



The World's First 3D-Printed Snowboard Bindings

CFMS has successfully developed the world's first 3D-printed snowboard bindings for DAK amputees. Army veteran Darren Swift (Swifty), the first double above knee (DAK) amputee in the world to compete in International Paralympic Committee (IPC) events approached CFMS to help create a set of new bindings which he hopes will help him qualify for the 2022 Winter Paralympic Games in China.

Challenges

For the last five years, Darren has been using a set of rudimentary, home-made bindings he developed with a friend which are painful to use and risk permanent injury due to the limited movement and lack of suspension in the bindings. The challenging aspect of designing the bindings was the complete lack of information on the requirements. From loading and ergonomics, to environmental conditions, there was very little data and no specific discipline knowledge.

Solution

CFMS has developed and tested the bespoke bindings dedicating more than 500 digital engineering hours to the development of the virtual prototype bindings. They were designed, tested and printed using the latest digital technologies; 1D system design and Computer Aided Design (CAD), to Design for AM, Finite Element Analysis (FEA) and Topology Optimisation. The bindings were manufactured using Selective Laser Sintering (SLS) for the almost isotropic properties and the precision in creating fine details, which translate into easy to assemble and lighter designs. 50% lighter, they were 3D-printed using glass-reinforced nylon to increase stiffness and performance. The choice of manufacturing technology was driven by the increased design freedom and possibility to iterate on the design without additional manufacturing set-up costs.

Only virtual testing was conducted; no physical prototype was produced and no failure was identified after extensive usage on the first test day.

Benefits

Providing the ability to absorb shock, the bindings offer complete adjustability and rotation, and a reduction in design and manufacturing time to market and cost. A completely new product concept has been digitally created with little to no prototyping. Flexibility in the design, fidelity in the digital modelling and no tooling costs make this process highly customizable with reduced costs for design, testing and manufacturing. The concept is multi-sector applicable and can be applied to projects where the need to reduce design and test costs are paramount in a scenario where a lack of initial data increases difficulties and variables. The snowboard bindings concept is an exemplar for how digital design and manufacturing can work together and accelerate the development of future products.

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