

3D Printed Easter Egg

Case Study

Client: Fourfoursixsix
Sector: Product Design
Process: SLS

When we were approached by Fourfoursixsix Architects and EOS with a project aimed at showcasing the advanced capabilities of superior additive manufacturing technologies, we set off on a 'hunt' for the perfect way to achieve this by creating an intricate and unique 3D printed Easter egg.

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The Faberge Big Egg hunt was a 2012 charity fundraising campaign, in aid of Action for Children and Elephant Family, and sponsored by the jeweller Faberge. Held across 40 days and 40 nights, people across London attempted to search for the 200 eggs that had been hidden throughout the capital.

Perhaps the most unique egg to be hidden away within the streets in London was the one that was produced using advanced additive manufacturing technology, commonly referred to as 3D printing. This stunning egg, which was created, designed and produced as the result of a collaboration between Ogle Models & Prototypes, Fourfoursixsix and EOS, demonstrated the extraordinary capabilities and advantages of additive technology when applied by the industry experts such as Ogle.

The challenge

Daniel Welham of Fourfoursixsix was one of the designers that came up with the exquisite 3D design of the egg, which went way beyond typical surface decoration and displayed a complex internal geometry. The entire geometry of the egg employs a set of architectural design principles that allowed the designers to address issues of structure, light and shadow – to stunning effect.



For such a specific and complex design, there are no traditional production techniques to create an accurate output. This is where advanced additive manufacturing techniques excel. The laser sintering process from EOS remains one of the most accurate additive layer manufacturing processes available today, and it is one of the technologies used daily, in-house, here at Ogle Models and Prototypes. Ogle is a company renowned for producing the highest quality of models using a range of techniques, including laser sintering, and was a natural production partner for this project.

The process

The egg was first conceived as a computer model within a 3D CAD programme. Once completed the immense native CAD files were sent from Fourfoursixsix to Ogle, where they were converted over the course of many hours into files that the laser sintering machine could read. This involved "slicing" the data into layers. These layers were then processed by the laser sintering machine, which holds a bed of powdered material, in this case PA2200 nylon. A focused laser beam then traced each micro layer, according to the digital data, across the top of the powder bed to sinter the powder.

On completion of that layer the powder bed drops by a fraction of a millimetre to begin the next layer. In this way, highly complicated forms – like the egg – can be produced, while the excess powder in the bed acts as a support for the structure. This excess powder can be removed relatively quickly and easily on completion of the build. The orientation of these parts was determined by the size of the egg – the dimensions of which are 608 mm by 355 mm by 465 mm – built in Ogle's largest laser sintering machine, an EOS P730. The machine ran for 42 hours and 46 minutes, needing the same amount of time to cool down.

Conclusion

Len Martin, Managing Director at Ogle Models and Prototypes, was very excited to be involved with this project, not least because of how it readily conveys the distinct advantages of the laser sintering additive manufacturing process, saying:

"For us, being invited to participate in this project was both a privilege and an excellent opportunity to demonstrate laser sintering, which can be maximised to great effect by the experience and expertise we have in-house at Ogle."

The egg designed by Fourfoursixsix for the Faberge Big Egg Hunt involves a highly-complex design with hugely variable geometries that are not possible to produce by any

other method. The final production of the egg is something to behold and I'm delighted that the collaboration between Ogle Models and Prototypes, Fourfoursixsix and EOS resulted in a hugely successful illustration of how additive manufacturing can go beyond normal production boundaries."

Indeed, these three companies came together with the expressed aim of demonstrating the potential of an advanced 3D design and production methods to a wider audience. According to Daniel Welham of Fourfoursixsix, "We have used our ability to work with these tools to develop an intricate, delicate and complex piece that intrinsically connects back to the spirit of the Faberge brand, which focuses on highly-accomplished design and craftsmanship alongside the use of exquisite materials. In some ways, our design brings this concept into the modern era on a larger scale: a piece of 21st Century digital opulence."

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