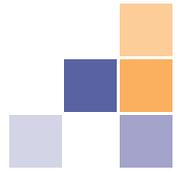


According to George,
"My father has always been very interested in using new technology in the work created at our company, utilizing lasers in silver work from very early on, so 3D printing technology was the next logical step for us."

Case Study



Grant Macdonald | Perfactory®

Luxury product company Grant Macdonald has garnered tremendous benefits from EnvisionTEC's Perfactory 3D printers. EnvisionTEC is a company that knows exactly what it is good at and that is manufacturing and supplying a range of highly accurate 3D printing systems and materials that produce exceptional quality parts. As a result, EnvisionTEC has built up an enviable client list of companies for which quality is a prerequisite. EnvisionTEC works with these companies to further develop and refine its photopolymer based additive systems - Perfactory - with the resulting output being truly inspirational applications of this 3D printing process.

A great example of this collaboration is international luxury goods company, Grant Macdonald. Established in London since 1969, the Grant Macdonald brand is synonymous with innovative, quality designs in silver and gold that can be found across the globe and in many royal households. The family company takes its name from talented founder Grant Macdonald who now works with his equally talented son George.

Grant was first introduced to the Perfactory additive manufacturing system in 2003 through his connections with the Goldsmiths Livery Company. From this initial introduction and with subsequent research the possibilities of utilizing the Perfactory machines within the silversmithing industry became apparent. According to George, "My father has always been very interested in using new technology

in the work created at our company, utilizing lasers in silver work from very early on, so 3D printing technology was the next logical step for us." The result was the company's first acquisition of a Perfactory system that quickly became an indispensable tool for producing accurate master patterns for molds.



Using the Perfactory constantly, Grant and George quickly realized that to get the most out of the process, a second, larger Perfactory was required that would allow them to build bigger pieces. During this time, the guys were working alongside EnvisionTEC on the development of castable resins. In 2006, Grant Macdonald invested in a second Perfactory system, and upgraded the original machine soon after that.



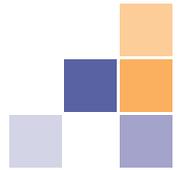
EnvisionTEC GmbH

Brüsseler Straße 51 • D-45968
Gladbeck • Germany
Phone +49 2043 9875-0
Fax +49 2043 9875-99

EnvisionTEC, Inc.

15162 S. Commerce Dr
Dearborn, MI 48120 • USA
Phone +1-313-436-4300
Fax +1-313-436-4303

www.envisiontec.com
info@envisiontec.com



Grant Macdonald | Perfactory®

George summed this up, *"The Perfactory® machines have allowed, and continue to allow us to make the impossible, possible. 3D printing has become an integral part of our day-to-day silversmithing without taking away from the skill of the silversmiths. It has simply helped with every job and cut massive amounts of time on jobs. There is no going back."*

What the Perfactory system brought to Grant Macdonald was the ability to design - and accurately produce - truly innovative and intricate pieces that could not be achieved using only traditional techniques. The silversmiths experimented with producing highly complicated pieces and at this time, and as a result of the work with the Perfactory system, discovered a new market - cutlery. George explained, "Making something that a silversmith could not possibly make by hand was something that really interested Grant and I. The Perfactory system offered the accuracy and quality that we needed to explore original cutlery design in a unique way. We worked on a single cutlery pattern for a palace of one of our

is approved, it is converted into a 3D CAD model using Rhino 3D software - always factoring in the 3D printing process for any parts that are to be cast in silver. Several prototypes of each part are built on the Perfactory using R11 resin, before a final, dimensionally accurate master pattern is built. Depending on the cutlery design, some pieces require direct casting, which requires little or no cleaning by the silversmiths. It is the accuracy of the 3D printed master pattern that makes this possible. The Perfactory builds the part with 25 micron layers of resin, a resolution that provides an excellent surface finish, that are highly accurate, even for parts up to 19 cm in height. Furthermore, Grant Macdonald is currently using the new castable resin from EnvisionTEC, EC500, with great success, particularly for much larger parts than the company has been able to contemplate previously. This opens up new and exciting possibilities for future design and development at Grant Macdonald. The other very positive result for Grant Macdonald, one that cannot be overlooked, is the greatly improved lead times from concept to final product. The Perfactory machine has enabled Grant Macdonald to reduce lead times from many months to just a few weeks - with superior, more complicated designs being produced.



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Middle Eastern clients using this methodology and the results were so successful, that we have since been producing bespoke sets of cutlery for clients all over the world."

At Grant Macdonald the central premise is innovative quality and the company's approach to achieving this is a blend of traditional skills with advanced technology and evolving the process with a team of highly trained personnel.

Controlling the design from the very beginning, the process starts with Grant working directly with the design team with initial sketches. Once the concept drawing



EnvisionTEC GmbH

Brüsseler Straße 51 D-45968
Gladbeck • Germany
Phone +49 2043 9875-0
Fax +49 2043 9875-99

EnvisionTEC USA

15162 S. Commerce Dr
Dearborn, MI 48120 • USA
Phone +1-313-436-4300
Fax +1-313-436-4303