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## **1. Introduction:**

It has taken almost forty years for laser technology to be applied in the gold jewellery sector, but now it has arrived it has led rapidly to revolution in the real sense of the word, as all of a sudden previously unimagined opportunities have arisen, both on the design front and in terms of versatility and production speed. The first laser prototypes date back to the late fifties, while the first industrial application didn't appear until 1962 (a machine for cutting plywood) and use did not spread to the gold jewellery world until the end of the nineties. Laser is a source with a very powerful, easily oriented band of light "thanks to which it is therefore possible to send a great quantity of energy in the unit of time, in the form of very brief light impulses and concentrate it on a spot measuring just a few hundredths of a millimetre in diameter. Varying its wavelength depending on the material being processed, it is possible to use it in the widest range of fields, alongside traditional technologies and in many cases successfully replacing the latter".

At first laser technology mainly influenced welding processes, where compared to the traditional technique of furnaces and powders it permits much shorter production times and greater certainty regarding title and colour. Soon however laser made its way into other phases of the production process and in particular into marking and engraving: its precision, in fact, permits the engraving of logos, photographs and patterns that previously were impossible to produce, or could only be obtained using manual or chemical methods, which are much more expensive

## **2. Brief about Technology**

Laser Marking is the practice of using lasers to mark an object. The technique can be very technical and complex, and often a computer system is used to drive the movements of the laser head. Despite this complexity, very precise and clean marking can be

achieved at a high rate. The technique does not involve tool bits which contact the marking surface and wear out. This is considered an advantage over alternative engraving technologies where bit heads have to be replaced regularly.

A laser marking machine can be thought of as three main parts: a laser, a controller, and a surface. The laser is like a pencil- the beam emitted from it allows the controller to trace patterns onto the surface. The controller (usually a computer) controls the direction, intensity, speed of movement, and spread of the laser beam aimed at the surface. The surface is picked to match what the laser can act on.

The point where the laser (the terms "laser" and "laser beam" may be used interchangeably) touches the surface should be on the focal plane of the laser's optical system, and is usually synonymous with its focal point. This point is typically small, perhaps less than a fraction of a millimeter (depending on the optical wavelength). Only the area inside this focal point is significantly affected when the laser beam passes over the surface. The energy delivered by the laser changes the surface of the material under the focal point. It may heat up the surface and subsequently vaporize the material, or perhaps the material may fracture (known as "glass" or "glass up") and flake off the surface. This is how material is removed from the surface to create an engraving.

Looking at the shape and construction of the jewellery Articles, the quantity to be marked and the size of the hallmark to be applied & opportunity to finish an article after hall marking,

Laser Marking machines are most suitable to carry out the work.

A laser marking system allows all typical jewellery marking tasks to be performed effortlessly, under PC control, with perfect results every time. Laser Marking is a PC-controlled, environmentally friendly