

# Plektotonik - Structural textile membrane from fast growing trees (SRC)

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## ABSTRACT

The impact of gravity on yarns is ignored in the graphical representations of textile techniques, and the represented textile fragments look like tensioned membranes, and the yarns appear formable but stable. The project *Plektionik – structural textiles, is a material system* emerged from the research on the use of elastic but stable twigs and warp-knitting techniques. The self-supporting textile is suitable for architectural scale.

We developed continuous, hybrid yarns, *Active Yarns*, that we define as elastic but stable yarns from fast-growing lignin-containing plants such as willow (SRC), rattan twigs, and metal wires. These properties of the fiber, formable, elastic, and stable, are inheritable and programmable on all levels of the textile hierarchy: from fiber by selection through Active yarn composition to the complex textile surfaces (1). The direction in which one loop interlocks, from above or underneath, results in a convex or concave surface. Applying a loop-based technique - the warp-knitting can give elasticity of the fabric or the *textiled* structure.

In order to analyse this textile as a structural membrane, we will focus on the *tubular surface*. The loop is recognised as the primary building block for the textile programming. The loop radius is related to the yarn thickness and properties. The yarn is pre-formed for the assembly. The density or “the frequency” of the looping can be programmed, and it defines the stability of the pre-formed segments. The tube can be formed from different numbers of the same pre-formed segments. The experimental trials showed that a certain number of segments assembled into the tubular surface would result in conformed tensioned structural membrane. For example, the surface of 16 pre-formed segments will result in the conformed tube using a 1,8 mm thick rattan filament pre-formed with the pre-defined “middle frequency.”

The obtained results are a step towards standardising fast-growing structures (2) for use in construction.

## REFERENCES

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<https://doi.org/10.15376/biores.12.2.4270-4282>