Mapping of linear materials from equivalent nonlinear materials in Abaqus, contacts for dynamic simulation, converting beam elements to connector elements and in turn create MPCs, set up initial and boundary conditions, definition of dynamic load case control cards and finally perform standard checks.

The automation of the above set of tasks in a sequential format was achieved using the ANSA Task manager. It provides an easy to use interface with seamless transition between the task manager and the main ANSA GUI. The automation was achieved using built in Task Manager Functionality as well as the python scripting interface in ANSA. The automation significantly reduces the time needed for set up from 6 hours to less than 0.5 hours. It eliminates manual errors and duplication of effort and aids in standardization of process.

ANSA AND EPILYSIS AS A LINEAR ELASTIC FRACTURE MECHANICS (LEFM) TOOL FOR 2D STRUCTURES

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BETA CAE Italy Srl, Italy

KEYWORDS –
LEFM, 2D structures, Crack Propagation

ABSTRACT –
Crack propagation is one of the most critical aspects that must be taken into account to determine Flight Inspections Intervals of an airplane.
Test campaigns and simplified models (based on mathematical solutions and boundary elements) represent the standard tools for this discipline.
The FEM approach could be very helpful to build more realistic models and to accurately evaluate the Stress Intensity Factor at the crack tip.

The aim of this tool is to start integrating

- The Automatic FEM model mesh generation in order to evaluate stress
- The Linear Elastic Fracture Mechanics equations implementation (through a VCCT approach) to evaluate Stress Intensity Factor at the tip(s) of the crack(s)
- The capability to deal with long and complex load histories for crack propagation calculation

in order to extract for 2D structures

- Stress Intensity Factor curves as a function of the crack length
- Crack Length curves as a function of the number of cycles

SOLID ELEMENT BASED FATIGUE ANALYSIS OF WELD JOINTS: BETWEEN THE POLES OF EFFORT AND ACCURACY

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KEYWORDS –
Fatigue assessment, weld modelling, finite elements

ABSTRACT –
Typically, in the automotive industry, the numerical fatigue life analysis of seam welds is based on shell models. Determining the local stiffness and the fatigue life of weld details with those models is a challenging task; especially for closely spaced welds as well as for the connection of metal sheets to thick walled or solid components.

Modelling weld details with solid elements allows for a meaningful description with respect to the load path and the stiffness. Applying a relatively coarse mesh for seam welds leads to an advantage for the fatigue assessment process compared to the detailed modelling required for the well-known “notch stress” approach with a reference radius r_{ref} = 0,05 mm at the weld’s root and toe.

For industrial applications the approach proposed reduces modelling and computation effort. The related mesh generation and post-processing techniques are presented. Exemplarily, improvements in the description of local stiffness are illustrated on typical weld details. In addition, the accuracy of numerical fatigue analyses is assessed based on the results of fatigue tests.

Session 7A

HONDA APPROACH TO AUTOMIZE THE NV CAE PROCESS

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KEYWORDS –
CAE, Noise & Vibration, Auto-process, Data management

ABSTRACT –
Design studies of vehicle structure for noise & vibration reduction with FE models are complex and operators are always struggling with these procedures. In addition, future CAE process will become more complex so it's so hard to catch up with manual skills anymore. We defined that standardization & automization are the direction of our enhancement.

BETA and Honda have collaborated to realize our next CAE environment. How BETA and Honda approach this challenge by ANSA, META, and SPDRM will be shown.

ALTERNATIVE MESHING STRATEGIES FOR ACOUSTIC RADIATION: A CASE STUDY

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BETA CAE Systems SA, Greece

KEYWORDS –
Acoustic radiation, meshing, wrap, intersect approach

ABSTRACT –
With the comfort standards in automobiles significantly increasing during the recent years, in even the smaller classes, customer expectations on acoustic performance has also increased. In addition, with traffic noise considered an environmental health issue, regulations on noise emission limits also mandates the creation of quieter vehicles.

Vehicles have a number of noise sources, such as the engine, the tires, the brakes, and the cooling fans. Noise is in most cases a result of vibrations and is radiated acoustically both into the interior and the exterior of the vehicle.

The challenge to reduce noise, while at the same time increasing competitiveness by reducing costs and saving time, has made manufacturers to involve simulations on acoustic radiation in the very early designing stages of components subjected to dynamic loads. These CAE-processes offer great assistance in reducing the need for creating physical prototypes, and same time offer the ability to conduct numerous experimentations and assessments.

In this paper, three modelling methodologies for the acoustic radiation analysis setup of a powertrain will be presented and compared to each other: 2 of them are an approach of the structural component (wrap-based methodologies), while the other is an exact representation using the original mesh as a reference. The target is to compare them as meshing strategies as well as of the respective benefit that they provide in terms of simulation results.

Session 7B

WORKING WITH THE BUILT IN PODESTRIAN TOOL BARS IN ANSA AND META AT VOLVO CARS CORPORATION

Ulf Westberg
Volvo Cars Corporation, Sweden

KEYWORDS –
Pedestrian, ANSA, META

ABSTRACT –
Before any pedestrian testing could be done, the car has to be marked. The marking divides the front of the car into zones which is assessed using the appropriate impactors. There are different protocols to follow how to do this, depending on the test to be carried out, certification or rating. When the testing area of the car is known, the target points have to be selected and the impactor should be positioned correctly at the target points. The number of impact points are often 100+. Doing both the above tasks manually, is cumbersome and time consuming. ANSA provides an automatic way to set them up by using the pedestrian toolbar.
Furthermore, presenting the results of such a large number of simulations, needs to be done in a clear way. The pedestrian toolbar in META offers tools to get a clear overview of the pedestrian status of the car.

Both ANSA and META offer great opportunities to customize your own toolbars for tasks that are done often and in large scale. At Volvo Cars Corporation, customized toolbars that are easy to adapt according to the user's need, have been used for a while.

MACHINE LEARNING PROCESS TO ANALYZE BIG-DATA FROM CRASH SIMULATIONS

Constantin Diez
Adam Opel AG, Germany

KEYWORDS –
Crash Simulation, Machine-Learning, Big-Data, Inference

ABSTRACT –
Machine Learning has shown to be a key technology in many disciplines like object recognition or natural language processing. In this contribution we will give an introduction to machine learning in the field of Crash Simulation and CAE. The scope will cover the topics of automated simulation results comparison by means of dimensionality reduction, as well as inference of cause and effect with decision tree learning as key technology. The paper will explain the data analytics process flow for selected examples, showing how to analyze and understand the behavior of an ensemble of 1000 simulation results quickly.

Session 7C

AUTOMATION TOOL FOR UNDERHOOD AND UNDERBODY THERMAL SIMULATION

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Xitadel CAE Technologies, India

KEYWORDS –
Process Automation, CFD Modeling, Productivity Improvement

ABSTRACT –
Effective Thermal management is an important consideration in the product development of passenger vehicles. Simulation of Thermal management is key to achieve not only passenger comfort but also to manage the heat generated from the tightly packaged engine compartment.

The UHUB process facilitates co-simulation of thermal and fluid flow to identify underhood hot spots and also to help improve the performance of the engine fan and vents. Model building and checking for this simulation are usually laborious and error prone. UHUB process is an end-to-end integrated process in ANSA which interacts with META Post and TAITherm. The scope of automation spans from water-tight geometry preparation to report generation and yields significant quality and productivity benefits.

SENSITIVITY ANALYSIS OF THE DIMENSIONS AND OPERATING CONDITIONS OF A NEW CONCEPT ROTARY ENGINE

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KEYWORDS –
Engine, 1D, 3D, Boost, Fluent

ABSTRACT –
2D and 3D simulations of a new concept rotary engine concluded that it produces higher power to weight ratio (up to 5 times) than Otto engines and has a higher thermal efficiency (up to 20%). It is crucial to test this engine in a wide speed range (1,000-15,000 rpm) and identify the parameters that influence its efficiency and output power the most. This paper conducts an 1D sensitivity analysis with AVL Boost in combination with 3D CFD simulations for validation (ANSYS Fluent). Energy values such as pressure, combustion, torque, output power were evaluated as function of the geometrical characteristics of the engine. The main conclusions are that the engine was choked over the 8,000 rpm and the most efficient speed was 4,500-5,000 rpm. In general, the most important parameters that limited its operation in high speed are the flow rate of valves and the pressure chamber's geometry.

Session 7D

ACTIVE DOE© EXTENSION: DOE AUTOMATION TOOL FOR MULTIDISCIPLINARY ROBUST DESIGN OPTIMIZATION USING STOCHASTIC ANALYSIS

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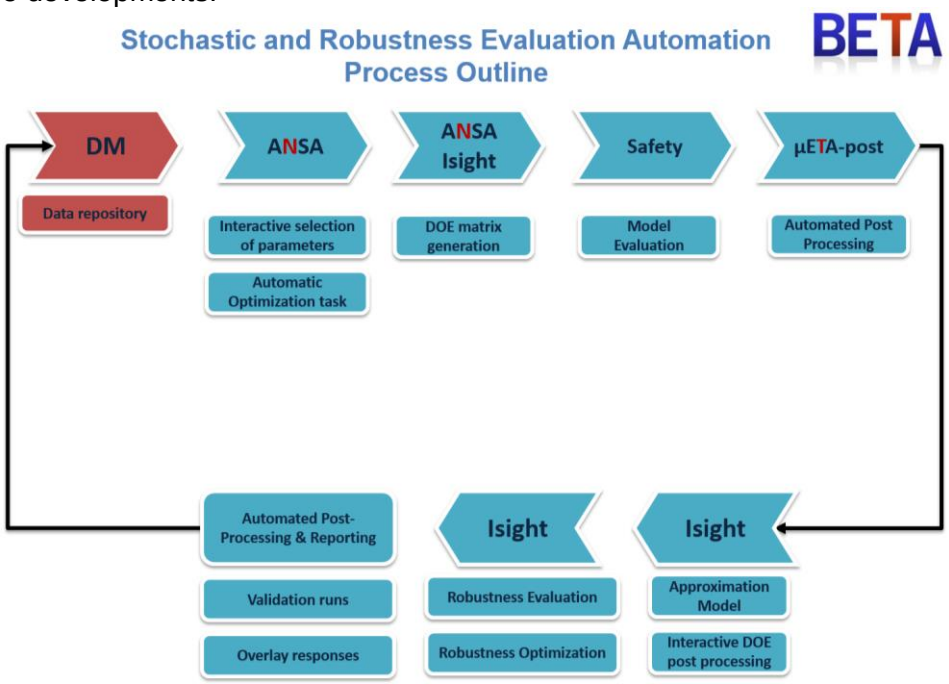
[1]DS SIMULIA, USA
[2]BETA CAE Systems USA Inc., USA

KEYWORDS –
Optimization, Robust design, Stochastic analysis, Automation

ABSTRACT –
A new software extension, **Active DOE** ©, in the software palette of BETA CAE Systems will be presented. Active DOE is a tool based on the initial collaboration between BETA CAE Systems USA and SIMULIA for the benefit of Fiat Chrysler Automobiles. The objective was to come up with a software solution for automating the stochastic and robust design optimization process. The DOE automation process developed helps engineers enhance their current workflow related to the multidisciplinary robust design optimization using GUI driven standardized process. The entire process is integrated in the ANSA environment with ANSA common model as a single source of truth. The tool allows users to interactively select the parts to include in the study and setup the design variables for optimization. The template driven process allows selection of prebuilt load cases and responses, response surface generation, approximation model building, robustness evaluation, and robustness optimization. The post processing functionality provides options to run the validation runs of the optimal designs, overlaying results of different designs, and generating detailed PowerPoint reports. The tool in its current release has the prebuilt load cases for Safety simulations using Isight as the optimization software. The future releases will have other discipline load cases to select as well as other optimization options. Finally, the tangible benefits of the new DOE automation process in terms of huge time savings, elimination of user errors, and streamlining the steps of the entire process will be shown, as well as a brief look at what will follow as future developments.



MULTI-OBJECTIVE DESIGN OPTIMIZATION OF STEEL FLOAT BY USING ANSA TASK MANAGER

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Ford Otosan, Turkey

KEYWORDS –
Multi Disciplinary Design Optimization, Automatization, Weight Reduction, ANSA Task Manager

ABSTRACT –
Weight reduction is one of the most critical goal of vehicle production. By this purpose, multi-objective design optimization tools are widely used. The aim of this study, obtaining weight reduction for steel float of Ford Transit vehicles. In order to find optimum design, thickness of sheet metal parts are changed automatically by using ANSA Task Manager. Then, Modefrontier is used for performing DOE. At The end of the study, 30 kg weight reduction is obtained FOR Ford Transit vehicles.

Session 8A

RELIABILITY-BASED DESIGN OPTIMIZATION IN RANDOM VIBRATIONS AND AERODYNAMICS

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KEYWORDS –
RBDO, Random Vibrations, Aerodynamics, TDRBDO

ABSTRACT –
This presentation is concerned with the application of novel reliability-based design optimization algorithms to design large-scale vibratory systems under random loads, and with the aerodynamic shape optimization of aerodynamic bodies under uncertainties. For the random vibrations part, a mass-related objective function is minimized, constrained by the time-dependent probability of failure being less than a given value. The probability of failure expresses the probability the maximum stress to exceed a user defined threshold. It is computed using joint up-crossing rates. A sparse-grid methodology is incorporated into the total probability theorem, to account for uncertainties in random variables (e.g. stiffness components of structure), and a novel reanalysis method is applied to reduce the computational cost of the structural analysis. The methodology is applied to the reliability-based design optimization of a vehicle frame under stationary loading. In the case of computational fluid dynamics, the optimal shape of an aerodynamic body is sought, considering geometrical and flow-related uncertainties. The robust drag of the aerodynamic shape is minimized under the condition the probability the lift exceeding a specified limit, is greater than a given value. The adjoint approach and a novel saddlepoint approximation method are combined with optimal design of experiments algorithms to efficiently take into account the uncertainties in the computation and minimization of an objective function under reliability constraints.

SOLUTIONS FOR NVH

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KEYWORDS –
Model Browser, Nastran Super Elements, Pre-test analysis, AMLS, TPA

ABSTRACT –
NVH analyses have some special requirements in both pre and post processing due to the need of running multiple cases within product development cycles. Usage of reduced models helps the analyser to speed up this process. Creation and handling of such reduced models like Nastran Super Elements and Modal and FRF representations for FBS analysis are now easy through new features and more efficient algorithms developed in ANSA and META.
Within this process FE analyses go always along with measurements coming from experiments. New tool developed within META facilitates correlation analysis and also pre-test analysis for estimating and determining the most efficient points to be used as measurement and driving (excitation, hammer) positions in a test model.
Quick TPA and contribution analyses on components can be driven from the respective toolbar (updated version) by just using the component FRF's and the corresponding forces in the associated connection points.
Computational time has effectively been reduced for modal analysis driven with the EPILYSIS solver by using AMLS algorithm.
The above described features are also presented in the related TU Session for NVH Solutions.

Session 8B

COMBINED ANALYSIS OF LS-DYNA CRASH-SIMULATIONS AND CRASH-TEST SCANS

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SIDACT GmbH, Germany

KEYWORDS –
Robust Design, Crash-Test Scans, Scatter, METAPOST

ABSTRACT –
In robustness campaigns and optimization processes META models are created out of a set of crash-simulations. With the help of such analyses the models used for the simulations can be improved. For example, instabilities can be found and explained or the needed material can be minimized under certain safety restrictions.

An important question in this context is: How good can these META models represent the reality? To answer this question, one can compare the crash-simulations to the real crash-tests, which were recorded by camera systems after the crash. To be able to compare the test-data with the LS-DYNA crash-simulations, we first need to convert the test-data by matching the geometries and transferring the part information from the simulation to the crash-test. Afterwards one can calculate the combination of the simulations, which approximates geometry and deformation behaviour of the test-data as close as possible. The distance and difference in behaviour between this calculated Best Fit and the actual crash-test can be used to measure the quality of the simulation model. Once the evaluation of the model is finished, the test-data can also be added to a robustness campaign as an additional simulation and used for further analysis.
This allows us to answer questions such as: How does the test fit into the simulation subspace? Which simulation runs are similar to the test for a certain crash event? Which of the dominating crash events found in the simulation can also be found in the test?

Thus, the described matching procedure combined with exemplary further analysis methods on the one hand allow for a quick and automated matching between test and simulation and on the other hand a more detailed validation of the simulation model in comparison to the actual test. Due to the conversion of the test-data, META can be used for both the simulations and the test-data, resulting in a smoother workflow.

SOLUTIONS FOR CRASH AND SAFETY

Thanassis Fokilidis*, Nikos Tzolas
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KEYWORDS –
Crash, Safety, Automation, Dummy, Model Build

ABSTRACT –
It is common knowledge that simulations of virtual models hold a key role during the design process of a vehicle. Considering the continuously growing number of Crash regulations, but also the different variants that a vehicle can have, one concludes to a plethora of similar or completely different simulations. The model build up and the evaluation of the analysis results are the key points for a successful pre and post processing. The tools that a CAE analyst should have at one's disposal must be characterized by robustness and automation to deal with the numerous and really complex numerical simulations.

The most important case during the model build up is a comprehensive model organization. BETA CAE Systems has come up with new data types that facilitate the set-up for the solver simulation run. These new data types come to fully support data management in both, ANSA and solver, files. Also, advanced capabilities of version control and the storage of all attributes that a file needs to be followed during a simulation build up, ensure a productive process starting from file input, moving to the assembly, passing to the load-case set up and finalizing with a bulk solver file output.

Moreover capabilities of META, the post processor, complete a successful numerical simulation. A complete suite of Crash tools in combination with the automatic report generation in META guarantee a clear overview and easy validation of the results of a Crash analysis.

Session 8C

RUNNING ANSA AND META IN THE CLOUD

Iago Fernandez
Gompute S.L.U., Spain

KEYWORDS –
Cloud Computing, Remote Viz, Hardware On-Demand

ABSTRACT –
Engineers are facing new challenges and companies need to re-think their investments, as on-premise hardware solutions are not flexible and cost-effective any more. Due to this, cloud solutions are becoming popular, especially when there is a need to expand on project basis.

Gompute will present the solutions and best practices to reduce the product design cycle and how ANSA and META can be integrated with the traditional FEA and CFD tools in a cloud environment, making the most out of the available CAE licenses. Common challenges like remote visualization over high latency links, large data transfer, or choosing the right hardware will be discussed.

EFFICIENT BUILD UP OF MODULAR CFD MODELS

Kostantinos Haliskos
BETA CAE Systems SA, Greece

KEYWORDS –
CFD-meshing, pre-processing, data management, ANSA

ABSTRACT –
CFD model sizes tend to increase at a fast pace, making the whole process of model build up and update a very challenging task. Technical difficulties imposed by the need to handle large data files of several gigabytes with the corresponding time penalties, as well as the delay in all operations applied on them, in combination with the ever increasing need to create and update more and more variants during the different design phases, make the whole process slow and error prone.

ANSA Data Management functionality, which has been proven for years in industrial-scale automotive development processes, now extends its functionality to address the special requirements of CFD models (watertight models) and offers a very attractive solution that allows the fast assembly of large models from sub modules. Several needs for quick model update, multiple configurations handling and different ride height setup are met with this powerful ANSA functionality.

Session 8D

STAMPING DIE TOPOLOGY OPTIMIZATION BY USING ANSA RESULT MAPPER

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KEYWORDS –
Topology Optimization, Lightweight, ANSA Result Mapper

ABSTRACT –
Die designs are generally conducted by conventional methods & standard guidelines. Therefore, the most efficient optimization studies are hardly used in this field. The objective of this study is to generate a die design methodology by using topology optimization. The contact pressures are obtained from manufacturing simulation and used for topology optimization via ANSA Result Mapper. For the new design, topology optimization results were investigated and interpreted to the CAD data by considering the manufacturing limitations.

A COMPLETE SOLUTION FOR TOPOLOGY AND BEAM SECTION OPTIMIZATION

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ABSTRACT –
In the latest release of BETA Suite, more optimization capabilities have been introduced which facilitate the concept design through the product development process.
Topology optimization is now available in EPILYSIS. Topology optimization is an ideal approach for the early stages of the design process as it can give the first ideas for the product design. With this addition in EPILYSIS, topology optimization problems can be set-up, run and evaluated seamlessly in a unique software suite.

New and former functionality collection is used for the automated definition of beam section optimization problems on large models. Using this process, simplified models consisted of beams and panels can be examined at no time using the NASTRAN SOL 200 optimizer. The resulted optimum values are applied on the detailed shell model for verification as the Morphing Tool facilitates the shape change of the detailed model.
Two case studies are demonstrate the above topics.

Session 9

INTEGRATION OF VIRTUAL REALITY TOOLS INTO THE CAE DEVELOPMENT PROCESS

Andreas Pau
Daimler AG, Germany

ABSTRACT-
With improved hardware performance, the integration of VR interfaces into standard postprocessing tools and the availability of cost-effective, high-performance head-mounted displays, the topic of virtual reality as a tool to be used by the computation engineer on a daily basis is becoming a more and more realistic scenario. When it comes to the SFB, NVH and crash areas, the standard process can be leveraged ─ without preparing the correlating data beforehand ─ to visualize the results in the VR environment at the touch of a button. The use of prototype solutions makes it possible to "experience" simulation results, devise more effective working models for collaboration and simplify interaction with the respective models. Working in the design space intuitively, using both hands for interaction, accelerates the work process. In collaborative projects, employees can make changes directly to the model and generate 3D sketches. An export option that saves data can then be used to access these changes in all subsequent process steps. From the perspective of a young engineer, using modern media such as VR makes working more enjoyable, which in itself is one more motivating reason to engage in further development activities.

RETOMO: THE KEY TO 3D-MODELLING FROM CT-DATA OF PHYSICAL OBJECTS

Evangelos Karatsis*, Chryssa Sferidou
BETA CAE Systems SA, Greece

KEYWORDS –
Computer Tomography, Mesh, 3D-Image processing

ABSTRACT –
Addressing the need of contemporary CAE community to embed new approaches, like Computer Tomography (CT) and the integration of its data into the CAE process, BETA CAE Systems brings forth new software, in order to support the role of CAE, especially concerning high-end complex structures with multi-material approaches.

This new software, RETOMO, has been introduced in order to provide the capability of improving CAE based design, by adding CT to the correlation process.

Due to the immense amount of different data definitions and the overall complexity to interpret material and geometry, the need for a robust –yet intuitive– tool was more than demanding. RETOMO comes as a solution to this, by processing CT data in correlation with CAE and CAD data and applying high-end methods to read, process, reduce, reconstruct and visualize the CT for the analyst/engineer.

The extension of high-end pre-processing tools, such as ANSA from BETA CAE Systems family products, to support this process offers a wide range of advantages, due to the extremely rich meshing functionality and file interfaces.

RENDERING DEVELOPMENTS IN META

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[2]BETA CAE Systems International AG, Switzerland

KEYWORDS –
Rendering, photorealistic, lighting, remote hardware acceleration, virtual reality

ABSTRACT –
CAE engineers are constantly trying to replace physical tests with realistic simulations, thus reducing cost, time and effort during the development phase of a product. As META is widely used in the automotive industry for visualizing and post-processing simulation results coming from various load cases and disciplines, the need for visualizing the results photo-realistically has also emerged. Multiple developments took place in the graphics engine of META, thus allowing photo-realistic visualization of results for engineering tasks, e.g. for identifying dents on surfaces, visualizing permanent deformations, evaluating damage during a crash, or for presentation purposes. Developments led to higher reporting quality and various performance improvements such as the faster saving of images, videos and the fully hardware accelerated remote visualization. All of the above, together with the support of VR devices in META provide a better user experience to CAE engineers.

Session 10A

ANSA: ENABLING INNOVATIVE MODELLING PRACTICES

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[1]Jaguar Land Rover Limited, UK
[2]FAR, UK

KEYWORDS –
CAE Modelling, ANSA python scripts, hybrid structures, multi-material structures

ABSTRACT –
In vehicle simulation, structural mechanics of deformational forces and energies play a crucial role. Initially the most important task is to compile a 'fit for purpose' CAE model with an acceptable approximation to the physical event. Common modelling practices provide considerable simplification to the complex set of inter-related CAE model decisions. These decisions are commonly reached through clean mathematical descriptions and empirical findings. As such they are best suited to well-known patterns of structural mechanics and behaviours.
The combined onset of new vehicle architectures, hybrid material structures, and alternative powertrains, could mean common modelling practices no longer result in satisfactory approximations. To further develop these practices an on-going research study within ANSA's pre-processing functionality proposes to establish python™ machine-learning patterns able to determine and execute best-suited modelling decisions. Five main modelling areas are being examined in detail: model assembly & interactions, element parameters, mesh patterns, geometric detailing, and material model choices. This paper describes the use of ANSA's python™ scripts to establish an adaptive approximation approach to efficiently realise a 'fit for purpose' CAE model.

PYTHON SCRIPTING IN ANSA/META FOR AUTOMATED TASKS PROCESSING DURING VEHICLE DEVELOPMENT PHASES

[1]Tunç Uzun, [1]Heiko Wüstner, [2]Thanassis Fokilidis
[1]Ford Werke GmbH/Ford of Europe, Germany
[2]BETA CAE Systems SA, Greece

KEYWORDS –
Automation, ANSA python scripting, PD Vehicle Safety

ABSTRACT –
For many post-processing tasks in the daily vehicle development process, highly customized tools have to be chained in order to retrieve and visualize complex results in very short time frame with adequate effort. This goal can only be achieved by using easy to use and yet powerful scripting capabilities implemented in ANSA/METAPOST in order to 'glue' the various tools together.

This paper discusses a few examples on how to use the ANSA/METAPOST python scripting module for highly automating the pre-processing of CAE models (Weld-Spot processing) to various custom scripts for CAE results post-processing.

FEATURE RECOGNITION AND MESH GENERATION FOR POWERTRAIN USING ANSA SCRIPT AND C++ PROGRAMS

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[2]Integral Technology Co., Ltd., Japan

KEYWORDS –
ANSA script, powertrain, feature recognition, mesh generation, pre processing

ABSTRACT –
To ensure a certain quality of simulation results, it is essential to create mesh according to specific mesh rules as different FEM meshes can give significant result change.
This paper describes how we generate mesh satisfying the detailed mesh rules for powertrain modeling by recognizing various specific features from the shape of input 3D CAD models and creating appropriate mesh automatically using ANSA script and C++ code.
We used ANSA script to create database, calculate from geometry shapes, call ANSA commands and execute C++ programs. We used C++ programs to solve complicated calculations that do not require geometry data.
Using the feature recognition and mesh generation techniques, we achieved to automate mesh generation procedures for powertrain following the specific mesh rules.

STUDY ON USING GEOMETRIC HASHING IN ANSA FOR SHAPE RECOGNITION AND DATA MANAGEMENT

Marieswaran Ramasamy
EASi Technologies, India

KEYWORDS –
ANSA DM, data management, Python API, Geometric Hashing, Shape recognition

ABSTRACT –
Geometric hashing is a technique to create an index of geometry based on geometrical properties. This paper explores the application of geometric hashing in ANSA Shape recognition is one of the biggest advantage of this technique. Aims to create a list based on unique geometric attributes. When a new part is created, it will be checked with already created list to check for reusability.

This method can be used in Data management. Current ANSA DM is using Module id and revision to create the index of parts. Module id is created from the part name which was given by cad tool. In this study I create a method based on geometric hashing to use in ANSA DM tool. Main advantage with this new method is we can match parts even though part names are different.

ANSA Python API is used in creating all this methods. ANSA API is very flexible in customising ANSA to experiment new methods

Session 10B

THE GENERATION AND MAINTENANCE OF THE 150% COMMON MODEL AT CEVT

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[1]China Euro Vehicle Technology (CEVT) AB, Sweden
[2]BETA CAE Systems SA, Greece

KEYWORDS –
ANSA, SPDRM, 150% Common Model, Standardization, Lead-time reduction

ABSTRACT –
In this work ANSA and SPDRM work seamlessly together to provide an efficient environment for the generation and maintenance of multi-configured vehicle models, commonly referred to as the "150% model".

At the heart of the procedure lies a simple but very important rule: "no part should be modelled twice; existing models should be reused wherever possible". In other words, all disciplines must share the same modelling techniques as long as possible and the resulting models should be suitable for cross discipline simulations. This rule can be relatively easily applied in the isolated case of a single vehicle configuration, but scaling it up to cover the wide spectrum of vehicle configurations and variants of today is a major challenge.

This work will focus on how CEVT has adopted and expanded the Common Model concept in order to create, utilize and maintain a multi-configured 150% common model as a single source of information from which all individual vehicle variants can be produced and become readily available for downstream CAE processes. Key elements to these procedures are the tight integration of ANSA to SPDRM and the Python-based automation and standardization enhancements achieved through the ANSA Task Manager.

Last, but not least, the effect of the adopted methodology to the overall reduction in CAE lead-time is discussed.

AUTOMATIC GENERATION OF HIGH-QUALITY CAE MODEL USING ANSA

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KEYWORDS –
Modelling automation, ANSA, time saving, standardization, quality measurement

ABSTRACT –
With improvements in analysis precision and computer performance, complex CAE models are required in order to faithfully reproduce an actual vehicle. However, it is difficult to meet the demand for stable quality on a limited development schedule if a conventional modelling approach is used. Therefore, to generate high-quality CAE models in a short time, a new automation tool has been developed using ANSA.

Automation has been applied to the modelling steps: input parameters, meshing, connection creation and model check, for parts of cab sheet metal and chassis frame. It enables users to generate FE models for Durability, NVH and Crash analysis. Connections, which had previously been particularly difficult, are now created much more efficiently by reading connectivity information automatically in the tool.

Additionally, there are various criteria regarding mesh and connection which directly affect the analysis results and therefore must be satisfied. Beginners typically spend many hours to meet these requirements, while experts can meet them in less time due to their specialized knowledge of the modelling process. Therefore, we quantified such experts' know-how and standardized it as criteria in the tool so that anyone can generate high-quality FE models.

Thus, applying the automation tool to the development process greatly reduced the time needed to create CAE models with stable quality. Expansion of this automation to other components and efficiency improvements in input design parameters are planned to be addressed in the future.

χMCF: A standard for joint information, covering PLM

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ABSTRACT –
Technical systems like passenger cars consist of thousands of individual parts which are connected by different kinds of joints (welding, gluing, riveting, screws etc.). The characteristics of a system and its components depend significantly on the used joints. Corresponding data must be available in the complete life cycle (design, simulation, testing, production, service, re-cycling). The increasing diversity of joining processes leads to a huge variety of attributes (geometry, joining partners, additional materials, processes, etc.) which are necessary for a qualified characterization of the joints. Often several engineers are working simultaneously on the same part and joints. But, as a rule, everyone is interested only in a subset of attributes pertaining to a specific joint. Frequently, joint attributes are created and maintained decentralized. This leads often to incompleteness and inconsistency of the data and thus inefficient processes.
χMCF (Extended Master Connection File) is a standard which has been developed by the working group 25 "Joining Technology" of FAT/VDA (The Research Association of German Automotive Union) and published as a detailed FAT report (No 286).
By χMCF, the attributes of a joint element are described unambiguously in a neutral way. The definition of the attributes can begin with few attributes only and grow towards full description during the development process. χMCF is open for new joint technologies, is open for company or tool specific data which are currently not yet covered in the general standard, and new joint elements can easily be integrated. By χMCF, an efficient process chain can be established with regard to the joint information. It is also a key enabler for further automations of all kind of virtual process steps.
χMCF 3.0 covers most of the joint elements which are commonly used in the automotive industry. The implementation of χMCF 3.0 in the finite element pre-processor ANSA of BETA CAE Systems International AG marks a milestone of the application of χMCF in the CAE process.

Session 10C

EVALUATING VISIBLE PERMANENT DEFORMATION USING THE IMPROVED RENDERING TOOL IN META

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KEYWORDS –
Visualization, visible permanent deformation, perceived quality, rendering, META

ABSTRACT –
The automobile industry continuously works to shorten the lead time during product development. One way of doing this is by using CAE analysis as a tool for evaluating different design proposals. The use of CAE analysis during the development process is becoming increasingly important since prototype build and physical verification of cars is both expensive and time consuming. The evaluation of a “no visible permanent deformation” requirement is often hard to perform in the CAE post-processing tool but easier to evaluate in the real world after a physical test. The light reflections from the surface needs to be examined in great detail by the human eye from different angles. Using the new improved display mode to visualize models photo-realistically rendered in META helps the CAE engineer to evaluate the simulation results in a similar way as the physical test results are evaluated. An example is shown from the early development of the new Volvo XC60.

FE ANALYSIS ON ELECTRIC MOTOR SUBJECTED TO EARTHQUAKE

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KEYWORDS –
Electric Motor, Response Spectrum Analysis, Finite Element Method

ABSTRACT –
A Finite Element approach has been applied to assess the structural response of an industrial electric motor designed and produced by Nidec ASI S.p.A. subjected to earthquake, in order to classify its performances according to the seismic safety groups provided by standards.
The electric motor was a 4 poles induction motor CR 710 Y 4, for variable speed industrial application with a rated power of 2500kW.

The 3D discretized models of the following components of the electric motor were generated: motor housing, shaft, front and rear shields; the other components were considered into the analyses through simplified models.

The 3-D CAD models of the abovementioned components were simplified and discretized using ANSA pre-processing tool. The same tool was also used to generate beam elements, lumped masses, simplified bearings elements, contacts and other connections among components. The model was hence imported in one of the most common commercial FEM software. The followed Finite Element approach foresees the execution of static, pre-stressed modal and single-point response spectrum (SPRP) analyses.

Loads related to the working conditions are: gravity acceleration, electromagnetic force between stator and rotor, rotational velocity, shaft torque and rotor unbalance force.

The seismic load is the earthquake response spectrum, in terms of acceleration vs. frequency, calculated, considering an initial damping of 2%.

Calculated stresses and displacements allowed to attribute the electric motor to the proper seismic safety group according to standards.

FINITE ELEMENT MODEL UPDATING OF LARGE SCALE STEAM TURBINE ROTOR

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KEYWORDS –
Structural Dynamics, Large Scale Structures, Modal Identification, Model Updating, Reverse Engineering

ABSTRACT –
This paper presents a computational framework for the updating of large scale finite element models. An extensible framework of CMA-ES optimization algorithm, a state of the art updating technique, was coupled with EPILYSIS solver, in order to produce computational effective results. The developed framework is applied to a high-fidelity FE model of a steam turbine rotor with several millions of degrees of freedom, using experimentally identified modal parameters. First, using an integrated reverse engineering strategy, the digital shape of the three sections of a steam turbine rotor were developed and the final parametric CAD model was created. The finite element model of the turbine was created using tetrahedral solid elements. Due to complex geometry of the structure, the developed model consists of about fifty-five million DOFs. The identification of modal characteristics of the frame is based on acceleration time histories, which are obtained through an experimental investigation of its dynamic response in a support-free state by imposing impulsive loading. The developed computational framework with appropriate substructuring methods, are used for estimating the parameters (material properties) of the finite element model, based on minimizing the deviations between the experimental and analytical modal characteristics. Direct comparison of the numerical and experimental data verified the reliability and accuracy of the methodology applied.

FEM ANALYSIS OF A HAND MADE TUBULAR METALLIC SPACE FRAME FOR A PORSCHE 5500 SPYDER REPLICA CAR

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BLAU EI E.E., Greece

KEYWORDS –
AUTOMOTIVE, REPLICA CARS, TUBULAR CAR FRAME, PORSCHE 550

ABSTRACT –
Inspired by the Porsche 356 the Porsche 550 was designed primarily as a racecar. From 1953 to 1956 Porsche 550 achieved significant success at famous circuits racing across both Europe and the US. The Spyder's excellent performance, beautiful exterior and unfortunate Hollywood connection have made the 550 one of the most frequently reproduced classic automobiles offered from various companies as a kit or as a build to order car.
This presentation will show the model setup of a hand made tubular metallic space frame from of a Porsche 550 replica car which was built from a greek car manufacturer. The scope of our study was to assess the influence of various parameters such as the dimensions and number of the tubes, the type of welds etc on the mechanical behaviour of the frame. Special attention have been paid to bending and torsion behaviour of the frame which are considered critical factors for the driveability and overall ownership experience. The unique customization abilities of METAPOST were also exploited in order to create ready to use reports of the various analysis versions.

Session 10D

ADVANCED PRE-PROCESSING TOOLS FOR PROCESS SIMULATION OF CARBON FIBER SHEET MOLDING COMPOUNDS IN THE AUTOMOTIVE INDUSTRY

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KEYWORDS –
Composites, CF-SMC, mapping, molding simulation, warpage simulation

ABSTRACT –
The design of molding tools and molding cycle process parameters for complex parts made from sheet molding compound (SMC) is often an expensive and time consuming task. 3D finite element based simulation of the compression molding process is a desirable approach which can help reduce the number of actual experimental runs. The recent increase in usage of expensive Carbon Fiber Sheet Molding Compounds (CF-SMC) for automotive series parts has placed significant importance on the process simulation of SMC parts. One example for the application of CF-SMC is the C-pillar support structure found in the chassis of the new BMW 7 series.

In contrast to Glass Fiber Sheet Molding Compounds (GF-SMC), CF-SMCs show a different rheological behavior, making common commercial software tools for mold filling simulations unreliable for predicting important process and part properties e.g. filling behavior and resulting fiber orientations.

In this work, a Virtual Process Chain (VPC) for CF-SMCs is presented and applied to a pre-series version of the C-pillar part of the new BMW 7 series. The VPC contains the two main simulation steps of mold filling and warpage simulation. These steps are coupled through an ANSA interface which transfers the necessary results from the mold filling simulation and creates material cards for the warpage simulation. First, the main ANSA Pre-Processing functionalities used in this work will be explained. Second, the application of the functionalities will be demonstrated for an automotive part.

The compression molding simulation results for two different material charge patterns will be shown. Those outputs will be used to create intermediate ANSA models which contain the 3D fiber orientation information for each case. The fiber orientation will be mapped on a warpage mesh, clustered and translated into mechanical and thermal properties for each element of the warpage mesh. A 3D laminate element definition in ANSA is used to model the solid CF-SMC and a user-defined variable is used to visualize the distribution of material properties. Results for the simulation of the cooling phase will be shown and compared to the CAD geometry and experimental optical measurements taken of the part to validate the approach. The material distribution information is transformed to a shell laminate definition to make it applicable for structural analysis (e.g. crash simulation at vehicle level).

Warpage simulation results for both charge patterns will be compared and the differences in the engineering constants will be visualized for the shell composite definition. This makes it easy for process simulation engineers to evaluate the effects of different charge patterns on the part performance.

DESIGN & OPTIMIZATION OF CARBONFIBER-ARMORED PLASTIC PARTS WITH ANSA & META

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KEYWORDS –
Carbon, Leightweight, Low Cost

ABSTRACT –
Part 1: Procedure
Here we will briefly discuss the new method, as well as the possible applications.
Short Trip:
The process is comparable to the production of reinforced concrete: instead of a steel framework, which is cast in concrete with a mold, a carbon fiber framework is inserted into a molding tool and is sheathed in an injection molding process with a thermoplastic resin matrix. Here too, the reinforcement creates an enormous increase in strength. This makes it possible to use it in highly stressed areas:
• Unit support
• Brake pedal
• Shaft covers
• Rims
• Etc.

Part 2: Interpretation
Here, we will describe how an entire design can be carried out with ANSA and META:

1. Suitability
Based on the installation space and the load assumptions, the "quick checks" are used to determine whether the component is suitable for the process.

2. Topology
The next step is to develop and evaluate the framework concepts for load transfer.

3. Dimensioning
An interface to LS-Opt was implemented to optimize the amount and amount of fiber.

4. Manufacture
The machine can also be generated directly in ANSA.

Part 3: Showcase
The method is to be presented on a shaft cover, which according to EN 124 complies with the class D 400 (up to 40t) and is thus approved for roadways and side strips of roads for all types of road vehicles. The process is now to be used to develop carbon-fiber-reinforced plastic versions according to EN124 class D, which are not only a much lighter, but also less expensive than conventional shaft covers (usually made of cast iron or steel).

WEIGHT OPTIMIZATION OF A F1 COMPOSITE FRONT WING

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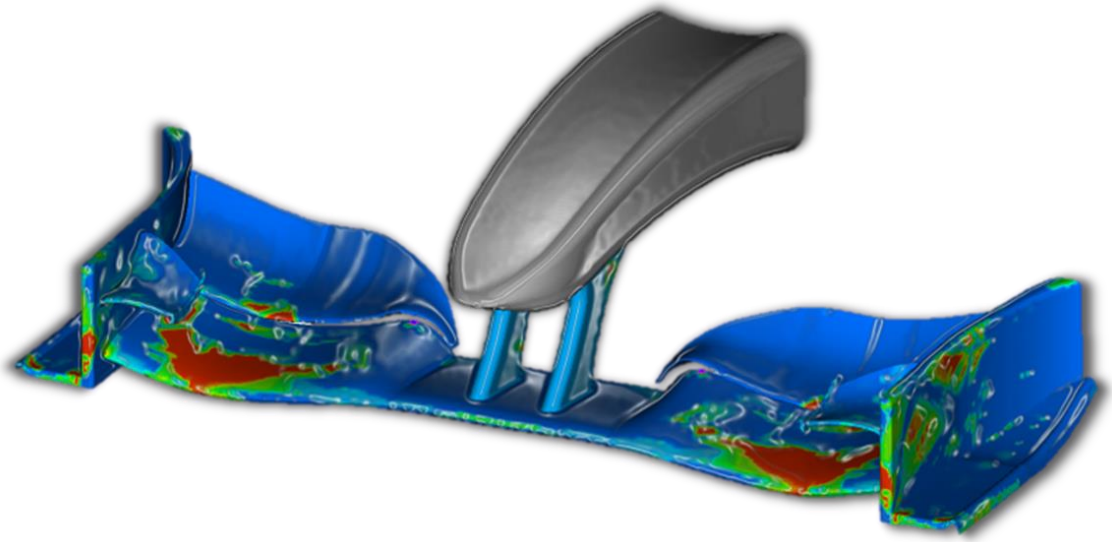
ABSTRACT –
The aim of this project is to give the user a general idea on how a weight optimization for a geometry made out of Composite materials can be done using ANSA Laminates tools, METAPOST-Processor, NASTRAN-SOL200 and modeFRONTIER optimizer. As an appropriate example, a 2011 Formula 1 front wing is selected as the model to be optimized. The main task of the optimization is to minimize the wings' total weight, while keeping it at the same time stiff enough in order to resist on the pressure distribution that is created when the car reaches the final speed of 320km/h and make it also compatible with FIA 2011 Regulations. Beginning with a CFD simulation the pressure distribution is calculated and then mapped on the FE model where it is situated as a loadcase for the FE Analysis, while for FIAs Regulation the displacement of the wing is tested under a force of 100kg. For the optimization of the wings' composite structure the layer thickness and layer orientation are used as design variables, creating each time a new laminate model while all layers are being draped after any change on the model. Finally, a comparison between the optimized model and a simple laminate model is done for the weight and the cost of each wing in order to highlight the benefits gained from the optimization process.



Session 11A

CAE ACTIVE MODEL APPS

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KEYWORDS –
Active Apps, Model Assistant, Model Diff, Active Model, Model Checks

ABSTRACT –
CAE has become an indispensable part of product development life cycle. As the importance of the simulations has grown, so has the complexity and amount of the data involved. Most of the times, CAE and CAD data are collected from various business entities in an organization. They are generated using various software, processes, modelling techniques and are exported in different formats. As a result, they are usually far from being “simulation ready” to department standards. Because of these complexities, it becomes challenging for an analyst to verify and integrate the data to perform accurate, efficient and traceable simulations.

BETA CAE Systems USA Inc. has developed the Active Apps portfolio in order to facilitate the CAE design process with a goal of shifting the burden of performing high quality simulations from the analyst to the Active Process Apps. Model Assistant helps to generate an ANSA model from a monolithic solver deck file complete with generic representations and automatic sorting of sub-assemblies. The Model Diff Tool provides an ability to easily differentiate two models by the shape, connection, joints, trim, properties and materials standpoint. In addition it facilitates the output of diff report and the Master Model update based on the differences. Model Checks Tool helps to determine the integrity of the model against the CAE standards. Active Model can understand various geometrical features of the CAD data and sort it into actionable containers. Various algorithms operate on these containers to automatically generate meshed parts, bolts and connections.

Active Apps harness the unparalleled power of ANSA to make the model build process easy and robust. The interaction with the tools is straightforward, making it easy to learn and implement in any CAE environment. Standardization captured into the process software and corresponding automation of repetitive and critical steps, make the simulations accurate, accountable, repeatable and traceable. This allows engineers to focus more on product development and organizations to save cost and increase productivity in short and long term.

THE STATE OF THE BETA DEVELOPMENT PLATFORM

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KEYWORDS –
Platform, Scripting, Python, API, Extensions

ABSTRACT –
Computer Aided Engineering is a highly technical field that demands continuous innovations and breakthroughs. In many cases, in order for innovations to take place, there is a need to jump ahead of the functionality that is currently available. The CAE tools need to provide advanced open programming capabilities were specialists can provide rapid solutions. These engineering specialists should not need to reinvent the wheel, instead APIs (Application Programming Interface) based on the latest IT industry standards should be available to them.

The goal of BETA CAE Systems has always been to provide the best CAE software solutions. We have opened our applications' programming libraries to the BETA user community, so that everyone can build upon the powerful functionalities of our software and create extensions that fit their needs.

Python's powerful ecosystem of scientific libraries together with BETA's libraries resulted into a unique, general purpose CAE development environment with unprecedented capabilities. These technologies have been embraced by the CAE community.

Continuing the effort to further improve the capabilities of the development platform new functionality is introduced that will provide greater performance, more native feel. Such functionality is the drawing artifacts on the screen and applying custom fringes, applying user defined checks on ANSA Entity Cards, using the base.Entity object to write faster and more efficient code, various new techniques to write higher performance code and how to avoid potential performance bottlenecks, ability to save, and retrieve, custom data in an ANSA database.

Moving forward we are introducing the a new distribution and commercialization layer to our development platform. Selected third party developers will be allowed to commercialize and market their application through BETA's License Manager and an on-line extensions store.

Session 11B

ANSA PRE-PROCESSING STRATEGIES FOR MULTIPHYSICS SIMULATION OF MOTORCYCLE HELMET

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KEYWORDS –
Multiphysics, ANSA, CFD, FEA

ABSTRACT –
Nolangroup is one of the leading manufacturers of motorcycle helmets worldwide. It owns the commercial helmet brands Nolan, X-Lite and Grex.
Traditionally, Nolangroup helmet design has been based on physical experiments using prototypes. In order to enhance its helmet design capabilities and reduce costs and time to market, Nolangroup have recently introduced simulations in the fields of external and internal aerodynamics, thermal and humidity exchanges, vibroacoustics for noise transmission and crash impacts.
In the framework of EU funded project Fortissimo, collaborating with MoxOff S.p.A. (technology expert) and Cineca (HPC provider), Nolangroup developed a dedicated multiphysics platform named HPCASCo which, through a customized GUI, enables automatic simulations set-up and parametrization, interfaces with the HPC scheduler system and remotely post-processes the results producing simulation reports.
The main task for Nolangroup engineers is still in the preparation of discretized computational models. In this paper we explain how we intensively exploited the ANSA software package in the pre-processing of all simulation workflows.
We first illustrate our procedure for watertight geometry preparation and batch meshing for OpenFOAM CFD simulations, then we show how we build LS-DYNA FEA crash models based on thickness shell for polycarbonate components and solid volumes for crushable foams. Finally, the main constraint of the open source code SPEED (SPectral Elements in Elastodynamics with Discontinuous Galerkin) adopted in vibroacoustic simulations is that it requires structured full-hexahedral mesh. To this aim, we developed an original meshing strategy, consisting in full-quad meshing of the external helmet surface and intruding/morphing layers of hexahedrons to fill the volume occupied by the various materials of the helmet.

STUDY OF DYNAMIC LOADS ON FABRIC CAR COVER USING COUPLED FLUID-STRUCTURAL ANALYSIS

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Phitec Ingegneria Srl, Italy

KEYWORDS –
Multiphysics, LS-DYNA ICFD, Fabric Material

ABSTRACT –
The efficiency of vehicle aerodynamics has been driven by the strict regulation in terms of CO2 emission reduction and fuel consumption.
Aerodynamics have also a role before the vehicle is delivered to the end user, the transportation of vehicle to local showrooms is done by trucks or train. In order to prevent any damage on the vehicle body due to dust, small stones or hail a textile cover is often applied. The aerodynamic flow unsteadiness is amplified by the cover displacement while at the same time the fabric cover is highly stressed.
In order to extract fabric transient load an understanding of the flow field around the covered car is needed. The problem can be studied using a classical approach of splitting the physics and use a one-way coupling, thus the flow field is calculated first and then it is applied as “frozen” to the structural field where the cover deformations are computed. As an alternative a multiphysics approach can be used, in this case both flow field and structural deformation are solved concurrently. The latter approach goes more insight into the transient dynamics of the phenomena but is much more computational demanding.
ANSA pre-processing tool is used to wrap a deformable car cover around a typical DrivAer, Heft et al. (2012), car body while LS-Dyna multiphysics incompressible fluid solver (ICFD) is used to analyse the coupled fluid and structural phenomena.
An example application has been selected, the fabric cover has been provided by Confezioni Andrea Srl and its permeability experimentally determined.
The methodology presented allows for an evaluation of the dynamic loads acting on the covering fabric and the prediction of fabric resistance to failure due to high frequency and intensity shaking.

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Session 11C

ADVANCED POST-PROCESSING OF RESULT FROM MOLDFLOW / MOLDEX3D AND EXTENSION

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KEYWORDS –
Assembled warpage, Barycentric coordinate system, moldflow, moldex3d, python

ABSTRACT –
With the development of the industry for light weight, more and more complex reinforced plastic parts are now widely used. The processing software like Moldflow and Moldex3D is commonly used in plastic moulding to simulate the melt flow and defects predictions.
The traditional post processing tools in Moldflow / Moldex3D is designed mainly for user from processing field, it is difficult to solve complex user-defined calculation. Additionally, the best solution for use is to integrate as many as possible into one single platform.
Here the paper introduced 3 typical applications that used ANSA / META to proceed the simulation result from Moldflow / Moldex3D for complex result calculation and approaches. It also can be fully integrated into optimization flow like LS-Opt or Isight.

THE EFFECT OF POROSITY ON THE MILLING OF METAL FOAMS

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KEYWORDS –
Porosity, Milling, 3D FEM Modelling, Porous aluminium

ABSTRACT –
The significance of porous materials is continuously increasing, with porosity being one of the most determinant factors to fulfil the application requirements. Among them, porous aluminium is the most used, due to its low melting point, low weight and ease of manipulation. Although porous aluminium is near-net-shape fabricated, usually, a finishing step is essential to reach the tolerances of the selected application. The present work presents the effect of porosity on the milling on porous aluminium, through a computational-experimental framework. The porous geometries of 65%, 70% and 75% porosity were reconstructed by a Voronoi-based CAD algorithm to much the geometrical characteristics of the real foam. A FEM model of the 3D closed-cell porous geometry was built to simulate the milling process. ANSA was efficiently used in the initial meshing and as a tool for remeshing the porous geometry when it was severely distorted during milling. The cutting forces monitored during milling were correlated with the FEM-calculated ones, revealing a good convergence. Depending on the porosity, the chip evolution and fragmentation mechanisms vary, leading to multiple force fluctuations in a single cut and burr formation. There is an optimum window of cutting conditions that allows for a minimum distortion of the porous geometry during milling, depending on the porosity.

Session 11D

RELIABILITY BASED ROBUST DESIGN OPTIMIZATION OF A FREE-FALL-LIFE-BOAT (FFLB)

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KEYWORDS –
Optimization, Reliability, ships and offshore, FSI

ABSTRACT –
The FFLBs are fully enclosed vessels, used for emergency evacuation from ships and offshore structures. They are launched from a specifically designed tilted platform on which they slide and then free fall, until entry to the seawater. It is of great importance to predict the behavior of such vessels at the early design stages and assure the proper function in hazardous conditions. Critical parameters such as occupants' acceleration, vessel's strength and successful clearance from the accident area, have to be considered during the design and verification process.
Combined CFD and FEA algorithms are used to analyze vessel's behavior, where numerous iterations are needed to reach convergence, including interpolation of the dynamic loads from the CFD to the FEA. However, the use of a FSI algorithm can produce results much faster and thus the design optimization can become a feasible and cost effective approach.
In addition, the fluctuations and uncertainties of operational and geometrical parameters, such as boat position, angle and initial velocity, have to be taken in account in the design process, since they influence the definition of design objectives (in particular, % of samples respecting limits on occupants' acceleration and clearance distance): the optimization under uncertainties process is also called Reliability-based Robust Design Optimization.
In this paper, a case study of the FFLB optimization is presented using a FSI solver. ANSA software is used to morph the FFLB mesh by editing its shape and its initial position, and modeFRONTIER software is used to automate the simulations and perform the optimization under uncertainties using a proper optimization algorithm. The results lead to important conclusions regarding the proper FFLB shape and operational parameters, which guarantee an optimal motion pattern of the vessel.

UTILIZING ANSA AND META SCRIPTING CAPABILITIES FOR PROPELLER GENERATION, EVALUATION AND POST PROCESSING

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[2]Volvo Penta, Sweden

KEYWORDS –
CFD, propeller, evaluation, cad generation

ABSTRACT –
Volvo Penta develops, manufactures and markets world leading engines and complete power systems for boats and industrial applications.

In this paper we focus on three different aspects, the cad generation, the evaluation and the post processing of results on propellers

On the first topic we evaluate scanned propellers provided by suppliers. In that way we are able to give feedback regarding wrong propeller generation. Currently the evaluation is done automatically with a script that runs in METAPOST.
The next step is the generation of the whole propeller in ANSA, so as the propeller design engineer will have full control over the geometry.
The last subject is the analysis of CFD results in METAPOST.


Demo Sessions

Demo 3

ANSA KINETICS Solver: Latest developments and use cases

A. Paraschoudis

In this session, the latest developments of Kinetics will be showcased giving to the audience the opportunity to become more familiar with the latest features that have been implemented. Instead of following the typical powerpoint presentation route, this session will be based on live demo examples to let users understand how the latest functionality can be used in their real case scenarios.
The session will include information on producing modal reduced files instantly using the new Flex Builder interface defining flex bodies using the Flex Assistant wizard the evaluation of stresses/strains and export of results in op2 format including simple controllers in dynamic models using simulation scripts to perform an advanced process of consecutive simulations.

Demo repeats at Session 10

Demo 4

Design and Implementation of Robust User Toolbars in Synergy with Python Scripting

A. Radopoulos

Several Post-Processing procedures feature highly complicated tasks that have to be performed numerous times through the design cycles of a new product. These repetitive and complex tasks can be automated and driven via a simplified purpose-built User Interface.

This demo will demonstrate how to develop a robust User Toolbar that generates a report presentation via a Python script. The toolbar will be made in such a way so that it records META session commands that are reproducible and will also feature a window designed using BCGUI functionality.

Technical update on NVH Solutions

G. Skouvaklis

A. Correlation and Pre-test Analysis.

Demo of Pre-test analysis techniques available in META will be shown. The eigenvector results of an FE model analysis will be used to determine the most efficient points to be used as measurements and driving (excitation, hammer) positions in a test model.

B. TPA toolbar

A case of TPA analysis will be demonstrated using as input a .pch file with the connection forces and a .pch file with the FRFs. Forces and FRFs can be matched through a dedicated tool in META and contribution analysis can be performed through special plots.

ACP-OpDesign: Optimal Design Gateway : Reveal the path to optimized products

A. Kaloudis, Th. Sarigiannis

ACP OpDesign, is an intuitive and process guided optimization desktop environment, developed by BETA CAE Systems, based on ETA's Accelerated Concept to Product process. With its optimization oriented and highly specialized user interface, based on the process depicted as a diagram in the tool, it offers to the user the capability to take advantage of an efficient, direct interaction to:

- ANSA's powerful morphing and parametrization functionality,
- custom designed META Post-processor tools,
- Topology and parametric optimization Software,
- FEA solvers

Featuring a list of tools designed and developed in the context of actual optimization projects, ACP OpDesign is truly the gateway to product optimal design.
The following demo takes you on a step-by-step guide through the various phases of the process and presents the capabilities of the software (ACP-OpDesign, ANSA and META) by means of examples.

Starting from a product design space, we shall apply the loads under consideration for a topology optimization analysis. The results of this analysis will be interpreted and transformed into a low fidelity model, which will be then validated against the same loads.

Taking this model as a basis, we will parametrize it regarding its geometry (3D shape, position, cross section), its material and its thickness, and a parametric optimization will take place. The results of this analysis will be post-processed and evaluated.

Demo 6

Model Update Techniques using Compare and the New Replace

S.Chatzikonstantinou

BETA CAE Systems provides solutions to facilitate the decision making and minimize the time needed for the Model Update. The purpose of this demo is to present how the Compare Tool can be used efficiently for the estimation of the parts' update workload, while much time and money are saved by re-using the meshed geometries of existing parts. Additionally, the user can learn how to take advantage of the new Replace Tool benefits and accelerate the update of a new sub-assembly in the existing model by re-applying automatically all the external connectors and the model setup entities. At the end, a detailed report informs the user about the success or failure of the process on each individual entity.

State-of-the-art methodology for model build and assembly

G. Haralampidis, A. Zografos

The purpose of this demo is to present the latest developments of ANSA in the area of Modular Assembly. According to the new methodology, the interface points of individual sub-assemblies are marked with special entities which facilitate the assembly of the Simulation Model. During this demo the concept of Assembly Point and the 'Bolt - Connector - Bolt' scheme will be implemented to perform the Simulation Model assembly using different connecting methodologies. A key feature of the presented approach is to enable the assembly of the final Model without loading and editing the separate sub-assemblies.

Process and Data Management for CAE Simulations

M. Pappas

This demo session addresses the management of CAE simulation runs, from the process and data management perspective. A typical user story for the management of simulation runs will be demonstrated within a simulation environment consisting of ANSA, META and SPDRM. This user story starts from the list of analyses that need to be conducted on various configurations of a model at a particular project milestone. The list of key features that will be highlighted throughout the user story includes, but is not limited to:

- planning of CAE simulation activities
- job delegation to different users and teams
- composition of simulation runs
- management of job submission and monitoring
- automatization of the post-processing of run results

KOMVOS - SDM Console highlights

A. Fassas, M.Tryfonidis

In the latest years the number of simulation runs executed during the development of each new model has been increased, which has as a result the increase of the generated data. In addition many parts are common for several simulation models. The need emerges for having a tool that can ensure saving the correct data at the correct position, can navigate through these data in order to retrieve them when necessary and can also monitor the process and give useful information to the user.
For this reason BETA CAE Systems introduced the SDM Console, which builds a direct interface between ANSA and 3rd party SDM systems and supports the CAE engineers along the whole process.
In this demo session the functionality of our new Product SDM Console will be presented. The benefits of using the functionality of SDM Console will be revealed, by presenting how several issues that occur during a common process can be handled.

Feature Manager and its contribution in pre-processing

Dimitrios Zafeiropoulos

One of the main tasks for an engineer is to verify and eventually improve the design of geometric features of parts (such as holes, beads, flanges, fillets etc.), based on simulation results. Therfore, these features tend to have special meshing requirements, as well as special design changing needs with regard to optimization.
In recent ANSA versions, a lot of functionality has been developed in order to cover these requirements. The Feature Manager tool aims to combine all this feature-related functionality, giving access to mesh manipulation settings and design change actions (morphing) through a modern and easy to use interface that ensures overview and control.
This demo will introduce the capabilities of the Feature Manager tool that is coming with ANSA version 18.0 and explain how it fits and assists in standard pre-processing activities, as well as enabling completely new ones. Finally, it will provide some hints about future extensions of this tool in coming ANSA versions.

Demo repeats at Session 10

Delivering production-ready ANSA extensions

Y. Kolokythas

BETA CAE System's powerful extensibility technology offers a unique general purpose CAE developing environment with unprecedented capabilities. Existing and upcoming functionalities and APIs enable the ones providing customized solutions to achieve even more, by allowing greater flexibility, native feel and great potentials.

In this session, a set of powerful new features for developers will be presented and demonstrated including: drawing artifacts on the screen and applying custom fringes, applying user defined checks on ANSA Entity Cards, using the base. Entity object to write faster and more efficient code, saving and retrieving data from an ANSA database. A second set of patterns and techniques allowing you to write high performing code, avoid ANSA anti-patterns will be discussed.

Demo 7

Advanced Durability Results Visualization, Analysis and Correlation

A. Radopoulos

Engineers are often tasked with the extraction and correlation of results through complex steps of post-processing, often involving more than one analysis or technique. Also, results may come from a different source, either from simulation or test and have different meshing requirements. META features various tools and supports a number of files that assist engineers to reach their final design assessment. A number of tools have been introduced in META that assist towards these processes: Stress Linearization, Strain Gauges, Critical Areas, Line Integral Convolution. This demo will demonstrate how these tools can be used in conjunction with other META functionality, e.g. Linear Combination, Modal Response, User Field Function, to assist engineers towards visualization, analysis and correlation of structures.

Mid-surfacing: a task for the “brave”? Not any more

Dimitrios Zafeiropoulos

Mid-surfacing of complex casting and plastic parts is one of the most time consuming and frustrating tasks in pre-processing. An attempt to provide a solution was made in ANSA v13.2 with the “Casting” function, which proved to have a high degree of automation, but it couldn't be considered as a 100% solution, in the sense that manual inspection and correction was required to achieve the desired mesh quality.

This manual post-processing set of actions requires the application of versatile functions such as aligning nodes, trimming/extending features, creating new surfaces, setting up correct thickness, fixing the mesh quality and in some cases even creating hybrid meshes. Moreover, the complexity of the geometries makes the checking of those results a very difficult task to perform.

ANSA version 18.0 has a new automated mid-surfacing algorithm to present, with a completely new approach for checking and fixing problematic areas. This new approach not only speeds up the whole process but also generates new potential in creating the “perfect” mid-surface.

This demo will give you a tour in the advancements of mid-surfacing in ANSA v18.0 and help you gain a better understanding of what to expect in the near future.

Demo repeats at Session 11

Demo 8

Data Management in post-processing - An interactive dashboard for results management

A. Perifanis, S. Chatzikonstantinou

A key aspect of CAE activities is related to managing the vast amount of related data both in the pre processing as well as in the post processing phase. BETA CAE Systems has proceeded in the recent years with extending its pre-processing data management system, known as ANSA DM, to post-processing. Automated post-processing actions can be initiated from within the tool and the outcome (curves, tables/spreadsheets, videos, images) is automatically placed under the corresponding model and can be readily displayed through a viewer in either ANSA or META. Post-processing sessions can be parameterized and thus, stored as library items and can be applied easily to different models / runs. Overlaying and comparing results from different versions is also streamlined, based on associations that are built intrinsically between the different model runs and their results.
This demo will present the capabilities of ANSA DM related to post-processing through a use case.

Demo 10

Brake Squeal Analysis with ANSA and META

I. Karypidis

Engineers working on brake systems often come across the challenge to reduce the squeal noise of brakes, that may be caused due to the simultaneous contribution of various parameters such as Pressure, Working Temperature, Rotational speed and Friction coefficient of the contact surfaces. BETA CAE Systems provides a combined plug-in in ANSA and META in order to streamline the treatment of several experiments occurring from the combination of the aforementioned variables. In ANSA the whole procedure can be set up using a common model that will output directly all of the necessary experiments, combining different values for the examined variables using the Latin Hypercube algorithm. META provides the user the ability to investigate all unstable modes of all experiments in a common plot and calculate the Component Contribution Factors (CCF) and the Component's Modal Contribution Factors (CMCF) on problematic frequencies of any experiment. When the whole evaluation process is complete, all of the resulting contribution plots can be automatically added in a PPTX/PDF report. This demo will show the combined process through the respective ANSA and META plug-ins, providing hints on how to extract the experiments from the common model and evaluate the results of all experiments leading to a full report of the examined variations.

Powertrain NVH post processing

A. Sarridis

Powertrain analysts can benefit from the effective solutions in META to evaluate vibration results coming from operational engine loads, the area contribution to the radiated noise and the radiated exterior acoustic field in order to assess the current design and to elaborate further design improvements. In particular operational loads and their responses as vibrations and sound pressure levels can be plotted as Campbell diagrams and in 2.5D plots. Moreover, orders can be extracted and displayed separately with the order tracking option as well as exporting them as load tables in Nastran format. Pressure distribution in polar coordinates along with a user defined meridian is provided with the Directivity plot. ERP can be directly plotted from Nastran results or calculated in META based on the modal basis of the structure. Further on 3D results are supported from various exterior acoustic solvers in frequency and time domain.

Model built up with A/LC points for NVH and use in Pre-Post

A. Klotsikas

A common problem in CAE activities in pre-processing is to build multiple loadcases on a certain model or variation of it, depending on the analysis type. BETA CAE Systems has introduced a new tool, called Loadcase Assistant (currently for building loadcases for NASTRAN) which facilitates this process through a user friendly environment.

The user is able to define the Boundary Conditions (BCs) and Output Requests (ORs) along with all necessary loadcase and solver parameters. The loadcases can be defined by combining the created BCs and ORs arbitrarily. The generated loadcases can also be saved as loadcase templates in order to be reused on another model. The created loadcases can also be associated with different configurations of the model within the same database by taking advantages of technics available in the newly introduced features of Model Browser (Parts), which offer great capabilities of creating several model setups.

The process of creating reduced representation of a part of a Model (NASTRAN Super Element, Modal representation, FRF representation) will be presented. Display models can be associated with these reduced representations. Simulation models and the respective solver file can be output for a NASTRAN solution (Nastran Super Elements) or FBS analysis driven in META and setting up the FRF Assembly tool (Modal, FRF representations).

Assembly and Loadcase points (A/LC points) are a new way to tag hard points (referring to grid ID or location) with a name. Connectors, boundary conditions and output requests, can now be defined on A/LC points instead of just model grids. Thus templates can be created and applied on various models afterwards.

In this demo the build-up of such a loadcase scenario will be presented on a model for NASTRAN analysis. A template will be generated and reapplied on another variation of the model. Afterwards the usage of A/LC points in post processing comparison techniques will be demonstrated. Comparison between two FE model results or between FE and measured results can be done without reliance on IDs.

A complete solution for Squeak and Rattle Analysis

T.Fokilidis

Comfort in a vehicle is achieved, among others, through a quiet and durable interior. One of the main aspects for achieving this, is the elimination of Squeak and Rattle noises. The corresponding tests in laboratories are numerous in order to produce interior and exterior parts that eliminate these undesirable phenomena. As a result the need for developing numerical models that explain and predict the behavior of a vehicle in Squeak and Rattle is inevitable.
A simulation method that is used for the Squeak and Rattle numerical analysis is the E-LINE method. This method focuses on calculating and evaluating the relative displacement between two components in time domain. In ANSA there is a special tool that sets up the model for a S&R analysis according to E-LINE method. This setting up concludes to a file that is able to run not only in 3rd party solvers like NASTRAN and LS-DYNA but also in EPILYSIS the BETA solver. At last but not at least META comes with a special tool that makes the evaluation of S&R results really easy. Taking into account the above BETA products format a complete solution in dealing with the demanding S&R numerical simulations.

A Unified environment for processing test videos and Simulation models

Stavros Kleidarias

Throughout the development process of a complex structure such as a vehicle, simulation and testing are both present in almost all phases. Being able to use them efficiently and concurrently maximizes the benefit to the user, providing valuable information on identifying defects and avoiding errors and delays in the development chain.

Videos are very commonly used as test results especially in crash analyses. This presentation showcases a LS-Dyna FEA model and relevant real test videos simultaneously processed in META, the post-processor of BETA CAE Systems. It will be proven that META forms a single, unified, environment for detailed FEA model results processing as well as for complete video processing

Automated Post-Processing & Report-Generation for Standard Crash & Safety Tests Simulation

N. Tzolas

There are an increasing number of standardized tests, for which a vehicle should comply with and all these tests, usually, require the generation of a standardized report.
For the generation of reports for simulated tests, after each solver run, the followed post-processing actions are always the same.
This repetition is proven cumbersome, time-consuming and prone to errors. Therefore, the automation of the execution of those actions and the subsequent report generation is required.
Apart from automating the repeated post-processing actions another problem is to compare the results of the simulated tests with the physical tests results.

This demo will present software tools developed in META, the Post-Processor of BETA CAE Systems, that automatically process and create reports for Occupant Protection in Interior Impact, Pedestrian Safety analysis and IIHS structural ratings. These tools streamline the extraction of the results for the respective tests. They lead directly to reports and create overview models for supervisory evaluation in cases of a large number of simulation runs.

Demo 11

NVH Root cause analysis with NVH Console

V. Pavlidis

This session addresses the area of reduced models and their use for the assessment of NVH behavior of complicated structures. Reduced modeling has been identified since many years as an efficient technique to master efficiently dynamic calculations on big structures which otherwise can be costly or even not feasible otherwise. The respective tools highlighted here, provide a robust and simplified procedure towards implementing reduced modeling, featuring the following sections:
- Streamlined assembly and modelling reduction
- Fast conducting numerous "what-if" studies
- Easy identification of root causes of poor NVH performance

Various configurations with multiple subcases can be built easily in a modular way also through the use of external xml files.
Numerous “what if” studies through modifying modal characteristics of components (modal damping, modal frequency, constraining modes) or by changing bushing properties can be conducted easily and in a simple way. Symmetrical treatment of entities and linking of bush connectors for bush sensitivity analyses is available. Root cause analysis is performed by means of Transfer Path Analysis, Mode Contribution, Energy Map, Grid Participations and System Modes participations. At any time and from within the same environment, the whole assembly can be output for Nastran SOL108 or Nastran SOL111 after various checks being performed real-time automatically assuring process robustness.

RETOMO: The key to 3D-Modeling from CT-Data of physical objects

Petros Mihailidis, G. Panagos

Addressing the need of contemporary CAE community to embed new approaches, like Computed Tomography (CT) and the integration of its data into the CAE process, BETA CAE Systems brings forth new software, in order to support the role of CAE, especially concerning high-end complex structures with multi-material approaches.
This new software, RETOMO, has been introduced in order to provide the capability of improving CAE based design, by adding CT to the correlation process.
Due to the immense amount of different data definitions and the overall complexity to interpret material and geometry, the need for a robust –yet intuitive– tool was more than demanding.
RETOMO comes as a solution to this, by processing CT data in correlation with CAE and CAD data and applying high-end methods to read, process, reduce, reconstruct and visualize the CT for the analyst/engineer.
The extension of high-end pre-processing tools, such as ANSA from BETA CAE Systems family products, to support this process offers a wide range of advantages, due to the extremely rich meshing functionality and file interfaces.

Engineering evaluations through live reports

A. Perifanis, I. Karypidis

Evaluation of a new model version is usually based on a combination of reviewing reports generated by automated processes and interactive post processing. Automated reports often cannot give all information needed to understand a problem that has appeared. Interactive post processing on the other hand can be tedious, time consuming and prone to errors. Another key point is the ability to find the evaluations of past versions that are related to a specific issue using appropriate filters.
This session will show the way to create in META, the Post-Processor of BETA CAE Systems, PowerPoint reports that are afterwards searchable based on defined criteria. Furthermore, functionality will be demonstrated to save post-processing work in META native databases in a way that facilitates results inspection and evaluation at a later time. A use case will be shown where such reports are filtered, the META databases related to them are then retrieved and dedicated tools are used in META to create interactive reports efficiently.

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