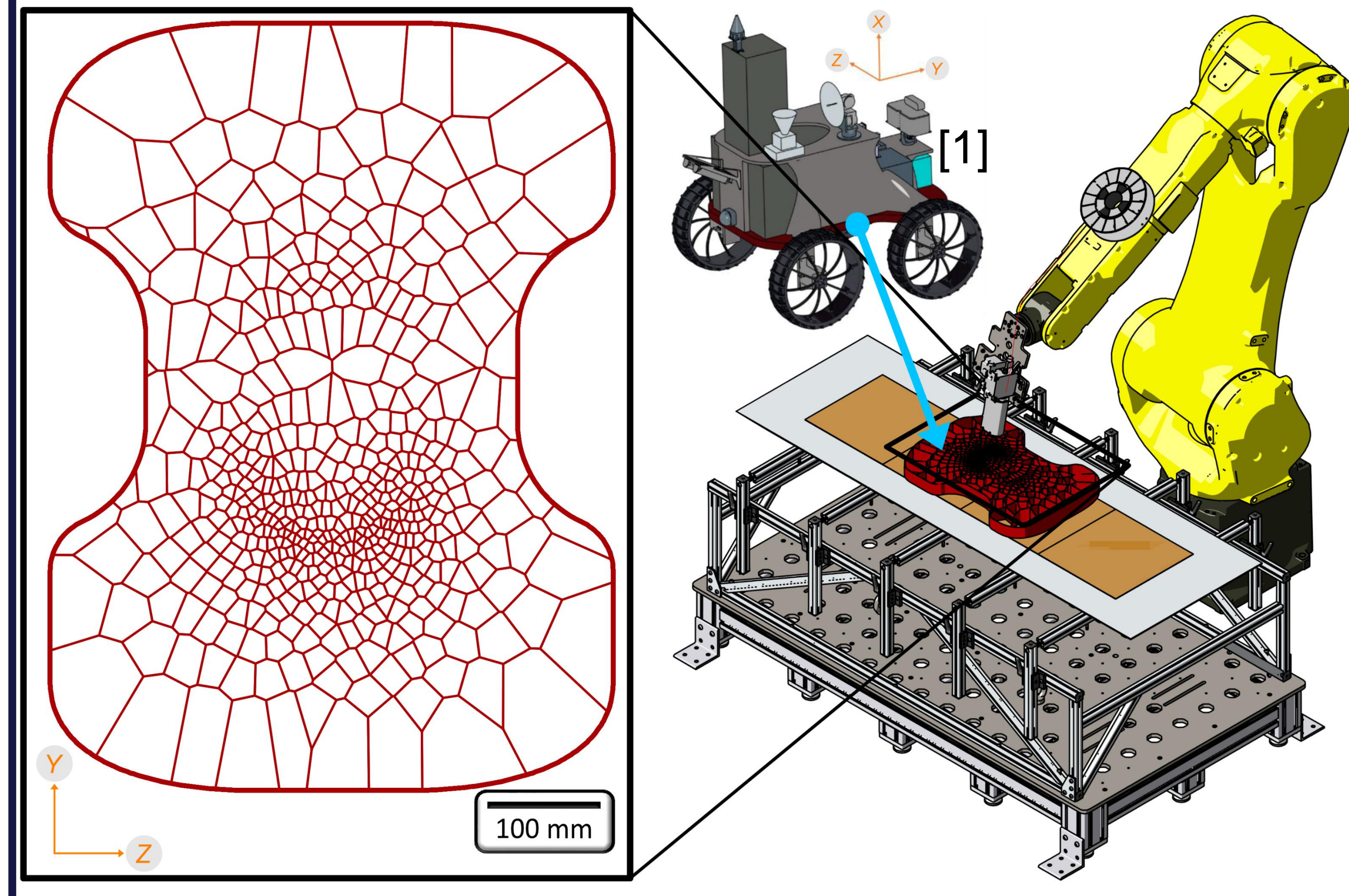
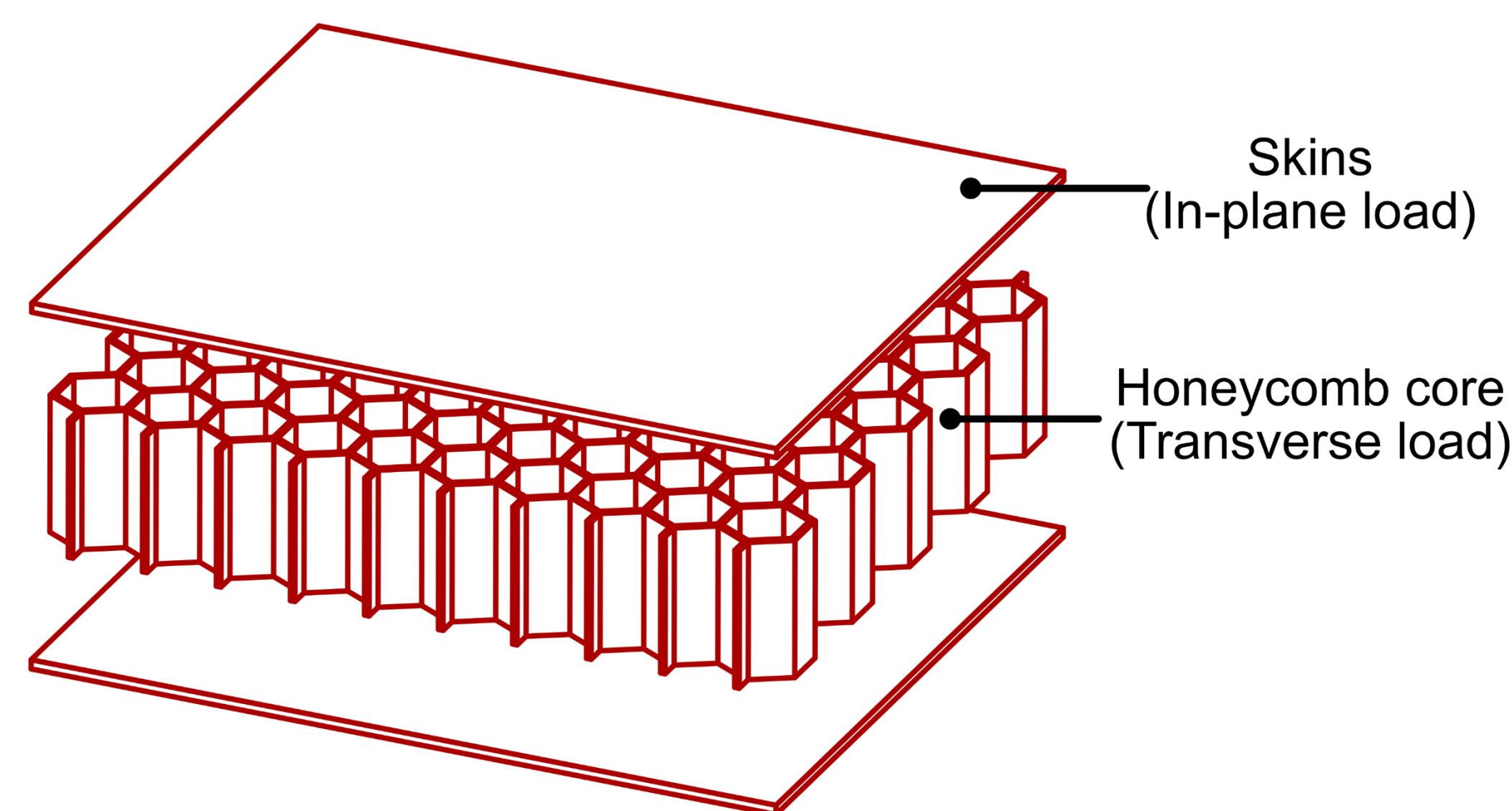


LUNAR ROVER IN COMPOSITE MATERIALS

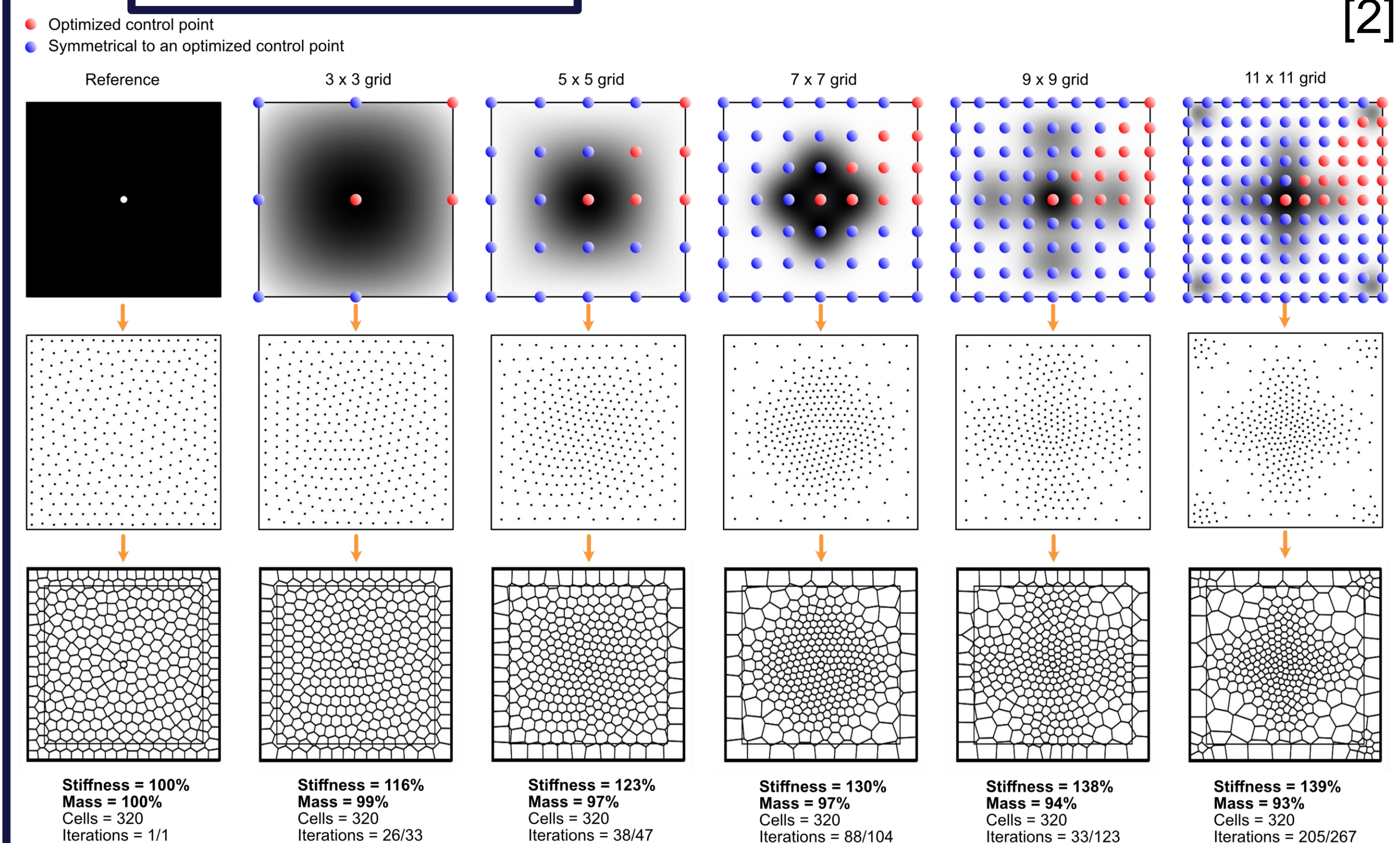


SANDWICH PANEL THEORY

Sandwich panels are lightweight structures with high flexural stiffness. They are widely used in the aerospace industry.



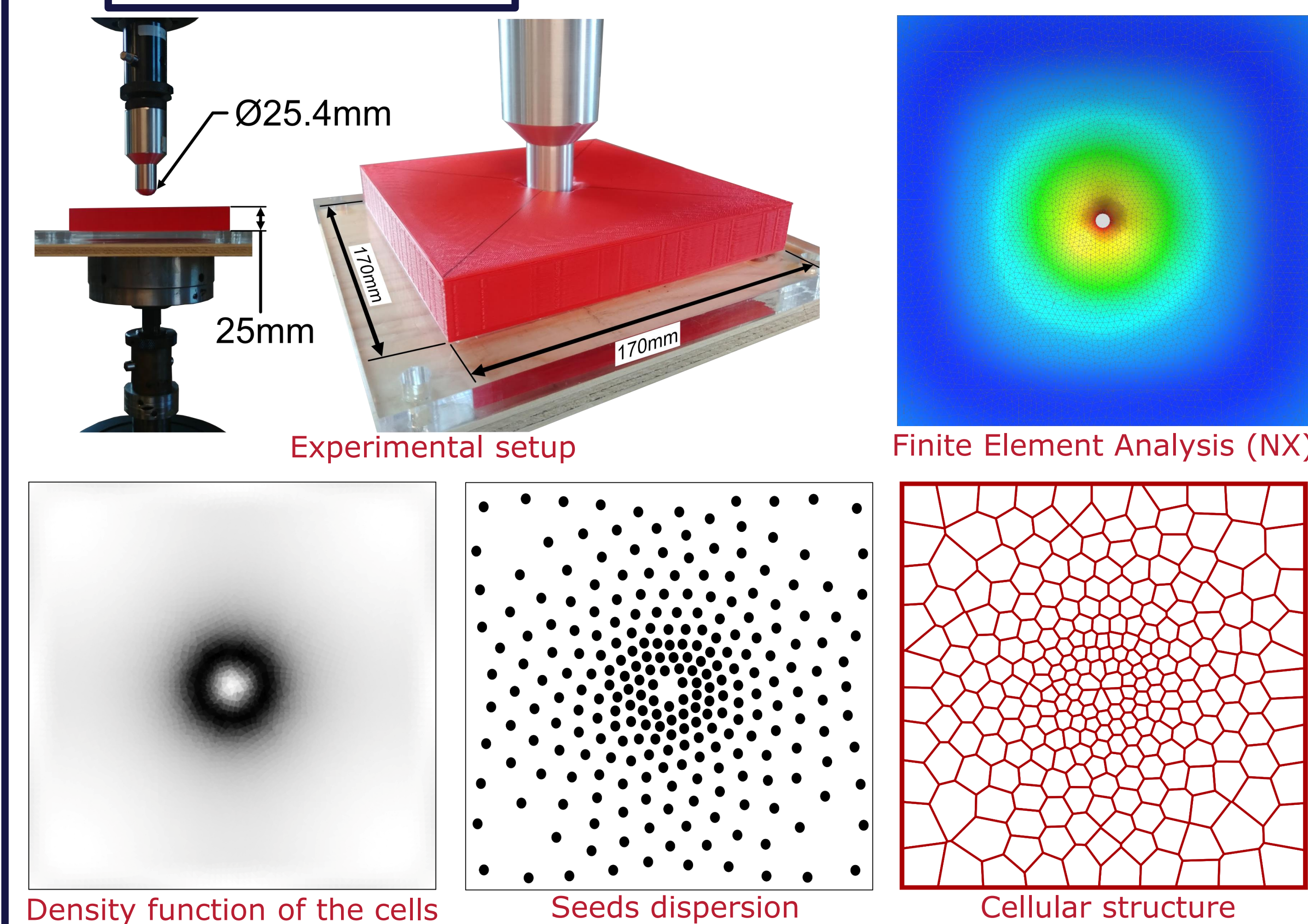
OPTIMIZATION



OBJECTIVES

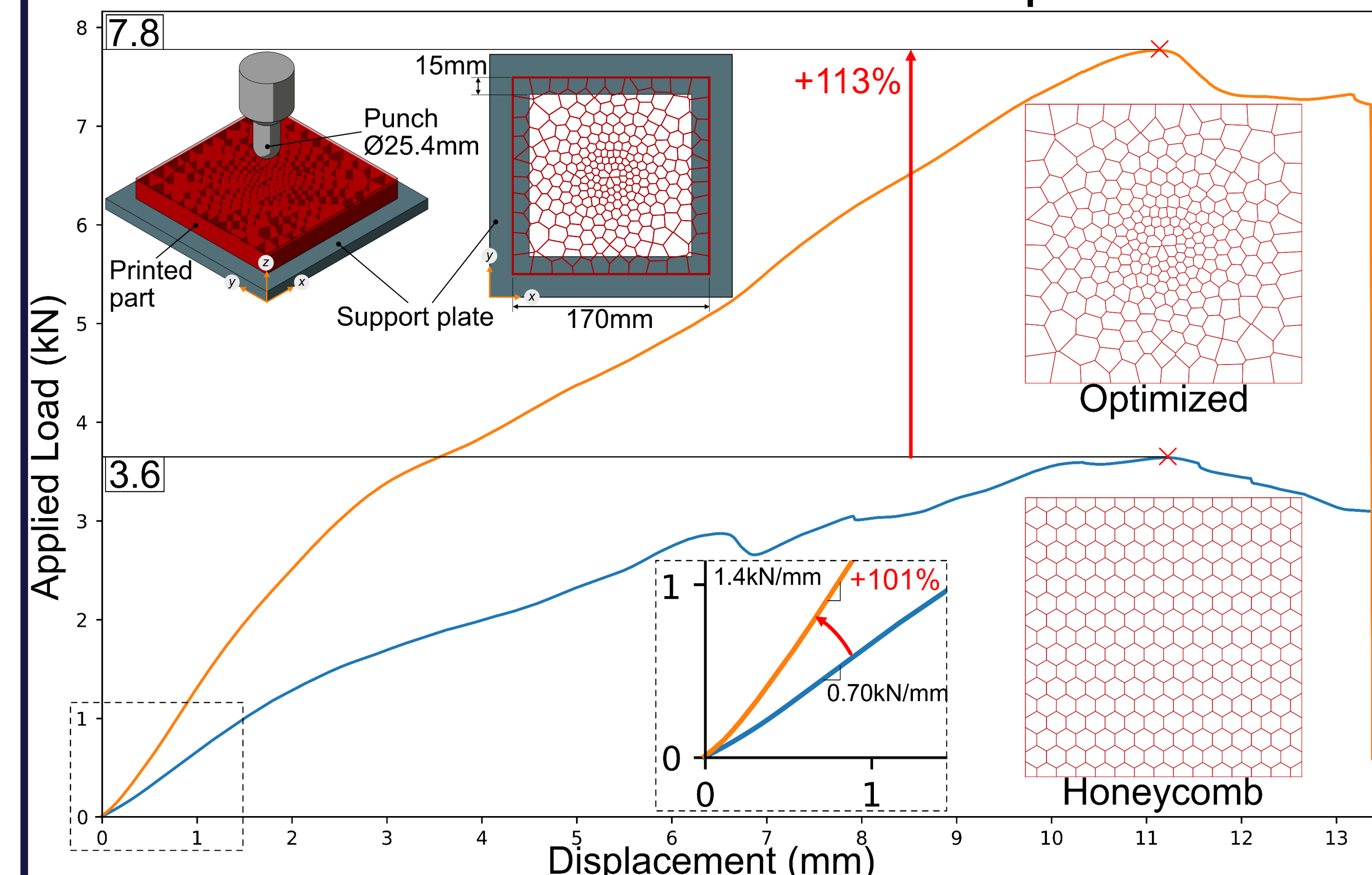
Maximize stiffness of a sandwich panel for a given amount of cells.

METHODOLOGY



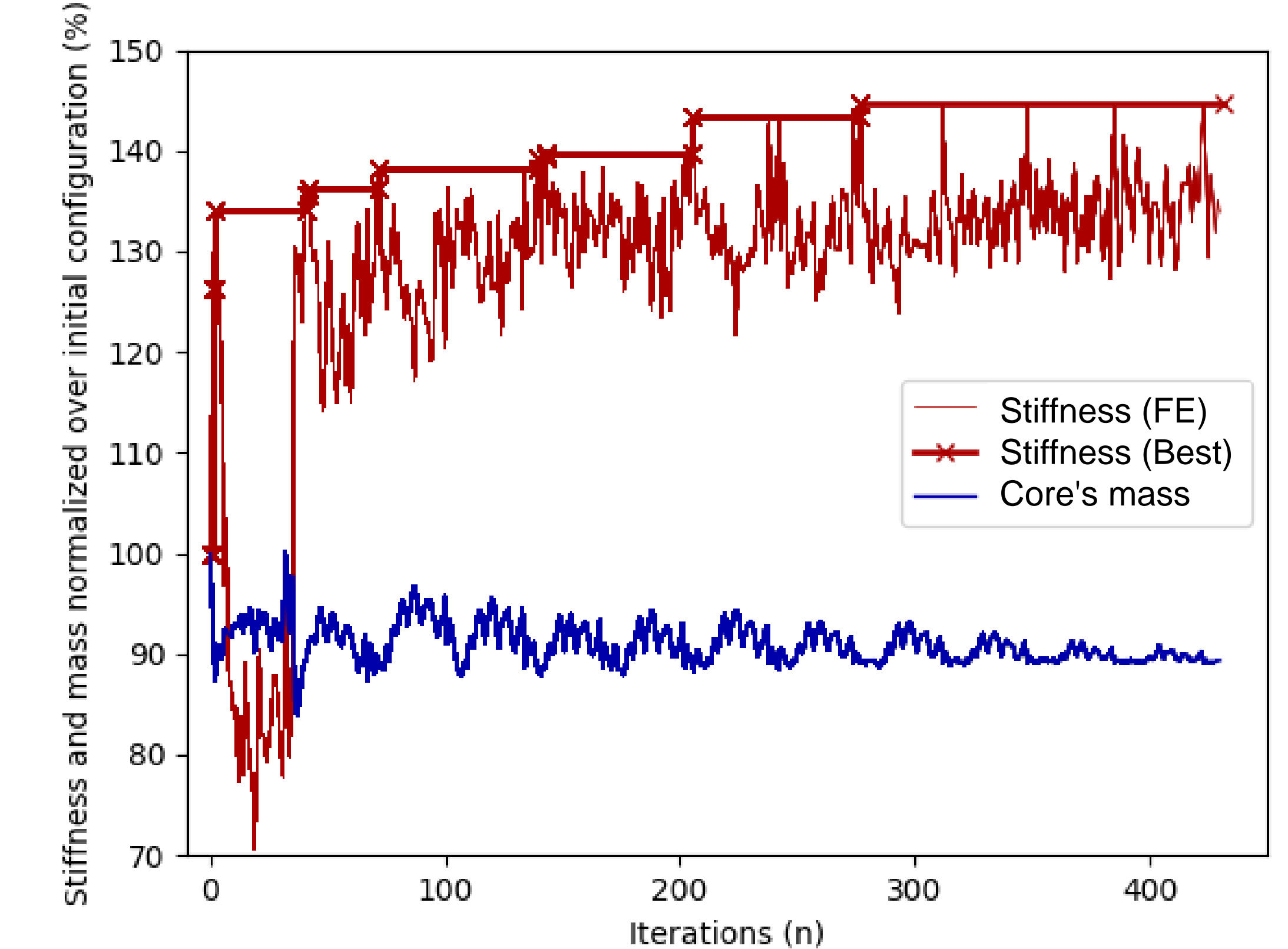
RESULTS

A central punch applies a quasi-static load at constant speed on a simply supported sandwich panel on the edges. Reshaping the core allowed to double the stiffness and the ultimate load at equal mass.



RESULTS (CONT'D)

The stiffness of the sandwich panel quickly converges with 6 variables defining the density function.



CONCLUSIONS

Concentrating cells of a sandwich panel significantly improves its stiffness and its ultimate load under non-uniform constraints. 2D cellular material optimization leads to mass efficiency and will allow rovers to be sent in space using less resources.

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- [2]: Audet, C., S. Le Digabel, V. Rochon Montplaisir, et C. Tribes. « NOMAD version 4: Nonlinear optimization with the MADS algorithm ». arXiv:2104.1167, 2021.

ACKNOWLEDGMENTS

