

## **Vishesh Kumar**

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### **Education**

- Michigan Technological University, Houghton, MI, USA Aug 02 - Dec 06  
*Ph.D. (Dept. of Mech. Engr. – Engr. Mech.)* GPA: 3.95/4.0  
Research: - A Material Flow and Economic Exchange Model to Characterize the Impact of Vehicular Changes and Policies on the Automotive Recovery Infrastructure  
**Advisor:** Dr. John W. Sutherland
- Indian Institute of Technology (I.I.T.), Kanpur, India July 96 - May 00  
*B. Tech (Mechanical Engineering)* GPA: 8.6/10

### **Academic Experience**

- University of Washington, Seattle, WA, USA Aug 07 - present  
*Post-doctoral Research Associate*
- Fuel Cell Design, Durability and Remanufacturability Laboratory (focus on PEM Fuel Cells)
  - Open Source Information Model for Fuel Cells

- Michigan Technological University, Houghton, MI, USA Aug 02 – July 07  
*Post doctoral Fellow*
- Project Coordinator, NSF ERC Preproposal (submitted May 07)
  - Wood-to-Wheels Industry Relationship Coordinator
  - Mentoring Students (conducting research and writing papers)

#### *Teaching Assistant (including distance learning students)*

- Advanced Quality Engineering
- Design of Experiments

#### *Research Assistant*

Conducted research in “Material Flow and Economic Exchange of Automotive Recycling Infrastructure” – Used a simulation model for material flow and economic exchange within the automotive recycling infrastructure to predict the economic and environmental effect of future changes in the automobiles. Aluminum Intensive Vehicle and Composite Intensive Vehicle were compared with the normal change in the material composition of the vehicle.

#### *Henes Doctoral Fellow*

- Assisted Dr. Sutherland with preparation of 2nd edition of *Statistical Quality Design and Control, Contemporary Concepts and Methods*, by Richard E. DeVor, T. H. “Phil” Chang, John W. Sutherland. Responsibilities include work with several chapters (e.g., Hypothesis Testing, Plotting and Interpretation of Control Charts, Simple Comparative Experiments, Response Surface Methodology) and organize the development of new exercises for all.
- Developed EXCEL-based SPC and DOE games using Visual Basic and their solution.

## Industrial Experience

Maruti Udyog Ltd., Gurgaon, India

June 00-July 02

*Research Engineer (R&D Division, Engine Group)*

Engine Hose/Bolts Development

Tear-Down Analysis

Timing Belt Noise Suppression

Engine and Chassis Dynamometer

Performance and Endurance Tests

## Publications

### Journal publications

1. Kumar, V. and J. W. Sutherland, "Development of Strategies to Ensure the Sustainability of the U.S. Automotive Recovery Infrastructure," *Resources, Conservatio, and Recycling*, in preparation.
2. Kothari, A. D. V. Kumar, and J. W. Sutherland, "A Comparison of Manufacturing System Configuration Strategies for New Product Introduction," *International Journal of Production Research*, in preparation.
3. Jordan, K. L., V. Kumar, and J. W. Sutherland, "Evaluation of Life-cycle Economic and Environmental Benefits of Product Servicizing," in preparation.
4. Xue, H., V. Kumar, S. M. Pandit, and J. W. Sutherland, "Material Flow analysis of Manufacturing Processes using an Enhanced Input-output Model," *Journal of Ecological Economics*, in preparation.
5. Kumar, V. and J. W. Sutherland, "Material Flows and Economic Exchanges Within the Automotive Recycling Infrastructure: Model Development, Validation, and Examination of Future Scenarios" In review for *Journal of Industrial Ecology*.
6. Kumar, V. and J. W. Sutherland, "The Automotive Recovery Infrastructure: Current Issues and Future Research Directions," *International Journal of Product Design and Manufacture for Sustainability*, in review
7. Kumar, V., P. S. Shirodkar, J. A. Camelio, and J. W. Sutherland, "Characterizing Value Flow during the Product Life Cycle Including the Effects of Reuse, Remanufacturing, and Recycling," *International Journal of Production Research*, Vol. 45, No. 18 & 19, 2007, pp. 4555 – 4572.
8. Kumar, V. and J. W. Sutherland, "Infrastructure Changes Required to Achieve Higher Material Recovery Targets from End-of-Use Vehicles," *Transactions of the North American Manufacturing Research Institute of the Society of Mechanical Engineers*, Vol. 35, 2007, pp. 201-208..
9. Xue, H., V. Kumar, and J. W. Sutherland, "Material Flow and Environmental Impacts of Manufacturing System via Aggregated Input-Output Models," *Journal of Cleaner Production, Special Issue on Approaching Zero Emissions*, Vol. 15, NO. 13-14, 2007, pp. 1349-1358.
10. Kumar, V., K. R. Haapala, J. L Rivera, M. J. Hutchins, W. J. Endres, J. K. Gershenson, D. J. Michalek, and J. W. Sutherland, "Infusing Sustainability Principles into Manufacturing/Mechanical Engineering Curricula," *Journal of Manufacturing System*, Vol. 24, No. 3, 2005, pp. 215-225.
11. Bandivadekar, A. P., V. Kumar, K. L. Gunter, and J. W. Sutherland, "A Model for Material Flows and Economic Exchanges within The U.S. Automotive Life Cycle Chain," *Journal of Manufacturing System*, Vol. 23, No. 1, 2004, pp. 22-29.

### Conference publications

12. Haapala, K. R., M. J. Hutchins, J. L. Rivera, V. Kumar, A. R. Clarke, T. D. Eatmon, R. A. Harris, M. H. Durfee, J. R. Mihelcic, D. R. Shonnard, and J. W. Sutherland, "Educational, Research, and Training Aspects of the Sustainable Futures NSF IGERT

- Project," *Proceedings of the 2007 ASEE North Midwest Sectional Conference* – **Accepted**.
13. Adler, D. P., V. Kumar, P. A. Ludewig, and J. W. Sutherland, "Comparing Energy and Other Measures of Environmental Performance in the Original Manufacturing and Remanufacturing of Engine Components," *Proceedings of 2007 International Manufacturing Science and Engineering Conference* – **Accepted**.
  14. Garcilaso, L. R., K. L. Jordan, V. Kumar, M. J. Hutchins, and J. W. Sutherland, "A Life-cycle Comparison of Clothes Washing Alternatives," *Proceedings of 14th CIRP Conference on Life Cycle Engineering*, 2007, (C3-6), pp. 423-428.
  15. Shirodkar, P. S., V. Kumar, M. E. Jarvie, and J. W. Sutherland, "Exploring Value Flow in the Product Life Cycle to Promote Successful Value Recovery," *Proceedings of Sustainable Manufacturing IV Global Conference on Sustainable Product Development and Life Cycle Engineering*, Sao Carlos, Sao Paulo, Brazil, October 3rd - 6th, 2006, (Paper #LCA02).
  16. Garcilaso, L. R., V. Kumar, and J. W. Sutherland, "Conversion of Products to Services (Dematerialization) to Promote Sustainability," *Proceedings of 16th CIRP International Design Seminar -- Design & Innovation for Sustainable Society*, Session: Design for X, (CD-ROM), 2006, pp. 118-127.
  17. Tumkor, S., K. R. Haapala, V. Kumar, and J. W. Sutherland, "New Engineering Design Concepts for the Sustainable Products," *Proceedings of the American Society for Engineering Education – 113th Annual Conference and Exposition*, June 18 – 21, 2006, Chicago, IL, (2006-1301), appeared on CD-ROM.
  18. Kumar, V., D. J. Bee, P. S. Shirodkar, S. Tumkor, B. P. Bettig, and J. W. Sutherland, "Towards Sustainable "Product and Material Flow" Cycles: Identifying Barriers to Achieving Sustainable Multi-Use and Zero Waste," *Proceedings of ASME – International Mechanical Engineering Conference and Exposition (IMECE) – Energy Conversion and Resources*, 2005, (IMECE2005-81347), pp. 433-442.
  19. Tumkor, S., J. W. Sutherland, and V. Kumar, "Electrical and Electronic Equipment Recovery and Recycling in Turkey," *Proceedings of ASME – International Mechanical Engineering Conference and Exposition (IMECE) – Energy Conversion and Resources*, 2005, (IMECE2005-81358), pp. 443-449.
  20. Kumar, V., K. R. Haapala, J. L. Rivera, M. J. Hutchins, D. N. Beach, W. J. Endres, J. K. Gershenson, D. J. Michalek, and J. W. Sutherland, "Towards Manufacturing/ Mechanical Engineering Curricular Change in Support of a Sustainable Future," *Looking Forward: Innovations in Manufacturing Engineering Education, CIMEC (CIRP International Manufacturing Engineering Education Conference) and 3rd SME International Conference on Manufacturing Education*, 2005, June 22-25, San Luis Obispo, CA, pp. 50-58.
  21. Xue, H., V. Kumar, S.M. Pandit, and J.W. Sutherland, "An Enhanced Input-Output Model for Material Flow Analysis of Manufacturing Processes," *Proceedings of Japan-US Symposium for Flexible Automation*, 2004, Denver, CO, CD-ROM.
  22. Sutherland, J. W., V. Kumar, J. C. Crittenden, M. H. Durfee, J. K. Gershenson, H. Gorman, D. R. Hokanson, N. J. Hutzler, D. J. Michalek, J. R. Mihelcic, D. R. Shonnard, B. D. Solomon, and S. Sorby, "An Education Program in Support of a Sustainable Future," *Proceedings of ASME– International Mechanical Engineering Conference and Exposition*, Vol. 14, 2003, pp. 611-618.

## Proposals

- *Reducing the Environmental Impact of Material Conversion Process*, Dow Corning Corporation, PI, \$5,000 (6 months), 2007; **Accepted**.
- *Engineering Research Center for Lignocellulosic Biofuel-based Transportation: Wood-to-Wheels: Pre-proposal*, Dr. J. W. Sutherland (PI), National Science Foundation, approx. \$30M+ (10 years), May 2007, in review.

- *A Product Recovery and Reuse Infrastructure to Achieve a Closed-Loop Value Flow*, Dr. B. P. Bettig (PI), National Science Foundation, approx. \$400,000 (3 years), Feb. 2005, Not-funded.
- *Computer Laboratory for Demanufacturing*, Dr. J. W. Sutherland (PI), PACE Grant – GM, \$15,000, **Accepted**. (Award Money: \$10,000 and two H.P. computers.)
- *Model-Based Analysis of the Impact of Future Vehicle/Industry Changes on Automotive Material Life-Cycles*, Dr. J. W. Sutherland (PI), National Science Foundation, approx. \$475,000 (3 years), Oct. 2003, Not-funded

## Presentations

- "Achieving Higher Material Recovery Rates from End-of-Use Vehicles," at 2007 North American Manufacturing Research Conference 35, Ann Arbor, MI, 2007.
- "A Material Flow and Economic Exchange Model to Characterize the Impact of Vehicular Changes and Policies on the Automotive Recovery Infrastructure," Ph.D. Dissertation Defense, Michigan Technological University, Houghton, MI, 2006.
- "Characterization of the Impact of Vehicular Changes and Policies on Automotive Recovery Infrastructure," at the Graduate Student Council poster session, Michigan Technological University, Houghton, MI, 2006. – **Best presenter award**
- "A Material Flow and Economic Exchange Model to Assess the Impact of Vehicular Changes and Policy on Automotive Recovery Infrastructure," at the Sustainable Futures Institute poster session, Michigan Technological University, Houghton, MI, 2006.
- "Assessing the Impact of Material Changes and Policy on the Automotive Recovery Infrastructure Using a Material Flow and Economic Exchange Model," Dissertation Proposal Defense, Michigan Technological University, Houghton, MI, 2006.
- "Material Flows and Economic Exchanges Within the Automotive Recycling Infrastructure: Model Development and Validation," at 2006 Multi-disciplinary Student Research Colloquium, Michigan Technological University, Houghton, MI, 2006.
- "A Model for Material Flows and Economic Exchanges Within the Automotive Recovery Infrastructure," at Henes Fellow Lecture Series, Michigan Technological University, Houghton, MI, 2006.
- "Closed Loop Product and Material Flow-cycles," at the Sustainable Futures Institute Colloquium, Michigan Technological University, Houghton, MI, 2006.
- "Towards Sustainable "Product and Material Flow" Cycles: Identifying Barriers to Achieving Product Multi-Use and Zero Waste," at ASME-International Mechanical Engineering Conference and Exposition, Orlando, FL, 2005.
- "Environmental and Economic Sustainability of the Automotive Recovery Life-Cycle Stage," at the Sustainable Futures Institute poster session, Michigan Technological University, Houghton, MI, 2005.
- "Sustainable Manufacturing Initiative – DeManufacturing Laboratory," at Michigan Technological University, for GM-PACE Grant, 2004.
- "Analytic Models for Economic Demanufacturing Inventory Management," at American Society of Mechanical Engineers – International Mechanical Engineering Conference and Exposition, Anaheim, CA, 2004.
- "An Enhanced Input-Output Model for Material Flow Analysis of Manufacturing Processes," at Japan-USA Symposium of Flexible Automation, Denver, CO, 2004
- "Environmental Issues in Automotive Recycling Infrastructure," at the Graduate Student Council poster session, Michigan Technological University, Houghton, MI, 2004.

## Computing Skills

- Operating system : Unix, Windows
- Word processing : Framemaker, MS Word
- Life-cycle software : SimaPro 6.0
- Mathematical analysis : MATLAB, MS Excel, MINITAB
- Languages : Visual Basic .NET, C & C++, MATLAB Programming
- Others : ARENA, ArcInfo GIS, SDRC/Ideas,

## Graduate Courses

- System Dynamics
- Quality Engineering
- Design of Experiments
- Optimization
- Machining Dynamics
- Machining Processes
- Sustainable Futures I
- Sustainable Futures II
- Remote Sensing for the Environment

## Awards and Recognition

- Best Presenter – *Graduate Student Council poster session, 2006*
- Henes Doctoral Fellowship: January 2005 to December 2006
- Nominated for 2006 Exceptional Graduate Student Scholar award
- IGERT Associate (NSF funded 5-year project): Fall 2004 – present
- Ford Motor Company Fellowship: 2003-2004
- Academic Excellence Award – Sophomore year, I.I.T. Kanpur, India

## Activities and Service

- Member of ASME, SME, and SAE
- Session Chair: 2007 NAMRC, Ann Arbor, MI
- Session Chair: 2004 ASME-IMECE, Anaheim, CA
- Graduate Student Council: Orientation Chair (elected) 2004-2005, 2005-2006
- Paper Reviews for various journals and conference proceedings