

Jeffrey A. Abell, Ph.D., PE, CMfgE

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Experience

General Motors Corporation, Warren, MI

Nov08 – present Lab Group Manager – Advanced Propulsion Manufacturing Processes, Manufacturing Systems Research Lab, GM Research & Development

- *Manage* budget, researchers, and lab resources to execute research projects focused on advanced battery manufacturing processes for quality, cost and throughput improvements
- *Manage* collaborative research projects with universities
 - *University of Michigan – GM Collaborative Research Lab – Advanced Vehicle Manufacturing*
 - *Massachusetts Institute of Technology – GM Collaborative Research Lab – Technical Cost Modeling*
 - *Cleveland State University – NSF Grant (Co-PI) - “GOALI: Biogeography-Based Optimization of Multiple Related Complex Systems”, \$296,000 – NSF Engineering Design directorate*
- *Develop* battery manufacturing intellectual property strategy

Mar06 – Oct08 Technical Manager - Robust Synthesis, Global CAx Methods and Integration

- *Developed* process and tool for coarse die face CAE mesh generation for early metal forming analysis - implemented optimal binder wrap generation methods (reduced process time from ~8 hours to approx. 20 minutes) – Tool/Method Invention awarded
- *Developed* fast method and tool to generate tangentially blended addendum nodes for early metal forming analysis (reduces process time from ~2 hours to approx. 5 minutes) – ROI submitted
- *Leading team to develop* math model validation methods and tools to predict time-series simulation response bias for GM Powertrain – engine and driveline analysis methods complete (methods for transmission analysis are in development) – Tool/Method Invention awarded
- *Developed* method for release and requirements progression based on graph theoretical and sparse systems methods – Tool/Method Invention awarded
- *Developed* methods and tool for stochastic, event-based FlexRay dynamic segment analysis (vehicle electrical architecture analysis) – ROI submitted
- *Developed* standalone multi-objective trade-off analysis tool for CAE and design engineers
- *Awarded* NSF grant (co-PI) for “GOALI: Biogeography-Based Optimization of Multiple Related Complex Systems”, \$296,000 – NSF Engineering Design directorate
- *Participate* in GM-Stanford “Work Systems” Collaborative Research Lab, current project “Robust Vehicle Architecture”
- *Business owner* for Design Engineer specific CAE toolset
- *Moderated* TEP courses: “Assembly Modeling and Design” (University of Michigan), “Design and Analysis of Industrial Experimentation” (Univ. of Illinois), and “Global Product Development” (Chalmers University)

General Motors Corporation, Adam Opel, AG, Rüsselsheim, Germany

- May03 – Feb06 Manager, Global Engineering Integration, GME Engineering Business Strategies and Services (International Service Personnel assignment)
- *Led* engineering process harmonization initiatives for Global Epsilon Architecture Development team:
 - ◆ *Led* GME team for Global Key Characteristic Description System / Key Product Characteristic content alignment
 - ◆ *Coordinated* Global Statement of Requirements (SOR) Appendix alignment
 - ◆ *Coordinated* VPPS release organization alignment
 - *Led* Global Design Engineer process development team (global single point release)
 - ◆ *Defined* working processes for global, single point product release
 - ◆ *Developed* Global Design Engineer workshare responsibility template
 - ◆ *Managed* GMNA and GME pilot case studies
 - ◆ *Coordinated* with other global process teams (change management, BOM & reuse, design operations, etc)
 - ◆ *Developed* Global Epsilon training module
 - ◆ *Managed* release issues related to Global DE
 - *Coordinate and participate in* global engineering council initiatives:
 - ◆ *Global Product Development* – TEP course Subject Matter Expert
 - ◆ Support *GM-Stanford Collaborative Research Lab as GME Liaison, “Modularization of Work Tasks for Global Worksharing”*
 - *Developed* total vehicle mass potential optimization program – Genetic Algorithm implementation to find near-optimal sets of options that maximizes both overall mass reduction and minimizes front axle load reduction within cost constraints

General Motors Corporation, North America Product Development, Warren, MI

- Apr02 – May03 Engineering Group Manager - Vehicle Development Process Engineering, Engineering Process & Math Strategy (EPMS)
- *Managed* team of engineers to deliver strategic process reengineering projects (i.e., development of re-engineered processes and work instructions, coordinate program implementation). Projects included:
 - ◆ *Led* global team to identify & share best practices and solve common issues related to Virtual Review implementation (“Integrated Assessment Review” project team in GMNA)
 - ◆ *Pre-VDR Surface Data Flow process*
 - ◆ *Integrated Interior PPAP process*
 - *Coordinated* engineering business requirement input to EDS-PLM Managed Maintenance
 - *Coordinated & published* EPMS Master Program Implementation Plan
 - ◆ *Identified targeted pilot vehicle program and project implementation status*
 - ◆ *Identified critical enablers to achieve overall vehicle program objectives*
 - *Managed* EPMS Strategy #3 (Strategy Captain): Improve, Simplify & Math Enable the VDP
 - *Coordinated weekly EPMS Staff Strategy meeting (publish agenda, facilitate meeting, etc.)*
- Jan01 – Apr02 Engineering Group Manager - Program Implementation, Engineering Process & Math Strategy
- *Managed* Program Math Leads team for implementation of math-based-process initiatives on vehicle programs

- *Established* standard Program Math Workshop and Math Plan process
 - *Implemented* tactical corrective actions for engineering process issues on vehicle programs
 - *Developed & published* Master Program Implementation Plan
- Jul00 – Dec00 Engineering Group Manager - Pontiac Math Implementation (Math Leads), Math Data Strategies
- *Managed* installation & implementation of Pontiac Virtual Reality Center (operational Oct 2000)
 - *Managed* Pontiac Design Analysis Process (DAP) implementation
 - *Managed* Pontiac Supplier Collaboration Activities
- Feb00 – Jul00 Assistant Staff Engineer - Virtual Factory Processes, Math Data Strategies
- *Facilitated* Virtual Factory and Manufacturing Math Data Initiatives Team
 - *Managed* Pontiac Virtual Factory Proof of Concept project
 - *Participated* on Pontiac Process and Systems Action (PSAT) and Process Integration Teams
 - *Coordinated and developed* prioritized Warren/Pontiac Manufacturing “Produce Product” IT project briefs (for IS&S budget process)

DaimlerChrysler Corporation, Advance Manufacturing Engineering, Auburn Hills, MI

- Nov98 – Feb00 Senior Systems Specialist, Manufacturing Technical Support
- *Managed* Manufacturing Simulation & Analysis development group, specifically:
 - ◆ *Managed* Robotic Simulation & Off-Line Programming development team
 - ◆ *Led* Robotic Systems Engineering activity (Robot Testing, In-Line Inspection)
 - ◆ *Led* manufacturing discrete event simulation development (Standard Practices, Analysis Techniques)
 - *Supported* Post-Merger Integration (PMI) Projects related to merger of Daimler-Benz and Chrysler Corporation (Virtual Manufacturing Sub-Cluster)
 - ◆ *Evaluate* DaimlerChrysler-Stuttgart (DCS) Digital Manufacturing Technologies
 - ◆ *Support & Make Recommendations* to PMI Sub-Cluster Executive Management Team
 - ◆ *Managed* PMI Pilot Projects to Achieve Synergies and Cost Savings
 - *Coordinated* Development of Advance Manufacturing Engineering (AME) Systems Architecture
 - ◆ *Managed* evaluation projects and made recommendations regarding platform digital manufacturing tools & systems to executive management
 - ◆ *Managed* Pilot Projects for Evaluation of New Digital Manufacturing Technologies

Delphi Interior & Lighting Systems, Delphi Automotive Systems, General Motors Corporation, Troy, MI

- Jul94 – Nov98 Advanced Manufacturing Engineer, Advanced Development Group (6/96-11/98)
 Senior Project Engineer, Advanced Development Group (7/94-6/96)
- Responsibilities:
- *Assessed, Developed, and Implemented* advanced Manufacturing Engineering technologies for design, simulation, and analysis)
 - ◆ *Developed And Implemented* Advanced Manufacturing Engineering Analysis Software Systems (Awarded Two Trade Secrets and One Defensive Publication)
 - ◆ *Advised* Executive Management Regarding Virtual/Digital Factory Technologies and Strategies for their use

- ◆ *Mentored* engineers and student interns in Manufacturing Simulation And Analysis
- *Managed* Virtual Factory Laboratory
 - ◆ *Obtained project approval and managed facilities implementation (Jun96)*
 - ◆ *Investigated, Developed, and Implemented* Human Immersion and Visualization (Virtual Reality) Technologies for Product and Process Design and Validation
 - ◆ *Led* team of three engineers in research & development projects
 - ◆ *Led* Virtual Factory Center Of Expertise, Delphi Automotive Systems
- *Manufacturing Engineering Subject Matter Expert*, Delphi-I Math Based Strategy Team
- *Principal Investigator*, “Virtual Factory”, Cooperative Research and Development Agreement with U.S. Army TARDEC And Deneb Robotics, 7/96-11/98

SA Consulting Company, Novi, MI

Aug93 - Jul94 Senior Technical Consultant
Developed and Implemented Analysis Engine and Graphical User Interface for Intelligent Scheduling System at Ford Motor Company, 8/93 - 6/94

GMI Engineering & Management Institute, Flint, MI

(Dec85 – Jul94) Assistant Professor – Industrial & Mfg. Systems Engineering (Sep92 - Jul94)
Instructor – Industrial & Manufacturing Systems Engineering (Jul90 - Aug92)
Instructor – Mechanical Engineering (Jan88 – Jun90)
Instructional Assistant – Mechanical Engineering (Dec85 – Dec87)

- *Taught and developed* undergraduate and graduate engineering courses (year developed in parentheses): Computer Integrated Manufacturing Systems; Robotics (1987); Simulation for Manufacturing; Dynamics; Fundamentals of Manufacturing Engineering (1991); Manufacturing Processes; Object Oriented Modeling (1994); and Instrumentation Laboratory
- *Served on* University Committees: Academic Review Committee; Special Policy Committee on Sexual Harassment; GMI Research Council; CIM Laboratory Committee; Chair, IMSE Department Head Search Committee (1993); National Center for Manufacturing Sciences Proposal Committee
- *Advised* thesis students: 52 Bachelors' students, one Master's student
- *Awarded* NSF Grant (co-PI), “Flexible Assembly Cell” (DUE-9451778), 1994, \$90,000
- *Developed* course “Object Oriented Modeling”, Curriculum Development Grant, Society of Manufacturing Engineers, 1994, \$3,000

Inland Division, General Motors Corporation, Dayton, OH

Jun85 - Dec85 Associate Manufacturing Engineer, Manufacturing Development Laboratory
Developed new tools and processes for instrument panel production

Jun80 - Jun85 Engineering Cooperative Education Student

- *Completed* a wide variety of assignments in product engineering, manufacturing engineering
- *Completed* Fifth Year thesis at Inland's Ponte de Sor, Portugal manufacturing facility (worked in Portugal total of 11 months)

Education

Doctor of Philosophy, Oakland University (Rochester, Michigan), 1992
Major: Systems Engineering (Discrete Systems)

Minors: Artificial Intelligence, Operations Research

Dissertation topic: Perturbation Analysis of Discrete Event Systems; Object Oriented Modeling and Simulation Methodologies

Master of Science, Oakland University (Rochester, Michigan), 1987

Major: Systems Engineering (Discrete Systems)

Concentration: Manufacturing Systems/Robotics

Bachelor of Science, Kettering University (formerly General Motors Institute; Flint, Michigan), 1985

Major: Mechanical Engineering

Concentration: Machine Design

Thesis topic: Manufacturing process and tool improvements for aluminum steering wheel hubs production (recommendations based on constraints imposed by aluminum alloy properties, and best practices for die casting, broaching, and taper sizing operations)

Professional Certification

Professional Engineer (Michigan), No. 6201043878

Certified Manufacturing Engineer (SME, Robotics), No. 1922627

Intellectual Property

Two GM Trade Secrets, four GM Method/Tool Inventions, and one GM Defensive Publication awarded

Journal Publications

Leung, P., K. Ishii, J. Abell, and J. Benson, "Distributed System Development Risk Analysis", *Journal of Mechanical Design*, 130 (5), pp.051403 (1-11).

Abell, J.A., editor, "Simulation in the Automotive Industry", Special Issue of *Simulation*, Fall 2000.

Sefferdini, Hamid, A.D. Castillo, and J.A. Abell, "The Development of Cellular Manufacturing System for Automotive Parts", *Computers & Industrial Engineering*, 33, pp. 243-247 (1997).

Abell, J.A. and R.P. Judd, "Perturbation Analysis of Structurally Modified Discrete Event Systems", *Transactions of the Society for Computer Simulation*, vol. 10, October 1993, pp. 185-204.

Submitted Journal Publications

Simon, D., and J. Abell, "A Majorization Algorithm for Constrained Correlation Matrix Approximation", *Linear Algebra and its Applications*, Elsevier, submitted Jan2008.

Conference Publications (refereed conferences indicated)

Leung, P., K. Ishii, J. Benson, and J. Abell, "Validation of Distributed Risk Framework", 2007 ASME Design Engineering Technical Conference (DETC2007-34868, refereed), Las Vegas, NV (September).

Leung, P., K. Ishii, J. Benson, and J. Abell, "Distributed Component Risk Analysis", Proceedings of ASME International Mechanical Engineering Congress and Exposition '06 (IMECE2006-14131, refereed), Chicago, IL (November).

Leung, P., K. Ishii, J. Benson, and J. Abell, "System Engineering Workshare Analysis", Proceedings of the 2006 ASME Design Engineering Technical Conference (DETC2006-99252, refereed), Philadelphia, PA (September).

Leung, P., K. Ishii, J. Abell, and J. Benson, "Global Failure Modes and Effects Analysis: A Planning Tool for Global Product Development," Proceedings of the 2005 ASME Design Engineering Technical Conference (DETC2005-85117, refereed), Long Beach, CA (Sept.).

VandenBossche, D.J. and J.A. Abell, "Using Visualization and Simulation Tools for Improved Equipment Reliability and Maintainability", SAE 11th RMSL Workshop, May 1999.

Abell, J.A., "Generative Part Sequence Optimization for an m-Machine Workcell", *Proceedings of Autofact '98*, Society of Manufacturing Engineers, October.

Abell, J.A., "Design and Validation of Manufacturing Control Schemes Using an Integrated PC Based System Simulation", *Proceedings of the First World Congress on System Simulation*, September 1997, Singapore.

- Sefferdini, Hamid, A.D. Castillo, and J.A. Abell, "The Development of Cellular Manufacturing System for Automotive Parts: A Case Study", *1997 Industrial Engineering Research Conference*, March, Puerto Rico.
- Judd, R.P. and J.A. Abell, "The Use of Simulation for Off-Line Controller Validation", *Proceedings of the 1996 Summer Computer Simulation Conference*, Portland, OR, July, pp. 92-96.
- Abell, J.A. and J.P. Pullukat, "Fuzzy Modeling of Manufacturing Processes", *Proceedings of SPIE International Symposium on Intelligent Systems and Advanced Manufacturing*, Philadelphia, October 1995.
- Wemple, J. and J.A. Abell, "A Model of Material Movement Requirements", *Proceedings of 1994 Summer Computer Simulation Conference*, La Jolla, CA, July, pp. 607-612.
- King, L.S., J.A. Abell, and W.F. Erevelles, "Hierarchical Control in CIM Education" (invited paper), *Proceedings of 1993 Allerton Conference on Control*, Champaign, IL, September.
- Abell, J.A. and R.P. Judd, "Perturbation Analysis of Discrete Event System using Aggregated Objects", *Proceedings of 1993 Summer Computer Simulation Conference*, July, pp. 65-69.
- Abell, J.A. and R.P. Judd, "Perturbation Analysis of Object Oriented Discrete Event Systems", *Proceedings of 1993 American Control Conference* (refereed), June, pp. 2293-2297.
- Abell, J.A. and R.P. Judd, "Reusable Simulation Object Specification through Arbitrary Message Passing and Aggregation Scheme", *Proceedings of 1993 Object Oriented Simulation Conference (OOS '93)*, January, pp. 9-14.
- Abell, J.A. and R.P. Judd, "Object Oriented Perturbation Analysis of Discrete Event Systems", *Proceedings of 1992 Summer Computer Simulation Conference*, Reno, Nevada, July, pp. 164-168.
- Abell, J.A. and R.P. Judd, "Model and Algorithm for Analysis of Discrete Event Systems with Structural Changes", *Proceedings of 1992 American Control Conference* (refereed), Chicago, June, pp. 3206-3210.
- Abell, J.A. and R.P. Judd, "Perturbation Analysis for Systems with Large Structural Changes", *Proceedings of 1991 Summer Computer Simulation Conference*, Baltimore, July, pp. 104-109.

Internal Reports and Publications

- Abell, J., R. Rebba, and S. Liu, "Math Model Validation of a Powertrain Driveline", 2007 Global CAE Conference (General Motors), September 2007.
- Oetjens, T., R. Sarraga, P. LeBlanc, and J. Abell, "Developable Binder Wrap", 2007 Global CAE Conference (General Motors), September 2007.
- Oetjens, T., Y. Long, J. Abell, and M. Zhao, "Automated Die Face to Obtain Formed Metal Material Properties", 2007 Global CAE Conference (General Motors), September 2007.

Books and Chapters

- "Certified Manufacturing Engineer Home Study Review Course", study guide developed in collaboration with MGI Management Institute (New York), 1995.

University Courses, Professional Short Courses, Presentations

- "Robust Architectures", Stanford MML Supply Chain Forum (Palo Alto, CA), 17Jul2007.
- "Management of Global Partnerships", Stanford MML Supply Chain Forum (Palo Alto, CA), 18Jul2006.
- "Confidence in Workshare Planning", EPFL-Stanford International Research Roundtable (Lausanne, Switzerland), 16Sep2004.
- "Manufacturing Optimization" (EME 6983), Lawrence Technological University, (Spring 1999)
- "Automated Production Systems" (EME 4123), Lawrence Technological University, (Fall 1997, Fall 1998)
- "Simulation" (IE 443/642), Wayne State University, (Fall 1995)
- "Fundamentals of Manufacturing Review" and "Manufacturing Engineering Certification Review- Part II", short courses taught for Society of Manufacturing Engineers (3/94, 10/94, 6/94, 10/93, 5/93)

Professional Service

- Doctoral dissertation committee (April Bryan, candidate, Prof. Jack Hu, chair), University of Michigan, "Co-Evolution of Product Families and Assembly Systems", successful defense May 2008.

Doctoral dissertation committee (Peter Leung, candidate, Prof. Kos Ishii, chair), Stanford University, “A Framework to Identify and Evaluate Distributed Work Risk”, successful defense Nov. 2006.
Accreditation Board for Engineering and Technology (ABET) Program Evaluator, Manufacturing Engineering (SME), 2007 – present; Mechanical Engineering (ASME), 2008 - present.
Program Committee, 2007 American Control Conference, July 2007.
Senior member, Society of Manufacturing Engineers (SME)
SME Professional Licensure committee – Mar. 1998 – Dec. 2003
Kettering University Alumni Board, 2000 – 2002
Board of Directors, Society for Computer Simulation (SCS), 2000 – 2002
Vice President - Membership, SCS, 1998 – 2000
Reviewer, *Simulation*, SCS, 1998-2002.
Program Chair, *Simulation in Synthetic Environments 1996*, SCS, April 1996
Reviewer, **Engineering Fundamentals**, SME Publications, 1992