Fact Sheet 08:
CAD

Introduction

Computer Aided Design, or CAD for short, is a term that refers to the use of the computer for the creation of designs. CAD programmes are available in two-dimensional packages (2D) such as Adobe Illustrator or CorelDraw, or three-dimensional (3D) modelling packages such as Matrix or Rhino and CAD is fast becoming standard practice in many businesses in the jewellery and silversmithing industry. Although it shouldn't be regarded as a replacement for traditional skills but rather another tool in the jeweller's toolkit, there are a number of advantages and disadvantages that should be considered about whether to integrate CAD in to your business.

Advantages

* Accuracy
* Less time required for modification
* Simple to change stone colour, size etc
* Repeatability
* Ability to send designs easily all over the world
* Ability to render a photo-realistic image of the piece prior to selling
* Jewellery specific software features that automate processes such as pavé setting and provide weight calculations in precious metal
* Ability to create pieces on the computer, then dismantle into component pieces to cast separately which allows new design possibilities
* Ability to display pieces on your website that have yet to be made to show full breadth of designs.

Disadvantages

* Training: 3D modelling software packages have complicated looking interfaces with an array of commands and to master a package requires many hours of training and practice.
* Designs can be compromised by lack of knowledge of the software package in question. This can of course be overcome by outsourcing to a CAD bureau.
* Costly to implement
* The choice of which software to buy can be confusing

The CAD process

The flowchart on the following page illustrates the process of designing using CAD from an initial hand drawn sketch through to a three dimensional CAD model that can be exported to Computer Aided Manufacture (CAM) such as CNC milling machines or rapid prototyping equipment.

1. Initial concept drawings can be created in the traditional way with paper and pencil or even directly into a CAD programme.
2. If on paper, the design can then be scanned and imported into the 3D modelling programme and used as a guide to creating the three dimensional model.
3. The model can then be modified and manipulated until the designer is happy with the outcome. Many iterations of the design can be saved and compared.
4. The design can then be rendered to give it material properties, surface texture, gemstones and other decorative effects. These can be shown to a client or customer to present a photo-realistic interpretation of the piece they will be receiving, and even an animation. Following any feedback, this allows any adjustment of a design to take place before moving on to the more expensive process of manufacture.
5. Once the design has been finalised, it is ready to export.
6. It needs to go through one more process, file checking, which is usually in a separate piece of software. This is in order to check the model is of sufficient quality to go to manufacture, and doesn't have any holes or other problems that might interfere with the creation of the final model. CAD bureaus will usually check your file.
7. The model is ready to be sent for manufacture. Because it is a digital file, this can be sent by email which reduces manufacturing time, and it can also be sent anywhere in the world to be made.

Approaching a professional CAD designer or bureau

These days, most CAD bureaus offer a complete design service so you can send them your sketches and they will create a 3D CAD model for you that can be exported to Computer Aided Machinery (CAM). Some are even taking over the production of the piece in to precious metal and the lines between casting company and CAD bureau are starting to blur.

Pencil sketches or paper technical drawings can be imported into a CAD programme and used as a guide for producing the model. However, if you are using a CAD designer or bureau, it is useful to supply some extra information such as more detailed technical drawings detailing materials and size and cut of any gemstones etc to ensure you use the minimal time with the CAD designer as they commonly charge by the hour.

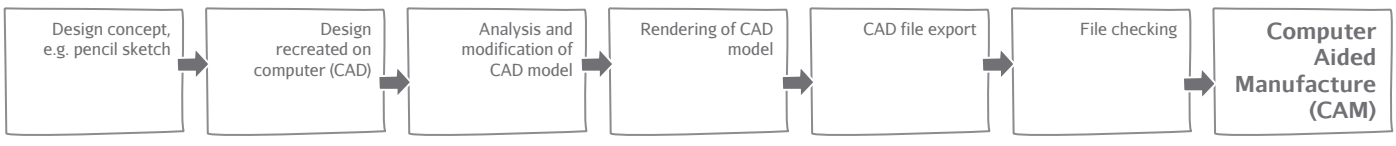
Send as much information as possible about the design you want to create from as many different angles as possible. Include as many measurements as possible – metal thicknesses, dimensions, gemstone sizes etc.

Things to look out for:

* Don't get distracted by the size of your CAD model on the screen, as it can be misleading.
* Keep an eye on wall thicknesses, particularly for channel setting and also claw thickness. As general guidance, claws should be no less than 0.7mm or they will be too fragile.
* A good tip is to keep a vernier gauge by your mouse so you can keep checking dimensions in the real world.

However, a good bureau will double check these measurements and feed back to you if they believe the model will not be fit for purpose.

More general information about dealing with manufacturers can be found on: **Fact Sheet 02: approaching a manufacturer**.



Costing and pricing

CAD designers usually charge by the hour so ensure you have as much information to hand as possible to avoid them having to contact you for more information. If your intention is for the bureau to not only create a CAD model for you but to also provide you with a finished piece, you will need to discuss the costs involved with them managing this process for you and get an estimate. Alternatively, you can manage this aspect yourself once you have the CAD model and get a range of quotes.

CAD FAQ

Q: If I send my CAD drawing by email to a company, is there anything I can do to protect the IP?

A: You could use a *Non Disclosure Confidentiality Agreement* (NDA) if you were concerned. If you are a member of the BJA, these can be downloaded from its website.

Q: What is the best programme for creating jewellery on the computer?

A: This is a very common question and a difficult one to answer. The best solution is to try before you buy. Some programmes, like Rhino offer a free trial download. You can try the software free of charge but saving of models is limited to a number of saves. Others will supply you with a trial version. Go to trade fairs and ask for demonstrations or go on a beginner's course.

Q: If I get a CAD bureau to create a CAD model for me, who owns the IP?

A: You own the intellectual property of the design.

"CAD has given a new dimension to my work and helped take me to a new level of design innovation."

Glossary

CAD
Computer Aided Design

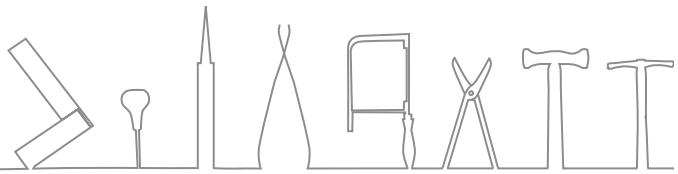
CAM
Computer Aided Manufacture

NDA
Non Disclosure Confidentiality Agreement – a legal contract between you and a third party not to disclose information that you have shared

Rapid Prototyping
Construction of an object from CAD data into a solid object using additive technology

Rendering
Creation of a photo-realistic interpretation of a 3D model

STL
Stereolithography file format used for exporting to rapid prototyping equipment



Jewellery specific software

Rhino3D
www.rhino3D.com

JewelCAD Pro
www.jcadcam.com

Matrix3D
www.gemvision.com

ArtCAM JewelSmith
www.delcam.com

3Design
www.3design.com

Databases of industry specific trade services

The following websites hold information about trade services, equipment suppliers, products and educational courses:

benchpeg: www.benchpeg.com
The jewellery industry's leading creative and digital communications network

British Jewellers' Association Trade Product Search: www.bja.org.uk
A membership organisation that represents the jewellery industry

Ganoksin: www.ganoksin.com
An international online resource for the jewellery industry

The Goldsmiths' Company Technical Portal: www.thegoldsmiths.co.uk
A supplier database of trade-to-trade services and suppliers

Acknowledgements

CAD & Rapid Prototyping Bureau, Weston Beamor Ltd
www.westonbeamor.co.uk