

AIM

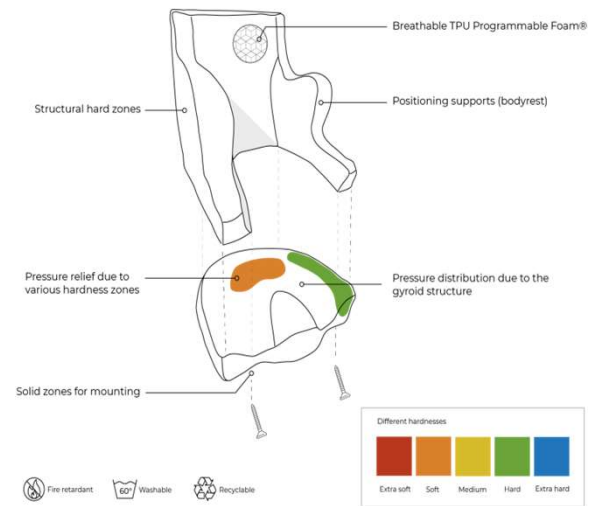
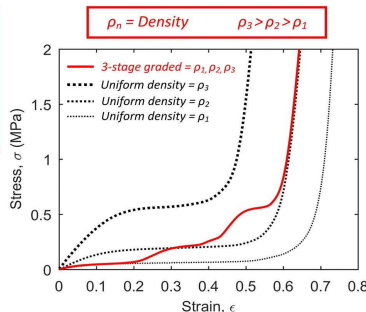
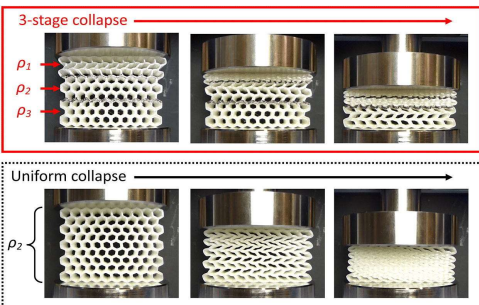
To compare and analyse the advantages and limitations of modern **3D** printed wheelchair cushions **against** conventional foam seating.



METHOD

This poster tries to compare the mainly used foam or gel cushioning with the modern style of additive manufacturing of 3d seats to fit the specific diagnosis of the patients, be it a paediatric scoliosis case, geriatric patients, or simply anyone who needs customised wheelchair cushions, with the major focus on the hysteresis characteristics of the widely used TPU.

RESULTS

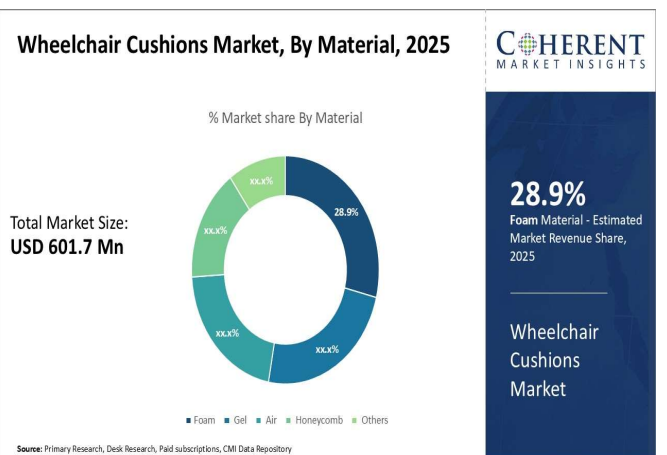


Fused filament fabrication of Thermoplastic Polyurethanes (TPU's) offers the capability to manufacture tailorable, flexible honeycomb structures with energy-absorbing applications. The density grading and damping profiles enable the graded honeycomb structure to undergo cyclic loading to densification without failure. This behaviour reveals the potential of density grading of TPU structures to provide superior impact protection in extreme conditions.

A COMPARATIVE ANALYSIS

Advantages of **3D** printed cushions over conventional foam designs:-

- **Manufacturing a bespoke seat according to the severity and angulation of the curve is beneficial for scoliotic wheelchair users.**
- A quick **3D** scan is sufficient for the manufacturing, that can be modified and shared anywhere in the world.
- Can be integrated with modern technologies like the wheelchair cushion cooling system.
- Specific softness and hardness zones can be easily built into the cushion to fit the user's **comfort** and positional needs.
- Hygienic and washable properties with excellent ventilation.



Conclusion

Wheelchair cushions and seating represent a vast and rapidly evolving field with new innovations aimed at enhancing patient comfort, posture, and pressure management. **3D printed wheelchair cushion** has tremendous potential to make a social impact **by offering affordable solutions and** by involving **Assistive Technology** users in designing and developing open-source solutions **according to their specific need.**

References

Simon R.G. Bates, Ian R. Farrow, Richard S. Trank, Compressive behaviour of 3D printed thermoplastic polyurethane honeycombs with graded densities, Materials & Design, Volume 92, 2019, Pages 150-162, ISSN 0264-1275, <https://doi.org/10.1016/j.matdes.2019.05.010>

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