Approved by the Regents
May 16, 2024

PROMOTION RECOMMENDATION
The University of Michigan
College of Engineering
Department of Mechanical Engineering

Daniel R. Cooper, assistant professor of mechanical engineering, Department of Mechanical Engineering, and assistant professor of integrative systems and design, Integrative Systems and Design Program, College of Engineering, is recommended for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, and associate professor of integrative systems and design, without tenure, Integrative Systems and Design Program, College of Engineering.

Academic Degrees:

Ph.D.	2014	University of Cambridge, Engineering, Cambridge, United Kingdom
M.Eng.	2009	University of Cambridge, Mechanical Engineering, Cambridge, United Kingdom
B.Eng.	2008	University of Cambridge, Mechanical Engineering, Cambridge, United Kingdom

Professional Record:

2023 – present	Assistant Professor, Department of Integrative Systems and Design, University of Michigan
2017 – present	Assistant Professor, Department of Mechanical Engineering, University of Michigan
2013 – 2016	Post-Doctoral Fellow, Mechanical Engineering, Massachusetts Institute of Technology, Cambridge, MA

Summary of Evaluation:

Teaching: Professor Cooper's teaching record reflects his commitment and enthusiasm for education and mentorship across both undergraduate and graduate levels. He consistently receives high teaching evaluations, maintaining an impressive average Q2 score of 4.65/5.0 over 13 courses taught. He has graduated two Ph.D. students with another seven in progress (one co-advised). He is also a member of 10 other Ph.D. committees and advises several master's and undergraduate students. His teaching methodology prioritizes active and contextual learning, showcasing his creative approach that caters to the diverse needs of his students. His exceptional teaching efforts were recognized with the ASME Ben C. Sparks Education Award for his continuous innovation in undergraduate education.

Research: Professor Cooper is a renowned figure in sustainable manufacturing research, known for groundbreaking contributions in reducing the carbon footprint of manufacturing processes. His work encompasses three key areas, namely, increasing aluminum recycling, decarbonizing domestic manufacturing through system-level analysis, and developing methodologies to enhance decision-making in supply-chain materials flow. With a well-funded research portfolio of $8.4M, including significant government and industry grants, Professor Cooper has published 23 papers in leading journals. His research has been cited over 2,000 times, with an h-index of

18. His influence extends to the industrial sphere, evident through two awarded U.S. patents and four pending patent applications, one of which will be licensed by the startup Saltaire Sustainability LLC.

Professor Cooper's integrated approach involving Life Cycle Assessment (LCA), Material Flow Analyses (MFA), and diffusion analysis has garnered international recognition, finding application in reports by the IPCC and the U.S. Department of Energy. Notably, his work has influenced the Ford Motor Company and Argonne National Lab, particularly in the adoption of results related to aluminum circularity and uncertainty quantification using Bayesian modeling approaches. Professor Cooper's research has been praised by his colleagues, highlighting his leadership in decarbonizing materials-intensive industries and his substantial contributions to advancing circular economy strategies and sustainable metals.

Recent and Significant Publications:

Yongxian Zhu, Gregory A Keoleian, Daniel Cooper, "A parametric life cycle assessment model for ductile cast iron components," *Resources, Conservation and Recycling*, 2023.

Jiayuan Dong, Jiankan Liao, Xun Huan, Daniel Cooper, "Expert elicitation and data noise learning for material flow analysis using Bayesian inference," *Journal of Industrial Ecology*, 2023.

Maxwell Vanatta, Deep Patel, Todd Allen, Daniel R. Cooper, Michael Craig, "Technoeconomic analysis of small modular reactors decarbonizing industrial process heat," *Joule*, 7(4): 713-737, 2023.

Jonathan Cullen, Daniel Cooper, "Material flows and efficiency," *Annual Review of Materials Research*, 2022.

Gregory Oberhausen, Yongxian Zhu, Daniel Cooper, "Reducing the environmental impacts of aluminum extrusion," *Resources, Conservation and Recycling*, 179, 2022.

Service: Professor Cooper has served as the chair and as a member of many departmental and college-level committees. Additionally, his four-year tenure as the co-chair/chair of the ASME Manufacturing Engineering Division Life Cycle Engineering (LCE) Technical Committee showcases his commitment to external service. Professor Cooper's instrumental role in organizing multiple symposia within the ESAFORM and CIRP LCE conferences further highlights his passion for facilitating collaborative initiatives. His valuable contributions to the DOE Basic Energy Sciences (BES) workshop speak to the profound impact of his service on the wider community.

External Reviewers:

Reviewer A: "Professor Cooper has made significant contributions to decarbonization of the steel and aluminum industries specifically through his methodological contributions to improving the accuracy of supply chain MFAs."

Reviewer B: "He is hitting on all cylinders. He has a good level of funding from diverse sponsors, stable research group with students reaching and defending Ph.D. degrees, excellent external reputation."

Reviewer C: "In my view, Dr. Cooper's work is innovative and highly important. He is one of a very small number of engineers who direct their research to aspects of mechanical engineering that are vital to planetary sustainability – ore deposits of critical materials, quantitative analyses of their employment, and potential material reuse."

Reviewer D: "…Prof. Daniel Cooper has undeniably established an impressive track record of achievements. His background and interests will undoubtedly enrich research initiatives at the University of Michigan in the field of sustainability and manufacturing."

Reviewer E: "…I can say that Dr. Cooper's scholarship and professional activities have had practical relevance and impacts for policy makers, industrial decision makers, and our shared research communities that are impressive for a scholar at his (still quite early, I would argue) career stage."

Summary of Recommendation: Professor Cooper is a global force in the field of sustainable manufacturing. His contributions are innovative and influential, acknowledged by the unanimously affirmative appraisals from his colleagues. Additionally, he has played a substantial role in education, service, and fostering diversity, equity, and inclusion (DEI). It is with the support of the College of Engineering Executive Committee that I recommend Daniel R. Cooper for promotion to associate professor of mechanical engineering, with tenure, Department of Mechanical Engineering, and associate professor of integrative systems and design, without tenure, Integrative Systems and Design Program, College of Engineering.

Steven L. Ceccio, Ph.D.
Interim Dean
Vincent T. and Gloria M. Gorguze Professor
of Engineering
College of Engineering

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