

MYterials for THermal Insulation in Construction(MYTHIC)

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Project/Research Group: MYTHIC

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A mycelium is a network of fungal threads or hyphae. When it binds with organic substrates it forms mycelium composites. Mycelium composites are chosen because it has good thermal insulation, fire resistance and moisture resistance. Helps progress Dutch Government Goal of wanting all homes to be Independent of natural gas by 2050.



For this project MYTHIC the chosen mycelium was Ganoderma resinaceum and the substrate chosen to bind with it was rapeseed straw. This was decided as the most optimal combination from the last project MNEXT had done "Building On Mycelium". This combination of fungi and substrate was the most optimal over 10 other substrates and 5 other fungi as it had the best physical properties and acoustic absorption capabilities when grown.

Design and Prototyping



Images of Mould that was designed and the result of mycelium insulation panel

An AutoCAD software had to be used to design the mould for the Mycelium Insulation Panel (SolidWorks). After communication with many MNEXT partners, a size of 1200x600x180mm was decided. However, the size was not reliable because the mould would not fit into the climate chamber. Therefore, the size was halved to 600x300x180mm. Keeping the same thickness so the Rc Value remains the same (Rc value = $6m^2K/W$)

$R_c = \text{Thickness of material} / \text{Thermal Conductivity of Material}$

Engineering of Sterilization Techniques

The goal here is to compare the effectiveness of autoclaving and steam pasteurization in order to replace autoclaving with a less energy-consuming and water-consuming technology. A pasteurization set-up had to be imagined, designed with an AutoCAD (SolidWorks) and built. Then a list of time and temperature combinations had to be done to be tested. This part is currently being done. Subsequently, samples will have to be made with the pasteurize substrate and then be tested for some mechanical properties and infection.



Images of the pasteurization setup and the pipe system that distributes the steam homogeneously

Conclusion

For Design and Prototyping, the plans remain to send the insulation panel prototype to a partner to build a façade on it and improving the design so it can look more appealing and market ready.

For engineering of sterilization technique, as all the tests aren't done yet, results aren't available yet but should be available by 15 days.

References

1. <https://www.micropia.nl/en/discover/microbiology/mycelium/>