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Sandwich panels with *Arundo Donax* core and flax fibre composite skins

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Nowadays the climate changing is a huge issue, for this reason the use of new sustainable materials is becoming more important for the green architecture [1]. In this perspective, the use of natural materials like bamboo or *Arundo donax* can be a viable alternative [2][3]. The use of these raw materials is limited by their shapes and dimensions. Their use in laminated structures or in panels can overcome this issue.

In the present study, sandwich panels with the core made of *Arundo donax* (AD) rings and the skins made of flax fibre reinforced epoxy composites are studied, inspired by the idea proposed in [4] in which the core was made of bamboo.

The influence of the roughness of the surfaces of the rings, i.e. the cutting cross sections and the lateral surfaces, on the ultimate stress was studied. In particular, pull-off tests between the ring and the skin were carried out to understand how the sandpaper polishing of upper and lower surfaces of the rings can affect the strength of adhesion between the skins and the core.

Sandwich panels were also manufactured using thermocompression. The lateral surfaces of AD rings were previously treated with different sandpapers to evaluate the effect of the roughness of the lateral surfaces of the rings on the shear rigidity and strength of the core and then on the resulting bending properties of the sandwich panel.

Three points bending tests were performed on sandwich beams. The results show a significant influence of the treatment on the lateral surfaces of the AD rings on the bending properties of the sandwich material. They also pointed out higher bending properties than the one obtained in literature with bamboo core [4] for a lower apparent density.

These panels can become a good green option in constructions exploiting AD canes which grow naturally, very fast and invasive in many parts of the world.

[1] Madhura Yadav, Arushi Mathur, Bamboo as a sustainable material in the construction industry: An overview. *Materials Today: Proceedings*, 43, Part 5, 2021, pp. 2872-2876.

[2] Esti Asih Nurdiah, The Potential of Bamboo as Building Material in Organic Shaped Buildings. *Procedia - Social and Behavioral Sciences*, 216, 2016, pp. 30-38.

[3] L. Molari, F. Coppolino J.J. Garcia, 'Arundo donax: a widespread plant with great potential as sustainable structural material', *Journal of Construction and Building Materials*, 268, 2021, 121143.

[4] Livia Avila de Oliveira, Gabriela Luiza Corat Coura, Maikson Luiz Passaia Tonatto, Tulio Hallak Panzera, Vincent Placet, Fabrizio Scarpa, A novel sandwich panel made of prepreg flax skins and bamboo core. *Composites Part C*, 29, 2020, 100048.

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