Precious
Software & Hardware

Hardware and Software use in the AM of Jewellery

Currently, there are a variety of Additive Manufacturing (AM) hardware technologies being successfully used to manufacture precious metal jewellery. Each is at different levels of readiness for adoption for AM of precious metals. There are still some technical and practical problems to be resolved, both by the technology vendors themselves, and also the machine purchasers or potential purchasers who are generally required to develop their own solutions. Unresolved functionality issues such as surface finish/resolution, repeatability, powder management, identifying and creating suitable supply chains as well as finishing/polishing of complex geometries needs to be addressed.

It is precisely with this intent of resolving some of these technical/practical problems that the UK-based Precious partner Cooksongold has developed the Precious M080 platform jointly with Germany-based EOS GmbH. This technology platform will be the primary choice and most fully developed hardware available to the UK jewellery industry with its own semi-mature and a well-developed integrated supply/process. This is currently the only machine available that has been developed specifically for precious metal applications. It is not only safe and secure when handling precious metal powder, it is also considered to be eminently suitable for installation in a typical jewellery manufacturing environment. This machine was developed with an emphasis on build quality to improve surface finish/resolution while ensuring repeatability. At the same time, it focuses on effective powder management to minimise losses and ensure full powder accountability.

On the software side, there are two primary groups of software that exist for use by the jewellery industry: (1) Design Software and (2) AM Preparation Software. Design software are typically traditional CAD packages used for designing jewellery pieces. Some are jewellery focused but more are general purpose CAD design software as used in any industry. These software offer high flexibility to create complex geometries as mesh, solid or surface models, however the design freedoms offered and their suitability for jewellery design relies heavily on the proficiency of use of the designer.

The AM Preparation Software, generally used by AM manufacturers are specialised software that have been created specifically to deal only with the nuances associated with AM when compared to traditional manufacturing. Nuances include: repairing model files to ensure the necessary water-tightness for successful build, orientating pieces taking into account different build objectives, adding multi-purpose fixturing to pieces, slicing pieces into buildable layers and on some, applying build strategies (laser trajectories and parameters) to each layer. With metal AM, the considerations of orientation and fixturing are critical to ensuring quality builds and reducing post-processing efforts. Fixtures are typically used to improve build effectiveness by supporting the weight and features of the design, to provide reinforcement and stability of the piece on the build platform, to reduce thermal effects by removing built-up heat from the piece and to improve surface finish by supporting critical surfaces that are near or close to being horizontal.

Currently, only a handful of AM preparation software exists and the functionalities of some can be limiting. Some software vendors are showing interest in streamlining the preparation process, improving functionality and speed. Taking all of these nuances and objectives into account in a cohesive software package will ensure that the end goal of unleashing AM design freedoms is realisable. Precious partner Delcam, as a traditional CADCAM supplier to the design and manufacturing industries, stands at an advantageous position to improve on currently available options for both designing pieces and preparing AM pieces for manufacture.

The Precious project unites designers, a software vendor and manufacturing partners. It will play a vital step in ensuring that both the hardware and the software used in the AM of jewellery meet the high standards required and expected.