

AQC0337

Nanopublication — Advanced Research in 3D Printed Wood PLA Sculpture - Scale and Structural Complexity

by Arnaud Quercy · Dasein · 2022



Advanced Research in 3D Printed Wood PLA Sculpture - Scale and Structural Complexity

"Dasein [1]" represents a significant advancement in my technical research [2] with 3D printed wood [3] PLA [4], achieving greater scale (40x30cm) and structural complexity than previous miniature works. The piece required solving challenges in support structure design, material warping at larger dimensions, and post-processing to achieve the refined wood-grain surface visible in the final form, while maintaining structural integrity for the cantilevered curved sections.

CONTEXT

Wood-filled PLA (polylactic acid with wood fiber additives) presents specific technical challenges that become pronounced at larger scales. The material exhibits greater tendency to warp during cooling compared to standard PLA, particularly in large curved sections where differential cooling rates create internal stress. At the 40x30cm scale of "Dasein," these material properties required careful attention to print bed adhesion, controlled ambient temperature, and strategic support placement to prevent deformation during the 30+ hour print process.

The organic, flowing geometry compounds these challenges. Unlike geometric forms with flat surfaces and right angles, the continuous curves and cantilevered sections of "Dasein" required dense support structures that must later be removed without damaging the wood-grain surface. I developed a support strategy using tree supports with carefully calibrated contact points, allowing clean removal while maintaining the smooth flow of curves. The overhanging void sections were particularly critical—these required bridging support that could bear the weight of subsequent layers while remaining removable.

Post-processing involved several stages to achieve the refined wood appearance visible in the final sculpture. Initial support removal used precision tools to avoid marring the surface. Light sanding with progressively finer grits (220, 400, 600) smoothed the layer lines while preserving the natural wood-grain texture inherent to the PLA compound. The final surface treatment enhanced the wood character without obscuring the honest evidence of additive fabrication—the goal was refinement, not mimicry of carved wood.

The metal armature mounting solution emerged from structural necessity at this scale. Unlike smaller PLA sculptures that can be self-supporting, "Dasein's" cantilevered sections and top-heavy mass distribution required external support. I designed a threaded metal rod insert during the print process, allowing the sculpture to mount securely to the metal base while appearing to float. This engineering decision became philosophically resonant: the necessary support structure materializes the sculpture's dependence on its worldly ground, its inability to exist in pure autonomy.

REFERENCES

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- [2] **Collection Context:** Research on Tensions
- [3] Tao, Y., Wang, H., Li, Z., Li, P., & Shi, S. Q. "Development and Application of Wood Flour-Filled Polylactic Acid Composite Filament for 3D Printing." *Materials* 10, no. 4 (2017): 339.
- [4] **Technical Domain:** Additive manufacturing, wood-filled PLA, sculptural fabrication
- [5] **Artist:** Arnaud Quercy
- [6] **Artwork:** Dasein (AQC0337)
- [7] Turner, N., Goodwine, B., & Sen, M. "A Review of Origami and Its Applications in Mechanical Engineering." *Proceedings of the Institution of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science* 230, no. 14 (2016): 2345-2362. [On structural challenges in complex 3D printed geometries]
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- [9] ## Document Metadata
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