

PROMOTION RECOMMENDATION

University of Michigan
College of Engineering

Suman Das, assistant professor of mechanical engineering, Department of Mechanical Engineering, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.

Academic Degrees

B.S. 1990 Indian Institute of Technology, Madras, India, Mechanical Engineering
M.S. 1993 University of Texas at Austin, Mechanical Engineering
Ph.D. 1998 University of Texas at Austin, Mechanical Engineering

Professional Record

2000-present Assistant Professor of Mechanical Engineering, University of Michigan
1999-2000 Lecturer, University of Texas at Austin
1999-2000 Post-doctoral Fellow, University of Texas at Austin
1993-1998 Graduate Research Assistant, University of Texas at Austin
1993 Research Intern, BF Goodrich Research and Development
1991-1993 Graduate Research Assistant, University of Texas at Austin

Summary of Evaluation:

Teaching: Professor Das has a good overall teaching record. He received an award from the Department of Mechanical Engineering for his outstanding student evaluations during the Fall 2003 for teaching the core undergraduate course ME250 Design and Manufacturing I, his primary teaching responsibility. Letters obtained from his research advisees and classroom students reveal a teacher of remarkable passion and impact. For example, "He really cared about his students he made sure that we learned the necessary skills to grow both as an engineer and as an individual." "... I have heard nothing but positive feedback from them [the students in the class]; that he is accessible, patient, and gives his undivided attention." "He came to class [ME360] well prepared for the lecture and he was more than capable teaching the course at a pace and direction that was influenced by our ability to grasp the information." The committee feels that Professor Das' student support, as expressed in the attached letters, is quite exceptional. The CRLT teacher evaluation scores for Professor Das also demonstrate that he is a very solid classroom teacher, though not surprisingly for someone at his rank, there is some room for improvement. He consistently receives very good scores in all of the graduate courses, especially his solid free form fabrication course: ranging from 4.00, 3.75 to 4.9, 4.9 on Q1, Q2, respectively. There seems to be no identifiable weakness in his graduate teaching. His undergraduate teaching is average when compared to scores all other faculty receive in teaching ME250. His scores show steady improvement with time and the committee feels his potential as a classroom teacher is very high.

Research: Professor Das has made important contributions in the area of solid freeform fabrication (SFF) beginning with his doctoral research on "Direct Selective Laser Sintering of Metals". Since he joined the University of Michigan in 2000, he has identified new and important niches in SFF that were previously unexplored. A prime example is the fabrication of degradable polymer scaffolds for tissue engineering. Professor Das, in collaboration with Professor Hollister and others, has made significant impact in this area of tissue engineering scaffolds in a relatively short time. The impact of Professor Das' work can also be seen from the significant popularity of his recent paper in this area. This paper made ScienceDirect's *Top 25 Hottest Articles* list for the prestigious journal *Biomaterials*. Another example of his work

includes the current and proposed work with Professor Kurabayashi on nanoscale fabrication. This work is both scientifically exciting and may lead to new types of engineering applications. Professor Das continues to deliver outstanding results and shows great insight into the important future problems that need to be solved. The external letters attest to this. In summary, Professor Das has demonstrated his ability to identify fruitful areas of research by extending the scope (metals, polymers, and ceramics) and applications (tissue engineering, fuel cells etc.) of SFF.

Recent and Significant Publications:

- Partee, B., S. J. Hollister and S. Das, "Selective Laser Sintering Process Optimization for Layered Manufacturing of CAPA[®] 6501 Polycaprolactone Bone Tissue Engineering Scaffolds," *ASME Journal of Manufacturing Science and Engineering*, May 2006 (accepted).
- Hollister, S.J., C.Y. Lin, E. Saito, C.Y. Lin, R.D. Schek, J.M. Taboas, J.M. Williams, B. Partee, C.L. Flanagan, A. Diggs, E.N. Wilke, G.H. Van Lenthe, R. Mueller, T. Wirtz, S. Das, S.E. Feinberg, P.H. Krebsbach, "Engineering Craniofacial Scaffolds," *Orthodontics and Craniofacial Research*, 8, pp.162-173, 2005.
- Williams, J.M., A. Adewunmi, R.M. Schek, C.L. Flanagan, P.H. Krebsbach, S.E. Feinberg, S.J. Hollister, S. Das, "Bone Tissue Engineering Using Polycaprolactone Scaffolds Fabricated via Selective Laser Sintering," *Biomaterials*, 26, pp.4817-4827, 2005.
- Chung, H. and S. Das, "Numerical Modeling of Scanning Laser-Induced Melting, Vaporization and Resolidification in Metals Subjected to Step Heat Flux Input," *International Journal of Heat and Mass Transfer*, 47(19-20), pp.4165-4175, 2004.
- Chung, H. and S. Das, "Numerical Modeling of Scanning Laser-Induced Melting, Vaporization and Resolidification in Metals Subjected to Time-Dependent Heat Flux Inputs," *International Journal of Heat and Mass Transfer*, 47(19-20), pp.4153-4164, 2004.
- Kumar, P., J. K. Santosa, E. Beck and S. Das, "Direct-Write Deposition of Fine Powders Through Miniature Hopper-Nozzles For Multi-Material Solid Freeform Fabrication," *Rapid Prototyping Journal*, 10(4), pp.14-23, 2004.
- Das, S., "Physical Aspects of Process Control in Direct Selective Laser Sintering of Metals," *Advanced Engineering Materials*, 5(10), pp.701-711, 2003.
- Das, S., S. J. Hollister, C. Flanagan, A. Adewunmi, K. Bark, C. Chen, K. Ramaswamy, D. Rose and E. Widjaja, "Freeform Fabrication of Nylon-6 Tissue Engineering Scaffolds," *Rapid Prototyping Journal*, 9(1), pp.43-49, 2003.
- Bourell, D., M. Wohlert, N. Harlan, S. Das and J. J. Beaman, "Powder Densification Maps in Selective Laser Sintering," *Advanced Engineering Materials*, 4(9), pp.663-669, 2002.
- Das, S., T. P. Fuesting, G. Danyo, J. J. Beaman and D. L. Bourell, "Direct Laser Fabrication of Superalloy Cermet Abrasive Turbine Blade Tips," *Materials and Design*, 21(2), pp.63-73, 2000.

Service: Professor Das is more than fully engaged in professional service activities external to the university and is executing them in an exemplary manner. He has been highly visible around the country with organizing workshops, conference panels, and making presentations. He has also responded effectively to the typical service and administrative duties requested of someone of his rank at the departmental and college level, and he has shown all around good citizenship.

External Reviewers:

Reviewer (A): "... his research evolved from solid freeform fabrication into novel applications to tissue engineering scaffolds, securing funding from highly competitive programs at the National Science Foundation, National Institutes of Health, and industry. These achievements are quite impressive for someone at such an early stage in his career, and they constitute a distinct indication that his research contributions, insight and creativity, are highly regarded by the scientific community."

Reviewer (B): "His work shows depth, scholarship, innovativeness, fundamental understanding and great technical ability. Overall, he has amassed a record of very high quality research on significant topics." "His potential for continued independent, original research contributions and academic leadership in both teaching and research is outstanding....I therefore very strongly recommend Professor Das for promotion to the rank of Associate Professor with tenure."

Reviewer (C): "His record of scholarly research, from his Ph.D. through the present, is outstanding. I am very impressed with his ability to apply and extend engineering science to further the SFF field. His papers are the highest quality. He has demonstrated significant advances in several fields related to SFF and has a high paper output....The problems that Dr. Das is working on are critically important to the advancement of the SFF field and to applications in metal part manufacturing, bioengineering, and others." "This year I am providing recommendation letters for 5 faculty candidates for promotion and tenure in the design and manufacturing areas. Dr. Das has – by far – the best record of these candidates. The combination of originality, quality, and scholarly impact puts him head-and-shoulders above the others." "I give Dr. Das my highest recommendation for promotion to Associate Professor with tenure. I have no doubt that Dr. Das would qualify for promotion and tenure at [my institution]."

Reviewer (D): "Professor Das is a pioneer in the field of Solid Free Form Fabrication (SFF)".... he was probably one of the first people to make metal parts using SFF and almost certainly the first to apply selective laser sintering (SLS) for the direct manufacture of complex three-dimensional metal structures." "...Prof. Das' interaction with his colleague Scott Hollister led to a fruitful and productive collaboration on using bioresorbable polymers for the generation of tissue scaffolds. I believe this work is fundamental in nature and could lead to breakthroughs in surgical applications." "Professor Das has the essential ingredients for becoming a research leader at the interface between design/manufacturing and the life sciences."

Summary of Recommendation: Professor Suman Das' record is well established in research, teaching and service. He has demonstrated the ability to attract students to his laboratory, garner financial support for his research activities, has published numerous top quality papers in his field, has been recognized for his scholarship and impact by the international academic and national industrial communities, is an extremely passionate teacher and motivator of students, and has contributed beyond expectations to national service. It is with the support of the College of Engineering Executive Committee that I recommend him for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, College of Engineering.



Ronald Gibala
Interim Dean, College of Engineering

May 2006