

**Tuesday, March 27, 2018**

AM Schedule		PM Schedule	
	<p><u>Lecture: Automotive Body Structures</u>                      Instructor:  <b>Nasim Uddin</b>                      President  <i>Global Automotive Management Council</i></p>		<p><u>Lecture: BIW Materials</u>                      Instructors:  <b>Mike Davenport</b>                      Director  <b>Dan Sakkinen</b>                      Manager  <b>Harry Singh</b>                      Sr. Product Application Engineer  <b>Steve Schaar</b>                      Manager  <i>US Steel</i></p>
Time	Room 103	Time	Room 103
8:15 am	<p><b>Welcome &amp; Introduction</b>  <b>Warren Parsons</b>                      Chief Architect  <i>General Motors</i></p>	1:30 pm	<p><b>Overview</b>                      Banana Chart and Overview of Steel Types</p>
8:30 am	<p><b>Vehicle Dynamics – Forces on Vehicles</b></p> <ul style="list-style-type: none"> <li>- Resistance</li> <li>- Tractive</li> <li>- Braking</li> </ul>	1:45 pm	<p><b>Steel Making Overview – Filling in the Banana Chart</b></p> <ul style="list-style-type: none"> <li>- Mining</li> <li>- Casting</li> <li>- Hot &amp; Cold Rolling</li> <li>- Continuous Annealing</li> <li>- Coating</li> </ul>
9:00 am	<p><b>Fuel Economy &amp; CAFE</b></p>	2:45 pm	<p><b>Material Selection Process</b></p> <ul style="list-style-type: none"> <li>- Functional Objectives                             <ul style="list-style-type: none"> <li>o Crash Management                                     <ul style="list-style-type: none"> <li>▪ Energy Absorption</li> <li>▪ Minimize Intrusion</li> </ul> </li> <li>o NVH                                     <ul style="list-style-type: none"> <li>▪ Stiffness Dominated</li> </ul> </li> <li>o Durability</li> </ul> </li> <li>- Tie Back to Banana Chart</li> <li>- WorldAutoSteel Mass Benchmarking Example</li> </ul>
9:15 am	<p><b>Introductions, Definitions, Nomenclature of Automotive Body</b></p> <ul style="list-style-type: none"> <li>- BIWs &amp; Greenhouse</li> <li>- Body Configurations &amp; Topologies</li> <li>- Major Assembly Breakdowns</li> </ul>		
9:30 am	<p><b>Structure Requirements</b></p> <ul style="list-style-type: none"> <li>- Load &amp; Deformations</li> <li>- Strength, Stiffness, and Energy Absorption</li> <li>- Second Moment of Inertia</li> </ul>		
9:45 am	<p><b>Body Structure Elements</b></p>	3:45 pm	<p><b>Break</b></p>
10:00 am	<p><b>Break</b></p>	4:15 pm	<p><b>Producing BIW Components</b></p> <ul style="list-style-type: none"> <li>- Roll Forming</li> <li>- Stamping                             <ul style="list-style-type: none"> <li>o Global vs Local Formability                                     <ul style="list-style-type: none"> <li>▪ Forming Limit Diagram</li> <li>▪ True Fracture Strain</li> <li>▪ Hance Diagram</li> </ul> </li> </ul> </li> </ul>
10:30 am	<p><b>Body Bending Requirements and Design</b></p> <ul style="list-style-type: none"> <li>- Bending Strength Requirements</li> <li>- H-Point, Stiffness, Frequency</li> <li>- Benchmark</li> </ul>		
11:00 am	<p><b>Torsional Requirements</b></p> <ul style="list-style-type: none"> <li>- Vehicle Stiffness with Torsionally Flexible Body</li> <li>- First Order Approximation of Vehicle Roll Stiffness</li> <li>- Strength Requirement</li> <li>- Twist Ditch</li> </ul>		
11:30 am	<p><b>Crashworthiness Requirements</b></p> <ul style="list-style-type: none"> <li>- Mandated requirements</li> <li>- Front Barrier</li> <li>- Point Mass Model</li> <li>- Crash Efficiency Factors</li> <li>- V-T Histories</li> </ul>	4:45 pm	<p><b>Sheet Metal Forming Overview</b></p> <ul style="list-style-type: none"> <li>- Types of Strain, FLC, Circle Grid Analysis                             <ul style="list-style-type: none"> <li>o Lessons Learned</li> <li>o Case Studies</li> </ul> </li> </ul>
12:00 pm	<p><b>Design for Vibrations</b></p> <ul style="list-style-type: none"> <li>- Vibration Source &amp; Interactions</li> <li>- Resonance</li> <li>- Noise &amp; Vibration Mode-Map</li> <li>- Body Vibration Test</li> </ul>	6:45 pm	<p><b>Adjournment</b></p>
12:30 pm	<p><b>Lecture Adjourned &amp; Lunch</b></p>		

**Wednesday, March 28, 2018**

<b>AM Schedule</b>		<b>PM Schedule</b>	
<b>Lecture: BIW Materials (cont.)</b> Instructors: Mike Davenport Director Dan Sakkinen Manager Harry Singh Sr. Product Application Engineer Steve Schaar Manager US Steel		<b>Lecture: High Pressure Casting Solutions in the Automotive Industry</b> Instructor: Harold Gerber Director Shiloh	
<b>Time</b>	<b>Room 103</b>	<b>Time</b>	<b>Room 103</b>
8:30 am	<b>Circle Grid Analysis Exercise</b> <ul style="list-style-type: none"> <li>Evaluate various parts and plot on FLD</li> </ul>	2:30 pm	<b>Core Engineering Principles Relating to Casting Strategy</b> <ul style="list-style-type: none"> <li>Design Concepts and System Requirements</li> <li>Forces, Environments, and Joining</li> </ul>
10:30 am	<b>BIW Assembly</b> <ul style="list-style-type: none"> <li>Welding – Types Described                             <ul style="list-style-type: none"> <li>RSW Basics</li> </ul> </li> </ul>	3:30 pm	<b>Casting and Vehicle Applications – Light Metal Process Review</b> <ul style="list-style-type: none"> <li>Forging, Sand, Perm Mold, HPDC, Squeeze, HIPC Product, and Process Fit</li> </ul>
11:00 am	<b>Break</b>	4:30 pm	<b>Break</b>
12:00 pm	<b>Introduction to Global Automotive Trending</b> <ul style="list-style-type: none"> <li>Lightweighting in Designs, Vehicles, Markets</li> </ul>	5:00 pm	<b>Product Process Design for Manufacturability</b> <ul style="list-style-type: none"> <li>Modeling, Simulation, Flow, Thermal, Stress Concentration Heat Treatment, Machining, Assembly, Traceability</li> </ul>
12:30 pm	<b>Materials Ferrous and Non-Ferrous</b> <ul style="list-style-type: none"> <li>Vehicle Structure Examples Fitting to Vehicle System Requirements</li> </ul>	6:00 pm	<b>Conclusions, New Trends, Research Directions</b> <ul style="list-style-type: none"> <li>Systems Thinking, Process Consistency, Homogenous Structures</li> </ul>
1:30 pm	<b>Lecture Adjourned &amp; Lunch</b>		

**Thursday, March 29, 2018**

AM Schedule	<u>Lecture: Design for Laser Welding Seminar</u> Instructor: David Havrilla Manager TRUMPF	PM Schedule	<u>Lecture: Part Consolidation &amp; Tailored Joining Solutions in Automotive</u> Instructors: Jim Evangelista Director Steve Fetsko Manager Shiloh
Time	Room 103	Time	Room 103
8:00 am	Introduction	1:00 pm	Overview in Tailored Joining in N.A.
8:15 am	Why Employ Laser Welding?	1:30 pm	Design Benefits <ul style="list-style-type: none"> <li>- Material Optimization                             <ul style="list-style-type: none"> <li>o Gross &amp; Net Weight</li> </ul> </li> <li>- Consolidation of Components</li> <li>- Product Performance</li> </ul>
8:45 am	Focus Fundamentals, Power, and Energy	2:30 pm	Design Tradeoffs for Cost/Weight Optimization
9:15 am	Welding and Material Considerations	3:30 pm	Break
9:45 am	Strength, Joint & Tolerance Considerations	4:00 pm	Team Study
10:15 am	Design for Laser Welding	4:30 pm	Formability <ul style="list-style-type: none"> <li>- Effects of Tailored Blanks During Forming</li> <li>- Correlation Studies</li> <li>- Weld Characterization</li> <li>- Placement of Weld Line on Component</li> </ul>
10:45 am	System & Process Consideration	5:00 pm	Aluminum Tailor Joining
11:15 am	Applications Overview	5:30 pm	Co-Formed Components <ul style="list-style-type: none"> <li>- Patch forming</li> <li>- Viscoelastic Patches for NVH Reduction</li> </ul>
11:30 am	Keys for Success		
12:00 pm	Lecture Adjourned & Lunch	6:00 pm	Adjournment