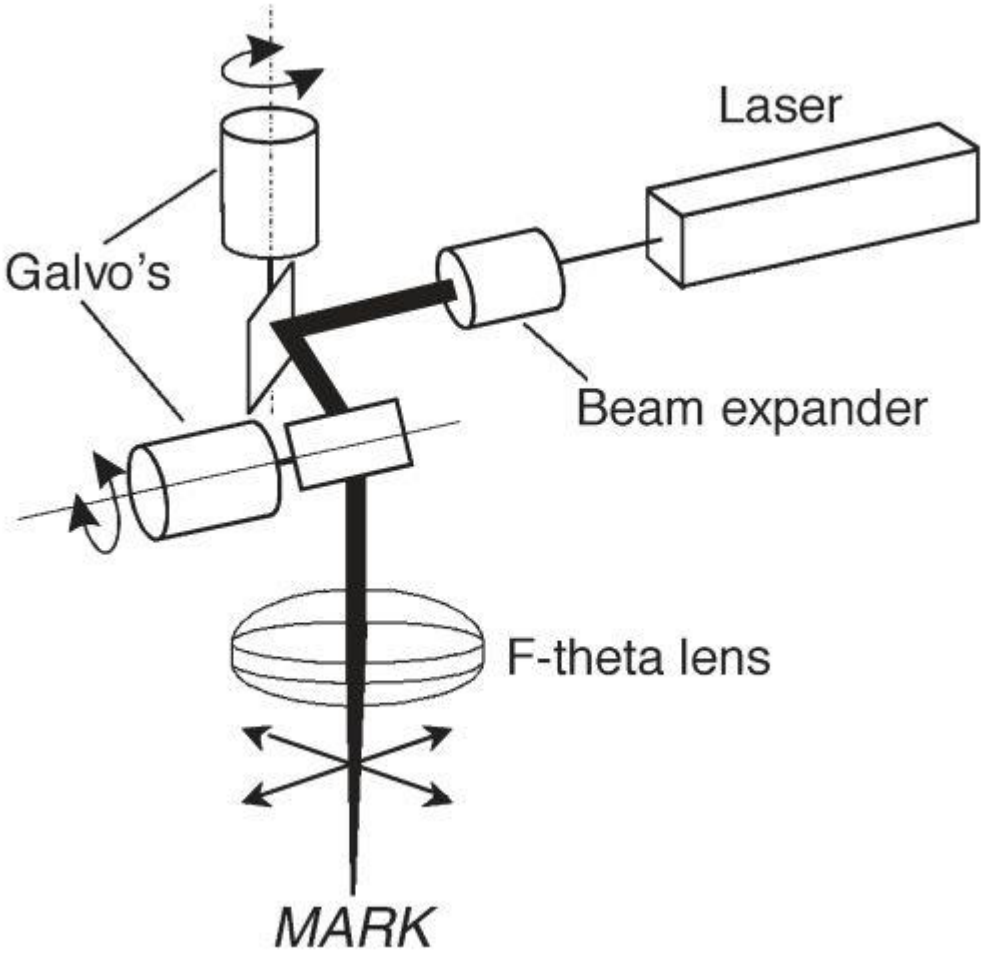
Incredible Laser Cutting Technology

OFweek laser: Soon after its naissance, laser is regarded as "tool of solution" . Scientists have realized from the very beginning that laser - the strange object - will become the most important technology in this era. Till now, laser has influenced human life dramatically by its decades' primary application.

Laser Marking (Carving) Technology

Laser marking (carving) technology is the most applied technology in laser processing field. Laser marking (carving) is a marking method to use local irradiation of high-energy density laser to generate chemical reactions like vaporization and color change in the material surface in order to form a permanent marker. It can make any characters, symbols and patterns, with size from millimeter to micron, which is significant in products' anti-counterfeiting.



Source : http://www.amadamiyachieurope.com/cmdata/images/Applications/photoLarge/Laser-Marker-process.jpg

The ultra fine focused laser beam is just like a cutting tool which can remove objects' surface material point by point. Its advancement relies on the non-contact marking

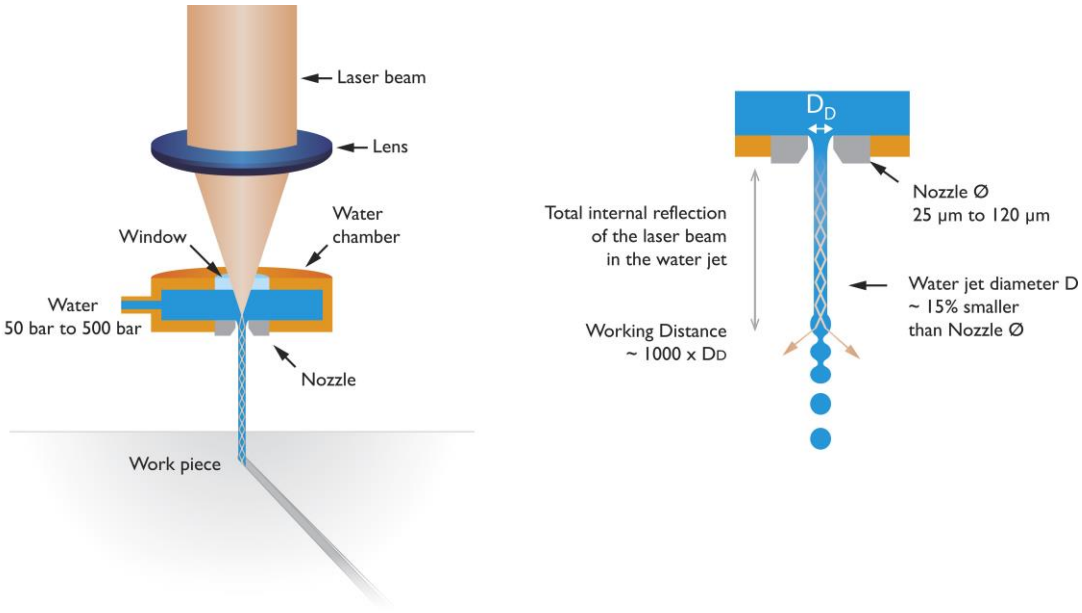
process which generate no mechanical squeeze and mechanical stress thus without damage on the workpiece. What's more, with the small size of laser beam and small heat effect area, it can complete elaborate processing that conventional methods can not realize.

The 'cutting tool' of laser processing is the focused light point, no need for adding other equipments or materials. As long as the laser can work well, it is possible to process continuously for a long time. Laser processing is high in speed and low in cost. It is automatically controlled by computer without human intervention.

It is only the content in computer that relates to the marking content of laser. As long as the marking system can recognize the draft design in computer, the marking machine can restore the accurate design information on the proper carrier. So the function of software influence the function of system to a great extent.

Laser Cutting Technology

Laser cutting technology has been widely used in metal and nonmetal material processing, which greatly reduces the processing time and cost and enhance the quality of workpiece. Modern laser becomes the fantastic sword that would cut clean through iron as though it were mud.



Source: http://www.synova.ch/uploads/pics/laser_LMJ_Principe_40cm_et_300dpi.jpg

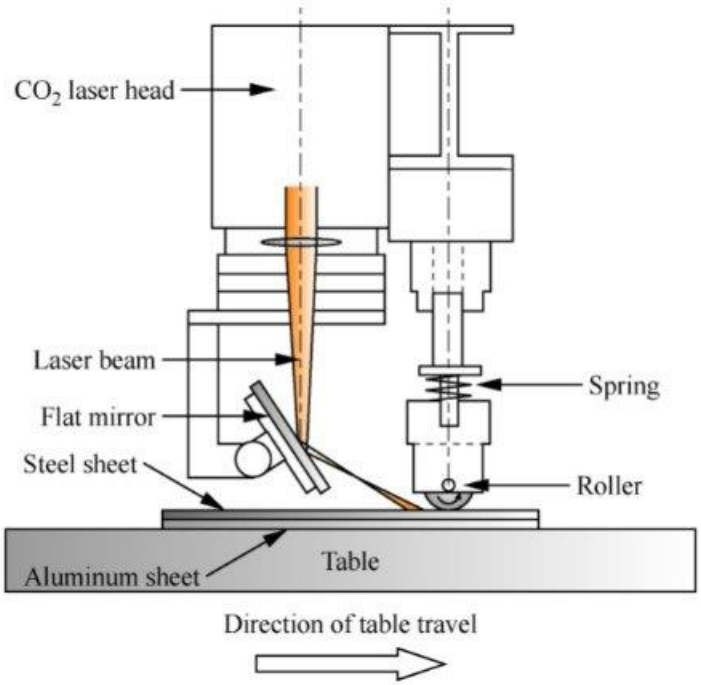
Take Hanslaser's CO2 laser cutting machine as an example, the overall system is composed of control system, motion system, optical systems, water cooling system, smoke control and exhaust system and so on, with an adoption of the most advanced numerical control mode to implement multiaxial linkage and equal energy

cutting, regardless of the speed. At the same time, it supports figure formats as DXP, PLT and CNC and strengthens interface graphics rendering capability. The motion accuracy in high speed is obtained from the adoption of superior imported servo motor and drive and guide of control rod.

Laser cutting is accomplished by the application of high power density energy generated from focused laser. Under the control of computer, laser discharges through pulse and a output of high-frequency pulse laser forms light beam of particular frequency and pulse width. After conduction and reflection through optical path and focused by focusing lens group, the pulse laser beam becomes a subtle and high-energy density flare, located near to the surface area to be processed and then it melts and gasifies the material in a moment. Every high-energy laser pulse can sputter a fine hole in a second. Under the control of computer, laser head and workpiece will move relatively and positioning according to the graph thus to get the desired shape. When cutting, a coaxial airflow is jetted from cutting head, blowing the melting and gasified material. Compared with the traditional plank processing methods, laser cutting has high cutting quality, speed, flexibility and wide range of application.

Laser Welding Technology

Laser welding technology is also an important aspect of laser materials process technology application. It belongs to heat conduction, which means that laser radiation heat the surface of workpiece and the heat will expand to the inside through heat conduction and finally melt the workpiece to form laser pool by the control of laser pulse's parameter like width, energy, peak power and repetition rate. It has successfully applied in microminiature component welding. The appearance of High power CO2 and YAG laser has opened up a new frontier of laser welding. It is also widely applied in industries like machinery, automotive and steel because of its good performance in deep penetration welding.



Source : http://www.intechopen.com/source/html/40989/media/image1.jpeg

The major advantages of laser welding are high speed, high depth and little deformation. It can work in room temperature and particular conditions with simple equipment and device. For example, the laser beam will not offset; laser welding can be carried out in air or any gas environment, or even through glass or any transparent material. When welding, depth-to-width ratio can reach to 5:1 and the highest can reach up to 10:1. It can weld refractory materials as titanium and quartz as well as anisotropic materials with good effects. For example, copper and tantalum can be well welded with zero defect. It can also applied in microwelding. Focused laser beam can generate flare, which can be applied in mass microwelding by its precision positioning function, such as assembly in IC lead, clock hairspring, kinescope electron gun etc. Laser welding is efficient in production and has little heat effect area without any welding spot contamination, thus improving the welding quality.

It is flexible in welding areas that is difficult to access. Optical fiber transmission has been adopted in YAG laser technology, which greatly promotes the popularization and application of laser welding technology. Beam split is easy to be realized by time and space and multiple beam can be processed all at once, providing conditions for more precise welding.