



Integrated Design & Manufacturing

The Integrated Design & Manufacturing sessions articulate theoretical developments and provide information on real-life application to industry in the areas of process capability, productivity, reliability, robust design, DFM (design for manufacturability), global supply chain integration and world-class manufacturing performance in the mobility industry.

IDM101 Predictive Analytics and Tools Development

Fundamental issues in predictability, uncertainty, methodology, philosophy, algorithm, computation, tools development, and applications. The areas to be covered by this session will be very broad: design, durability, reliability, warranty, sale, ...everything and anything related to prediction and forecasting in the automotive industry.

IDM102 Reliability and Robust Design in Automotive Engineering: Reliability-Based Design Optimization and Robustness

This session will address theoretical developments and automotive applications in RBDO and Robust Design. Topics include computational algorithms for efficient estimation of reliability, Monte Carlo simulation, Bayesian reliability, Dempster-Shafer Evidence Theory, and Multi-Disciplinary Optimization, among others.

IDM103 Reliability and Robust Design in Automotive Engineering: Reliability and Accelerated Testing

This session presents methods and applications for assessing reliability in product development. Topics include reliability target allocation, vehicle reliability, combined environment tests, integration of reliability tests with CAE / simulation, integration of failure modes and effects analysis, statistical considerations in accelerated tests, life data analysis, reliability growth analysis, and information limits in reliability assessment such as small sample sizes.

IDM104 Reliability and Robust Design in Automotive Engineering: Decision Under Uncertainty/ Uncertainty Modeling

Methods for modeling uncertainty and decision making under uncertainty are presented in this session. Both theoretical developments and practical applications from the automotive industry are covered.

IDM105 Reliability and Robust Design in Automotive Engineering: Reliability and Robust Design in Automotive Aero-Thermal and Fluid Systems

The purpose of this session is to bring awareness among the automotive aerodynamics, thermal and hydraulic systems development community to address the need of reliability analysis and robust design to improve the overall product quality. This session also introduces CAE based optimization of aero-

thermal and fluid systems to improve automotive fuel economy. This session presents papers covering both testing and simulation.

IDM106 Reliability and Robust Design in Automotive Engineering: Model Validation and Verification

Model Validation and Verification invite papers that deal with the theoretical and/or applied aspects of one or more of the following representative topics: model development, model correlation/calibration, model verification, model validation, uncertainty quantification, uncertainty propagation, validation metrics, predictive capability assessment, etc.

IDM107 Value proposition for the implementation and application of GD&T:

What challenges have been met, or issues resolved with GD&T? We are looking for papers where obstacles have been overcome by instituting or improving the implementation and application of GD&T. This is not only directed to design and engineering, but to manufacturing and inspection as well.

IDM109 Integrated Computational Materials Engineering (ICME)

ICME is an emerging discipline to address foundational engineering problems with the integration of predictive tools and methods that model and simulate materials & product design, manufacturing processes, local materials properties and component performance. This session will address new developments and practical applications of ICME for metallic, polymeric and composite material systems in automotive industry.

IDM110 Business Modeling/Operation Research/Big Data Analytics

Business Modeling/Operation Research/Big Data Analytics are key enablers for the next wave of innovation and growth across most industries and will address complex issues and systems that involve multiple objective, many alternatives, trade-offs between competing effects, large amounts of data and situations involving uncertainty or risk. This session will address new technical advances in these areas and provide valuable insights through the applications of real-world case studies.

IDM111 Multidisciplinary Design Optimization (MDO)

Multidisciplinary design optimization (MDO) focuses on optimizing the performances of complex systems that involve multiple interacting disciplines. It may encompass design synthesis, sensitivity analysis, approximation concepts, optimization methods and strategies, artificial intelligence, and rule-based design - all in the context of integrated design dealing with multiple disciplines and interacting subsystems or systems of systems.

IDM201 Modeling and Simulation of Military Ground Vehicles (Part 1 of 3): Structures, Including Durability, Reliability and Testing Methods

The complexity and cost of military vehicle ground vehicles render them ideal candidates for a system-level modeling and simulation (M&S) environment. This session will serve as a technical forum to address the practical challenges, current gaps, and emerging technologies related to modeling and simulation of military ground vehicles. Included in this session will be design, optimization, requirements development, and performance analysis as related to military ground vehicles in an M&S environment. Topics of interest consist of, but are not limited to: vehicle system integration and optimization; dynamics and control of vehicles; autonomous systems; advanced and hybrid powertrains;

computational methods; fuels and combustion; high performance structures and materials; and vehicle mobility.

Modeling and Simulation of Military Ground Vehicles (Part 2 of 3): Robotics and Autonomy

The complexity and cost of military vehicle ground vehicles render them ideal candidates for a system-level modeling and simulation (M&S) environment. This session will serve as a technical forum to address the practical challenges, current gaps, and emerging technologies related to modeling and simulation of military ground vehicles. Included in this session will be design, optimization, requirements development, and performance analysis as related to military ground vehicles in an M&S environment. Topics of interest consist of, but are not limited to: vehicle system integration and optimization; dynamics and control of vehicles; autonomous systems; advanced and hybrid powertrains; computational methods; fuels and combustion; high performance structures and materials; and vehicle mobility.

Modeling and Simulation of Military Ground Vehicles (Part 3 of 3): Thermal and Fluids

The complexity and cost of military vehicle ground vehicles render them ideal candidates for a system-level modeling and simulation (M&S) environment. This session will serve as a technical forum to address the practical challenges, current gaps, and emerging technologies related to modeling and simulation of military ground vehicles. Included in this session will be design, optimization, requirements development, and performance analysis as related to military ground vehicles in an M&S environment. Topics of interest consist of, but are not limited to: vehicle system integration and optimization; dynamics and control of vehicles; autonomous systems; advanced and hybrid powertrains; computational methods; fuels and combustion; high-performance structures and materials; and vehicle mobility.

IDM300 Trends in Development of Accelerated Reliability and Durability Testing Technology

This session presents the theory, practices and technology used in the development of trends in reliability and durability testing (ART/ADT) technology and accurate physical simulation for successful performance predicting. The purpose is covering new ideas and unique approaches to simulation interaction of full field inputs, safety, and human factors, improvement the ART/ADT steps-components, implementation that leads to development dependability, reduce recalls, life cycle cost, time, etc.

IDM301 Augmented Reality and Virtual Reality (AR/VR) Applications

Once largely a subject of science fiction speculation, virtual reality is increasingly finding real-world applications in industry. This technical session will focus on uses of augmented reality/virtual reality (AR/VR), immersive visualization, virtual testing, and other tools to support all phases of product design and development, as well as manufacturing, ergonomics, serviceability, and safety.

IDM302 Additive (3D Printing) Manufacturing

This session deals with the manufacture of detail parts through laser sintering, stereo lithography, fused deposition modeling, and other emerging technologies. The session will explore technologies and methods for producing net or near net parts in various resins, plastics and metals directly from a CAD model that could employ design architectures that couldn't be achieved by other manufacturing methods.

IDM303 Robotics and System Integration

The scope of the Robotics and System Integration session covers robotics, and how robotic systems are integrated in a manufacturing environment. Included in the robotics theme is modeling, simulation, and experimental analysis for multi-axis serial robots, parallel robots (Stewart platform), and Collaborative robots (Cobots). This can include kinematics, dynamics and controls elements, path planning optimization, cell design, and safety/ reliability solutions.

IDM304 Intelligent Manufacturing Solutions

Manufacturing success is dependent on the maximum utilization of all available resources, through rethinking production methodology, empowering human creativity and intelligence, capturing and capitalizing on available information throughout the automotive product life cycle. This session will explore artificial intelligence, robotics, enterprise solutions, big data, emerging processes, remanufacturing, and automation technologies as they related to the ever-changing automotive factory floor.

IDM400 Key Success Factors for DFSS, Lean Product Development, and Manufacturing

This technical session deals with research and development efforts addressing the advancement and applications of Lean methodologies and Quality improvement in the mobility Industry. Papers presented in this session will portray the latest developments in the principles, practices, tools, processes, and applications of Lean and Quality improvement methodologies.