

Lasers Shine at Jewelry Manufacturer Atelier Schon



Case Study

Jewelry manufacturing presents a unique challenge, namely to create beautiful and distinctive designs from expensive and sometimes delicate materials, and then fabricate them in a reliable and cost-effective way. Jewelry manufacturer Atelier Schon (Hamburg-Blankenese, Germany) combines design expertise with technological knowledge in order to achieve both these goals. This article explores the key role that laser welding and marking tools from Coherent have played in their efforts.

Improving Jewelry Manufacturing

Modern jewelry production still relies largely on techniques that have been employed for centuries. New technology is usually only adopted when it delivers at least one of three key benefits. The first of these is achieving better results. Specifically, this means a final product which is better made, in terms of mechanical strength or other improved physical properties, or which has an improved cosmetic appearance. Most often, critical appearance factors are surface finish (roughness or texture), surface color (that is, the absence of discoloration or uneven coloration), and overall piece shape. For example, if a ring is sized, the ideal end result is one in which the join is undetectable because there is no difference in color, texture or dimensions with the rest of the piece.

The second consideration is production time. Tools or methods that reduce production time cut costs for the jeweler. And, they also improve customer satisfaction because they enable quicker delivery of product, or reduce turnaround time on repairs.

The final consideration is design freedom. Technology sometimes allows the designer to realize designs that might have been difficult, expensive or previously impossible. This provides the designer with a greater sense of satisfaction, and can also lead to a competitive edge. That is, more distinctive and desirable products.

For welding, cutting and marking operations, lasers deliver benefits in all three of these areas. One key reason for this is that lasers apply heat in a high spatially confined manner. Thus, the laser can cut, weld or mark with high spatial precision, and without adversely affecting heat sensitive precious materials (pearls, opals, etc), or damaging or discoloring small or delicate metal structures.

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Lasers at Atelier Schon

Atelier Schon is run by the husband and wife team of Volker Carstens and Christina Carstens (born Schon). Christina is the creative force, acting as designer and goldsmith. Volker brings manufacturing and engineering skills to rapidly turn these designs into high quality, well made jewelry.

Volker is always on the lookout for technology that will enable Atelier Schon deliver a better product, and became interested in acquiring a laser system in 2015. To determine what products would work successfully in his operation, he enlisted the help of fellow jeweler Tobias Teigelkötter, who also sells laser machines through his company Teigelkötter Lasertechnik (Werne, Germany), a long-term partner of Coherent.

Based on Tobias' recommendations, Atelier Schon acquired two Coherent laser systems, a Performance 6002 Facelift welder, and an EasyJewel marker. These were chosen because of their combination of performance, capabilities, and ease-of-use.

Welding

The Performance Facelift 6002 welder is used at Atelier Schon for manufacturing and repair. This is a freestanding, self-contained system in which the focused laser beam is directed into an enclosed work chamber. Parts are either handheld, or placed in a fixture, which is then put in the work chamber. The operator views parts through the stereomicroscope with a cross-hair, and then accurately places the weld, controlling the laser using a foot pedal.

A touchscreen interface allows the user to input various laser parameters. These can be basic controls, such as power or beam diameter. But, the system also provides easy access to more sophisticated functionality, such as control over laser pulse shape or elimination of the "first-pulse" effect, which can be a problem with other laser welders.

The first-pulse effect refers to the fact that when a lamp-pumped YAG is used, that the first few pulses are typically much more powerful than subsequent pulses. This may cause excess heating to occur. As a result, the operator may have to stop and start again, several times, in order to avoid overheating and damaging the part. Laser parameters may even have to be altered during the process. The Coherent SweetSpot Resonator feature eliminates this problem and delivers high pulse-to-



Fig 1. The Coherent Performance 6002 Facelift is a compact system for fast, precision manual welding.

“Welding jewelry requires finesse, not brute force, and that’s why we like the Coherent system...”

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pulse stability, meaning that an operator can safely work on a piece without interruption and get consistent results.

“Welding jewelry requires finesse, not brute force, and that’s why we like the Coherent system,” notes Volker Carstens. “It’s stable and consistent at any power level, high and low. This really gets critical when you’re welding something thin or delicate, like a fine wire or hollow chain that is easily damaged or even vaporized when it’s heated too much. Plus, the Performance Facelift is forgiving if you don’t have the work piece exactly at the focus position. For the operator, it’s nice to have a bigger tolerance on workpiece position with a manual welder. We use the system virtually every day for ring resizing, and it gives us great quality welds in minutes, without the color matching problems we run into with soldering.”

Marking

Marking is performed extensively in the jewelry industry. This can be simple through ornate designs on almost any type of piece, particularly for individualizing items with engraved names, text and graphics of all sorts, even including fingerprints. Often, the surface to be marked isn’t flat, and this creates challenges, particularly for laser systems.

The Coherent EasyJewel is a compact, tabletop system specifically designed for jewelry marking applications. Mark artwork itself is typically created first in PC based software like Illustrator or AutoCAD, or even scanned in from hand drawings. The digital artwork file is transferred to the EasyJewel, and then the built-in Visual Laser Marker (VLM) software allows the editor to easily scale, orient, or otherwise manipulate the mark artwork in any way necessary. Then, the user places parts inside the enclosed work chamber, positions them using the integrated vision system, and initiates the marking process.

“So, much of the marking we do is individualized; putting an inscription or name on a watch or ring, for example. The EasyJewel makes this whole process fast and simple, from bringing the artwork into the system through actually making the mark,” reports Volker Carstens. “It’s also a very flexible system, and can handle just about anything we throw at it in terms of material, shape and type of mark. In addition, it’s got some specialized capabilities that are particularly important for jewelry marking. One of these is the Ring Marking Module, which makes it easy to mark either the inside or outside of a ring, as well as all sorts of other curved surfaces.”



Fig 2. Jewelry welding often involves joining small parts, such as attaching these earring posts, and the Coherent laser welder provides the precise application of heat required to get a good join without producing damage or discoloration (Image courtesy of Atelier Schon).

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Fig 3. Marking jewelry frequently involves producing complex, intricate patterns, often on curved surfaces. The Coherent EasyJewel facilitates the entire process, from transferring the artwork to the system, through setting laser parameters, to the marking process itself (Image courtesy of Teigelkötter Lasertechnik).



Cutting

Although the EasyJewel is a marking system, Atelier Schon also frequently uses it for cutting. Typically this is done by setting the system to engrave at the highest power, and then repeating the shape until the material is cut completely through. Using this method, metals of up to about 1.2 mm thickness can be cut. The thickness limitation occurs because, unlike a true laser cutter, the EasyJewel doesn't have a blowing system to remove melted material. This melted metal can flow back into the cut and close it up.

"The ability to cut with the EasyJewel is a huge bonus for us, since we can't really justify the cost of a separate laser cutting system, and we're not producing anything in sufficient volume to make it worth creating a stamping tool," explains Carstens. "Also, laser cutting gives us better results than anything else. It's way less expensive than water jet, and doesn't produce as much loss of metal. It's also much cheaper and faster than wire EDM. Plus, the setup speed is so fast, it's practical for us to use even for cutting just a single piece."



Fig 4. Although it's designed for marking, Atelier Schon regularly uses the EasyJewel for cutting thin metal, such as this sailboat charm (Image courtesy of Atelier Schon).

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Conclusion

Jewelry is generally more complex to manufacture than other fashion items. And, it involves materials that are inherently costly, and sometimes one-of-a-kind or irreplaceable. Laser welding, marking and cutting is an ideal tool in this environment because of its unique ability to deliver precision, speed, and minimal heat affected zone. This provides jewelers with the optimum combination of speed, precision, and finesse necessary to reliably transform delicate and valuable materials into unique and beautiful items.

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