AGENDA as of April 19

SAE 2012 Powertrain Electric Motors Symposium for Electric and Hybrid Vehicles Monday, April 23, 2012, Woodward Ballroom, 2nd level, Westin Book Cadillac, Detroit, MI, USA *Symposium Chair: Marc Winterhoff, Partner at Roland Berger Strategy Consultants, North America*	
7:00 a.m. - 3:00 p.m.	SAE Registration Open
7:30 - 8:00 a.m.	Continental Breakfast
8:00 a.m. - 5:00 p.m.	Exhibit Open
8:00 a.m.	Welcome and Introductions Ray Bakerjian, SAE International
8:00 a.m.	Keynote Presentation: Racing Green Endurance: An EV Record Alexander Schey, Vantage Power Racing Green Endurance: An EV Record will focus on what a small team of ambitious and talented engineers can do when they have a dream! Back in 2009, a team of graduates from Imperial College London came together to do something radical to change the public perception of electric vehicles forever. They came up with the idea to design and build the world's longest range electric car, and then drive it down the longest and toughest road in the world; the 26,000km Pan-American Highway! Racing Green Endurance: An EV Record will share the story from start to finish, and will also focus on the technology used to achieve such a feat, with particular mention of the electric motors.
8:30 a.m.	Global Market Developments Marc Winterhoff, Roland Berger Strategy Consultants The traction motor is key to the “synergy of the electric powertrain”, the overall functionality of the battery, e-motor, power control electronics, and charging system. Therefore some automakers have decided to design, develop, and produce their traction motors in house while some others are working with suppliers for their electric power train motors. Off-the-shelf motors, no matter how extensively they are adapted for a specific application, can compromise the efficiencies of the propulsion system.
9:00 a.m.	Hidden Costs in Motor Specifications David A. Fulton, Remy International It is a challenge to write a good motor specification. Typical spec. problems are omitted or ambiguous requirements, or overly tight tolerances that drive up cost but not value. These problems create hidden penalties in cost, performance, reliability, and development time. This presentation will describe common problems in traction motor specifications and associated penalties, as well as recommendations to avoid them. Topics will include spec.’s for demagnetization, mechanical considerations, torque ripple, performance, and others.
9:30 a.m.	Networking Break and Exhibit
10:00 a.m.	The Supply of the Heavy Earth Metals and the demand for them by the Global OEM Automotive Industry Jack Lifton, Technology Metals Research, LLC There has recently been a great deal of hypothesizing and prognosticating about the security of supply of the rare earths for the non-Chinese OEM automotive industry. The pundits and industry analysts have warned of demand destruction by substitution driven by sustained high prices as well as due to supply interruptions. What has been overlooked for the most part is that the issue is not about all of the rare earths; it is just about some of them, the critical rare earths. And even in that category

AGENDA as of April 19

	there are two separate issues: 1) Is there enough production of the light rare earth, neodymium, to sustain current demand and can its non-Chinese production grow to meet expected non-Chinese demand? and 2.) Is there even enough production of the heavy rare earths, dysprosium and terbium, to meet current Chinese demand and is it possible to produce dysprosium a.) Outside of China, and b.) In a finished form that could be used to manufacture "under the hood' rare earth permanent magnets outside of China? This presentation will bring the audience up to date on these issues, and will emphasize that the overwhelming majority of the OEM automotive industry demand for the rare earths critical to its products is, first and foremost, for the under the hood accessories of the powertrains of internal combustion powered vehicles, the next largest use is for the passenger cabin accessories for all vehicles, and last today is the demand from the under the hood powertrains of EVs and Hybrid Electric Vehicles. Assuming that the security and quantity of supply issues for dysprosium are resolved the growth of demand for products containing them will not depend just on the future growth of the market for EVs and HEVs, not at all.
10:20 a.m.	Material Technology Challenges and Opportunities for Traction Motors Yucong Wang, General Motors Company Challenges and opportunities for traction electric motors propelling hybrid and electric vehicles require scientists and engineers to discover and invent, develop and manufacture advanced materials for rotors, rare earth permanent magnets, lamination steels, stator copper wire winding and insulation system, and other components with low cost, good reliability and durability in a wide range of operating environments and driving conditions. This presentation will discuss rare earth metals, precious metals, and other critical automotive metals, and the impact of these metals on hybrid, electric and fuel cell vehicles, as well as alternative solutions.
10:40 a.m.	Metals in Motors Invited, Ford Motor Co.
11:00 a.m.	Copper-Rotor Induction-Motors: One Alternative to Rare Earths in Traction Motors Malcolm Burwell, The Copper Alliance The copper-rotor induction-motor made its debut in automotive electric traction in 1990 in GM's Impact EV. Since then, this motor architecture has covered millions of miles on other vehicle platforms which will soon include Toyota's RAV4-EV. With the industry's attention focused on cost-effective alternatives to permanent-magnet traction motors, the induction motor has returned to the spotlight. This talk will overview where the copper-rotor induction-motor is today, how the technology has evolved since the days of the GM Impact, the state-of-play in its mass-manufacturing processes and today's major supply-chain players.
11:20 a.m.	Battery Metals for 21st Century Power Trains Jon Hykawy, Byron Capital Markets As the need to develop better and less expensive batteries for automotive applications continues, we will likely need to examine potential tradeoffs between enhanced performance and costs. In particular, the choice of cathode materials automatically involves changes in performance and material costs. We will examine some of the possible cathode materials for use in next-generation battery packs, and the financial implications regarding those materials.

AGENDA as of April 19

11:40 a.m.	Rare Beef And Rare Earths: Why Process Technology Matters Larry Thomas, Primet Precision Materials Those who are concerned about access to rare earths and other critical minerals for EV powertrains are focused on the exact wrong problem. The presentation discusses why it's control of process technology, not the raw ores themselves, that dictates cost, availability and performance.
12:00 p.m.	Panel Discussion: Metals in Motors Moderator: Jack Lifton, Technology Metals Research LLC Panelists: Jack Lifton, Technology Metals Research, LLC Yucong Wang, General Motors Company Larry Thomas, Primet Precision Materials Jon Hykawy, Byron Capital Markets Malcolm Burwell, The Copper Alliance Invited, Ford Motor Company
12:30 p.m.	Networking Luncheon and Exhibit *graciously sponsored by* D&V Electronics Ltd.
1:45 p.m.	Challenges and Requirements for High Volume Production of Electric Machines Wei (William) Cai, Jing-Jin Electric With automotive electrification, the electric machines show a tendency to share or even replace the dominant role of internal combustion engines in future vehicles. Besides the design and innovation of different electric machines to meet the needs of powertrain and drivetrain performances, high volume production becomes a challenging topic and an un-avoided requirement. Flexible line and sharing line will help the variation of production rate and volume, while the dedicated unique line contributes to large scale of E-motor production. Supplier chain from raw materials, parts to processes has to be built from ground-zero or low grade to mature stage within quality specification and time limitation. Multi-function skills, cross area technologies and complex management etc. are all required for E-motor manufacturer to grow up with component and equipment suppliers. Reducing cost, improving quality and guaranteeing safety are always the thematic series. Manufacturers, suppliers and material innovators from China are aggressively pushing the high volume production of E-motors for global vehicle electrification.
2:15 p.m.	Advanced Testing of Electric Drives and Motors Voiko Loukanov, D&V Electronics Ltd. This presentation will cover an overview of challenges and key discussion points for advanced electric motor and drive testing. The presentation will visit some examples of how D&V approaches these issues and also some suggestions for how the industry can view these intriguing problems as opportunities. The presentation will also delve into current testing developments that involve resolver, load bank and power measurement devices by highlighting solutions in the market today. There will also be a cursory look into the future of electric motor testing and what we can expect in the near term.
2:45 p.m.	Networking Break and Exhibit

AGENDA as of April 19

3:15 p.m.	Will they prevail in Electric Drive Vehicles: Comparison of IPM, Induction, FSPM, DSPM and other New Electric Machine Topologies Chunting (Chris) Mi, University of Michigan-Dearborn Permanent magnet (PM) motors with both magnets and armature windings on the stator have attracted considerable attention lately. But will they prevail? This presentation will compare the suitability of flux switching PM motor, doubly salient PM motor, induction motor, and IPM for advantages and suitability for use in plug in electric vehicles.
3:45 p.m.	GM's Automotive Traction Motor Field Experience and Cost Opportunities Matthew Laba, General Motors Company GM's electrified vehicles have accumulated hundreds of millions of miles in the hands of customers and great reliability has been experienced. This is a positive result, but as with all electrified vehicle components, overall motor cost remains a challenge. There are several possible directions for cost reduction. Each may be pursued, but must be considered with care not to compromise the product reliability and total customer experience in electrified vehicles.
4:15 p.m.	Panel Discussion: OEM and Suppliers on Engineering Moderator: Marc Winterhoff, Roland Berger Strategy Consultants Panelists: Matthew Laba, General Motors Company Patrick Wilson, Parker Hannifin Corp. Wei (William) Cai, Jing-Jin Electric Voiko Loukanov, D&V Electronics Ltd. Chunting (Chris) Mi, University of Michigan-Dearborn Tom Vanderlaan, Remy International
5:00 p.m.	Adjourn