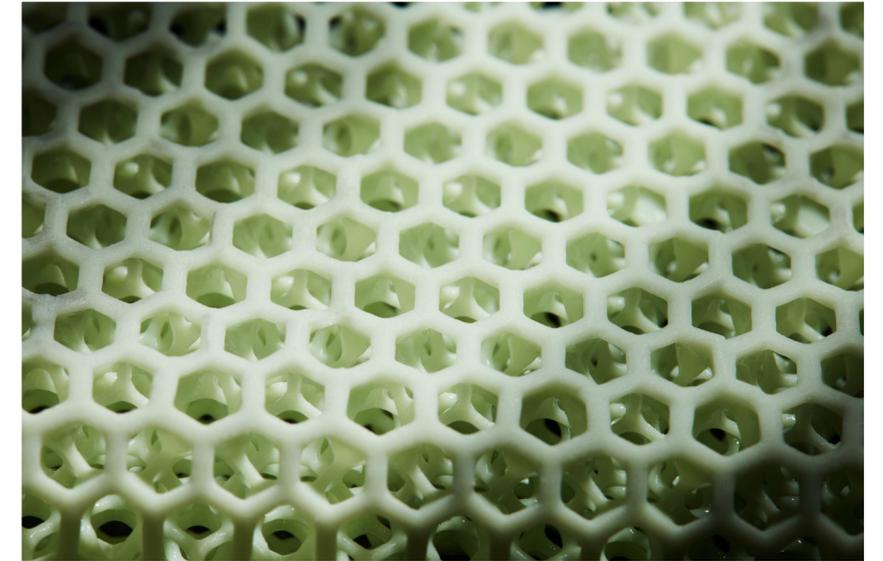


JACK WOLFSKIN COMBINES EXCEPTIONAL PADDING AND VENTILATION IN AERORISE BACKPACK



01

INTRODUCTION

Application:

Aerorise technology to improve comfort and breathability for the wearer

Material used:

EPU 41

The result:

Highly breathable, elastic lattice creating air circulation, reducing the temperature on the back



FINDING THE RIGHT FIT

Carbon and Jack Wolfskin share the same goal of looking for new ways to create innovative products, making the two companies a natural fit when Jack Wolfskin wanted to create a new hiking backpack. Carbon's EPU 41 green, an energy-returning elastomer, was used to print latticed pads for comfort and support while wearing Aerorise,

while also allowing air to circulate and keep the wearer cool. The final part of the equation was how to bring a product utilizing this cutting-edge technology and materials to market at scale, a question that OECHSLER, a leading polymer solutions provider and Carbon production partner, is an expert at answering.



BACKGROUND

Most common carrying systems on the market focus on either body contact with complex foam layering or back ventilation on the back panel. More back ventilation usually means losing comfort, and vice versa. Jack Wolfskin wanted to combine both into one design. Innovation has long been a driver in Jack Wolfskin's pack collection.

The focus is on maximizing ventilation, minimizing pressure points, and customizing fit to work with natural body motion. In an effort to increase ventilation without sacrificing comfort, their technology and innovation team came up with the idea of integrating a 3D printing solution into their packs. Jack Wolfskin was aware of Carbon's previous outdoor-industry accomplishments, so they requested sample pucks of the latticed materials.

The varying soft and hard attributes of the single material fascinated the team.

A NEW BEGINNING

Jack Wolfskin hadn't worked with 3D printing design before but knew it offered a significant opportunity due to the performance benefits and reduction of material waste.

"Jack Wolfskin is driven by the mantra 'We Live to Discover.' The Aerorise development process was a moment of

discovery for our product team. You could feel the level of excitement as the project came together and the final product came into existence. It's fun to be a part of something that is going to change an industry,"

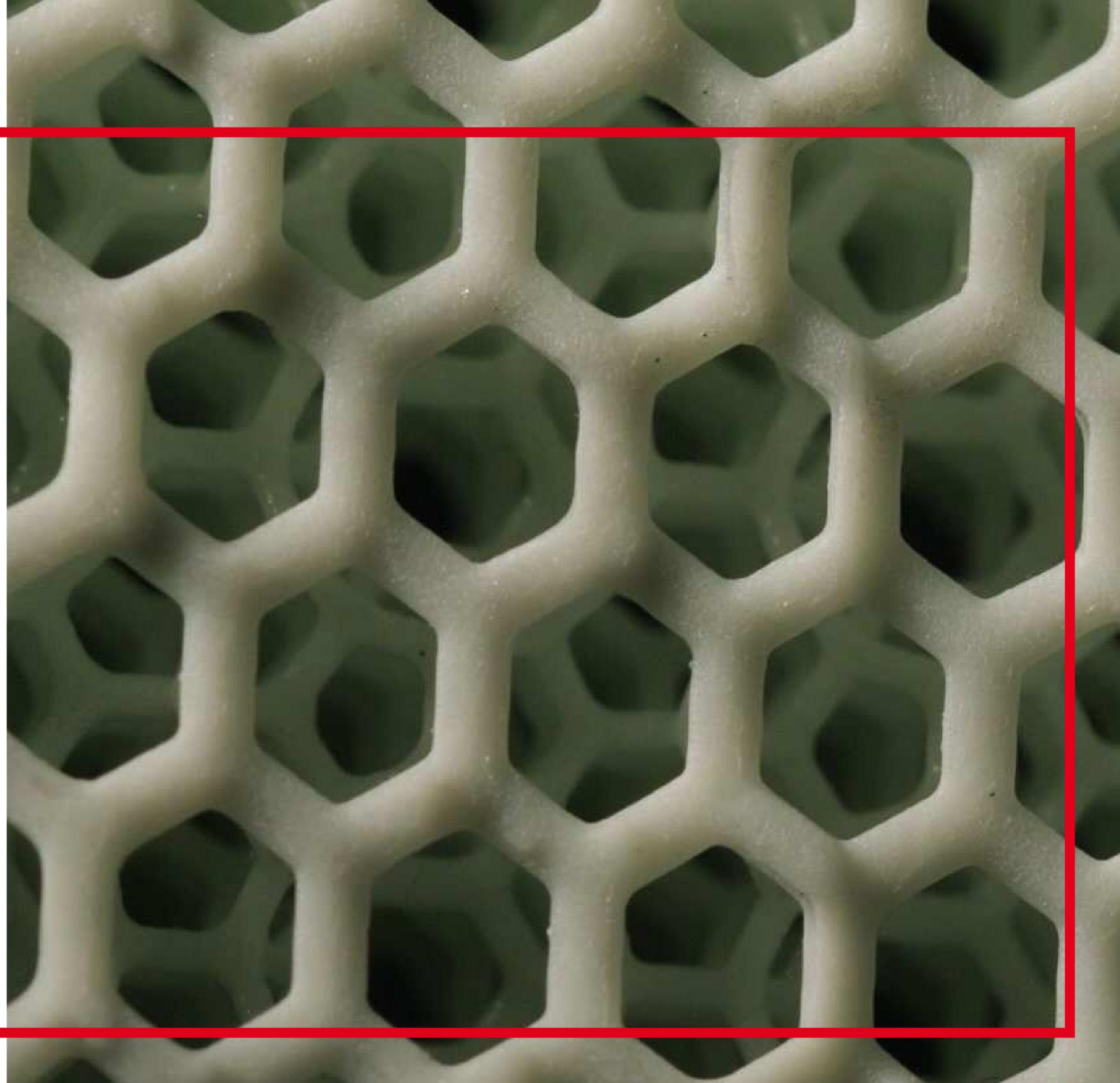
said Daniele Grasso, Vice President of Apparel & Product.

MATERIAL AND PART REQUIREMENTS

The longevity of mechanical qualities such as elasticity and structural support was the priority in selecting the technology.

The second part of the challenge was ensuring the production of the design met the quality and cost requirements. OECHSLER knew it would have to optimize the part, print script, and platform position to meet these criteria.

- Superior ventilation and lower back temperature for the user
- Zonal cushioning to minimize pressure points
- Lightweight
- Durable



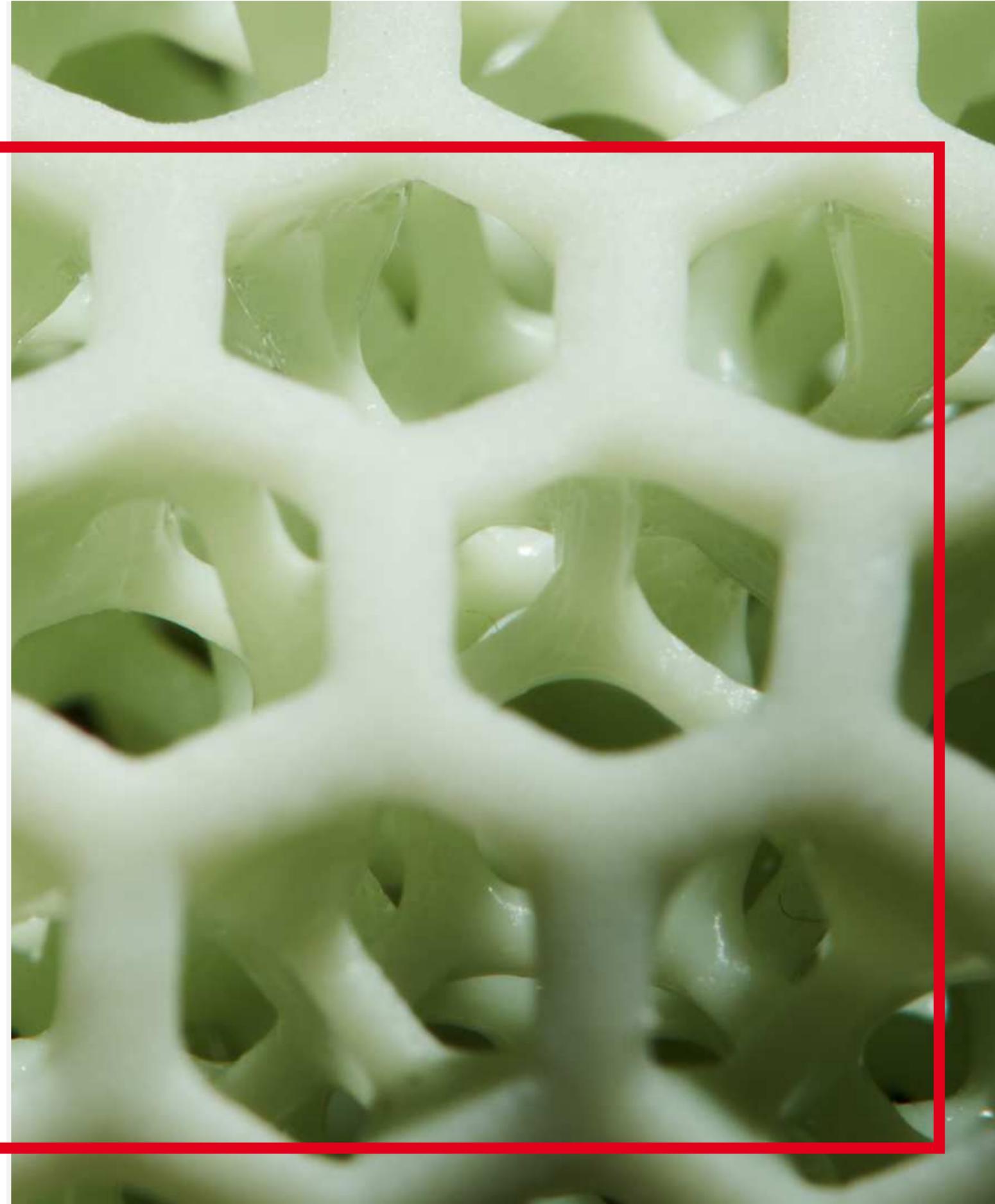
THE SELECTION

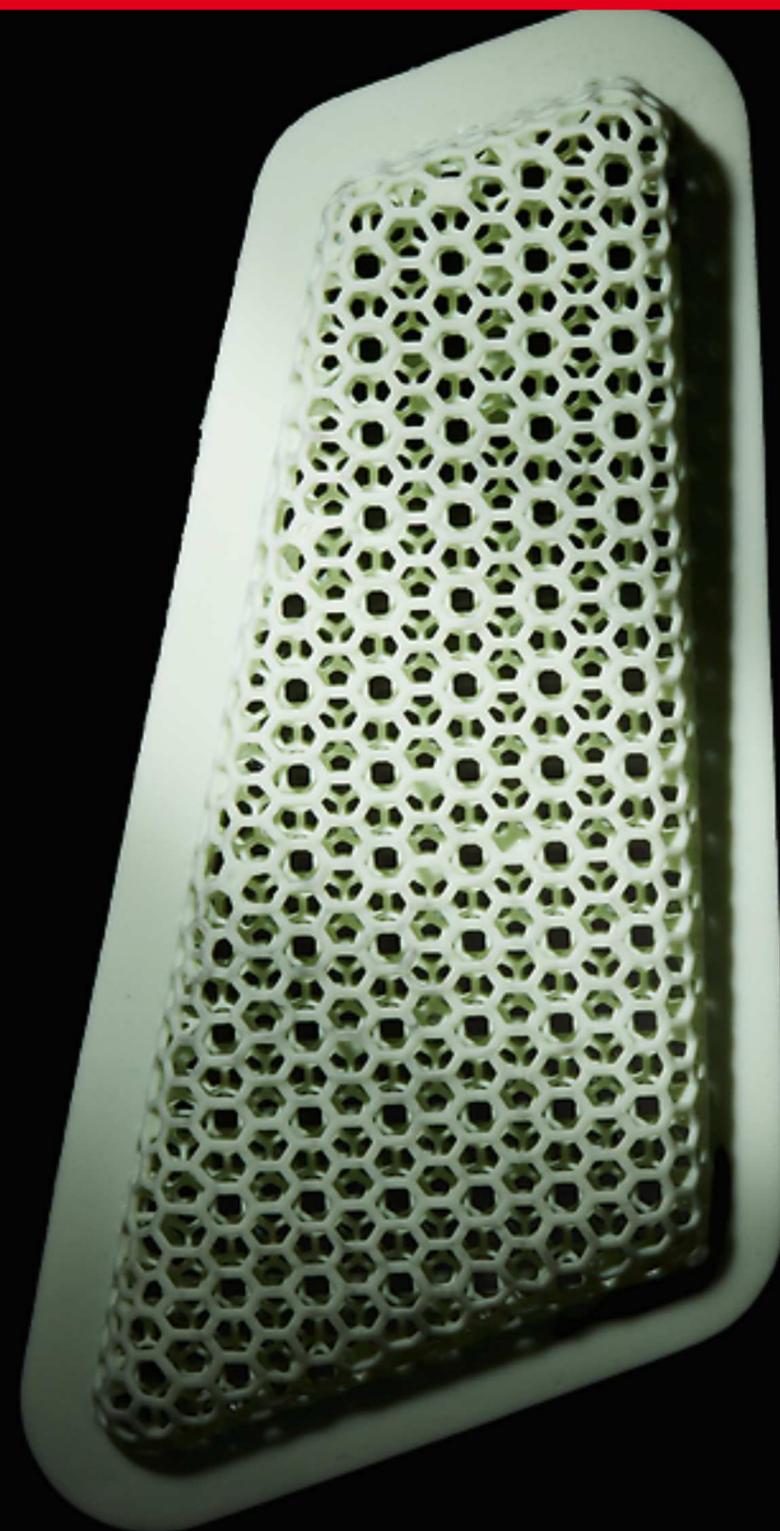
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The samples Carbon sent to the Jack Wolfskin design team convinced them EPU 41 was the right material. The final product is abrasion-resistant, highly breathable through its lattice structure, and the surface

finish allows for the right degree of grip while remaining easy to clean.

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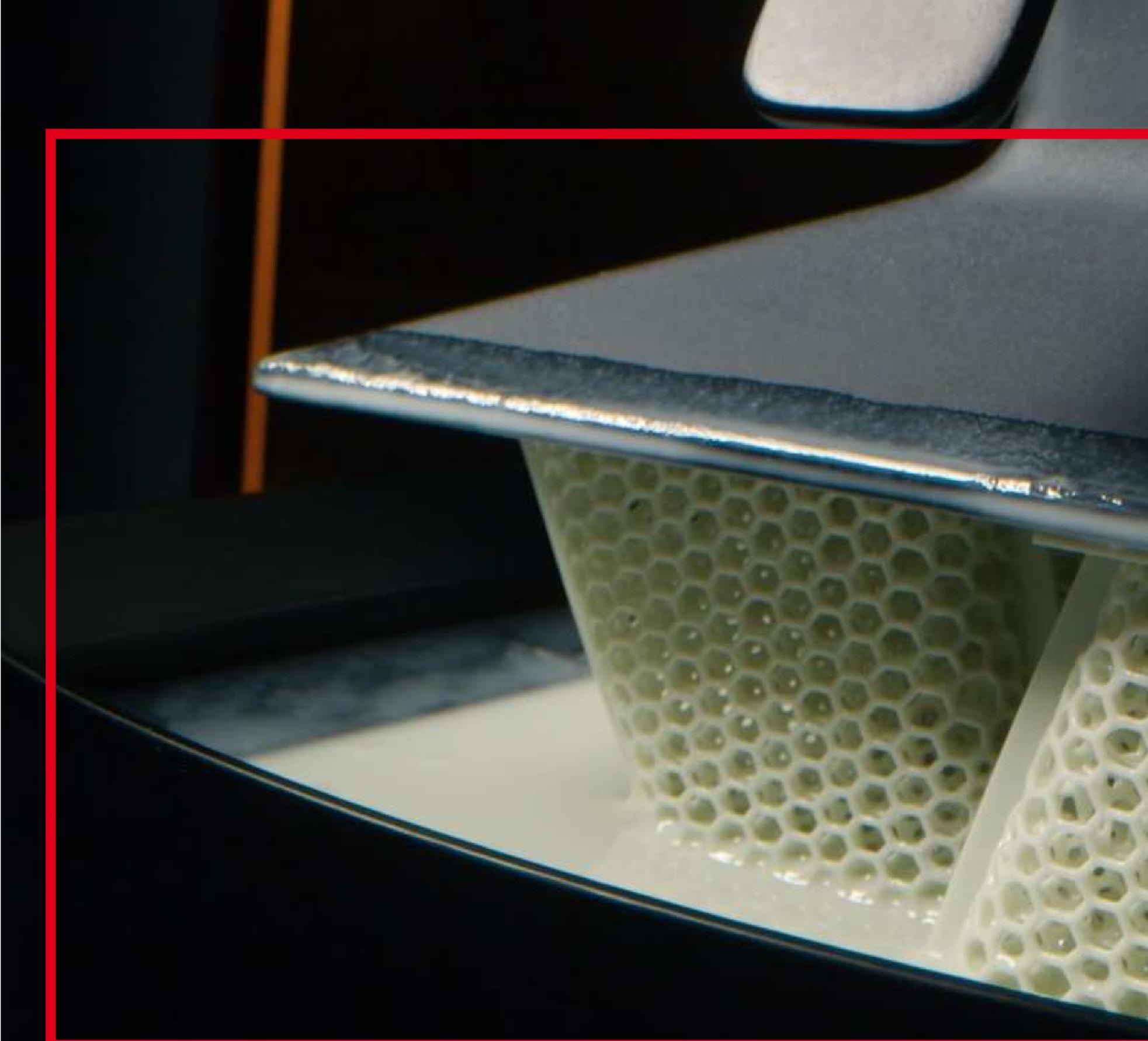




SOLUTION

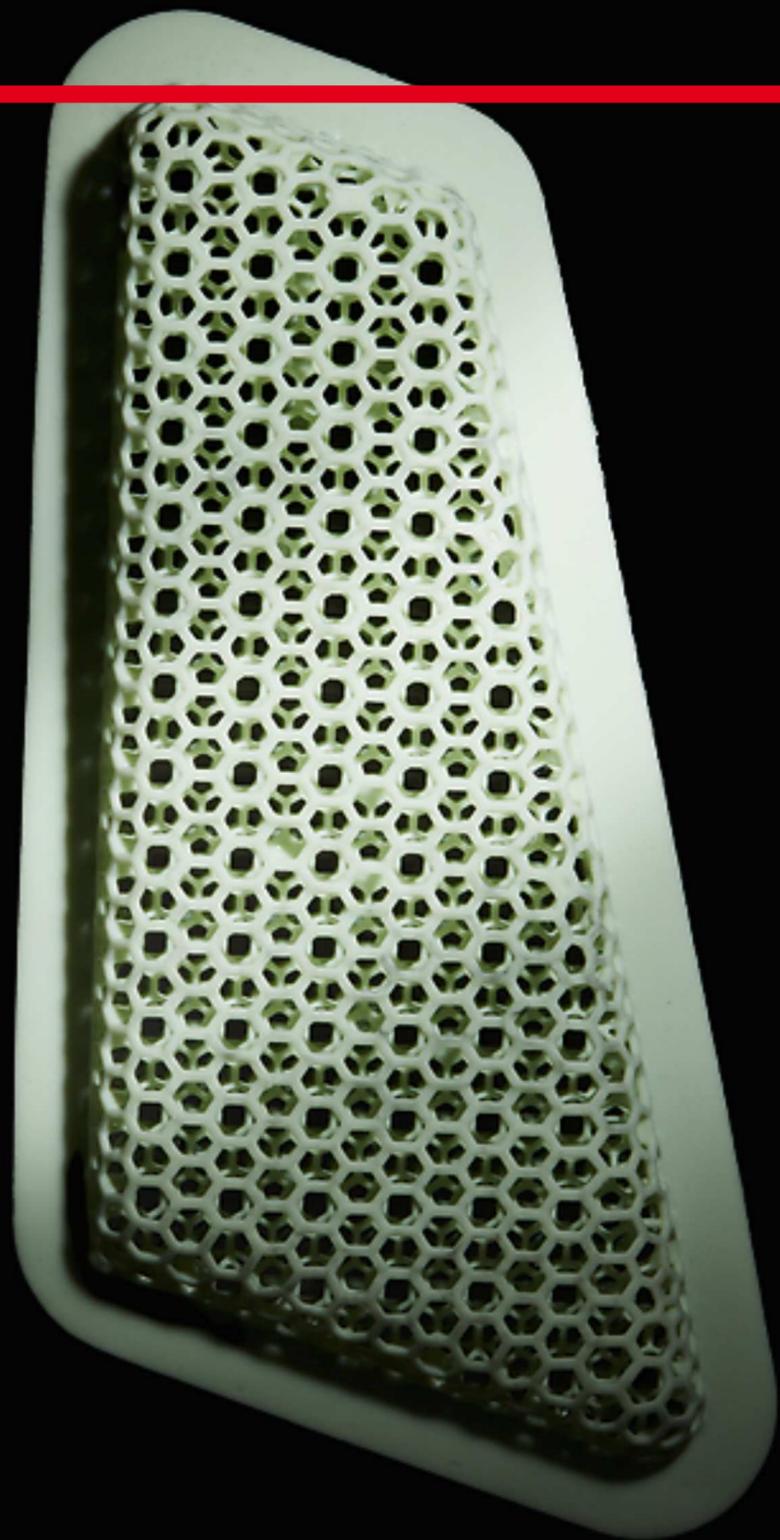
Aerorise combines durability, lightness, comfort, and ventilation into one backpack. It uses the optimal placement of four individual 3D-printed panels on the shoulders and lumbar areas, which provide a lightweight, multi-zone body fit. Jack Wolfskin worked with Carbon's applications engineers, who used Carbon Design Engine™ software to design the panels and the optimal lattice structure and transitions.

The panels' open cell structures with thousands of individual struts vastly improve ventilation, maintain comfort, and improve load control even with heavier loads. 3D printing allowed the engineers to integrate different degrees of horizontal and vertical cushioning firmness in one piece rather than using complex layering of different materials to achieve the same qualities.



"It's not every day that material advancements come along that make such a difference. Aerorise addresses all of the primary challenges of backpacks – ventilation, support, and comfort – through a single technology that wasn't available until recently. Our customers are going to love this product,"

Richard Collier, CEO of Jack Wolfskin



THE QUALITY

Because Jack Wolfskin's design ethos is "Engineered in Germany / Proven in the wild," it was important for them to find a production partner in Germany.

Carbon introduced them to OECHSLER, one of the largest parts manufacturers in the additive industry. OECHSLER was able to print several prototypes to test the lattice structures. Once Jack Wolfskin was happy with the design, there were two main considerations to be made. On the one hand, they wanted to keep the industrialization process as lean as possible,

but on the other hand, they did not want to compromise on the print result. In critical areas, additional struts were added for reinforcement and to avoid print defects.

Additionally, they reduced the part height to shorten the print time. Exposure time reduction in certain layers sped up the print while increasing exposure time on top layers improved the part surface. OECHSLER was able to reduce the print time from prototype to serial production by 40%.



"We are pleased to support Jack Wolfskin in the development of the 'Aerorise' backpack series. With our expertise in additive manufacturing, we have been able to significantly improve the product features of the backpack for the benefit of the customer. Additive Manufacturing will significantly change the design and product development of outdoor equipment and sporting goods in the coming years. We see significant growth potential for 3D printing development and series production in these areas."

Matthias Weißkopf, General Manager of OECHSLER Motion and Senior Vice President of Global Product & Technology Development

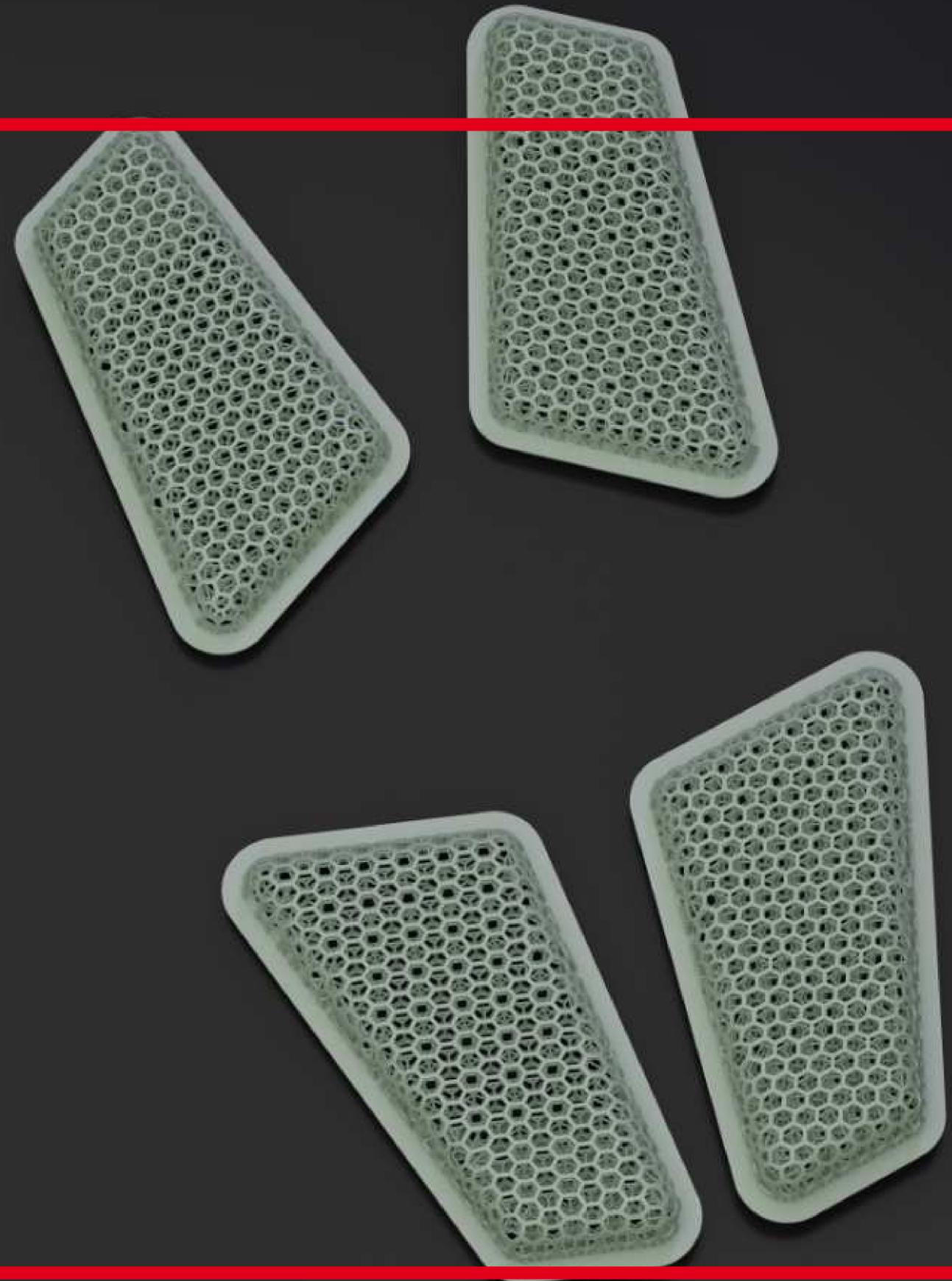
RESULTS

The early response on the Aerorise pack is positive. The pack has been tested internally with stellar results.

Gerold Ringsdorf, Head of Development of Backpacks for Jack Wolfskin for two decades, claims that Aerorise plays out its main strengths of ventilation, cushioning, and support, especially in the lumbar area, and that no other packs compare. It offers a great balance between soft, hard, snug, and supportive.

Aerorise is just the start of Jack Wolfskin's journey into additive technology. Jack Wolfskin, OECHSLER, and Carbon will continue to push the boundaries of product design in terms of comfort, usability, and sustainability.

"Comfort, load control, and ventilation are age-old challenges in pack design," said Magdalen Hamel, Category Manager of Equipment, for Jack Wolfskin



“The technology presented in Aerorise is only newly available. It directly benefits hikers on the trail and takes the industry in a new direction. The design is really impressive from an engineering perspective and further supports our belief that together, in cooperation with partners, we can make a notable difference and take the industry a step forward.”

Partnering with Carbon and OECHSLER made innovation possible that none of the parties could have created individually.





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