Addressing Challenges of Electrification with Simulation and Test
Agenda – Day 1 - Morning

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Day 1		Joint Track
8.15-9.00	**Keynotes**	**Introductions - Siemens Digital Industries Vision & Event Kickoff**
9.00-9.45		**Siemens Mobility Solutions - Connecting people through connected mobility** Siemens Mobility has been broadening their approach - we don't just look at technologies as a standalone module, but the full picture. Not only from a perspective of connected vehicle technology, we analyze the data through the level of city infrastructures. By examining traffic patterns to simulate and predict traffic we help cities with congestion, offering intermodal solutions that cover the last and first mile of your commute. Learn more about how Autonomous, Connected, Electric and Shared (ACES) trends are not only still here, but also coming to life.
9.45-10.00		**Break**
10.00-11.00	**Industry Challenges/Solution Overviews**	**Full Vehicle System Modelling and Multi-Attribute Balancing** Leverage Simcenter's scalable model fidelity at each stage of development cycle to deliver the best design dealing conflicting attributes, focusing on meeting the requirements of your product. Discover how our system simulation *and electrification* solutions will be a key enabler to push simulation to the next step, from the earliest design team up to vehicle and project teams. **Renaud Meillier**
11.00-12.00		**CAE Democratization** As programs budgets are reallocated and reduced to contain EV, ADAS, AV development, more upfront CAE simulation is required to streamline and expedite development in these areas. And, to survive the forecasted downturn, companies need to do more with less while reducing time and costs to market. CAE Democratization enables non-traditional engineering roles to conduct simulations utilizing automation & CAD2CAE integration available in NX & Simcenter 3D. However, it is not all about the technology, real world case studies will be covered including: • Cultural lessons learned & solutions • Program improvement metrics • Business case: ROI, payback • Resource allocation tradeoff analyses (offshore, local, etc.) **Greg Roth**
12.00-1.00		**Lunch**

Addressing Challenges of Electrification with Simulation and Test
Agenda – Day 1 – Afternoon

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Day 1		Test Track	Simulation Track
1.00-2.00	Technical Sessions for a Deeper Dive	**Transfer Path Analysis – Part 1** Without an internal combustion engine to mask noises, the noise characteristics of a vehicle have now completely changed. For example, road noise now governs a large percentage of the sound perception of an electric vehicle, and is critical to understand and manage. In this session, we'll introduce how transfer path analysis is used for noise management, in particular for road noise. • Source, Path, Receiver Concept • Force Estimation • Multi-Source Introduction (e.g. Road Noise) **Peter Schaldenbrand, Kevin Grenier**	**E-Drive NVH Performance** The emergence of Electrical Drive Systems present new challenges for traditional powertrain development organizations. This session will introduce key Simcenter solutions that apply to the design and development of these systems which integrate electric motors, power electronics, and transmission gearing. Taking an NVH focus the Engineering services team will review a step by step methodology for e Drive NVH, including the development of electromagnetic loads, gear tooth meshing loads, shaft & bearing modeling, and prediction of the acoustic response from the unit's housing. **Keith Moss, Prasad Vesikar**
2.00-2.45		**Transfer Path Analysis – Part 2** Measuring Electric drive system noise must focus on the presence of tonal and order based noise from electromagnetics, invertor PWM switches, gear tooth meshing whine orders, as well as pumps for Vehicle Thermal Management that introduce ON-OFF transients. All of this affects the subjective perception of cabin noise. We will cover Load identification for assembly predictions at design stage, e.g. Blocked Force method., Road Noise using TPA methods, and Application based Instrumentation strategies for TPA – selection of instrumentation, excitors, and methodology selection **Prasad Vesikar**	**Battery modelling - From requirement to calibration, From cell design to vehicle integration** The Simcenter tool chain enables battery modelling to support the pre-sizing, design, operation, control and powertrain integration of batteries. See how a wide range of models balances the needs between early phase designs with high fidelity models. We will show fully coupled electro-flow-thermal simulation for cooling and/or to simulate the impact of aging on the electrified drive line. Also we'll cover how to design and verify controls for BMS (Battery management system) with full powertrain integration. **Warren Seeley, Sidhant Gulati**
2.45-3.00		**Break**	**Break**
3.00-4.00		**Durability (Mechanical/Electrical)** Quality and reliability requirements for semiconductor packaging have become stricter as semiconductor content increases. High junction temperatures and the corresponding thermal stress can cause degradation, and ultimately failure of semiconductor components. In this session we will introduce thermal transient testing as a solution to measure and assess component and system level thermal performance, and active power cycling tests to help understand the reliability of high power transistors that are used for electric traction applications. **Andras Vass-Varnai**	**EV Controls** This session demonstrates the benefits and efficiencies gained by application of MBSE to accelerate the development of control algorithms for EV programs. Utilizing Model-Based Design and Systems Engineering, companies leverage the power of traceability between requirements, control algorithms and test cases to identify gaps. By assessing their control algorithms in a way that couples to multi-domain system models of the EV and its various subsystems. Topics & Case studies relate to : requirements engineering, control algorithm development, Controls implementation, Testing via HiL, SiL and HiL methodologies, and Process consulting to assist roadmap creation and institutionalizing best practices. **Ammon Wright, Shiva Sivashankar**
4:00-4:45		**Model Based Systems Testing (MBST)** **Testing for Simulation/VEM Benchmarking (Test based Requirements/Reengineering Model Based Testing)** Siemens will present real world case studies (incl. Vehicle Energy Management) that show how simulation and physical testing can be combined in innovative ways in order to shrink development time and reduce dependence on prototypes, and improves quality and throughput compared to silo'd processes. **Prasad Vesikar**	**Big Data, IoT, Digital Twins** Utilize your 'Big Data' from existing vehicles to virtually develop new e-powertrains earlier in the product development cycle by coupling 'Big Data', through the MindSphere platoform, to Simcenter System Simulation models. Leveraging this new capability can enable non-expert modeling engineers to complete high value system analysis, analytically discover issues which normally show up only after a full vehicle build, and investigate optimization of hardware and software system solutions before prototypes are built. **Eric de Hesselle, Akshay Sheorey**

Addressing Challenges of Electrification with Simulation and Test
Agenda – Day 2 – Morning

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Day 2		Joint Track
8.15-9.00	**Keynotes**	**Siemens Digital Industries Mobility** **Puneet Sinha**
9.00-9.45		**Customer Key Note –Honda** **Tom Ramsey**
9.45-10.00		**Break**
10.00-11.00	**Industry Challenges/Solution Overviews**	**Siemens Product Roadmap Key Note** The Simcenter portfolio of products has moved to a new continuous release system, which means that new features and capabilities are coming faster than ever before. In this session, the development organization will overview recently released capabilities, and the near term roadmap. This will give a clear picture on how Simcenter is oriented towards the electrification market **Doug Wenk**
11.00-12.00		**Simulation Data Management** Digital Simulation is increasingly seen as the key to development efficiency and increased profits. Unfortunately, Digital Simulation has also become a process bottleneck for many companies. Managing the massive amount of data input and generated during simulation and deriving results quickly enough that may influence design decisions has become the one of the greatest challenges for Engineers, Analysts, and Product Managers. This presentation will offer an overview of the Teamcenter Simulation module and discuss how it can be used effectively to manage simulation data. Additionally, the simulation specific capabilities of Teamcenter Simulation, namely the CAE Data Model, Integration with Third Party CAE tools, CAE BOM Management, and Simulation Visualization functionality will also be reviewed. **Rick Licursi/Raghav Kashi**
12.00-1.00		**Lunch**

Addressing Challenges of Electrification with Simulation and Test
Agenda – Day 2 – Afternoon

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Day 2		Test Track	Simulation Track
1.00-2.00	Technical Deep Dives	**EV Sound Quality Metrics** Without an internal combustion engine to mask noises, the noise characteristics of a vehicle have now completely changed. High frequency tones, from gear drives to electrical switching noise, create tonal characteristics that need to be managed to ensure customer satisfaction. • Tonal Metrics and Masking • Motor/Inverter Noise • Gear Noise **Peter Schaldenbrand**	**A Massive Simulation Approach to Verify and Validate HAV Systems** Overview of scenario generation and sources for edge cases. The importance of physics based sensor models (LIDAR, RADAR, Camera, V2X) will also be discussed. Frameworks for running and managing the large amount scenarios to be simulated. **Tony Giotsos**
2.00-2.45		**Live EV Noise Measurements** Acquiring data on an electric vehicle requires new methodologies. Learn the latest and greatest measurement techniques for electric vehicles. • Sound Camera, Video Synced Measurements • Instrumentation for Load Identification **Chris Debusschere** **John Drabison**	**Wire Harness Challenges** Vehicle Electrification is driving big changes upon the mechanical product development tasks for electrical wire harnesses, not only for new programs with new modular electrical architectures, but also for adaptation of existing vehicle platforms for partial or full electrification. By digitalizing the harness routing studies, OEMs can reduce warranty recall risk. Also in this session we'll additionally discuss how wire harness grommets can be designed and evaluated for their NVH isolation behavior and how different grommet designs can influence the ability to hit Acoustic Transmission Loss targets. **Keith Moss , Ramana Kappagantu**
2.45-3.00		**Break**	**Break**
3.00-4.00		**AVAS & Active Sound Design** Drivers enjoy the feel of the power of vehicle through the noise of the engine system. The exterior as well as interior sound of engine and exhaust develops character of the vehicle, which generates joy in drivers and passersby. EVs have interior sound quality with predominant electrical noise character and very low exterior noise. For the safety of pedestrians and to make them aware of the presence of oncoming vehicles, governments are developing norms for vehicle warning systems. To develop the vehicle sound to provide expected feel of driving to conventional drivers, interior and exterior sound could be designed as per preference of driver. This augmentation of sound needs to be engineered. This session will discuss the requirements and methods of sound character development of AVAS system, as well as sound engineering tools and methods for active sound design. • How electric vehicles should sound • Brand sound generation with Augmented noise. • Development of relation between vehicle acceleration and feel of sound **Prasad Vesikar, Akshay Sheorey, Bart Vandenplas**	**External Aerodynamics/Soiling and Thermal Management** The disruption of vehicle electrification is driving need to minimize energy usage to enable longer drive range. To capture design requirements of the vehicle can drive competing objectives between cabin, cooling system, and aerodynamics of the vehicle. In addition, brakes, electronics, batteries, and other critical components must be kept cooled and clean of debris. This session focus on the impact of CFD for complete vehicle integration on electric vehicles and ways process automation can be used to increase realism of the simulation and enable design exploration. Covered in this talk are: • Enable fast aerodynamics for drag reduction • Examining trade-off between cooling air and drag reduction • Managing passenger thermal comfort • Modeling water/dirt impact on ADAS sensors & cameras • Managing full vehicle heat protection simulation. **Fred Ross**