



# CENTER FOR ADVANCED VEHICULAR SYSTEMS

Mississippi State University

**FY08**

**Fourth Quarter Report**

1 April 2008 to 30 June 2008

## EXECUTIVE SUMMARY

In the fourth quarter of the 2008 academic year, CAVS has secured a stable condition as evident by the graduation of several students, completion of several “initiative” projects, and placement of six staff into senior management or tenure-track positions. With the program maturation, CAVS is focusing on research and development projects to better match its mission as an interdisciplinary center that provides team-based solutions for complex issues associated with human mobility. During April – July 2008, CAVS faculty and staff proposal activities included 13 awards totaling \$4,817,915 and 5 continuation awards totaling \$2,169,270. This gave a net award inflow of \$6,987,185 while CAVS had a net expenditure of \$3,983,303.

CAVS research support for the quarter included:

- 9 academic faculty
- 23 research associates
- 9 postdoctoral fellows
- 52 graduate students
- 66 undergraduate students
- 12 administrative professionals
- 8 administrative staff

Highlights from the detailed report include the following:

- 10 proposals, totaling \$4,323,628 were submitted for future funding
- CAVS staff submitted 12 articles and 3 books for publication, and 14 conference submissions
- During the same time CAVS was responsible for
  - 20 published articles
  - 1 published book
  - 13 presentations

• The following PI’s and Co-PI’s submitted proposals:

Arockiasamy, Antonyraj -	1	Carruth, Daniel -	1	Coltharp, Dave -	1
Haupt, Tomasz -	2	King, Roger -	2	Littell, Neil -	1
Marin, Esteban -	1	McCarter, Kelli -	1	McFadyen, Gary -	1
McGinley, John -	1	Park, Seong Jin -	1	Reeves, Kari -	1
Rowland, Zach -	1				

## **I. Accomplishments**

### **A. Grants and Proposals**

#### ***1.Submitted Proposals Awarded – Totaling \$4,817,914.51***

- “Advanced Naval Power Systems Through Electric Ship Systems Research and Development Proposal,” Haupt, T., Florida State University, \$93,985.
- “Advancement in On-Board Vehicle Power-WD 0001,” Molen, M., Mazzola, M., US Army Tank Automotive Research, Development, and Engineering Center, \$900,015.01.
- “BAE Advanced Information Technologies,” McGinley, J., BAE Systems, \$9,922.
- “Investigation of the Effects of Increased Coverage Area for Soft Body Armor,” Carruth, D., Lawrence Technological Institute, \$24,790.
- “Joint Combat Outpost Quick Reaction Test (JCOP QRT) Support,” Coltharp, D., Sentel, \$120,901.
- “NEES Computational Simulation: SimPort,” Haupt, T., NEES Consortium, \$75,000.
- “SimBRS WD 004-Cyberinfrastructure,” Haupt, T., McCarter, K., US Army Tank Automotive Research, Development and Engineering Center, \$618,036.
- “SimBRS WD 02-Improved Techniques for Vehicle Prognostic/Diagnostic Data Acquisition, Analysis, and Storage,” King, R., US Army Tank Automotive Research, Development and Engineering Center, \$2,124,980.35.
- “SimBRS WD 03-Using Virtual Soldier Research to Determine the Work Required to Integrate Cognitive Architectural Modeling in the TARDEC GVSL,” McFadyen, G., Carruth, D., McGinley, J., Reeves, K., Rowland, Z., US Army Tank Automotive Research, Development and Engineering Center, \$84,932.74.
- “SimBRS WD 05-Multi-scale Metal Component Reliability/Safety,” Horstemeyer, M., US Army Tank Automotive Research, Development and Engineering Center, \$499,997.41.
- “Simulation Environment for FSSIM-Shadwell Forward Database Extension,” Haupt, T., Naval Research Laboratory, \$92,514.
- “Vehicle Performance Monitoring System for MDOT Law Enforcement,” Rowland, Z., Crocker, M., Reeves, W., Mississippi Department of Transportation, \$139,811.
- “Workshop for Scientific Issues on Medical Applications of MicroNano Powder Injection Molding-Molding, Sintering, Modeling, and Commercial Applications,” German, R., National Science Foundation, \$33,030.

#### ***2.Continuations – Totaling \$2,169,270.02***

- “ChallengeX: Crossover to Sustainable Mobility,” Molen, M., McAlpin, A., General Motors Research & Development Center, \$5,000.
- “REU Site: Multiscale High Rate Phenomena,” Gullett, P., Stevenson, T., National Science Foundation, \$98,600.
- “Southern Regional Center for Lightweight Innovative Design – Budget Period 2,” Horstemeyer, M., Eamon, C., El Kadiri, H., German, R., Hammi, Y., Haupt, T., Kim, S.G., Lacy, T., Park, S.J., Rais-Rohani, M., Solanki, K., Department of Energy, \$1,980,000.
- “Updating the Joint Antiterrorism Guide, Joint Forward Operations Base Handbook, and Joint Contingency Operations Base Handbook with New Protective Measures,” Coltharp, D., Sentel, \$85,670.02.

## B. Publications

### Articles in Trade Journals and Popular Press

- “Material Homogeneity in Powder Injection Molded Ceramic Microchannel Arrays,” Wu, C., Atre, S.V., Laddha, S., Lee, S., Simmons, K., Park, Seong Jin, German, R., *PIM International*, June 2008, 2(2), 68-73.

### Peer-Reviewed Journals

- “A Technical and Market Contrast and Comparison for Metal Powder Injection Molding,” German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Deformation Gradient Tensor and Strain Tensors for Atomistic Simulations,” Gullett, P., Horstemeyer, M., Baskes, M.I., Fang, H., *MSMSE*, April 2008, 16, 1-17.
- “Densification Behavior and Properties of Spark Plasma Sintered HfB<sub>2</sub>-20SiC,” Atre, S.V., Kendoll, G., Othara, M., Shoop, H., Camey, C., Park, S.J., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Development of Nanotubes Reinforced Metal Composites for Heat Sinking Applications,” Ahmad, F., Norani, M., Gehad, G., German, R., *Advances in Powder Metallurgy and Particulate Materials*, CD, May 2008.
- “EDM Performance of W-CU Electrodes by Nano Tungsten,” Kwon, Y.S., Chung, S.T., Lee, J.H., Joun, M.S., Lee, S., Noh, J.W., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Effect of Powder Characteristics and Sintering Conditions on Density and Corrosion Resistance of MIM 316L,” Dwividi, R.K., Heaney, D.F., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Fracture and Fragmentation Problems in Particulate Materials Processing,” German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Injection Molding of Micro-Porous 316L Stainless Steel Parts,” Gulsoy, O., Suri, P., Park, S.J., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Integrated Simulation of Mold Filin (Binder Powder Separation), Debinding, and Sintering in Powder Injection Molding,” Park, S.J., Kim, S., German, R., Atre, S.V., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “Interpretation of the Relationship Between Skin Temperature and Vegetation Fraction: Effect of Subpixel Soil Temperature Variability,” Mostovoy, G.V., Anantharaj, V., King, R., Filippova, M.G., *International Journal of Remote Sensing*, May 2008, 29(10), 2819-2831.
- “Mapping Between Material Design and Properties Using Material Informatics for PM Simulation,” Park, S.J., Lee, S., German, R., Atre, S.V., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ: Metal Powder Industries Federation, CD, June 2008.
- “Material Homogeneity in Powder Injection Molded Ceramic Microchannel Arrays,” Wu, C., Atre, S.V., Laddha, S., Lee, S., Simmons, K., Park, S.J., German, R., Sr., D., *PIM International*, 2008, May 2008, 2(2), 68-73.
- “Microstructure and Mechanical Properties of Sintered Ti-Fe-Zr,” Gulsoy, O., German, R., Suri, P., Park, S.J., Arockiasamy, A., Kadiri, H.E., Whitehorn, R., *Advances in Powder Metallurgy and Particulate Materials*, Metal Powder Industries Federation, Princeton, NJ, CD, May 2008.

- “Microstructure History Effect During Sequential Thermomechanical Processing,” Yassar, R.S., Murphy, J., Burton, C., Horstemeyer, M., El Kadiri, H., Shokuhfar, T., *Materials Science Engineering A*, April 2008, *10*, 1016.
- “Mixing Simulation for Powder Injection Molding Feedstock: Quantification and Sensitivity Analysis,” Ahn, S., Kang, T.G., Park, S.J., German, R., Atre, S.V., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ; Metal Powder Industries Federation, CD, June 2008.
- “Optimization of Process Conditions in Micro Powder Injection Molding Using Taguchi Robust Design Method: Part I. Primary Design Parameters,” Urval, R., Lee, S., Atre, S.V., Park, S.J., German, R., *Powder Metallurgy*, Jun 2008, *51(2)*, 133-142.
- “Prediction of Tool Wear and Tool Life by Experiment, Modeling, and Simulation of the Die Compaction Process,” Li, W., Park, S.J., Hammi, Y., German, R., Blau, P.J., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.
- “The Effect of Fe Atoms on the Adsorption of a W Atom on W(100) Surface,” Houze, J., Kim, S., Kim, S.G., Park, S.J., German, R., Horstemeyer, M., *Journal of Applied Physics*, May 2008, *103(10)*, 106103.
- “The Effect of Feedstock Composition on Defect Evolution in Powder Injection Molded Ceramic Microarrays,” Atre, S.V., Ladha, S., Wu, C., Simmons, K., Park, S.J., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, CD, June 2008.

#### **Book or Book Chapter**

- “Integrating Cognitive and Digital Human Models for Virtual Product Design,” Carruth, D., Duffy, V. G., *Ergonomics and Psychology: Developments in Theory and Practice*, Taylor and Francis, Chebykin, Bedny, and Karwowski, May 2008, pp. 29-40.

#### **Peer-Reviewed Conference Papers**

- “Ensemble of Metamodels with Optimized Weight Factors,” Acar, E., Schaumburg, IL, 4th AIAA Multidisciplinary Design Optimization Specialist Conference, April 2008.
- “High Rate Deformation in Press-Sinter W-Cu Using Hopkinson Bar Test,” Tucker, M.T., Bammann, D., Park, S.J., Kwon, Y S., German, R., Proceedings of the International Conference on Tungsten, Refractory and Hardmaterials VII, Metal Powder Industries Federation, Princeton, NJ, June 2008.
- “Influence of Cross-Sectional Geometry on Crash Characteristics of Crush Tubes,” Najafi, A., 49th AIAA/ASME/ASC/AHS/ASC Structures, Structural Dynamics and Materials Conference, Schaumburg, IL, April 2008.
- “Micromechanical Simulations on Hygro-Mechanical Properties of Bio-Fiber Composites,” Xue, Y., Wang, K., Proceeding of 2008 MRS Spring Meeting, San Francisco, CA, May 2008.
- “Multistage Fatigue Model on Viscoelastic Materials at Elevated Temperatures,” Bouvard, J.L., Xue, Y., Taylor, P., Horstemeyer, M., Oglesby, D., Monterey, CA, 6th International Conference on Mechanics of Time-Dependent Materials, April 2008.
- “Parallel Implementation of Three Scientific Applications Using LB\_Migrate,” Chaube, R., Carino, R., Banicescu, I., Proceedings of the 9th International Workshop on Parallel and Distributed Scientific and Engineering Computing, Miami, FL, April 2008.
- “Reliability Estimation Using Dimension Reduction and Extended Generalized Lambda Distribution,” Acar, E., Eamon, C., Schaumburg, IL, 10th AIAA Non-Deterministic Approaches Conference, April 2008.

- “Three Dimensional Atomistic Simulation of the Sintering and Shrinkage Behavior of Nanoscale Tungsten,” Moitra, A., Kim, Sungho, Kim, S.G., Park, S.J., German, R., Proceedings of the International Conference on Tungsten, Refractory and Hardmaterials VII, Metal Powder Industries Federation, Princeton, NJ, CD, June 2008.
- “Topology Optimization of Continuum Structures Using Element Exchange Method,” Rouhi, M., 4th AIAA Multidisciplinary Design Optimization Specialist Conference, Schaumburg, IL, American Institute of Aeronautics and Astronautics, April 2008.

#### **Peer-Reviewed Conference Abstracts**

- “Augmented Reality Based Visual Prototyping: See What You Mean,” Littell, N., McMillan, D., *2008 Annual CATIA Operators Exchange*, Lake Buena Vista, FL, April 2008.
- “CATIA Implementation in the Design of the DBF Aircraft,” Littell, N., Parker, T., *2008 Annual CATIA Operators Exchange*, Lake Buena Vista, FL, April 2008.
- “Simulation Modeling: Breakthrough Technology for Small and Medium Size Manufacturers,” Walden, C., Hill, T.W., Dennis, H.G., Sheely, R.A., *Expanding Manufacturing Growth Potential*, Orlando, FL, 2008 MEP National Conference, April 2008.

#### **Peer-Reviewed Conference Posters**

- “Development and Analysis of Bio-Inspired Design Aluminum Composites,” Antonyraj, A., Suri, P., Park, S.J., German, R., *Advances in Powder Metallurgy and Particulate Materials*, Princeton, NJ, Metal Powder Industries Federation, June 2008.

#### **Technical Report**

- “Business Continuity Assessment Survey,” Puryear, S., Walden, C., *CAVS Extension Technical Report*, June 2008.
- “Business Continuity Template for Small and Medium Size Manufacturers,” Puryear, S., Walden, C., *CAVS Extension Technical Report*, June 2008.
- “Finite Element Analysis of the Plastic J-Bracket Used in the ZW Vertical Back Glass of a Nissan Vehicle,” Oglesby, D., Solanki, K., Marin, E., Wang, P., *MSU.CAVS.CMD.2008-R0010*, May 2008.
- “Pilot Tool for Linking Ship Design to Shipyard Simulation,” Walden, C., Hill, T.W., Holt, R., Greenwood, A., *CAVS Extension Technical Report*, June 2008.
- “Structural Analysis of Drop-deck Trailer,” Solanki, K., Oglesby, D., Hollingsworth, L., Jones, E. W., Marin, E., *CAVS Report MSU.CAVS.CMD.2008-R0008*, June 2008.

#### **Non-Refereed Conference Papers**

- “FireGUI: A Software Tool for Predicting Fire and Smoke Spread on Ships,” Henley, G., Haupt, T., Parihar, B.S., Williams, F.W., Biloxi, MS, *American Society of Naval Engineers*, April 2008.

#### **Non-Refereed Conference Abstracts**

- “Prediction of Tool Wear and Tool Life by Experiment/Modeling/Simulation of the Die Compaction Process,” Li, W., Park, S.J., Hammi, Y., German, R., Blau, P.J., Qu, J., *2008 World Congress on Powder Metallurgy & Particulate Materials*, June 2008.

#### **Non-Refereed Conference Posters**

- “Simulation Environment for Onboard Fire and Smoke Propagation Model,” Haupt, T., Henley, G., Parihar, B.S., Austin, TX, *Electric Ship Research and Development Consortium*, May 2008.

### **C. Presentations**

- “A Consistent Theory for Internal State Variable Theory,” Bammann, D., Ward, D. K., Groh, S., Bouvard, J.L., American Academy of Mechanics, New Orleans, LA, June 2008.
- “Armored Vehicle Development at Navistar Defense in West Point, MS,” Dennis, H.G., Columbus Officers Club, Columbus, MS, April 2008.
- “Armored Vehicle Development at Navistar Defense in West Point, MS,” Dennis, H.G., West Point Lions Club, West Point, MS, May 2008.
- “Armored Vehicle Development at Navistar Defense Plant in West Point, MS,” Dennis, H.G., Amory Rotary Club, Amory, MS, May 2008.
- “Armored Vehicle Production at Navistar Defense Plant in West Point, MS,” Dennis, H.G., Sheely, R.A., Meridian, MS, April 2008.
- “Armored Vehicle Production in West Point, MS,” Sheely, R.A., Dennis, H.G., Rotary Club, North Jackson, MS, April 2008.
- “Bridging Atomistics and Continuum Mechanics and Associated Length Scale Issues,” Horstemeyer, M., American Academy of Mechanics, New Orleans, LA, June 2008.
- “CAVS Extension Mission and Armored Vehicle Development in West Point, MS,” Walden, C., Dennis, H.G., Sheely, R.A., WALT “910 Talk Radio,” Meridian, MS, April 2008.
- “Modeling for Powder Metallurgy Component Design and Performance Prediction,” Hammi, Y., Stone, T., Tucker, L., Horstemeyer, M., Marin, E., MPIF/APMI 2008 World Congress on Powder Metallurgy & Particulate Materials, Washington, DC, June 8-12, 2008.
- “Myth Buster: Introduction to Design of Experiments,” Walden, C., Industry-Education Partnership, Canton, MS, June 2008.
- “Myth Buster: Introduction to Design of Experiments,” Walden, C., Canton, MS, June 2008.
- “Pressure-Dependent Plasticity Model for Powder Metallurgy Compaction,” Hammi, Y., Stone, T., Tucker, L., Horstemeyer, M., First American Academy of Mechanics Conference, New Orleans, LA, June 17-20, 2008.
- “Simulation Based Shipyard Planning System at Halter Marine,” Walden, C., Executive Control Board, San Diego, CA, National Shipbuilding Research Program, June 2008.

### **D. Awards & Recognition**

- Dennis, H.G., Walden, C., “MEP Practitioner of the Year,” *Manufacturing Extension Partnership*, Orlando, FL, Annual Conference, April 2008.
- Horstemeyer, M., presented with the Ralph E. Powe Research Excellence Award at the MSU Research Awards Banquet, May 2008.
- Park, S.J., selected into “Dictionary of International Biography 34th Edition by International Biographical Center, Cambridge, England,” May 2008.
- Park, S.J., selected into the Upcoming 2008-2009 “Honors Edition” of “Who's Who Among Executives and Professionals” by Madison Who's Who, Long Island City, NY, May 2008.

## II. Activities

### A. Proposal Submissions

- “Computational Design Tool Development for Multilevel Optimization of Product-Material Systems under Uncertainty,” Haupt, T., National Science Foundation.
- “Edison Materials Technology Center,” Park, S.J., IAP Research, Inc.
- “Joint Combat Outpost Quick Reaction Test (JCOP QRT) Support,” Coltharp, D., Sentel.
- “Methods for Homogenous Dispersion of Nanoparticles Nanoparticles in Mg Matrix,” Antonyraj, A., NineSigma.
- “SimBRS WD 0004-Cyberinfrastructure,” Haupt, T., McCarter, K., US Army Tank Automotive Research, Development, and Engineering Center.
- “SimBRS WD 02-Improved Techniques for Vehicle Prognostic/Diagnostic Data Acquisition, Analysis, & Storage,” King, R., US Army Tank Automotive Research, Development, and Engineering Center.
- “SimBRS WD 03-Using Virtual Soldier Research (VSR) to Determine the Work Required to Integrate Cognitive Architecture/Modeling in the TARDEC GVSL,” McFadyen, G., Rowland, Z., McGinley, J., Carruth, D., Reeves, K., US Army Tank Automotive Research, Development, and Engineering Center.
- “SimBRS WD 06-Material Database and FEA Material Model Development for Polymer Materials,” Marin, E., US Army Tank Automotive Research, Development, and Engineering Center.
- “Three-Dimensional Virtual Prototyping of Conceptual Ship Geometry for Halter Marine,” Littell, Neil, VT Halter Marine.
- “WD 011-Hybrid Cellular Automata for Vehicle Structural Design for Improved Soldier Crash Safety & Survivability,” King, R., US Army Tank Automotive Research, Development, and Engineering Center.

### B. Publication Submissions

#### Book or Book Chapter

- “*Handbook of Mathematical Relations in Particulate Materials Processing*,” German R., Park, S.J., John Wiley & Sons, Inc., May 2008.
- “Section A. MIM in Chapter 9. Simulation of PM Processes,” Park, S.J., Ahn, S., German, R., Chung, S.T., *ASM Handbook*, ASM International, June 2008, 22.
- “Section A. Press and Sinter in Chapter 9. Simulation of PM Processes,” Chung, S.H., Kwon, Y.S., Park, S.J., German, R., *ASM Handbook*, ASM International, June 2008, 22.

#### Articles in Trade Journals and Popular Press

- “On the Mechanical Characterization of Thermoplastic Polyurethane: Testing and Modeling,” Bouvard, J.L., Xue, Y., Taylor, P., Marin, E., Horstemeyer, M., Oglesby, D., *Mechanics of Time-Dependent Materials*, June 2008.

#### Peer-Reviewed Journals

- “A Robust Modeling for WHA with Premixed and Prealloyed W-Cu: Homogenization and Densification with Heating Rate Effect,” Sethi, G., Park, S.J., Johnson, J.L., German, R., *Acta Materialia*, June 2008.
- “Effect of Powders and Binders on Rheological Behavior and Moldability in Iron and Stainless Steel Powder Injection Molding Process,” Ahn, S., Park, S.J., Atre, S.V., German, R., *Powder Metallurgy* 2008, June 2008.

- “Integration of Microstructure-property Relationships in an Internal State Variable Plasticity and Damage Constitutive Model for Reliability-based Optimization in Engineering Design,” Solanki, K., Acar, E., Horstemeyer, M., Steele, G., *International Journal of Design Engineering*, June 2008.
- “Master Decomposition Curve Analysis of Ethylene Vinyl Acetate: Influence of Metal Powders,” Atre, S.V., Enneti, R.K., Park, S.J., German, R., *Powder Metallurgy 2008*, May 2008.
- “Master Decomposition Curve Analysis of Ethylene Vinyl Acetate: Influence of Metal Powders,” Atre, S.V., Enneti, R.K., Park, S.J., German, R., *Powder Metallurgy, 2008*, May 2008.
- “Melting Tungsten Nanoparticles: a Molecular Dynamics Study,” Moitra, A., Kim, S., Houze, J., Jelinek, B., Park, S.J., German, R., Horstemeyer, M., Kim, S.G., *Journal of Physics D: Applied Physics*, April 2008.
- “Review: Liquid Phase Sintering,” German, R., Suri, P., Park, S.J., *Journal of Materials Science*, May 2008.
- “Shape and Sizing Optimization of Automotive Structures with Deterministic and Probabilistic Design Constraints,” Solanki, K., Acar, E., Eamon, C., *International Journal of Vehicle Design*, April 2008.
- “System Reliability Based Vehicle Design for Crashworthiness and Importance of Reducing Material Uncertainty,” Acar, E., Solanki, K., *International Journal of Vehicle Design*, June 2008.
- “Utilization of Silicon Rubber to Characterize Tool Surface Quality During Die Compaction,” Thompson, K., Li, W., Park, S.J., Antonyraj, A., German, R., *Powder Metallurgy*, May 2008.
- “Viscoelastic Behavior of Porous Sintered Steels Compact,” Antonyraj, A., Park, S.J., German, R., *Research Letters in Physics*, May 2008.

#### **Peer-Reviewed Conference Papers**

- “Densification Behavior and Properties of Spark Plasma Sintered HfB-20SiC,” Atre, S.V., Kendall, G., Bothara, M., Shoop, H., Park, S.J., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “Development of Carbon Nanotube Reinforced Copper Composite Powder and its Application,” Kwon, Y.S., Lee, S., Noh, J.W., Park, S.J., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “EDM Performance of W-Cu Electrodes by Nano Tungsten Coated Copper Composite Powder,” Kwon, Y.S., Lee, H., Joun, J., Lee, S., Noh, J.W., Park, S.J., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “High Rate Deformation in Press-Sinter W-Cu Using Hopkinson Bar Test,” Tucker, M.T., Park, S.J., Kwon, Y.S., Horstemeyer, S., German, R., 2008 International Conference on Tungsten, Refractory & Hardmaterials VII, Washington, DC, June 8-12, 2008.
- “Injection Molding of Micro-Porous 316L Stainless Steel Parts,” Gulsoy, H.O., Suri, P., Park, S.J., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “Integrated Simulation of Mold Filling (Binder-Powder Separation), Debinding, and Sintering in Powder Injection Molding,” Kim, S., Ahn, S., Park, S.J., Atre, S.V., German, R., PMS 2008, Washington, DC, June 8-12, 2008.
- “Investigations on Novel Titanium Alloys for Structural Applications,” Gulsoy, H.O., Suri, P., Antonyraj, A., Park, S.J., German, R., El Kadiri, H., Peter, W.H., Blue, C., PM 2008, Washington, DC, June 8-12, 2008.
- “Mapping Between Material Design and Properties Using Material Informatics for P/M Simulation,” Lee, S., Park, S.J., Atre, S., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “Mixing Simulation for Powder Injection Molding Feedstock: Quantification and Sensitivity Analysis,” Ahn, S., Kang, T.G., Park, S.J., Atre, S.V., German, R., PM 2008, Washington, DC, June 8-12, 2008.

- “Prediction of Tool Wear and Tool Life by Experiment/Modeling/Simulation of the Die Compaction Process,” Li, W., Blau, P.J., Qu, J., Park, S.J., Hammi, Y., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “Taguchi Method for Sintering Study of Nanoscale Silicon Carbide Fabricated Using Plasma Pressure Compaction,” Bothara, M., Atre, S.V., Vijay, P., Sudarshan, T.S., Radhakrishnan, R., Park, S.J., German, R., PM 2008, Washington, DC, June 8-12, 2008.
- “The Effect of Feedstock Composition on Defect Evolution in Powder Injection Molded Ceramic Microarrays,” Atre, S., Ladha, S., Park, S.J., German, R., Lee, S., PM 2008, Washington, DC, June 8-12, 2008.
- “The Effect of Processing Variables on Gas Bubble Formation in Gas-assisted Powder Injection Molding,” Lee, K., Ahn, S., Nambiar, R., Park, S.J., PM 2008, Washington, DC, June 8-12, 2008.
- “Three Dimensional Atomistic Simulation of the Sintering and Shrinkage Behavior of Tungsten and Tungsten Alloys,” Moitra, A., Kim, S., Kim, S.G., Park, S.J., German, R., 2008 International Conference on Tungsten, Refractory & Hardmaterials VII, Washington, DC, June 8-12, 2008.

#### **Technical Report**

- “AMCOM Technical Report for April 2008,” Hill, T.W., Walden, C., May 2008.
- “AMCOM Technical Report for March 2008,” Hill, T.W., Walden, C., April 2008.
- “AMCOM Technical Report for May 2008,” Hill, T.W., Walden, C., June 2008.
- “RFID Technology Development Project,” Sheely, R.A., May 2008.
- “Task 1, CVDM (ORNL) Project Quarterly Reports,” Park, S.J., April 2008.
- “Task 5, SRCLID (DOE) June 2008 Monthly Report,” Park, S.J., June 2008.
- “Task 5, SRCLID (DOE) Project April 2008 Monthly Report,” Park, S.J., April 2008.
- “Task 5, SRCLID (DOE) Project May 2008 Monthly Report,” Park, S.J., May 2008.

### **C. Participation**

#### **Special Guest**

- Kirkland, R., hosted Ken Baker, retired Director of Research for General Motors, who visited CAVS and spoke about the future of the automotive industry to the staff. Ken also provided insight on areas of research that CAVS should focus upon, April 2008.
- Park, S.J., hosted Dr. Seokyoung Ahn, Assistant Professor at University of Texas Pan American, visited CAVS and gave a presentation, had two meetings with CMD and MP, April 2008.
- Branch, V., Technology Skills Association Competition Judge, April 2008.
- Branch, V., Jackson Public Schools presentation to seniors at Jackson Career Development Center, May 2008.
- Branch, V., Guest speaker at graduation ceremony for Madison Vocational Center, May 2008.
- Branch, V., Special Guest to American Association for Blacks (AABE) in Energy banquet. AABE is a program supporter for STEP, May 2008.
- Branch, V., INROADS Workshop presenter – “Transition to the World of Work,” June 2008.

#### **Visit**

- Kirkland, R., met with Fred Williams, Director of Safety and Survivability, with NRL to determine the strategy for FSSIM and the scope of work for this year's funding, April 2008.

#### **Meeting/Discussion**

- Branch, V., presentation to Jim Hill High School seniors, April 2008.
- Branch, V., met with JSU Engineering Dept about scholarships for STEP seniors, April 2008.

- Branch, V., advisory meeting with Madison Vocational Center, May 2008.
- Branch, V., INROADS Workshop presenter – “Business Simulation - Employment Case,” June 2008.
- Brown, D. attended “Measuring the Effectiveness of Virtual School Programs - Research and Beyond” seminar, presented by: Liz R. Pape, CEO, Virtual High School, April 2008.
- Brown, D., McCarter, K., Riddle, M., attended “Export Control Regulations Seminar” at CAVS, presented by Nick Miller, April 2008.
- Horstemeyer, M., Clayton, D.J., Field, D., III, D., Khaleel, D.M., Potirniche, D., Sarma, D., Spearot, D., Srivilliputhur, D., Chiesa, D., Bingert, D., Bammann, D., El Kadiri, H. Johnson, D., Nemat-Nasser, D.S., Wright, D.T., Zbib, D., Al-Rub, D., Barton, D.N., Voyiadjis, D., The “Symposium of Predictive Science & Technology in Materials & Mechanics” is the first in a series of three to be held over the next three years. It is designed to bring together top researchers in the fields of materials and mechanics in both modeling and experimentation at all link scales. Recognizing the importance of perceived impact in the area of mechanics and materials, we also had a panel discussion whose goal was to improve all of our efforts in that endeavor. The discussion included the possibilities of sharing graduate students, post-docs and improving knowledge of each other’s research efforts to improve recognition, June 2008.
- Horstemeyer, M., American Academy of Mechanics Symposium on “Multiscale Modeling for Plasticity and Damage,” New Orleans, LA, June 2008.
- Kirkland, R., Molen, M., arranged a meeting with Mike McGrevey to brief him on the proposed Plugin Hybrid Project at MSU and solicit support from administration, May 2008.
- Kirkland, R., presentation of CAVS Capabilities to the Starkville Lion's Club, June 2008.
- Kirkland, R., attended the 2008 Gulf Coast Trade Conference, sponsored by the Mississippi Development Authority. Met with industries from Alabama, Louisiana and Mississippi, April 2008.
- Kirkland, R., met with the Mississippi Transportation Coalition in Jackson, MS to continue development of the Transportation and Energy Plan for the State, April 2008.
- Kirkland, R., Henley, G., attended the 2008 ASNE Shipbuilding Conference where CAVS was asked to make a presentation of the FSSIM, April 2008.
- Kirkland, R., met with Sturgis Trailer Company to order the trailer for MSU's Motorsports Programs. Funding for the trailer was generated through the Cx Program, April 2008.
- Kirkland, R., arranged and hosted the CAVS's Steering Committee, May 2008.
- Kirkland, R., participated in the 2008 Challenge X Competition event in Baltimore, MD and Washington D.C. The MSU Team won the overall competition for 2008 and the trophy was presented to the team by the Secretary of Energy, May 2008.
- Kirkland, R., met with Ultra Life Corporation to discuss joint participation on research projects regarding automotive hybrid technology. Met with Robert Wise, Director of Research and Michael Braband, Program Manager for Government and Defense, May 2008.
- Kirkland, R., Rowland, M., met with Mike Ford, CFO and Jamie Williamson, Technical manager with LeFleur Transportation Corporation regarding CAVS’ Vehicle Performance Monitoring System, June 2008.
- Kirkland, R., attended the MS Transportation Coalition meeting in Jackson; and was asked to provide technical input for the proposed the State's Transportation Plan, June 2008.
- Kirkland, R., Young, M., Philips, S., exhibited the ChallengeX Vehicle at the 2008 Freescale Technology Forum in Orlando, FL, with all expenses paid by Freescale. Freescale proposed to sponsor a Controls Lab at MSU, June 2008.
- Kirkland, R., Molen, M., Cx Students, assisted in exhibiting the Cx Vehicle at the MS State Capital where a resolution was presented to the Cx Team, June 2008.
- Kirkland, R., Molen, M., Cx Students, University Relations, assisted in exhibiting the Cx Vehicle in Meridian MS, as part of the Victory Lap around the State, June 2008.

- Kirkland, R., Toghiani, H., hosted the 2008 Annual Meeting for the Mississippi Society for Plastic Engineers. Provided a tour of CAVS for the attendees, April 2008.
- Park, S.J., Rowland, Z., participated with in the 2nd KSEA-AL Symposium on Automotive Technology-Vehicle Manufacturing, Opelika, AL, on 4/12/2008, April 2008.
- Park, S.J., traveled to NSF with (Dr. Donna Reese) to have meetings with NSF program officers, Washington DC, April 2008.
- Park, S.J., traveled to Korea to have meetings with POSTECH, Hyundai, CetaTech, SKKU, ADD for Medical micro PIM workshop in March 2009 and DOE In-Kind Collaboration, April/May 2008.
- Park, S.J., participated in Seminar on Nano/Micro manufacturing at Northwestern University, Evanston, IL, June 2008.
- Park, S.J., participated in PM 2008 Conference (3 presentations and 15 paper published, Washington CD, June 2008.
- Park, S.J., visited to KUSCO (Korea-US Science Cooperation Center) for discussing US-Korea workshop on micro PIM for medical application, Vienna, MD, June 2008.
- Park, S.J., participated in Symposium of Predictive Science & Technology in Mechanics & Materials, Mississippi State University, June 2008.

#### **Peer Recognition**

- Park, S.J., presented “Benefits to Industry from Simulation of Polymer Processing: Cost Reduction and Quality Improvement” as keynote speaker in Society of Plastics Engineers Chapter 2008 Meeting, CAVS, MSU, April 2008.

#### **Service**

- Branch, V., Computer Simulations Trials, April 2008.
- Branch, V., media interview with Clarion-Ledger about the STEP program. Published on May 25, 2008 special edition, May 2008.
- Branch, V., ASQ testing, June 2008.
- Kirkland, R., Molen, M., assisted in arranging support for the proposed MSU Hybrid Bus Project. Researched and identified funding for the project through EPA, May 2008.
- Simmons, L., Kaler, G., utilized the CMM to analyze the failure mode of a seatbelt bracket. Then proceeded to use the CMM results to prove there was out of spec variation that needed to be pushed back to the manufacturer, May 2008.
- Simmons, L., Dennis, G., provided Launch support at Navistar Defense for the Afghan Vehicle. This includes Layout design and equipment installation, May 2008.
- Simmons, L., Holt, R., used previously recorded data to provide a new cellular manufacturing plan and layout to Harrison Manufacturing, LLC, June 2008.

#### **Other**

- Branch, V., Sardin, E., MS Technology Education Conference, April 2008.
- Brown, D., enrolled in “Introduction to C# Programming” course offered through MSU Distance Learning, April 2008.
- Carino, R., Hammi, Y., Horstemeyer, M., Partners, U., conducted training on models for powder metals, part of the USAMP Powder Metal AMD410 project, Dearborn, MI, May 2008.
- Hill, T. W., attended Principles of Lean for Job Shops Workshop and became NIST certified trainer in Principles of Lean for Job Shops, June 2008.
- Hill, T. W., taught Mintab as part of CAVS Extension Six Sigma workshop, April 2008.
- Hill, T. W., Greenwood, A., delivered Flexsim software training to GE Aerospace engineers to aid in designing GE's new Batesville, MS facility, May 2008.

- Kirkland, R., McAlpin, A., CAVS had over 23 media releases about CAVS and Challenge X for the 4th Quarter. There were additional coverage that were difficult to quantify due to distribution by the Dept of Energy, utility companies, state agencies and professional and trade publications, April 2008.
- McGinley, J., Robbins, B., Thomas, M., attended the Society for Automotive Engineers Digital Human Modeling for Design and Engineering Conference, Pittsburgh, PA, June 2008.
- Park, S.J., The Transactions of the KSAE (The Korean Society of Automotive Engineers): “Development of 590MPa grade Galvannealed TRIP Steel Sheets achieved by low Silicon contents For High Strength and Formability,” by Kwangsub Chi, Yonghee Kim, and Byoungil Kim, April 2008.
- Park, S.J., Science of SINTERING: “Prediction of Densification and Microstructure Evolution for  $\alpha$ -Al<sub>2</sub>O<sub>3</sub> During Pressureless Sintering at Low Heating Rates Based on the Master Sintering Curve Theory,” by W. Q. Shao, S. O. Chen, D. Li, H. S. Cao, Y. C. Zhang, S. S. Zhang, April 2008.
- Park, S.J., International Journal of Refractory Metals and Hard Materials: “Metal Injection Molding of Pure Molybdenum,” by Li Duxin, Tan Zhaoqiang, Li Kum, and Hou Haitao, April 2008.
- Park, S.J., Tsinghua Science and Technology: “Microstructure and mechanical properties of FeAl intermetallics prepared by mechanical alloying and hot-pressing,” by Song Haixia, Wu Yunxin, Tang Chuan’an, Yuan Shuai, Gong Qianming, and Liang Ji, April 2008.
- Park, S.J., Australian Research Council Discovery Projects - Request to Assess 2009 Proposals: “Control of Phase Formation in Metal Injection Moulding through Real Time Neutron Diffraction,” by D. J. Goossens and K. D. Liss, May 2008.
- Park, S.J., The Transactions of the KSAE (The Korean Society of Automotive Engineers): “Development Methods of Remanufacturing Industry for Resources Recycle,” by Hakssoo Mok, Changsu Jeon, Changhyo Han, Minjun Song, Byungsun Park, Hyunsoo Kwak, and Sangjin Park, June 2008.
- Thomas, M., Conference session co-chair of the Perceptual, Behavioral, and Cognitive Modeling technical session at the Society for Automotive Engineers Digital Human Modeling for Design and Engineering Conference, Pittsburgh, PA, June 2008.
- Thomas, M., attended the Regional Counter Terrorism Academy and collected data (BJA grant activity) during the Advanced Law Enforcement Rapid Response Training program provided by Mississippi Department of Public Safety and Homeland Security, June 2008.

## **F. Tours**

- Kirkland, R., Dr. Clinton Graves, June 2008.
- Kirkland, R., Aron Smith, June 2008.