

## **Why Is Laser Cutting Good to Process Stents?**

Manufactured with laser technology, stents are used as life saving devices. Stent wall structures have intricate webbing and need high precision to be done correctly. This current time in history is very remarkable for the medical industry. I guess this has been said probably many times before in history as it really is a matter of perspective. It must have been amazing for Edward Jenner who developed the first smallpox vaccine in 1796 which would become the foundation for others. In 1895 the X-Ray was developed by Wilhelm Conrad Roentgen, which gave doctors a non-invasive way for diagnosis. The lists of historic markers whether in science, industry, the arts, or medicine is something to admire. Life never stops and keeps moving forward, bringing both the good and bad. In the medical industry, the tenacity of researchers and physicians in all the medical fields keeps our available healthcare at the pinnacle of technological advances so in some respects this is a wonderful time to be alive. One advancement over the past 45-50 years are medical stents. Stents came about when an earlier procedure called balloon angioplasty was not fulfilling the need for coronary treatments. Angioplasty was using very small balloons to widen or open clogged arteries. This was a new process and successfully done back around 1977. However, the procedure could cause the artery to undergo restenosis a re-narrowing of the opening about 30% of the time. Clever thinkers in the medical field developed the stent. A stent is a tube-like structure with walls resembling a mesh. This cylindrical shape reminds me much of those fingers cuffs we played with as children. You would put your index fingers on each end and struggle to pull them out. Laser medical devices such as stents have different patterns, lengths, and diameters and can be made from stainless steel, bioresorbable materials or others. Laser cutting for the medical industry has been around since the mid 1960's and is used for its ability to manufacture precision parts out of metallic and non-metallic materials. Stainless steel laser cutting is abundant and often the material of choice for medical devices and tools. Medical laser cutting can be processed by various system types including ultraviolet, infrared and fiber laser technologies. You can call these medical laser cutters as many projects serviced by precision laser manufacturers have gained the confidence in the medical community. A prime reason medical laser cutting is sought after is the technology that produces fine geometries. Laser can have beam diameters of 20um microns or less. These beams of intensified light offer designers more options to take advantage of this. Another reason medical laser devices are done this way is the ability to process R&D. R&D is a necessity of any medical device development. It is the first of many stages that are required for advancement in the medical industry. Manufacturing laser medical devices has the flexibility by processing iterations without recurring engineering costs. Medical laser cutting is a great way to move from the R&D stage, directly into the supply stream once the project is approved for full production manufacturing. Laser cutting for the medical industry is supported by experienced manufacturers who know the challenges and requirements of the medical industry. These qualified manufacturers apply their expertise in laser cutting for medical device applications with confidence, integrity, and humility. Being part of a solution that will affect people's lives in a positive way is a great feeling.

## **What Is the Application of Laser Cutting In Medical Stents?**

The geometric and intricate patterns of medical stents can be very beautiful, but it is their ability to save lives and enhance an individual's quality of life that makes them such a wonderful gift to those in need. Medical stents are a key part in the treatment of narrowing or blocked arteries. Some of the different medical applications are:

- Coronary stents
- Cerebrovascular stents
- Peripheral artery disease stents
- Renal artery stenosis stents
- Medical stents are also used to treat aneurysms by reinforcing blood vessel walls that have weakened.

Stents vary in size but range typically around 8 to 32 millimeters in length with diameters of 2.5 to 4.0 millimeters. They are made from stainless steel, nitinol, silicon rubber or other biocompatible materials. It is stainless steel that many stents are made from. With very fine and intricate webbing, the manufacturing of stents is done successfully by medical laser cutting. Laser cutting for medical devices and precision parts has partnered with the medical industry with capabilities that other technologies cannot offer. For stents, medical laser cutting has developed and advanced laser technology due to the demands of medical, aerospace, defense, and other industries. To produce a medical device such as a stent the ultrafine tube shapes that stents are, require medical cutting lasers need to be able to manufacture without damaging materials that can be as thin as .2 millimeters. There are several types of systems used for medical laser cutters such as UV or ultraviolet, fiber lasers, femtosecond, and picosecond laser systems. Stents are sometimes referred to as laser medical devices since laser cutting for the medical industry is relied upon to keep technology moving forward in the development of stents but also for numerous medical devices, tools and delivery systems.

### **What is the best laser to process Stents?**

Picosecond and femtosecond laser technology is best for cutting stents. Medical laser cutting is an integral part in many medical devices and advancements in this industry. While there are different laser systems that can cut stents like nanosecond, picosecond, femtosecond, and fiber laser technology, it is the picosecond and femtosecond laser systems that have proved to be the best choice in laser technology. Medical stents are a great example of how technology and the medical industry have cooperated to fulfill a need that so many people have benefitted from using these life saving devices. Before stents, medical professionals used balloon angioplasty to open narrowed or closed arteries. This procedure was successful but did incur restenosis about 30% of the time. This re-narrowing of the artery needed a new solution and through the tenacity of medical research stents were developed. This development took place in the early 1980's and through the years advancements in design and use have enhanced patients' lives. The manufacturing of stents has largely advanced with medical laser technology. These delicate devices are made mainly from metal alloys. Designed with geometries, for example of 0.2 millimeters thick with lengths from 8 to 32 millimeters and diameters of 2.5 to 4.0 millimeters. These small tubes are not solid but, in a mesh or webbing that forms the cylindrical shape. These types of laser systems have short a pulse

duration minimizing any heat affected zones. There are some challenges to laser cutting stents whichever medical laser cutting system is used, such as:

- Material choice-Laser cutting for medical applications need to consider the material options. Stainless steel, nitinol, magnesium alloys, or platinum alloys are common for stents, but each will have challenges that laser manufactures need to be aware of.
- Geometry- Laser medical devices such as stents are designed to be expanded in the artery via a small balloon. The mesh designs of each are to provide strength and stability. However, the strands that create the webbing are thin and extremely delicate.
- Heat affected zone- While laser cutting is a great technology, it does cut with a high intensity beam of light. Heat affected zones are always an obstacle that must be solved. This is done by adjustments to the laser power, speed, and passes that the system runs, in addition to other settings. Many laser medical devices require minimal to no heat affected zones.

Laser cutting for the medical industry often is approached with challenges and stents are a great example of a successful partnership. As technology moves forward, so do the aspirations of researchers, scientists, engineers, and so on. With medical laser cutter technology many of these ideas and dreams can take a physical form by working with experienced and knowledgeable laser service providers.

Please read more at:

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