

Curventa's Original Helmet Development Shows how Ogle is going from Strength to Strength



With a great deal of experience in designing and developing professional safety head gear, Curventa has put this experience to good use to fully demonstrate its extensive capabilities in this area to a much wider audience.

To develop this project Curventa collaborated with Ogle Models + Prototypes to provide a quality, fully functional prototype model using some of the most advanced technologies available on the market today.

As an award winning product design and development consultancy Curventa's wealth of experience has been growing exponentially since 2001, when the company was founded by designers Ian Murison & Adrian Bennett. One particular application of Curventa's expertise in combining modern design with innovation and safety has recently been demonstrated by the company's development of novel protective headgear. Originally designed for extreme snowboarders, who, unsurprisingly require equally extreme protection when on the slopes, this latest development has also found favour with some Formula 1 pit crews due to its unique design advantages.

Curventa's new concept headgear — SCAR — was designed to meet a complex brief, namely to overcome the problems that many snowboarders face at high altitudes and freezing temperatures while often performing dangerous stunts. In other words, the headgear has been designed to encompass multi-functional protection.

Traditional snowboarding headgear tends to leave boarders exposed to extreme wind chill factors, as the helmet and goggles are completely separate items, that do not cover the whole face and they do not tend to fit together well. Furthermore, this combined equipment has a tendency to steam up easily. And, until now, the only device for facial skin protection has been an elasticated piece of fabric, called a snood, which wraps around the lower face.

Curventa's solution was to design a helmet with integrated goggles together with a unique, detachable face-mask that seals the head completely from extreme weather conditions while providing a continual flow of air from strategically located air intake apertures. This innovative design also ensures increased air-flow through motion — giving the wearer more ventilation when they need it most.

Using in-house 3D laser scanning techniques, the team at Curventa were able to obtain accurate data of the human head to determine precise dimensions for fit — and from this a full 3D CAD model was developed in SolidWorks. At this point in development, Curventa needed to prove the concept with a physical model, and design team leader Ian Murison knew exactly where to turn: Ogle Models & Prototypes.

Curventa supplied Ogle with the full 3D data and discussed the many different complex components of the helmet. For each component the best possible method of producing them was identified — an advantage that Ogle is able to offer all of its clients courtesy of the wide range of technologies that are utilized in house by the expert team there. Stereolithography (SL) was selected for the complex forms within the helmet. As a high resolution additive manufacturing technique, this process is capable of producing complex components that could not be achieved any other way. The superior surface finish of SL also made it the process of choice for these components even when compared to other additive techniques.

Beyond the SL production technique though, for which Ogle has gained an enviable reputation, each component was expertly finished within Ogle's dedicated finishing department. The traditional skills and expertise within this department are what truly sets Ogle apart when it comes to quality models and prototypes.

The upper shell of the helmet was produced on Ogle's 3D Systems SLA 7000 machine in a clear material that was hand finished down to a 2000 grit. The finish required for this was Chrome plating. Applying a metal finish to a plastic model is a highly technical, specialised process, supplied by 3DDC.

Ogle sent the parts to Graham Barton at 3DDC, where the SLA parts were further hand finishing to remove all the build lines in the model and down to 600 grit wet and dry. It was then etched for good adhesion between the substrate and the metal layer and subsequently made conductive using 3DDC's proprietary Metalise it... process, which was specifically developed to work with 3D printed parts. The part was then electro-plated with copper to a thickness of 120 microns at a low temperature so that the SLA materials do not distort during the plating process. The copper layer was then hand finished and polished to a high gloss finish so that the final layers of nickel and then decorative chrome could be successfully electro-plated on top to achieve the superb finish on this model.

The lower shell of the helmet and the face mask were also produced using SL, but required a different finish — they were painted in a special-effect paint to mimic a soft rubber finish.

To produce the goggles, the SL process was used once again, but in a different way — illustrating the highly versatile nature of the process. An SLA model of the goggles was built, from which a silicon tool was created that was used to produce the goggles in a soft PU rubber — to more closely resemble the manufactured parts. The lenses of the goggles however were once again produced on the SL system in a transparent material and then hand finished and polished with a layer of clear lacquer applied for maximum clarity.

As this was to be a full demonstration model, Curventa required a stand on which to exhibit the helmet, including a head shape on which to place the finished helmet. This needed to be strong and durable. Once again 3D scanned data of a head was captured for this model, and it was produced on a Selective Laser Sintering (SLS) system — another additive process that offers robust materials.

The base of the stand was achieved by machining Perspex with uprights to hold the head modelling the helmet. Apart from the plating process for the upper shell of the helmet, which was outsourced to 3DDC, the only other part of the helmet that Ogle had to source was the elasticated band for the goggles, which serves to illustrate the diverse range of capabilities in-house at the company.

With continued investment in its technology range and personnel expertise, Ogle has proven time and again to be the partner of choice for superior models and prototypes. This is certainly borne out by the team at Curventa who were more than delighted with the final result on the SCAR helmet and will be demonstrating the project in the coming weeks and months at events around the country.

