INTERNATIONAL WORKSHOP ADITIVE MANUFACTURING

2ND INTERNATIONAL WORKSHOP

ADDITIVE MANUFACTURING AND SUSTAINABILITY

BOOK OF ABSTRACTS

IWAM 24

INSTITUTO POLITÉCNICO DE BRAGANÇA

OCTOBER 4TH, 2024

2nd International Workshop on Additive Manufacturing and Sustainability

IWAM 24

Bragança - Portugal

October 4th, 2024

Title: 2nd. International Workshop on Additive Manufacturing and Sustainability (IWAM): book of abstracts

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Publisher:

Instituto Politécnico de Bragança

Campus de Santa Apolónia

5300-253 Bragança - Portugal

Publishing: 2025

ISBN: 978-972-745-347-4

Handle: http://hdl.handle.net/10198/29735

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WELCOME

We are pleased to present the International Workshop on Additive Manufacturing and Sustainability Book of Abstracts. This compilation brings together researchers, professors, and innovators from around the world who are advancing additive manufacturing (AM) and sustainable practices.

As the global community prioritizes environmental responsibility, additive manufacturing has emerged as a transformative technology capable of revolutionizing industries while reducing ecological footprints. This workshop unites advanced research, innovative applications, and progressive strategies to examine how additive manufacturing can enhance sustainability.

Within these pages, you will find a diverse array of abstracts showcasing ground-breaking work in areas such as:

Sustainable materials and processes in AM,

Energy efficiency and waste reduction,

Circular economy and lifecycle analysis,

Each contribution reflects a commitment to addressing the challenges and opportunities at the intersection of technology and sustainability. We hope this collection not only informs but also inspires collaboration and innovation among participants.

We are profoundly grateful to the authors, reviewers, and organizers whose unwavering commitment has enabled the publication of this book. A special thank you to our sponsors and partners for their unwavering support in bringing this workshop to life.

We appreciate your participation in this wonderful adventure. Let's work together to advance sustainability and innovation!

Warm regards,

The IWAM 2024 Organizing Committee,

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Rui Lima

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Mechanical analysis of specimens generated by 3D topological optimization

F Y M Stein, J Rocha, M Araújo, J Santos

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This study investigates the use of topologically optimized filling in additive manufacturing to enhance the strength-to-mass ratio of 3D printed parts. The research utilized SolidWorks modeling, adhering to the ASTM 695-15 standard, with optimization focused on various symmetries and preserved regions to maximize structural efficiency. The specimens were printed using Anycubic Kobra 2 Neo 3D printers and ABS filament, and the optimized models were compared to those with standard fillings (grid and triangular) through compression testing. The results showed that while the optimized filling achieved only 50% of the strength of the standard-filled models, the grid pattern outperformed the others, demonstrating superior performance and ductility. Ultimately, the study concluded that the optimization process did not surpass the performance of the standard meshes generated by 3D printing slicers.

Keywords: Topologically optimized filling; Additive manufacturing; Strength-to-mass ratio; Compression testing.