



3D Printing Gives Bernstein Innovation the Home Team Advantage in Product Development

Every sport has specific rules and specific equipment, yet despite no two players being exactly alike, much of their gear is. As 3D technologies become more available and accessible, however, generic, everyday solutions are transforming into new opportunities for innovation.

Bernstein Innovation GmbH is a Selective Laser Sintering (SLS) 3D printing service bureau in Linz, Austria, founded by Jakob and Klaus Schmied. Although the ultimate goal of the father and son team is to become Europe's leading 3D printing service bureau, they say that part of their business is illuminating the vast possibilities that are unlocked through 3D printing, as the full capabilities of the technology are still relatively unknown to the general public.

Traditionally offering small series and series production for applications ranging from specialized equipment for industrial production to 3D printed medical products, Bernstein Innovation recently undertook an endeavor of its own to solve the problem of ill-fitting shin guards. This mission generated ZWEIKAMPF, a novel, 3-part shin guard system by Bernstein Innovation that combines two custom-cut layers of XRD Extreme Impact Protection (a high-tech material for impact deflection) with an SLS 3D printed shell. ZWEIKAMPF is the first consumer product Bernstein Innovation has invented, developed and produced on its own initiative, through the help of 3D printing.

Bernstein Innovation was guided through the technology evaluation process and the purchase for their SLS system by 3D Systems partner BIBUS Austria.

Bernstein Innovation uses the 3D Systems sPro™ 140 SLS 3D printer throughout its daily operation to deliver functional end-use parts and durable prototypes. "SLS allows us to create final products that meet our demands, and is compatible with a broad range of materials that suit our, and our clients', different needs," said Stefan Niedermaier, Chief Technology Information Officer, Bernstein Innovation. Many of Bernstein Innovation's clients engage the service bureau and the 3D printing process





as a means of lowering start-up costs for new businesses or products – a benefit the firm experienced firsthand through the introduction of ZWEIKAMPF.

More than a 3D printed version of a preexisting product, ZWEIKAMPF shin guards are a totally redesigned concept that was brought to life using the full ecosystem of 3D technology. “We set out to make a shin guard that fits the body better than any other model on the market,” said Viktoria Reidl, Product Development, Bernstein Innovation. “We scanned numerous players and developed sizes based on real world data to provide an anatomical fit.” The company says their fully customized “Pro system” is the ultimate goal, which consists of manufacturing player-specific gear from scan to finish, but before launching that model, they first want to understand market interest and demand.

Throughout the design and development process of ZWEIKAMPF, Bernstein Innovation sought to outrank their form-molded competition by soliciting and responding to player feedback and tweaking their 3D file accordingly. Once the 3D scanning, designing and responsive modifications were complete, the files were ready for 3D printing and testing. Maximizing the build area on the sPro™ 140, Bernstein Innovation manufactures 300 - 350 shin guards per build using 3D Systems DuraForm® PA material. Offering fully automated powder handling for maximum efficiency, this SLS system is ideal for the continuous operation of the service bureau setting.

Once 3D printed, the shin guards are cleaned of excess powder, which is recycled back into the printer, and sand blasted. Bernstein Innovation then uses a combination of infiltration and coating processes to achieve the desired aesthetic of the shin guard shell.

As the last line of defense between an opponent and injury, shin guards must adhere to certain national regulations. In addition to sending ZWEIKAMPF shin guards to an external laboratory for compliance testing, Bernstein Innovation ran their final product through their own gauntlet of durability tests: putting the shin guards in washing machines, subjecting them to extreme temperatures, and driving over them in a car. Ideal for low- to mid-volume rapid manufacturing for

functional applications, DuraForm PA offered ZWEIKAMPF the winning combination of low moisture absorption with adhesive compatibility, enabling their three-part system.

ZWEIKAMPF shin guards are currently offered in three sizes, giving players a choice of inlay stiffness, ranging from soft for comfort, hard for impact, and an in between for the optimal average. Players can also customize their shin guards with personalized text.

ZWEIKAMPF is the first in-house project taken on at Bernstein Innovation, but based on the success of the process and results, there may be more to come. More information is available on their website.

