



## Blunt Force Impact & Human Factors Optimization via Lattice Structures 2020

The Warfighter is at continuous risk from traumatic brain injury (TBI) events. Over 413K global military traumatic brain injury cases have been diagnosed over the past decade. Additionally, the Department of Veterans Affairs were estimated to spend \$234 million just in FY2015 to treat TBIs among service members. It is also worth noting that TBIs typically demand recurring annual costs for long-term rehabilitation, especially because TBIs have high comorbidities with other medical issues such as Post-Traumatic Stress Disorder (PTSD). In response, the Department of Defense has called for "... a device, capability, or change to our current equipment that prevents concussive events in our force." To solve this problem, Windpact recently completed a two-year contract with the U.S. Army CCDC-SC to create an optimized padding solution with Windpact's patented Crash Cloud™ technology, setting a new performance standard for the ACH and the ECH. The Windpact Crash Cloud system outperformed existing padding technologies at 100% and 200% increase above the current standard impact energy levels.

This was only made possible with Windpact's novel process to create validated, predictive finite element models with 96% accuracy between simulation and physical data. These models reduce the need for physical prototyping and destructive testing, while allowing for optimization through simulation. Using these techniques, Windpact can now design hierarchical lattice structures ("lattices within lattices") that can be additively manufactured and fine-tuned to achieve desired characteristics for the development of warfighter-focused solutions for head and body protection, vehicle interiors, or other applications. Windpact's virtual prototyping capabilities deliver customized, optimal solutions that best address impact performance and human factors considerations to ensure the best-equipped warfighter.

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