Mycelium Amplifier

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Introduction

We successfully made a guitar amplifier out of mycelium. The traits of mycelium– fire-proof, sound dampening, lightweight– all contribute to not only an ideal but better amplifier. The amplifier will be smaller in size– portable, and rectangular in shape with rounded corners. We took inspiration from examples of EDEN Power Corp and MYCOAUDIO who produced small bookshelf speakers[1], as well as one by a student from Nottingham Trent University[2].

Process used to manufacture

Tools & Equipment

- Bandsaw
- CNC machine
- Belt sander
- Vacuum forming machine
- Palm sander
- Clamps
- CAD (Fusion 360)
- CAM

Materials

- Wood
- Wood Glue

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[1] Nicolaus Li. (2022). EDEN Power Corp and MYCOAUDIO Come Together for Mycelium Mushroom Speakers. *Hypebeast. Tech and Gadgets.*

[2] Sound on Sound. (2017). *Mushroom Speakers Designed by Students.*

- Spackle
- ABS Plastic Sheet (48x31 inches)
- Mycelium Mixture
- Internals from an Old Amplifier
- Old Speakers

Facilities

- Art & Design Workshop
- Art & Design Finishing room
- Siebel Center shop

PPE

- Safety Glasses
- Gloves

Recipe

- Mycelium recipe on grow.bio
- Mycelium recipe + wood shavings

Mold Design

We designed the amp on CAD. After that we reverse engineered a mold, taking into account factors such as 5 degree draft angles required on vacuum forms as well as the tolerance of the mold. Our intention for the design was to create two molds– one larger and one smaller– and overlap both molds for the mycelium to grow in between, effectively creating the “shell” of the amplifier. We would therefore need to CNC two separate blocks of wood for two molds.

After the digital model was complete, we attempted to CNC the two wood blocks for shaping the mold. Halfway through, we encountered an issue with the depth of the drill bit not being able to reach the bottom of the part before the chuck hit the top of the part. The CNC at A&D completed the mold, however not without inconsistencies and damage done to the part which had to be fixed before the vacuum forming process. Therefore we finished the other piece manually using a table saw in which we were still able to accurately and efficiently cut out. Due to the damage done by the CNC, we had to patch up the wood with spackle. After, we used the table router in A&D to cut out rounded corners to help release the mold from the final vacuum formed piece.

When the two wood blocks are complete, we vacuum formed over them with ABS plastic sheet (48x31 inches). To release the wood blocks, we utilized a dremel to cut open two corners of each mold, and glued the slits together once the molds are complete.

Post Processing

The first part of post processing involves sanding the fully grown and baked mycelium shell with a belt sander to discard any imperfections and overgrowth. We also spray painted the outer shell with a clear-coat to preserve its original mycelium look, and the front panel with black in order to blend into the mesh.

Three holes are drilled in the front panel to fit the three speakers, and a mesh covered over the entire panel. In order for the amplifier to work, we took apart some old amplifiers and fitted the internals into the mycelium amplifier. We had to build a new platform for the motherboard and wiring to be fitted into the top of the speaker. We

soldered the wires from the motherboard to the fuse, and connected those for the sound controls to the three speakers. The front panel and control panel are pressure fitted into the shell to complete the mycelium amplifier.

Questions to investigate further

One crucial issue is choosing the substrate to grow the mycelium with in order to enhance its strength and longevity. According to a study on mycelium and its growth with different added substrates by scientists at the Polytechnic Institute of Leiria in Portugal, it identified natural, unprocessed wood fine shavings as the best substrate for mycelium as it produces the most strength but did not add much to the weight of the finished product. We attempted to grow a piece of the front panel with this in mind, yet the mycelium did not fully grow compared to those that did not have natural wood shavings added. A possible issue could be that our natural wood shavings were not fine enough, or the added moisture from the shavings caused further alterations to the growth of the mycelium. Therefore, whether wood shavings could add additional strength to the mycelium in a practical sense should be further studied.

References

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