

GRO COCE

Green organic reinforces high performance Timber Concrete Composite Slab

The aim of the project was the development of an innovative ceiling system based on Timber Concrete Composite construction (TCC construction) by combining sustainable building products and construction methods. Thus, an economically and ecologically advantageous alternative to the currently prevailing, energy- and resource-intensive slab constructions made of reinforced concrete has been developed.

The new slab system consists of timber beams whose tensile zone is reinforced by high-performance hemp fiber-based reinforcement textiles. As a result, a significant reduction of the necessary timber cross-section and a more requirements-oriented and responsible use of the cross-section for all usual spans of the building and multi-storey building will succeed. In the project, the partners developed a high-performance hemp bast semi-finished product as well as the steps for its reproducible production by means of textile surface formation.

With regard to mechanical properties, in particular stiffness, values are achieved in the field of conventional glass fibre composites.

Typ of fibre	material	Young modul [GPa]	densety [g/cm ³]	Energy requirement Fibre semi- finished products [kWh/kg]
Hemp bast	Composites (Hempbast)	30 - 45	1,2	6 - 8
conventional natural fibres (hemp, flax)	Composites (textiles with UD fibre orientation)	16 - 25	1,3	16 - 22
	Composites (nonwoven)	4 - 6	1,1	12 - 14
conventional technical fibres	Composites glass fibre rovings	38 - 45	2,2	14 - 18
	Composites carbon fibre rovings	125 - 155	1,6	80 - 86

Table 1: Comparison of the characteristic values of composites (different fibre materials and matrix)

First application and stress tests of the Hanf bast semi-finished products on wooden beams were able to confirm the high performance potential of the natural fibre materials.



Figure 1 - Peeled Manually Bundled Hemp Bast



Figure 2 and 3: Application of hemp bast straps on the wooden beam

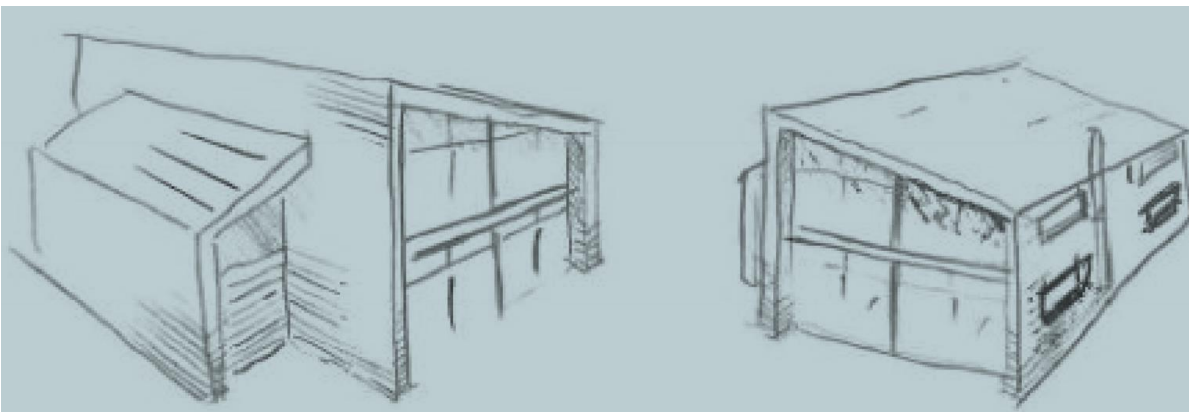


Figure 4: Construction concept

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