Automotive Courses 2021 Virtual
April 13-15, 2021
www.gamcinc.com
Phone: (734) 997-9249

Tuesday, April 13, 2021

AM Session	Focus: Electric Vehicle Structures Design & Engineering	PM Session	Focus: Electric Vehicle Structures Design & Engineering
Time	**Live Virtual Classroom**	**Time**	**Live Virtual Classroom**
8:15 am	**Introduction** Mehdi Shafiei *Novelis*	1:00 pm	**Fundamentals and Enablers for EV Structures (GM Chevrolet Bolt or Other Platforms)** Instructor: Warren Parsons, GM • Vehicle Overview • Structural Optimization • Material Application and Mass • EV Design Issues - Battery Integration - Side Impact / Battery Protection - Small Offset Frontal Barrier - Protection of High Voltage /Electrical Components
8:45 am	**Vehicle Design for Road Safety – Active Versus Passive Safety** Instructor: Sudip Bhattacharya, Ford • Human factors in road traffic accidents & preventive technologies • Inadvertent vehicle crash modes & impact-resistant structures • Impact injury risk prediction with ATDs & occupant restraint systems		
10:00 am	**Break**	3:00 pm	**Break**
10:30 am	**Measurement of Vehicle Crashworthiness** Instructor: Sudip Bhattacharya, Ford • Standardized crash tests for occupant Safety assessment – front, side and rear impact • Trends in road accident data & impact safety of vulnerable road users • Unknowns of safety assessment for BEV and autonomous vehicles • Summary of current safety regulations and competitive performance rating of new vehicles	3:30 pm	**Fundamentals and Enablers for EV Structures (Ford Mach E)** Instructor: Djamal E. Midoun, Ford • Product Highlights • Structural Development - BIW Materials - Closures Materials - Energy Management – Frontal Structures - Energy Management – Side Structures - Loads - Passive Safety Structures • Virtual & Physical Development
12:00 pm	**Lunch Break**	5:00 pm	**Adjournment**

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Wednesday, April 14, 2021

AM Session	Focus: Material Aspects	PM Session	Focus: Material Aspects
Time	**Live Virtual Classroom**	**Time**	**Live Virtual Classroom**
8:15 am	**Introduction** Vasant Pednekar *US Steel*	1:00 pm	**Steel Products & Processes** Instructor: Todd Link, US Steel • Sheet steel products – HR, CR, hot-dip coated, electrogalvanized • Steel Finishing Processes – BA, CAL, and CGL • Materials, Microstructure, Mechanical Properties: • Mild, BH, HSLA steels • Gen 1 AHSS – DP, TRIP, CP, martensitic, press hardened steel • Gen 3 AHSS • Formability and performance: • Global and local formability • Formability Maps • Crashworthiness • Fatigue behavior
8:30 am	**Aluminum Products & Processes** Instructor: Rajeev Kamat, Novelis • Alloy designations • Temper designations • Sheet products processing overview • Natural and artificial aging • Auto Specific Alloys: 5xxx (Al-Mg), 6xxx (Al-Mg-Si w/wo Cu) and 7xxx (Al-Zn-Mg w/wo Cu) • Surface quality • Corrosion resistance		
10:00 am	**Break**	2:30 pm	**Break**
10:30 am	**Design-Complementing Materials for EVs - Aluminum** Instructor: Don Whitacre, Novelis • Benchmarking of body structure • Benchamarking of battery enclosure • Discussion of design considerations for enclosures • Parts and alloys for load cases with safety considerations • Fire protection considerations	3:00 pm	**Design-Complementing Materials for EVs - Steel** Instructor: Harry Singh, US Steel • The evolution of body structure design • Body structure considerations for design and packaging for long range BEV • The lightweighting and design advantages offered by Advanced High Strength 3rd Gen Steels applied to EV structures • The mass saving premium ($ per kg mass saved), for the various light-weighting options for automotive body structures
12:00 pm	**Lunch Break**	5:00 pm	**Adjournment**

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Thursday, April 15, 2021

AM Session	Focus: Manufacturing Aspects	PM Session	Focus: Manufacturing Aspects
Time	**Live Virtual Classroom**	**Time**	**Live Virtual Classroom**
8:15 am	**Introduction** Mehdi Shafiei *Novelis*	1:00 pm	**Joining & Assembly for Steel & Aluminum Structures - Part I** Instructor: Mark Gugel, US Steel • Assembly Methods for Steel, Steel/Aluminum and Steel/Composite Structures • Fundamentals of Common Assembly Methods • Resistance Spot Welding (RSW) • Gas Metal Arc Welding and Gas Tungsten Arc Welding (GMAW/MIG/GTAW/TIG) • Laser Welding • Adhesive Bonding • Hemming • Friction -Stir Welding - • Hybrid-Joints (Mechanical, Welded, and/or Adhesive Bonded)
8:30 am	**Forming for Aluminum Structures** Instructor: Laurent Chappuis, Novelis • Definition of the basic concepts • Formability comparison with steel • Formability Limit Curve development, assumptions and application • Age hardening and its effects • Work Hardening & Anisotropy • Examples of material characterization tests • Stamping CAE considerations.	3:00 pm	**Break**
10:00 am	**Break**	3:30 pm	**Joining & Assembly for Steel & Aluminum Structures - Part II** Instructor: Mark Gugel, US Steel • Design Limitation Considerations for Assembly Methods • Process Limiting Considerations • Mechanical Limiting Considerations • Steel Grade/Combination Considerations • Steel Coating Considerations • Health Considerations
10:30 am	**Forming for Steel Structures** Instructor(s): Lu Huang & Marko Capelj, US Steel • Global Formability of Sheet Metals - Understanding the tensile stress-strain curves and n-values - Forming limit diagram - Global forming capacity index • Fracture Characterizations - High strain rate tensile test - Experimental determination of fracture strains - Development of GISSMO models	4:15 pm	**Feedback**
12:00 pm	**Lunch**	5:00 pm	**Adjournment**