

Guerrilla Gravity Improves Manufacturing Method for the Most Durable and Lightweight, High-performance Bikes



Guerrilla Gravity is a mountain bike manufacturing company based in Denver, Colorado. Its mission is to significantly improve mountain biking by building a community advocating for trail access, and creating innovative mountain bikes at democratized price points. Guerrilla Gravity's most recent innovation is its Revved Carbon Technology, representing the most compelling combination of durable bikes that are also lightweight and high performance. Revved Carbon Technology combines a new bike frame material and a new patent-pending manufacturing method. The result is 300% more impact resistant than other frames on the market that use traditional carbon fiber materials, while maintaining equivalent weight and stiffness properties. "This new manufacturing method allows us to reduce labor times by over 80% compared to traditional carbon bike frame methods by introducing automated fiber placement techniques," explains Will Montague, Co-Founder at Guerrilla Gravity.

Challenge

To date, Guerrilla Gravity's biggest challenge has been to scale production with increased demand. The manufacturing capacity has doubled year after year. The launch of Revved Carbon Technology brought an additional set of new challenges; pioneering a new material application and technology with no technology road map. With the risk of unknown problems arising, launch schedules were in jeopardy.

Altair OptiStruct™ Early in the Design Process

"Our philosophy is to develop the strongest frame possible for our chosen weight target," notes Montague. Rather than waiting to use optimization late in the development cycle, Guerrilla Gravity was able to integrate OptiStruct into the initial design phase to arrive at a much more concise solution very early in the process. "Without Altair's software we would have taken a more fundamentally basic approach to developing Revved Carbon Technology, such as iterating the carbon frame as black aluminum using isotropic material properties instead of jumping directly to 2D element orthotropic optimizations."

**Guerrilla
Gravity**
Bicycle MFG

Industry

Sporting Goods

Challenge

Pioneering a new material application and technology without a road map, while meeting schedule and production challenges due to rising demands.

Altair Solution

Using OptiStruct in the early design phase to enable a much more concise, high-performance solution very early in the process.

Benefits

Significantly shortened timeline for the development of lightweight, high-performance bikes, that are 300% more impact resistant than other frames on the market that use traditional carbon fiber materials, at significant cost savings.

OptiStruct enabled Guerrilla Gravity to jump to a high-performance solution much quicker than a common iterative FEA process. The topology optimization capabilities allowed the designers to run multiple load cases and evaluate exactly where the plies were needed in the frame. This knowledge early on enabled Guerrilla Gravity to make critical decisions that influenced expensive manufacturing outcomes. Additionally, OptiStruct allowed the team to gain significant confidence going into physical testing; knowing that the frames had a high likelihood of passing the American Society for Testing and Materials (ASTM) standards on the first try.

Results

“Without the use of OptiStruct it is estimated that we would be 3-4 months behind schedule with a lower performing frame. Making sure that we were able to make it through our scheduled laboratory testing without error was crucial to launching our product on time. Without OptiStruct we would have gone into testing with many more unknowns and would have likely arrived at a much heavier frame solution in order to remain on schedule. The ability to iterate and optimize in a significantly shortened timeline allowed our startup to become cash flow positive on schedule. We think Revved is at the forefront of bike frame material technology and Altair will help us keep it there.”

“As Guerrilla Gravity continues to design and improve our layups, Altair will continue to provide value in developing the strongest layups possible while also finding opportunities for additional weight reductions, which, with carbon fiber means raw material cost savings.”

Will Montague
Co-Founder, Guerrilla Gravity

Future Projects

The manufacturing efficiency of Revved Carbon Technology represents an entire sea of opportunities that can be applied to different applications. Over the next few years, Guerrilla Gravity will continue building and refining its manufacturing infrastructure to take advantage of the growing opportunities.

Altair Startup Program

Altair’s startup program decreased Guerrilla Gravity’s barrier to entry that is typically held by advanced software costs. Montague notes, “Without their startup program, the software would have been out of reach for us at our current size and budget.”



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