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Rethinking Historical Wood Waste

As restoration and conservation projects increasingly prioritise sustainability, the reuse and recycling of historical building materials are gaining attention. This study contributes to previous research (Fico, Rizzo, Malinconico, & Esposito Corcione, 2024) by exploring the suitability of historical wood waste as a 3D-printing material, addressing both heritage preservation and circular-economy goals. The research investigates how a 100-year-old wooden platband, found in a waste container, can be replicated from historical wood waste. To better understand the environmental impact of fabricating a platband replica from wood waste, the duration, energy consumption, and cost of the processes applied were documented and analysed.

The research was conducted in several stages. First, the historical platband was cleaned of paint and dust to prepare it for digital modelling. Sawdust for filament extrusion was prepared from non-conditioned pine beams and oak parquet of the same age as the platband. Polylactic acid (PLA) was chosen as a binder for the composite filament (Mosomi, Olanrewaju, & Adeosun, 2024). The study then proceeded with 3D printing using the fabricated filament. The final stage will involve outdoor moisture-content and biodegradability testing to evaluate the climate resistance of the printed replicas.

Preliminary results indicate that historical, non-conditioned wood waste combined with PLA can be extruded into a filament suitable for 3D printing. High-accuracy photogrammetry captured the structure and surface features of the historical artefact with precision, which were then transferred to the 3D-printed replica.

The digital-to-print route for the wood-waste/PLA composite required substantially more time, energy, and hands-on labour than producing a replica from new wood in a workshop. This shows that process optimisation remains an important goal for future work.

The method presented constitutes a sustainable conservation approach that aims for zero waste while respecting the value of historical artefacts, particularly when original materials are in poor condition. This technology has clear potential for multidisciplinary application.

Acknowledgements

The study was carried out with the support of the Estonian Academy of Arts and with contributions from the Head of the Prototyping Lab of the Estonian Academy of Arts, Madis Kaasik, and Anna Jõgi.

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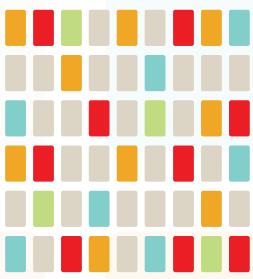
3rd Annual Conference of the Slovenian Node of the European Research Infrastructure for Heritage Science

E-RIHS Slovenia
Koper, 18–19 November 2025



https://doi.org/10.26493/978-961-293-546-7.18