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KEYNOTE PRESENTATIONS - TUESDAY, JUNE 2

ALGONQUIN BALLROOM A/B/C/D

8:30 - 8:45
Welcome Address ..... N/A
Sandeep Sovani, Director of Global Automotive Industry, ANSYS

8:45 - 9:15
Good Ideas to Great Designs ..... N/A
Jim Cashman, CEO, ANSYS
Turning a good idea into a great product requires not only dedication and passion, but also a tremendous amount of engineering and numerous iterations to balance all the requirements. This is where simulation plays a crucial role. This presentation demonstrates how confidence in simulation comes from getting all of the physics right, and then combining them into a complete system virtual prototype. We will also show that advanced simulation technology is necessary, but not sufficient, for today's product development cycle. To beat the competition to market, it must be deployed correctly. Industry leaders are injecting simulation into all phases of the development cycle and making it available to more engineers. To scale simulation to this level, it is paramount to standardize on a consolidated Simulation Platform.

9:15 - 9:45
A Journey from Document Centric to Model Based Systems Engineering and Development ..... N/A
Rudy Smaling, Executive Director of Systems Engineering, Cummins
Cummins is making significant investments in both simulation tools and engineering data management tools such as ALM/PLM. Based on an integrated analytical tools architecture framework, this presentation will walk attendees through Cummins' implementation efforts towards a Model Based Systems Engineering and Development capability. The implementation strategy, challenges and experience will also be discussed.

9:45 - 10:15
Ferrari's Performance and Endurance: Role of Virtual Engineering ..... N/A
Marco Fainello, Head of GT Car Development, Ferrari
Formula 1 teams must deal with many variables in a short period of time against the highest competition: the races can only be won if the team and the car are well prepared. The role of virtual engineering in this process has been expanding and changing through the years, from component to system integration, from design to scenarios. We'll look at how Ferrari is using virtual engineering to take the best ideas from different kinds of racing and integrate them into road cars.

10:30 - 11:00
Multiphysics in Powertrain NVH ..... N/A
Mario Felice, Global Manager of Powertrain NVH CAE, Ford Motor Company
The powertrain is a major source of noise and vibration in vehicles. In the effort to make vehicles quieter, various technologies, such a mufflers, mounts and shields, are used to reduce and mitigate powertrain noise. The operation of these technologies is often governed by multiple physics such as fluid, thermal, and mechanical aspects, that are tightly coupled with each other. This talk will discuss the importance of multiphysics in simulating powertrain NVH and present the specific example of multiphysics in an engine hydro-mount.

11:00 - 11:30
Toward Efficient and Effective Global Deployment of Engineering Simulation ..... N/A
Brian Matsubara, Head of Global Technology Alliance, Amazon Web Services
As product development organizations increase the scale and global scope of engineering simulation, a more efficient deployment strategy becomes a strategic priority. A need for consistent global access to tools, scaled access to HPC and increased operational efficiency is driving many organizations to move simulation off the desktop and into the data center. This talk will show how AWS and ANSYS have teamed up to support this trend in a secure public cloud environment, opening up new levels of access and scale for automotive engineering breakthroughs

11:30 - 12:00
Platformization of Product Development ..... N/A
Peter Bilello, President, CIMdata
The discipline of new product development is entering an era of accelerating change as engineered products become more complex, involving increasingly software-intensive systems and even "systems of systems." Creating robust and resilient business platforms for product innovation requires fundamental changes for all industry participants, and will increasingly rely on modeling and simulation. To be successful, simulation solution providers must develop a breadth and depth of integrated capabilities, observe industry standards, and offer open interfaces that permit their solutions to be adaptable, extensible, scalable and compatible with other enterprise business platforms. In this presentation, CIMdata will discuss this major industry development and how product-innovation enablement is evolving.

POWERTRAIN
Algonquin Ballroom A

1:30 - 2:00
Internal Combustion Engine Design and Optimization with Integrated Multiphysics, Multidisciplinary Simulations 1
Laz Foley, ANSYS
The presentation will highlight various engineering workflows specific to design and optimization of combustion system components, sub-systems and systems. These work flows and associated processes highlight the diversity in physics disciplines, user personas, user expertise and simulation tools. A series of use cases will demonstrate current solutions and future outlooks to meet the engineering productivity demands for a comprehensive, flexible and integrated engineering CAE platform.

2:00 - 2:30
Comprehensive Diesel Engine Thermal Management and Fatigue Life Prediction 12
John Kiedaisch, Steven Ballard and Naiqiang Wu, Navistar
Durability assessments of modern engines often require accurate modeling of thermal stresses in critical regions such as cylinder head firedecks under severe cyclic thermal loading conditions that steady-state simulations cannot capture. A methodology has been developed and experimentally validated in which transient temperature distributions on cylinder head, crankcase and other components are determined using a Conjugate Heat Transfer (CHT) CFD model and a thermal finite element analysis solution. This presentation discusses the new workflow and computational methodology, which includes a decoupled iterative process between CHT and in-cylinder CFD simulations, steady state and transient thermal FEA simulations, and stress and fatigue-life simulations.

2:30 - 3:00
An Integrated Powertrain Design Cycle Solution Utilizing Complete Analysis Toolsets in ANSYS Workbench 26
Robert Draper, Westport Fuel Systems
From optimizing port flows to monitoring detailed in-cylinder turbulent mixing in natural gas engines, the IC engine layout has created a streamlined process to run complex, moving mesh simulations in a robust fashion with excellent turn-around times. This presentation will show how the ANSYS Workbench environment allows for seamless coupling of the thermal-fluid response of the system to the underlying structure for accurate prediction of metal temperatures. The inherent capability for combining all of the physical phenomena at work in the engine can then easily be accounted for in the component life calculations.

3:30 - 4:00
Importance of Combustion Chemistry in Engine Design in Engine Design Simulations 36
Ellen Meeks, ANSYS
Designing new, high-efficiency, low-emissions IC engines presents technical challenges that are often dominated by the chemical kinetics that occur during combustion. Consequently, simulations of combustion for enhanced engine designs need good fuel combustion chemistry and combustion models. This presentation will show how ANSYS solutions can provide insights into four elements that are essential in engine combustion CFD in order to predict NOx and soot emissions accurately: comprehensive fuel models, detailed kinetics, spray models and auto-ignition models.

4:00 - 4:30
Gas Engine Capability Prediction Using Fundamental Combustion Properties ..... N/A
Hui Xu, Cummins
Gas engines are typically developed with pipeline-quality natural gas, but they need to accommodate various gaseous fuel compositions in the field. It is cost- and time-prohibitive to test every fuel composition in the laboratory. Key engine performance parameters include engine combustion duration, engine NOx emissions and knock propensity. Laminar flame speed (LFS), adiabatic flame temperature (AFT) and autoignition interval (AI) provide critical information related to these parameters. In this presentation, ANSYS CHEMKIN-PRO and appropriate reaction mechanisms will be used to compute LFS, AFT and AI, which will be used subsequently to predict engine performance relative to natural gas using non-standard fuels.

4:30 - 5:00
Multi-Scale Modeling of Combined Diesel Oxidation Catalyst and Diesel Particulate Filter 51
Robert Hayes, University of Alberta
This presentation will demonstrate the use of a combination of ANSYS Fluent and proprietary software (Axisuite) to model a diesel exhaust gas after-treatment system. It is necessary to include micro scale detail, especially for the DPF to give a good model. The fine detail is captured in the sub-model using Axisuite, which is then coupled to a large scale system model for the DOC and exhaust ductwork using ANSYS Fluent. The talk will focus on the coupling and the effects on the flow of the combined DOC/DPF.

BODY & INTERIOR
Algonquin Ballroom B

1:30 - 2:00
Self Entrained Particle Contamination 70
Dragos Moroianu, Volvo Cars
Side and rear car contamination is an important topic nowadays in the automobile industry because the increasing number of sensors present on the side and rear parts of the car need to function efficiently. This presentation will outline a method to compute the distribution of wheel-entrained particles on the side of a car.

2:00 - 2:30
Advances in Robust, Automated Meshing and Solving Methods for Vehicle Aero-Thermal Simulation
Hamid Ghazialam, ANSYS 82
Generating mesh for a complex geometry such as that required for full vehicle aero-thermal CFD simulation still requires significant engineering time. In this session we will introduce automated and robust pre-processing using ANSYS Fluent Meshing to generate surface mesh and tetrahedron volume-fill with continuous prism layers. We will also demonstrate a thermal mapping technique for conjugate heat transfer analysis that will further simplify meshing, and an isotropic y+ adaptation for more accurate boundary layer resolution.

2:30 - 3:00
Multi-Objective Optimization for Cross Flow Heat Exchanger Design 117
Apurva Gokhale, Esteco
This presentation will demonstrate formal, multi-objective engineering optimization for heat exhanger design using ANSYS Fluent and other commercial optimization software. Problem setup involving both geometry and process parameters is tricky and requires effective formulation and strategy selection, which will be shown in this session.

3:30 - 4:00
Total Vehicle Simulation of the Volvo S80 with a New Common Model Approach 130
Torbjörn Virdung and Peyman Davoudabadi, ANSYS
Using a common model for different aspects of vehicle simulations reduces lead times and optimizes the use of simulation resources. This session will present a workflow in which CFD modeling of a Volvo S80 is used to evaluate several key areas of vehicle development, including aerodynamics, underhood thermal performance and brake cooling. The workflow covers pre-processing, solving and post-processing.

4:00 - 4:30
External Aerodynamic Optimization Using ANSYS Mesh Morphing 142
Marco Evangelos Biancolini, University of Rome
Aero development requires the exploration of many shape variations, so a highly reliable and fully automated workflow using HPC is needed. This presentation will show how mesh morphing can be used to make the ANSYS CFD model parametric, and how the DesignXplorer optimizer can be used to automate the calculation.

4:30 - 5:00
GTAM – GENESIS Topology for ANSYS Mechanical 162
Hong Dong, Vanterplaats R&D
GTAM is an integrated extension that adds topology optimization to the ANSYS environment. Designers benefit by automatically generating innovative designs in a reliable, robust and easy-to-use interface. The extension allows the user to set up the topology problem, optimize it, post-process and export the optimized geometry, all within the ANSYS environment. This presentation will demonstrate how GTAM, topology optimization can be applied to multiple analysis systems, including static, modal, linear buckling, harmonic and random vibrations.

CHASSIS
Algonquin Ballroom C

1:30 - 2:00
Brake Squeal, Wear and Multiphysics Simulation 180
Santosh Kottalgi, ANSYS
Automotive brakes are obviously vital components of vehicle safety and a major contributor to warranty claims, so significant research is ongoing to develop better designs. Major areas of study are brake noise reduction, wear prediction, thermal management and structural strength. To cover such a wide range of design parameters, product development teams require software tools capable of predicting single as well as multiphysics behavior. This presentation will demonstrate how the ANSYS suite of multiphysics solutions can predict brake squeal, brake pad wear, and transient brake heating–cooling phenomena along with their effects on structural strength.

2:00 - 2:30
Structural Optimization Using the New RBF Morph ANSYS ACT Extension 191
Marco Evangelos Biancolini, RBF Morph
Shape optimization is usually the final step in the design process of machine parts. Mesh morphing allows quick exploration of many shape variations in a short time. This presentation will demonstrate shape modifications using mesh morphing with full automation using ANSYS ACT technology in the ANSYS Workbench environment.

2:30 - 3:00
Hydraulic Engine Mount Performance Characterization Using Fully Coupled FSI 225
Tony Ge, Ford Motor Company and Ibrahim Yavuz, ANSYS
Hydraulic engine mounts have to firmly fix the engine in position, absorb drive and braking torque, isolate and dampen engine vibration, etc. Understanding the dynamic behavior of hydromounts therefore is crucial. In this presentation, we will analyze hydromount designs to characterize the dynamic stiffness and phase angle as a function of incoming excitations using strongly coupled multiphysics simulations. We will demonstrate Fluid–Structure Interaction simulations involving ANSYS Fluent and ANSYS Mechanical, which are strongly coupled in the ANSYS Workbench environment.

3:30 - 4:00
Static Contact Evaluation – Test and ANSYS Workbench Correlation ..... N/A
Li Jun Zeng, TRW Automotive
This presentation will discuss analytical evaluations that were performed using the ANSYS Workbench nonlinear implicit penalty formulation. For comparison, experimental evaluations were carried out using Fuji papers. The results of

contact pressure under different load cases will be shown, demonstrating good correlation between experimental and ANSYS analytical results.

4:00 - 4:30
CAD and CAE Needs for Optimized 3-D Printed Designs 243
Andreas Vlahinos, Advanced Engineering Solutions
Additive Layer Manufacturing (ALM), also known as 3-D printing, is increasingly being employed as an advanced manufacturing technique. In addition to providing an overview of ALM techniques with several examples, this presentation will show how today's Topology Optimization tools do not provide the necessary solutions for ALM design. A list of Topology Optimization enhancements required to reach the full potential of ALM will be discussed, with a focus on ANSYS SpaceClaim 3-D printing capabilities.

4:30 - 5:00
Numerical Simulation on Tire Application Using Hyperelastic Material 254
Thein Chung Ket, Taylor's University
Simulations help the tire manufacturing industry evaluate and improve the durability of a tire's design. This presentation discusses the non-linear hyperelastic material properties affecting tire response to road conditions. Changes in various dimension will improve the performance without conducting an experiment. This will save a lot of time and cost.

ELECTRIFICATION & ELECTRONICS
Algonquin Ballroom D

1:30 - 2:00
Simulation of Installed Performance of Automotive Radar Systems 267
Matt Miller, Delcross Technologies
Automotive radars must operate in complex and dynamic environments where interactions with the host vehicle and the local environment can impact the performance of the radar system. In this presentation, ANSYS HFSS and Savant software tools will be used to assess performance of an automotive radar behind various fascia designs. HFSS will be used to compute fields over a Huygens surface (near-field box) that encloses a representative automotive radar and Savant will be used to simulate the interactions with the fascia and external environment.

2:00 - 2:30
Efficient and Accurate Modeling of Automotive Radar Modules using ANSYS Electonics Desktop 288
Markus Kopp, ANSYS
Radar is already being used in automobiles equipped with parallel parking assistance and back-up safety warning features. It will be used even more in the future as driverless vehicles, which are already logging thousands of test miles on highways, become common. This presentation will show how the ANSYS Electronics Desktop can be used to design an automotive radar module from an initial design concept to the final module.

2:30 - 3:00
Automotive Connector Simulation vs Measurement A Case Study 299
David Dunham and Sung Jung Yoo, Molex
With the explosion of higher speed electronics technology in the automotive world, it is critical to simulate and validate devices at higher data rates. This presentation will compare EM simulation results using ANSYS solutions with measured results up to 20 GHz for a typical automotive connector. Best practices for both simulation and measurement methodologies will also be discussed. The simulation part of presentation will include a typical modeled automotive connector, including mated test boards and SMAs.

3:30 - 4:00
Multiphysics Analysis of Hybrid Motors in Remy ..... N/A
Jason Wei, Remy
A variety of CFD and FEA analyses are conducted in the early design stage of new hybrid motors at Remy International, including ANSYS Maxwell for electromagnetics, ANSYS CFX for water cooling, ANSYS Mechanical for durability, and harmonic noise simulations. These analyses are utilized to greatly speed up and reduce the number of design cycles, as well as to meet/exceed performance specifications. In this presentation, a recently designed hybrid motor will be used as the focus to give the audience an overall picture of how Remy's analysts utilize the ANSYS Workbench environment to accelerate new product delivery.

4:00 - 4:30
FEM Calculation of End-Winding Leakage Inductance & Skewing and Their Effects on Performance of Electric Motors 309
Emad Dlala, ANSYS
This presentation will discuss new advancements in simulation for traction motor design and system integration in HEVs. Today, the design of the motor requires a multiphysics simulation to couple the magnetic, structural and thermal aspects of the design. The electric drive is simulated in a systems environment where the interactions between different components and controls can be considered.

4:30 - 5:00
High-Frequency, High-Power Magnetic Component Design with ANSYS Maxwell 3-D 320
Mark Christini, ANSYS and Jenna Pollock, Tesla Motors
Simulation-based design is vital to meet the increasing requirements of lightweight, reliable and low-cost magnetic components for automotive power conversion systems. In this presentation, the magnetic design of power components is realized via FEA magnetic simulation using ANSYS Maxwell 3-D to optimize the winding configurations, and determine magnetic fields and losses in conductive media. We will discuss the results of a thermal simulation of the power components conducted in a streamlined environment, where the coupling of the electromagnetic simulation with the steady-state thermal solvers was achieved.

ALGONQUIN BALLROOM A/B/C/D

8:30 - 8:40
Welcome and Awards Announcements ..... N/A
Sandeep Sovani, Director of Global Automotive Industry, and Aleksandra Egelja-Maruszewski, Senior Reginal Technical Manager, ANSYS

8:40 - 9:15
Automotive Industry Transformation from Simulation to the Industrial Internet ..... N/A
Etienne DeGroot, Director of ISV Market Development, Intel Corporation
The automotive industry is going through an exciting, software-driven transformation. Learn how Intel is working across the automotive industry to create, simulate and model the latest automotive designs. This talk will describe how technology is now delivering a compelling in-car experience that integrates the car as part of the consumer's "connected digital lifestyle." We will discuss the challenges that the automotive marketplace is facing to ensure that its products meet an increasing need for more robust design while also improving quality and safety. From IoT devices to the power of the data center cloud, discover what Intel is doing to help fuel the design and safety of automobiles for today and tomorrow.

9:15 - 9:50
Zero-Dimensional Knocking Simulation with Detailed Chemical Kinetics ..... N/A
Toru Noda, Manager Gasoline Engine Combustion, Nissan Japan
A zero-dimensional knocking simulation was developed by applying detailed chemistry as the auto-ignition model. Empirical correlation obtained through experimental analysis was applied to interpret the calculated auto-ignition of the end-gas to knock intensity. This presentation will show that the calculation results under various engine operating parameters show good agreement with experimental trace knock sensitivity to spark advance.

9:50 - 10:25
Deployment of CAE Simulation Technologies at an Enterprise Scale ..... N/A
Greg Roth, Chief Engineer, TRW Automotive
Since its introduction, CAE has transformed engineering and product development processes. While its capabilities exceeded expectations in specific technical instances, large-scale deployment at an enterprise level was difficult and problematic. Technical capabilities, cultural and corporate challenges had to be overcome to facilitate large-scale implementation. However, with the introduction of new GUI interfaces, computers and enhanced engineering processes, a large-scale global deployment of CAE technologies has now been rolled out.

10:40 - 11:15
Advancing Automotive Simulation ..... N/A
Walid Abu Hadba,Chief Product Officer, ANSYS
ANSYS continues to pioneer advances in simulation that enable complete virtual prototyping, such as system simulation, multidisciplinary optimization, high performance computing, customization, cloud computing and others. At the same time, we are deepening our core capabilities in fabricated structures, combustion, geometry modeling, electromagnetics, adjoints, etc. These advances will be reviewed in this presentation in the context of powertrain, vehicle body, interior, chassis, electronics and electrification.

11:15 - 11:50
Answering the Challenges of Automotive System and Software Engineering with Model Based Design .....N/A
Eric Bantegnie, Vice President, ANSYS
This presentation outlines the key benefits that can result from the development of virtual prototypes of complete automotive systems, including physical hardware, electronics and embedded software components. A virtual prototype of a complete electric powertrain will be detailed as an example of ANSYS systems simulation capabilities. The benefits of Model Based Systems Engineering and Virtual Systems Prototyping will also be presented for other key innovative systems developments, such as autonomous vehicle controls and high-safety systems.

POWERTRAIN
Algonquin Ballroom A

1:30 - 2:00
Design and Analysis for Muffler Acoustic Transmission Loss and Back Pressure Drop of a Tractor Engine 334
Pawan Singh, TAFE Motors
This presentation will demonstrate how ANSYS CFD simulation was used to optimize the performance of a tractor muffler by minimimizing the acoustic transmission loss with minimal pressure drop. A method was developed for performing acoustic harmonic analysis of a baseline design; the method was then used to design the new muffler. Parametric analysis was performed to study the sensitivity of muffler perforations.

2:00 - 2:30
Relative Analysis Method to Determine Durability in Aluminium Cylinder Heads 359
Anthony Megel and George Bailey, SWRI
This presentation describes the non-linear properties that must be taken into account during analysis of the durability of aluminum cylinder heads, and how those properties are modeled in ANSYS Mechanical. The analysis includes

assembly forces from bolting, gaskets, and press fits, and their effects on stress fields resulting from each step of the structural and thermal loading history. We will also discuss how the ANSYS results are used to predict durability from the perspective of the relative analysis concept.

2:30 - 3:00
Application of the Perzyna Model for Thermomechanical Fatigue Life Prediction of an Exhaust Manifold ..... N/A
Radwan Hazime, ADACS
This work shows that using a standard ANSYS model one can capture the important material behavior under high temperature cyclic thermal loading. This presentation will demonstrate that the Perzyna rate model, when incorporated with the Chaboche kinematic hardening model, adequately captures both kinematic hardening and viscoplastic rate effects without the need for an expensive user material model. ANSYS solutions were used for transient heat transfer analysis and time dependent elasto-viscoplastic structural analysis of an exhaust manifold undergoing a thermal cyclic test, in order to predict thermomechanical fatigue life.

3:30 - 4:00
Flow Distribution Prediction and Validation of Porous Dirty Side Duct in Diesel Air Induction Systems ..... N/A
Karunakar Yedam, Fiat-Chrysler
Porous ducts are widely used in all vehicle applications in FCA to address snorkel noise quality (sound pressure levels) at all engine speeds. This presentation will show a new approach to model porous ducts using a porous jump option in the 3-D CFD domain to predict and determine the overall air induction system (AIS) restriction, delta-p of components, and flow distribution in the dirty side duct of the AIS. This new, validated approach is included in the existing 3-D CFD-based global standard operating procedure to support current and future air induction systems.

4:00 - 4:30
Validation CFD Simulation of Premixed Combustion and Gasoline Spray in a SI Engine Using ANSYS CFD 367
Ishan Verma, ANSYS
Validation studies are critical to assess the accuracy and reliability of CFD simulations. In this work we report on validation studies for the SI engine under motored, premixed combustion and direct injection modes of operation. We also show gasoline spray-chamber simulations that were validated with fuel injection under atmospheric conditions. The predictive capabilities of ANSYS Forte CFD simulations for SI engines under different modes of operation are demonstrated.

4:30 - 5:00
Design Optimization of Vehicle Exhaust Muffler Using ANSYS
John Cherng, University of Michigan 381
This presentation will discuss development of an efficient method to optimize the transmission loss of a vehicle exhaust muffler. The sensitivity study includes the perforated hole variations, partition variations and absorption material insertion.

BODY & INTERIOR
Algonquin Ballroom B

1:30 - 2:00
ISO26262 and AUTOSAR Compliant Software for Automotive Infotainment and Control Systems 392
Eric Bantegnie, ANSYS
As an ever increasing number of active and passive safety systems are being developed for cars, there is a need to define a safety-system development process for the automotive industry. The ISO 26262 standard provides such definitions. This presentation will explain the standard and present a model-based approach — including certified code generation — to efficiently implement the embedded software that controls these systems, which will aid manufacturers in satisfying the safety requirements of ISO-26262.

2:00 - 2:30
Modelica Libraries for Integrated Vehicle Thermal Management and Their Usage in Industry 417
Hubertus Tummescheit, Modelon
This presentation will highlight the use of a coordinated suite of Modelica libraries for vehicle thermal management applications, and in particular its usefulness for robust design optimization early in the design cycle of a new vehicle. The models are implemented using the Vehicle Dynamics Library, Liquid Cooling Library, and Heat Exchanger Library from Modelon. An integrated vehicle thermal management model will be implemented, including the key physical and controls models, and the model will be used to highlight complex, multidomain interactions between the physical and control systems over drive cycles for combined thermal and fuel efficiency studies. The model will also be used to support controller development and optimization as an FMU integrated into Simulink.

2:30 - 3:00
Advances in Adjoint Methods 433
Zheming Zhang and Chris Hill, ANSYS
The adjoint solver is a unique tool for the optimization of systems. The improved usability and greater ability to handle aerodynamics and the design of thermal manag
large calculations will be reviewed in this talk. New tools to aid in multi-objective design in the presence of constraints, and for the exploration of what-if scenarios, will be described. The systematic improvement of designs through mesh morphing will also be covered.

3:30 - 4:00
Deterministic Aero-Vibro-Acoustics for Wind Noise Prediction 444
Marco Oswald, ANSYS
Assessment of aerodynamic noise is an important quality concern for automotive manufacturers. Air flowing past a vehicle may lead to high interior noise levels and affect cabin comfort. Interior noise results from various mechanisms: aerodynamic fluctuations of the disturbed flow around the side mirror or A-pillar; hydrodynamic and acoustic loading of the car panels and windows; and panel vibration and acoustic radiation inside the vehicle. This presentation captures

these important mechanisms in a simulation model and demonstrates the ability of coupled CFD (ANSYS Fluent) and FEM (ANSYS Mechanical Acoustics) tools to provide accurate aerodynamic and interior noise prediction results using the SAE-Body with side view mirror.

4:00 - 4:30
Easy Access to the Power of ANSYS LS-DYNA Through ANSYS Workbench 461
Philip Ho, LSTC
ANSYS Workbench LS-DYNA is a new user environment for running ANSYS LS-DYNA. It was created as a collaborative effort between Livermore Software Technology Corporation (LSTC) and ANSYS, Inc. using the ANSYS Customization Toolkit (ACT). This presentation will demonstrate how Workbench LS-DYNA provides a user friendly, easy-to-learn interface for creating input and viewing simulation results. The technology of ANSYS LS-DYNA is combined with the model preparation, automatic meshing, design exploration, report generation and other features of ANSYS Workbench to provide the best user experience for explicit simulations.

4:30 - 5:00
Utilizing ANSYS to the Measurement of the Checking Fixture after Annealing 477
Srikar Vallury, Moldex 3D
Checking fixtures are extensively used by automotive parts manufacturers to inspect the mountability of a part and measure its gap to ensure that it is within the required tolerance. This presentation will show how, following the injection molding process, the measurement of the checking fixture can be performed by means of static analysis using ANSYS solutions. If the result does not meet specifications, it can be improved with annealing in Moldex3D. The effect of annealing time on the warp of the checking fixture will also be discussed.

CHASSIS
Algonquin Ballroom C

1:30 - 2:00
Improving Sound Performance of Gasketed Assemblies by Selecting the Optimal Gasket Material 493
Paul Francis, Thermoseal
Engineers are often faced with the challenge of reducing noise levels in various assemblies. The gasket between two surfaces can have a significant impact on noise levels, and ANSYS Mechanical can be used to analyze the effect of various gasket materials on noise levels. This talk will demonstrate how ANSYS solutions can help you understand how the gasket material affects noise levels, so you can create gaskets that are optimized for noise and vibration reduction.

2:00 - 2:30
Numerical Investigation of Effect of Cooling Pattern on Residual Stress due to Rapid Temperature Change in Quenching Processes ..... N/A
James Jan, Eben Prabhu, Xingfu Chen, Ruichen Jin and Ulrich Weiss, Ford Motor Company
While finite element analysis (FEA) can predict residual stress caused by the rapid temperature drop in the quenching process used to produce high-strength metal components, the quality of FEA residual stress calculations is bounded by the accuracy of the temperature profile obtained either by the experimental heat transfer coefficient (HTC) method or by 3-D computational fluid dynamics (CFD) simulation. The practicality of 3-D CFD computer simulations is reduced because it requires two sets of meshes for CFD and FEA, and because two simulation tasks have to be restarted and performed for each design change. By characterizing the cooling pattern using the generalized heat transfer coefficient (HTC) concept, this presentation will show the sensitivity between residual stress and HTC using computer models.

2:30 - 3:00
An ANSYS Workbench Integrated Solution with DANTE for Modeling Quenching Process of Steel Components 516
Zhichao Li, Dante Solutions
Phase transformations are required to model the quench hardening process of powertrain components. User subroutines with phase transformation models and multi-phase mechanical models has been developed and linked with ANSYS solutions. During quench hardening of powertrain components, the in-process stress, phase transformations, residual stress, and distortion are critical to the process and the service performance. This presentation will demonstrate how to model the quench hardening process by linking DANTE subroutines with ANSYS solutions to optimize the heat treatment process.

3:30 - 4:00
Thermomechanical Fatigue Analysis of a Turbocharger Wheel 534
Jeffrey Mentley, HBM nCode
A turbocharger wheel is subjected to various dynamic loadings and temperatures during its lifetime. To ensure durability, fatigue analysis must consider all the combinations of RPM and temperature the wheel will encounter. This presentation will discuss some of the challenges involved with thermo-mechanical fatigue, and then examine how ANSYS nCode DesignLife can be used inside of ANSYS Workbench to predict the fatigue life of the turbocharger wheel.

4:00 - 4:30
Testing of Elastomers and Plastics in Support of Analysis 544
Kurt Miller, Axel Products
Elastomeric materials, which are often used in seals and vibration dampers, have traditionally been difficult to model because they can become severely distorted when in contact with other parts, which adds to the complexity of the simulation. ANSYS 16.0 features adaptive remeshing, which refines the mesh in highly distorted areas without the need

for the user to stop the simulation manually. This presentation will show how ANSYS Mechanical can be used to simulate the behavior of elastomers.

4:30 - 5:00
Combined MBD / FEA Analysis of an SLA Suspension Using ANSYS Workbench 563
Brant Ross, MotionPort
Multi-Body Dynamics (MBD) can provide the attachment and body loads that are needed for the structural analysis of mechanical assemblies that move during operation, such as a suspension system. This presentation will demonstrate the efficient usage of MBD technology in the ANSYS Workbench environment to develop loads. The focus will be on MBD modeling of an SLA suspension in the ANSYS user environment with a jounce/rebound simulation, including load transfer to a suspension component for structural analysis. A simulation of suspension performance in an off-road vehicle on rugged terrain will be shown.

ELECTRIFICATION & ELECTRONICS
Algonquin Ballroom D

1:30 - 2:00
Development of Heat Flow Simulation Method to Junction Block 574
Go Jong Won, Kyungshin Corp.
The design of PCB-type junction blocks has recently become more challenging due to their small size and large current. This presentation will show that it is essential to perform heat flow simulations using ANSYS Icepak and ANSYS SIwave to check design accuracy and provide information on the thermal disribution in the junction block.

2:00 - 2:30
Expanded GPU Capabilities in ANSYS 16.0 for Improving Automotive Simulation Workflows 587
Bhushan Desam, Nvidia
Simulations in the automotive industry typically involve complex workflows that include preprocessing on workstations for model preparation, moving models to remote clusters, solving in an HPC environment on many compute nodes, and downloading large solution files to local workstations for further analysis. These inefficient workflows can reduce simulation productivity, which might affect the product development cycle. ANSYS 16.0 solves some of these inefficiencies with GPUs for accelerating each phase of the workflow by providing support for graphics, solver computations and remote visualization. This talk will address some of the improvements that can be realized with GPUs for higher simulation productivity
in ANSYS 16.0.

2:30 - 3:00
Finite Element-Based Computationally Efficient Scalable Electric Machine Model Suitable for Electrified Powertrain Simulation and Optimization .....N/A
Kan Zhou, University of Michigan
Electric machines are key components of electric/hybrid electric vehicle (EV/HEV) powertrains. Thus, computationally efficient models for electric machines are essential for powertrain-level design, simulation and optimization. In this presentation, an ANSYS finite-element-based method for quickly generating torque-speed curves and efficiency maps for electric machines will be demonstrated.

3:30 - 4:00
Automotive Battery Simulation ..... N/A
Xiao Guang Yang, Ford Motor Co.
Battery simulation is a key step in the development of electrified vehicles. This presentation will discuss battery cell, module and pack modeling using ANSYS solutions.

4:00 - 4:30
Accelerating Electric-Vehicle Battery Engineering with Advanced Simulation 597
Taeyoung Han, General Motors
Adoption of hybrid and electric vehicles will increase as lithium-ion batteries become more affordable, energy-dense, durable, and abuse-tolerant. Thermal management is a key challenge in battery pack engineering, for which a new suite of multi-scale, multi-disciplinary simulation software has begun to accelerate innovation. Over the last three years, major strides have been made under a program sponsored by the U.S. Department of Energy called Computer-Aided Engineering for Electric Drive Vehicle Batteries (CAEBAT), to improve engineering software in order to shorten design cycles and optimize batteries. This presentation will demonstrate new tools that simulate battery electrochemical, thermal, fluid, and control-system effects.

4:30 - 5:00
Planar Transformers from Design to Integration Considering EMC/EMI and Thermal Effects 611
Mark Christini, ANSYS
The proliferation of automotive electronics requires more power supplies operating at higher efficiencies. Planar magnetic devices offer distinct advantages over their conventional counterparts. This presentation will show how to understand power supply losses, how to predict thermal performance and how to simulate conducted EMC for a planar magnetic transformer.

ADDITIONAL PAPERS