

# Mycelium Mockup

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Mycelium Mockup is an architectural installation that uses biotechnology to explore the contradictory relationship of sustainability to market forces in architecture. The installation is fabricated of cellulosic wood waste and living mycelium, the root structure of mushrooms. This thread-like fungus plays an essential role in the natural world, aiding in the decomposition of materials and converting them to biologically available elements. During the installation, the structural elements of the wall produce edible oyster mushrooms, providing a source of food as well as screen for video projections that investigate the tensions implicit in the desire to control natural processes. At project end, what is not eaten is composted, returning valuable organic matter to the local ecosystem.

The raw materials of Mycelium Mockup consist of heat-sterilized sawdust, nutrients, and *pleurotus ostreatus*, a mushroom strain native to the Pacific Northwest. The polysaccharide mycelium root structure of the mushroom grows in the interstitial spaces of the cellulosic sawdust, binding it together to produce a crosslinked biocomposite building material that is fully biodegradable. The polysaccharide forms naturally around the exterior of the blocks, adding to their structural performance. The compressive strength and thermal resistance of the dry mycelium biocomposite blocks is comparable to that of rigid foam insulation. Guide-work controls the location of the blocks during assembly. When fully assembled the individual living biocomposite

blocks grow together into a monolithic structure. The double curvature of the mockup wall stiffens the overall shape, while the rotation of individual blocks maximizes opportunities for masonry cohesion due to chitin growth between masonry courses. The use of selective voids allow multiple views of the city as backdrop and allows for an interplay of light between projectors located on opposite sides of the wall.

The installation provokes fundamental questions about our relationship to architectural materials. Buildings are erected and razed at a frenetic pace in pursuit of ever-increasing returns on investment in contemporary market economies. Architecture determined by revenue models results in materials that are discarded long before the end of their useful life. Rather than building for the ages, sustainability in the context of these rapid cycles of demolition and speculative construction calls for radically biodegradable architectural materials that anticipate their inevitable demolition by encoding organic decay into their basic structure. Mycelium Mockup is an exploration of a next generation material that explores our conflicting aspirations latent in the architectural development of cities.

# Mycelium Mockup

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Partial view of installation in museum courtyard. Foreground: broken blocks provide a view of internal structure of mycelium bio-composites. Background: biodeg wall serves as screen for video projectors that investigate the difficulty of controlling natural processes.



Video projections on wall at dusk



Projection on Wall



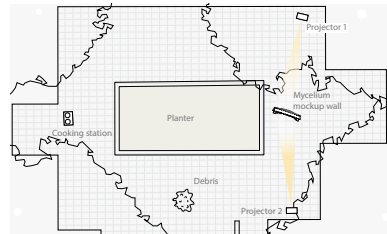
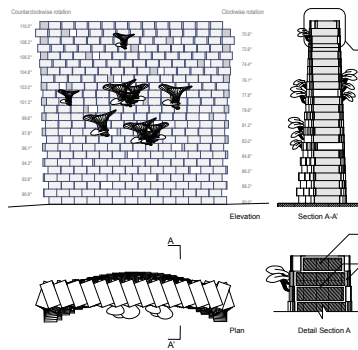
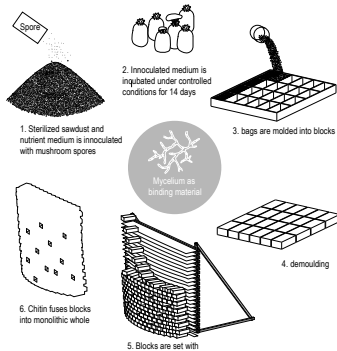
Mushrooms harvested from the wall served as hors d'oeuvres.



Biocomposite blocks add to ecosystem at end of project.



biocomposite blocks produce edible oyster mushrooms



**Fabrication** *Mycelium Mockup* is fabricated with living mycelium biocomposite blocks. Guide-work controls the location of the blocks during assembly. When fully assembled the individual moist biocomposite blocks grow together into a monolithic structure. The double curvature of the mockup wall stiffens the overall shape, while the rotation of individual blocks maximizes opportunities for masonry cohesion due to chitin growth between masonry courses. The use of selective voids allow multiple views of the city as backdrop and allows for an interplay of light between projectors located on opposite sides of the wall.



**Research** The raw materials of *Mycelium Mockup* consist of heat-sterilized sawdust, nutrients, and pleurotus ostreatus, a mushroom strain native to the Pacific Northwest. The polysaccharide mycelium root structure of the mushroom grows in the interstitial spaces of the cellulosic sawdust, binding it together to produce a crosslinked biocomposite building material that is fully biodegradable. A durable white material called chitin forms naturally around the exterior of the blocks, adding to their structural performance. The compressive strength and thermal resistance of the dry mycelium biocomposite blocks is comparable to that of rigid foam insulation.



top row from left: compression test, edible oyster mushroom growing from biocomposite block, inoculated growth substrate during incubation phase, samples contaminated with mold spores, repressing growth medium prior to molding, prototype block bottom row from left: green house interior, molded mycelium biocomposite blocks during drying