

PROMOTION RECOMMENDATION

University of Michigan
College of Engineering

Albert J. Shih, associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees

B.S. 1984 National Cheng Kung University, Taiwan, Mechanical Engineering
M.S. 1986 Cheng Kung University, Taiwan, Mechanical Engineering
Ph.D. 1991 Purdue University

Professional Record

2003-present Associate Professor of Mechanical Engineering, University of Michigan
1998-2002 Associate Professor of Mechanical and Aerospace Engineering, North Carolina State University
1991-1998 Process Engineering Center, Fuel Systems, Cummins Inc.
1989-1991 Teaching Assistant, Purdue University
1986-1991 Research Assistant, Purdue University

Summary of Evaluation:

Teaching: Professor Albert Shih has made significant contributions to teaching. He is currently serving as the *Design and Manufacturing* area coordinator in the Department of Mechanical Engineering, as well as the one of the lead instructors for ME450, the senior capstone design course. His contributions in improving the teaching laboratories of the ME250-350-450 course sequence have been lauded by his colleagues in ME. He has developed a new graduate course in *Medical Manufacturing* and began offering it in Fall 2005. Medical Manufacturing is a new emerging field and this represents a pioneering effort on his behalf since no such course exists elsewhere. Professor Shih also significantly revised one existing senior/graduate course, ME482 – *Machining Processes* and made it available for distance delivery. He has taught a variety of undergraduate core courses and electives, with overall average teaching evaluations. Professor Shih has graduated one Ph.D. and one MS since joining the University of Michigan. Including his service at NC state, he has graduated a total of 4 PhDs, and 11 MS students. He currently supervises a large group of 10 Ph.D. and 3 MS students.

Research: Professor Shih has made important contributions to manufacturing processes by identifying “non-traditional problems” for which he develops innovative scientific solutions. For instance, he is one of the pioneers who successfully analyzed orthogonal metal cutting processes using finite element methods (FEM), as evidenced from his well cited publications by the manufacturing community. His work in ceramic grinding has resulted in the first volume production technology of precision ceramic components for automotive applications with significant economic benefits. His innovative work in the machining of elastomers has opened the doors for the recycling of tires in the transportation industry. Since joining UM, while continuing some of his machining research, Professor Shih has directed his efforts towards emerging manufacturing technologies for energy-efficient and environmentally-friendly transportation. He has contributed to the development of novel processes for manufacturing internal combustion engine and fuel cell components. In parallel, he is working closely with medical researchers to investigate thermal management in tissue machining to minimize thermal damage to nerves. Both topics are timely and present rich opportunities for fundamental research, innovation and societal impact.

His work is supported by a variety of sources, including the National Science Foundation, Department of Energy (through Battelle) and industry.

Recent and Significant Publications:

- J. Luo, H. Ding, and A.J. Shih, 2005, "Induction-Heated Tool Machining of Elastomers - Part I: Finite Difference Thermal Modeling and Experimental Validation," *Machining Science and Technology*, in press.
- J. Qu, A. J. Shih, R.O. Scattergood, J. Luo (2005) "Abrasive Micro-Blasting of Surface Layers of Electrical Discharge Machined WC-Co Composite," *Journal of Materials Processing Technology*, Vol. 166, pp. 440-448.
- J. Luo, A. J. Shih (2005) "Inverse Heat Transfer Solution of the Induction Heat Flux," *ASME Journal of Manufacturing Science and Engineering*, Vol. 127, pp. 555-563.
- M. Bakal, A.J. Shih, C.T. Liu, S.B. McSpadden, R.O. Scattergood (2005) "Light Emission, Chip Morphology, and Burr Formation in Drilling the Bulk Metallic Glass," *International Journal of Machine Tools and Manufacture*, Vol. 45, pp. 741-752.
- A. J. Shih, M. A. Lewis, J. S. Strenkowski (2004) "End Milling of Elastomers – Fixture Design and Tool Effectiveness for Material Removal," *Journal of Manufacturing Science and Engineering*, Vol. 126, pp. 115-123.
- M. Bakal, A. J. Shih, R. O. Scattergood, C. T. Liu (2004) "Machining of a Zr-Ti-Al-Cu-Ni Metallic Glass," *Scripta Materialia*, Vol. 50, pp. 583-588.
- A. C. Curry, A.J. Shih, R. O. Scattergood, J. Kong, S.B. McSpadden (2003) "Grinding Temperature Measurements in MgO PSZ Using Infrared Spectrometry," *J. Am. Ceram. Soc.*, Vol. 86, pp. 333-341.
- J. Qu, A. J. Shih, R. O. Scattergood (2002) "Development of the Cylindrical Wire Electrical Discharge Machining Process: Part I: Concept, Design, and Material Removal Rate," *ASME Journal of Manufacturing Science and Engineering*, Vol. 124, No. 3, pp. 702-707.

Service: Professor Shih has a record of service appropriate for promotion. Within the Department of Mechanical Engineering, he serves as the *Design and Manufacturing* area coordinator, and is a member of the Manufacturing Council for the *Program in Manufacturing (PIM)*. External to the University, he is active in his professional societies. He is an Associate Editor for two journals, the *ASME Journal of Manufacturing Science and Engineering* and the *Journal of Production and Manufacturing Engineering*. He has been organizer or co-organizer for conferences for the Society of Manufacturing Engineers and the American Society of Mechanical Engineering. He is currently serving as co-organizer of the ASME Manufacturing Engineering Conference for October 2006, and the North American Manufacturing Research Conference for May 2007.

External Reviewers:

Reviewer (A): "Albert seems to be a strong contributor to graduate education and mentorship." "A quick review indicates that he has published journal articles with all of his MS and Ph.D. students, in most cases multiple papers with each." "This is something I look for as it reflects well on both the quality of and the totality of his work and the level of training that his students are receiving". "I have no doubt that Albert would be promoted to full professor here at [my institution] based on the record he has amassed and his stature in our manufacturing research community."

Reviewer (B): "He has a substantial list of publications in archival journals and conference publications. His work has been very well supported by both industrial funding and government agencies... so clearly he has been adept at working on problems of significance and potential impact." "His work is generally

considered to be careful, thoughtful and has impact on "non-traditional problems" in manufacturing which I believe is a very positive trait. And he is working on 'real' manufacturing issues balancing analysis with experimental validation. In that sense I would say that he ranks among the top of his [sic] peer group in manufacturing research in the US."

Reviewer (C): "Dr. Shih's work is always characterized by new theoretical insights into the underlying process phenomena, yet his results retain a high component of pragmatic relevance and as such are regularly finding their way into practical implementations. His prior industrial experience and high quality scholarly work put him into a unique position for manufacturing research and education. All the indications are that his contributions will continue to grow and leave a notable impact."

Reviewer (D): "Among his peer group of those combining careful experiments and mechanics Albert's record is quite strong. I note that I have written several letters for promotion to full professor recently and Albert's case, combining a strong publication record with industrial experience and patents, is as strong as any that I have addressed."


Reviewer (E): "Albert is very energetic, keeps a number of students engaged and energized at all times, and maintains a very good relationship with his DOE sponsor and with his collaboration in industry." "Albert brings a focused scientific approach to applied manufacturing problems which has been very successful in our automotive program."

Reviewer (F): "He is internationally known for his pioneering works in material processing methods such as turning, milling, drilling, grinding and electrical discharge machining (EDM)." "The quality of his research papers is significantly high, because his findings are based not only on the sufficiently detailed experimental data but also on the careful analysis and logically sound discussions."

Reviewer (G): "Dr. Shih has established himself as an outstanding researcher who has successfully undertaken a diverse range of research topics. I believe that his ability to work in different areas is especially important today in academia. Overall I find that Dr. Shih's record of achievement compares favorably with four others I know who have been promoted to professor at major research universities within the past five years."

Reviewer (H): "His impact is better than most other tenured professors because of his significant industrial background which has helped him gain insight into research areas that are of fundamental importance."

Summary of Recommendation: In summary, Professor Albert J. Shih is a highly regarded researcher and educator with important research contributions in the fields of manufacturing engineering and science. He professionally and willingly serves the Department, the College, and the profession. It is with the support of the College of Engineering Executive Committee that I recommend him for promotion to professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.



Ronald Gibala
Interim Dean, College of Engineering

May 2006