Evaluating the Feasibility of Mycelium-Based Biomaterials as Sustainable Core Components in Surfboard Design and Manufacturing

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Conventional surfboards are predominantly manufactured using petroleum-based foams and resins that are energy-intensive, toxic to produce, and non-recyclable, contributing to significant long-term environmental impact. As interest in sustainable materials grows, mycelium has emerged as a promising biomaterial due to its renewability, low embodied energy, and capacity to be grown into form. By integrating fungal growth behaviour into the design process, this research explores how biological systems can actively shape engineered structures. Spora investigates whether mycelium-based materials can inform alternative approaches to surfboard design through material experimentation and system-level prototyping. Rather than pursuing direct material substitution, a modular hybrid framework was developed that responds to the biological behaviour of mycelium's root networks. This growth-driven logic informed both structural organisation and component formation, enabling material to develop spatially rather than being removed through subtractive processes. In contrast to conventional surfboard manufacturing, which relies on shaping foam blanks and generates material waste, this approach minimises material input by allowing sustainable elements to grow into form. Mycelium was cultivated on agricultural substrates, dehydrated to create inert components, and integrated into a surfboard prototype which was assessed for growth consistency, form stability, and structural integrity. Although mycelium has material limitations, its integration within a reconfigured structural system demonstrates potential for biodegradable surfcraft and contributes to early-stage research on environmentally responsible product design and alternative manufacturing systems.

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