



Revolutionizing the design world

Photograph: Shireesh R Karrale

CAD/CAM technology has revolutionized both jewelry design and manufacture. Service bureaus have now opened up avenues for smaller jewelry companies to explore the advantages offered by it.

The advent of CAD/CAM unleashed technology for the biggest and the best jewelry houses in India. However, the cost involved made it the domain of only the biggest and the best. The advent of service bureaus (third party service providers) have democratized the IT revolution and is now paying off with even small jewelry companies being able to take advantage of the precision, quality, speed of design and competitive pricing that digital manufacturing is able to provide.

Basics first

Computer-aided design (CAD) involves the use of computer hardware and graphics software to generate 3D design drawings. CAD software enables a designer to quickly develop highly accurate and realistic 3D images of products.

Computer-aided manufacturing (CAM) is a system

for automatically producing finished products by using computer controlled production machines. CAM software needs to know the physical shape of the product (CAD model) before it can compose a corresponding set of fabrication instructions for a production machine. CAD and CAM work together in that the digital 3D model generated in CAD is fed as input to the CAM machine.

Tracing the Origins

CAD/CAM was first introduced to the Indian jewelry market because all prominent jewelry houses in US and Europe started expecting higher quality than what traditionally hand-made jewelry could offer. Like their far-eastern counterparts, Indian exporters had to adopt new ways or lose out on some of the biggest orders from the West.

The first CAM machine to come to India in around 1998



1

[1] Wax / rubber model in the first phase of CAD-CAM manufacture



2

[2] Silver master stage two of the designs manufacture



3

[3] Finished product gold and diamonds with the desired finish

Case Study

Imaginarium India, strives to constantly help jewelers across India realize the true potential of CAD/CAM.

The case discussed below is about a pair of made-to-order traditional bangles designed at Imaginarium for a client, Govind Soni of Planet Jewels.

While designing these bangles, Soni faced multiple problems such as lack of accuracy, sharpness and symmetry. The pave pre-cut was uneven and hence did not appear neat. Not only did the bangles take a long time for production, but the final product also exceeded expected diamond and gold weights. He was upset because he had exceeded his budget and his customer was reluctant to purchase.

Soni approached Imaginarium for help. When the same bangles were made using CAD/CAM, all his problems were resolved. The initial output was highly accurate and symmetrical. He was able to check the gold and diamond weight at every stage in CAD. Soni was able to share the CAD output with his customer, who was now able to see the prospective design as it would appear. Together they suggested some changes to the design. When, the CAD was finally approved, the bangles met his customer's expectations and budget.

This is just one of the many success stories where CAD-CAM has helped local manufacturers and retailers strengthen their business through enhancing their customers' experience.

was the T66 from Solidscape that gave fairly accurate wax outputs. Since then the industry has seen many different types of CAM machines such as ViperSi2, InvisionHR and Envisiontec, which operate on different technologies ranging from 3D printing and digital light processing (DLP) to stereolithography (SLA). Over the years, all these technologies have made significant advancements.

Software talk

In the CAD software segment, the industry has seen a huge influx of new softwares such as I-DEAS, JewelCAD, Rhino, Solidworks and Matrix. These software packages have evolved rapidly to meet requirements and in the process have significantly increased usability and reduced the time and effort spent on each design.

With the help of CAD/CAM, Indian jewelry exporters are now able to achieve higher accuracy and better quality. The turnaround time for jewelry production has come down rapidly. The exporters are also in a better position to produce jewelry within the desired gold and diamond weight. This technology has led to the creation

Did You Know?

Dentists use CAD/CAM technology to design the anatomical features, size and shape of a tooth restoration on a computer. The computer screen displays a 3D image of teeth and gums, allowing the dentist to use a cursor to draw the precise design of the tooth restoration. The CAD/CAM machine fabricates the restoration through a milling chamber that crafts the tooth-like ceramic material into a precise replica of the drawing.

of highly intricate, yet incredibly accurate designs in a quick and efficient manner, with reduced development costs.

Till recently, only jewelry exporters leveraged the CAD/CAM technology and it was generally believed that it could be employed only for mass production. Such

myths and the relatively high cost of this technology prevented small- to medium-scale jewelry manufacturers from switching to CAD/CAM.

With the advent of service bureaus that offer access to this technology at competitive rates as well as the availability of smaller and more affordable machines, even small manufacturers who tend to manufacture one-off pieces are beginning to realize CAD/CAM's value proposition. Imitation jewelry and plastic jewelry manufacturers also extensively use CAD across India and the world.

Transforming the jewelry industry

With new CAM technologies came new material outputs that could be directly cast into gold, thus avoiding the rubber mould as well as the silver master cost. These significant developments have helped transform the landscape of the jewelry industry. One can easily build custom designs, create an endless inventory of CAD designs and gain a competitive advantage by offering a service few others in the market can provide. Harnessing the power of CAD, one can design virtual 3D jewelry on-screen while generating a detailed color preview image that allows customers to see the piece before it takes physical shape. Thus, CAD/CAM brings together jewelers, customers and craftsmen for creating a design.



Myths and Realities

Myth 1 – CAD/CAM is only meant for mass production

The best jewelers all over the world are turning to CAD/CAM to enhance their products and gain a competitive edge in the market. The group does not just include mass manufacturers, who cater to large chains, but also jewelers who make fine quality jewelry in small batches.

Myth 2 – Only exporters can afford CAD/CAM manufacturing

When it was introduced, CAD/CAM, like any other technology, was expensive. As the technology evolved and with the advent of service bureaus, CAD/CAM has become increasingly affordable for everyone.

Today, it is being used extensively in the imitation jewelry market and in the manufacturing of plastic jewelry, both of which are low margin businesses.

Myth 3 – CAD/CAM technology cannot be used by manufacturers, who make one-off pieces

Jewelers, who make unique one-off pieces are looking for the best possible quality. A lot of these jewelers carry an inventory of their CAD files as masters rather than traditional master

moulds. Once the CAD design is approved by the end user, it is given out to a service bureau to manufacture. For the quality conscious time-constrained specialist, CAD/CAM offers an unbeatable advantage.

Myth 4 – CAD/CAM is a specialist technology and cannot be used for all types of designs

It can be used for all types of designs. The time taken for certain designs (eg temple jewelry) in CAD will be more than the others (eg simple rings, pendants)

Myth 5 – Pre-cutting does not help with CAD/CAM

CAD/CAM helps with pre-cutting. It provides an even setting and also reduces the setting cost.

Myth 6 – CAD/CAM makes the traditional 'babu' obsolete

A lot of jewelry houses today are taking help from their 'babus' to refine the CAD/CAM process in-house. That is, they are getting their CAD/CAM and even casting checked by 'babus' for production feasibility. This helps a lot since these procedures are usually done by CAD and CAM operators with little manufacturing knowledge.



Wax model made by using
CAD-CAM technology



ViperSi2 a computer aided
manufacturing machine

In such economically trying times as at present, CAD/CAM suddenly seems more relevant than ever before. Indian jewelers need to find new and innovative ways to strengthen business, stand out among competitors, demonstrate expertise and creativity and deliver real value to customers. For fulfilling these requirements, CAD/CAM technology is now establishing itself as the preferred mode of jewelry designing and manufacturing, which can stand the test of time Imaginarium is one of

About The Author

Nidhi Shah is senior marketing executive with Imaginarium and holds a degree in electronics engineering from the University of Pune. Shah has worked in technical competencies with leading manufacturing houses like Harriet Kelsall in the US and Goldsmiths and Tateossian in the UK in the past.



Nidhi Shah, Sr Marketing
Executive, Imaginarium

Asia's largest service bureaus providing master model-making services to the jewelry industry using CAD/CAM technology.

The directors at Imaginarium pioneered the service bureau concept in India almost a decade ago, built on the belief that the power of digital manufacturing needs to be available to every forward-looking jewelry manufacturer. With over 200 person-years of experience in offering the Indian jewelry industry the very latest in CAD/CAM technology, the company's infrastructure in SEEPZ Mumbai includes specialists in traditional jewelry, master craftsmen, CAD artists and experts in digital manufacturing, mould-making, quality control, engineering and more. The set-up has over 100 dedicated professionals, who are helping large jewelry houses as well as small- and medium-sized businesses. The firm now boasts of 9 RPT (rapid prototyping technology) machines, enjoys a client base of over 300 companies and has diversified into engineering and dental industries. The company firmly believes that the future of jewelry business is digital. Hence, it continues to make significant investments in the future of CAD/CAM to ensure that the Indian jewelry manufacturers remain competitive in the business, despite the economically challenging times. ■