Supplementary Material

Synthesis and Characterization of Wood Rigid Polyurethane Composites

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Experimental plan and statistical analysis

A composite experimental plan determined the optimal formulations in density and mechanical resistance using the NEMROD statistical analysis [1]. The iso-response surfaces of density and mechanical properties gave a simple visualization of the optimum fiber size and proportion.

The NEMROD statistical analysis identified foam formulations' optimum percentage and fiber size. The effect of these factors was not significant on the foam density. On the other hand, the effect of the particle size and its interaction with percentage was significant for the compressive strength (Table S1).

Table S1. Effect of particle size and percentage on compressive strength.

Coeficient	Value	Pr(>F)
b1	-2,917	16,9
b2	-8,833	0,142 **
b1-1	-2,250	52,2
b2-2	-23,000	< 0,01 ***
b1-2	9,125	0,408 **

R^2=0,69, '***' 0,001 '**' 0,01 '*' 0,05.

The iso-response (Figure S1) shows that the optimal compressive resistance is obtained with a particle size between 250 and 125 μm and percentages under 15%. It is known that the compressive strength for foams used in construction needs to be at least 100 kPa. Thus, the particle size cannot be higher than 300 μm, with percentages going from 10 to 30 %. The crosshatched area gives an idea of the acceptable percentage and particle size, while the colored area represents the maximum compressive strength achievable.

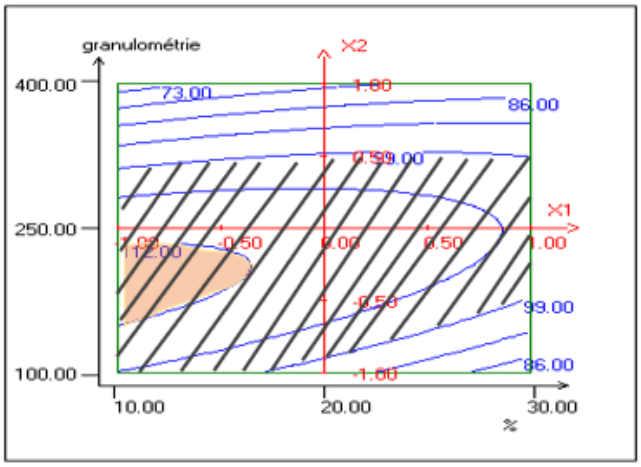

Figure S1. Iso-curves for compressive strength.

References

1. Tinsson, W. *Plans d'Expérience: Constructions et Analyses Statistiques*, 1st ed; Mathématiques et Applications; Springer: Berlin/Heidelberg, Germany, 2010; Volume 67. https://doi.org/10.1007/978-3-642-11472-4