

Ogle hit the slopes with helmet project



Case Study

Client: Curventa
Sector: Product Design
Process: SLA

With a great deal of experience in designing and developing professional safety headgear, Curventa has put this vast experience to use in order to fully demonstrate its extensive capabilities in this area to a much wider audience. To develop this project, Curventa collaborated with Ogle Models and Prototypes to provide a quality, fully functional prototype model using some of the most advanced technologies available on the market today.

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As an award-winning product design and development consultancy, Curventa's wealth of experience has grown exponentially since 2001, when the company was founded by designers Ian Murison and Adrian Bennett. One particular application of Curventa's expertise in combining modern design with innovation and safety was 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, it wasn't long before a number of Formula 1 teams approached the company to discuss the use of these helmets due to its unique design advantages.

The challenge

Curventa's headgear, named SCAR, was designed to meet a complex brief, namely to overcome the problems that many snowboarder 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. Until this design, 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 and Prototypes.

The process

Having supplied Ogle with the full 3D data and after discussing the many different complex components of the helmet. For each component, the best possible method of producing them was identified – an advantage that Ogle are able to offer all clients due to the wide range of technologies utilized by the team. Stereolithography (SLA) 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 couldn't have been achieved any other way. The superior finish of SLA also made it the process of choice for these components even when compared to other additive techniques. Beyond the SLA production technique, though, 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 one of Ogle's large frame SLA machines in a clear material that was hand finished to smooth the surface, removing all evidence of build layers. 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.

The part was sent to Graham Barton at 3DDC, where it was then etched for good adhesion between the substrate and the metal layer, and then subsequently made conductive using 3DDC's propriety 'Metalise It' process, which was specifically developed to work with 3D printed parts.

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 SLA, but required a different finish; painted in a

special-effect paint to mimic a soft rubber finish.

To produce the goggles, the SLA 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 SLA 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 used as 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 required Ogle to source was the elasticated band for the goggles, which serves to illustrate the diverse range of capabilities in-house at Ogle.

Conclusion

As Ogle has continued to invest in its technology range and personal expertise, the company has proven time and again to be the partner of choice for superior models and prototypes. This was certainly highlighted by the team at Curventa who were more than delighted with the final result in the SCAR helmet as they demonstrated the project at numerous events around the country.

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