

**Proceedings of ASME 2024  
International Design Engineering  
Technical Conferences and  
Computers and Information in  
Engineering Conference  
(IDETC-CIE2024)**

**Volume 5**

**29th Design for Manufacturing and the  
Life Cycle Conference (DFMLC)**

**August 25-28, 2024  
Washington, DC**

**Conference Sponsors**  
Design Engineering Division

Computers and Information  
in Engineering Division

**THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS**

© 2024, The American Society of Mechanical Engineers, 150 Clove Road, Little Falls, NJ 07424, USA  
(www.asme.org)

All rights reserved. “ASME” and the above ASME symbols are registered trademarks of the American Society of Mechanical Engineers. No part of this document may be copied, modified, distributed, published, displayed, or otherwise reproduced in any form or by any means, electronic, digital, or mechanical, now known or hereafter invented, without the express written permission of ASME. No works derived from this document or any content therein may be created without the express written permission of ASME. Using this document or any content therein to train, create, or improve any artificial intelligence and/or machine learning platform, system, application, model, or algorithm is strictly prohibited.

INFORMATION CONTAINED IN THIS WORK HAS BEEN OBTAINED BY THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS FROM SOURCES BELIEVED TO BE RELIABLE. HOWEVER, NEITHER ASME NOR ITS AUTHORS OR EDITORS GUARANTEE THE ACCURACY OR COMPLETENESS OF ANY INFORMATION PUBLISHED IN THIS WORK. NEITHER ASME NOR ITS AUTHORS AND EDITORS SHALL BE RESPONSIBLE FOR ANY ERRORS, OMISSIONS, OR DAMAGES ARISING OUT OF THE USE OF THIS INFORMATION. THE WORK IS PUBLISHED WITH THE UNDERSTANDING THAT ASME AND ITS AUTHORS AND EDITORS ARE SUPPLYING INFORMATION BUT ARE NOT ATTEMPTING TO RENDER ENGINEERING OR OTHER PROFESSIONAL SERVICES. IF SUCH ENGINEERING OR PROFESSIONAL SERVICES ARE REQUIRED, THE ASSISTANCE OF AN APPROPRIATE PROFESSIONAL SHOULD BE SOUGHT.

ASME shall not be responsible for statements or opinions advanced in papers or . . . printed in its publications (B7.1.3). Statement from the Bylaws.

For authorization to photocopy material for internal or personal use under those circumstances not falling within the fair use provisions of the Copyright Act, contact the Copyright Clearance Center (CCC), 222 Rosewood Drive, Danvers, MA 01923, tel:978-750-8400, www.copyright.com.

Requests for special permission or bulk reproduction should be addressed to the ASME Publishing Department, or submitted online at: <https://www.asme.org/publications-submissions/journals/information-for-authors/journalguidelines/rights-and-permissions>

ISBN: 978-0-7918-8839-1

## TABLE OF CONTENTS

Recycling Automotive Shredder Residue: A Techno-Economic Analysis..... <i>Luke Chapman, Amber Velez, Ashley English, Melanie Gavilanes, Hung Huynh, Emily Welsh, Amos G. Winter V</i>	1
Development of a Rapid Response Online Product Marketplace..... <i>Ahmed E. Elhabashy, Elif Elcin Gunay, Jaemun Sim, Mark W. Clements, Hamza Benaggoun, Mahdi Kabiri, Karl R. Haapala, Gul E. Okudan Kremer, Kyoung-Yun Kim</i>	8
Transitioning Towards Circular Consumer Electronics Products ..... <i>Junwon Ko, Gisele Bortolaz Guedes, Fazleena Badurdeen, I. S. Jawahir, K. C. Morris, Vincenzo Ferrero</i>	18
Parametric Analysis of Relationships Among Part Geometry, Build Time, and Energy Consumption for Laser Powder Bed Fusion ..... <i>Kaitlyn Gee, A. John Hart</i>	28
The Carbon Intensity of Generative Design: Emissions Analysis of Training and Sampling From Generative Models..... <i>Sara L. Wilson, Noah J. Bagazinski, Maria C. Yang</i>	36
Investigating Sustainable Production Planning of an Industrial Progressive Die Stamping Process Using Discrete Event Simulation ..... <i>Adrian Borbolla, Mohamed Nezar Aboujarra, Devarajan Ramanujan</i>	50
Exploring Ultrasonic Welding As a Means of Improving Structural Design Properties of FFF-Printed Thermoplastics ..... <i>Luke Goehring, Rainer Fink, Bruce Tai, Albert E. Patterson</i>	59
Structural Design Vs Manufacturability Costs of Complex Stamped Components ..... <i>Ibraheem Alawadhi, Satchit Ramnath, Abhishek Bolar, Yilin Fu, Jami J. Shah, Nathan Zurbrugg, Duane Detwiler</i>	68
Path Optimization From En Route 3d Printed Aircraft Using Physics-Based Estimation Methods and Surrogate Models..... <i>Tevin Dickerson, John L. Salmon, Christopher A. Mattson</i>	83
Manufacturability of Protein-Reinforced Foods With Overhang Designs..... <i>Md Ibrahim Khalil, Farnaz Maleky, Ranadip Pal, Paul F. Egan</i>	94
Techno-Economic and Environmental Impact Assessment of Phytomining for Extracting Rare Earth Elements in the Northwestern United States..... <i>Ethan Struhs, Amin Mirkouei</i>	105
Realizability and System Architecture for Collaborative Large-Scale Mobile Platform 3-D Printing Robots..... <i>Henry Hu, William R. Norris, Ahmet Soylemezoglu, Dustin Nottage, Albert E. Patterson</i>	113
Spiral Development Approach for Design and Validation of Large-Scale Extrusion-Based Autonomous Construction Systems..... <i>Albert E. Patterson, William R. Norris, Ahmet Soylemezoglu, Dustin Nottage</i>	121

Trade-Off Analysis for Time and Power Requirements in an Additive Manufacturing-Disrupted Manufacturing Cell.....	131
<i>Chad Jones, Matthew Montoya, Larry Strawser, Albert E. Patterson</i>	
Barriers to Sustainable System Evolution: a Simulation Study Exploring the Transition From Private to Public Transportation .....	139
<i>Rogelio Gracia Otalvaro, Bryan C. Watson</i>	
Using Design Insights From Customer Feedback to Advance Design for Repairability.....	149
<i>Claire Franz, Michael Saidani, Hyeonik Song</i>	
A Disassembly Score for Human-Robot Collaboration Considering Robots' Capabilities .....	158
<i>Hao-Yu Liao, Terrin Pulikottil, Jef R. Peeters, Sara Behdad</i>	
Design Guidelines for Repurposing: A Comprehensive Methodological Literature Review .....	168
<i>Adrian Dornbach, Janosch Luttmer, Arun Nagarajah</i>	
Life Cycle Analysis of Three-Story Mass Timber and Reinforced Concrete Structures .....	177
<i>David A. Brown, Dolor R. Enarevba, Karl R. Haapala</i>	
Prospective Life Cycle Assessment of Nonwoven Mat Manufacturing: Comparing Pre-Consumer Wood Waste Fibers to Post-Consumer Recycled Apparel Fibers .....	185
<i>Hira Durrani, Abigail R. Clarke-Sather, Paulo H. T. F. Alves</i>	

**Author Index**