Laser technology

Laser is a device that passes out light which Is electromagnetic radiation through a process of visual amplification based on the stimulated discharge of photons. The term “ laser” started as an acronym for Light Amplification by Stimulated Emission of Radiation. Lasers technologies are now applied in medicine, industry, military, law enforcement, research, product, laser lighting displays, and cosmetic skin treatments. This helps us in many ways for It helps us to use things easier, efficient and valuable. Objectives The following are objectives of the study.

Rather, it refers to surgery performed without transfusion of allegiance Champions of bloodless surgery do, however, transfuse products made from allegiance blood and they also make use of pre-donated blood for tautology’s transfusion. [9] The last twenty years have witnessed a surge of interest in bloodless surgery, for a variety of reasons. Jehovah Witnesses reject blood transfusions on religious grounds; others may be concerned about bloodstone diseases, such as hepatitis and AIDS. (Source: http://en. Wisped. Org/wick/doodles_surgery) Rather, it refers to surgery performed without transfusion of allegiance blood. Transfusion. The last twenty years have witnessed a surge of interest in bloodless apatite’s and AIDS. (Source: http://en. Wisped. Org/wick/doodles_surgery) Surgical Treatment Laser surgery is surgery using a laser (instead of a scalpel) to cut tissue. Examples laser surgery, in which the laser beam vaporizes soft tissue with high water content. Laser resurfacing is a technique in which molecular bonds of a material are dissolved by a laser. Laser surgery is commonly used on the eye.

Techniques used include ALASKA, which is used to correct near and far-sightedness in vision, and putrefactive crematory, a procedure which permanently reshapes the cornea using an chimer laser to remove a small amount of Green laser urge is used for the treatment/reduction of enlarged prostates. Laser surgery is much safer than normal surgery as it makes no physical contact so no infections are spread. Types of surgical lasers include carbon dioxide, argon, Nd: HAG, and KIT. Eye Laser corneal sculpting is a medical procedure that involves the use of laser to reshape the surface of the eye.

This is done to improve or correct myopia (short- sightedness), hypothermia (long-sightedness) and astigmatism (uneven curvature of the eye’s surface). The first laser sculpting procedures were performed over 20 years ago. The cornea is the transparent tissue that covers the front of the eye. It helps to control focusing. During laser eye surgery, a computer-controlled chimer laser is used to remove microscopic amounts of tissue from the cornea. The aim is to restore normal eyesight, without the need for glasses or contact lenses.

In one of the operations using the chimer laser, the thin outer layer of the cornea (called the corneal epithelium) is removed and the underlying layers are reshaped. This procedure is known as putrefactive crematory (PARK). In a more commonly used procedure, a thin flap of corneal tissue is created with another laser known as a fomented laser. The most widely used one is known as the Intranasal. This flap is then lifted out of the way. The chimer laser reshapes the underlying tissue and the flap is replaced to cover the newly reconnected surface.

Alternatively, an instrument with a very fine blade called a micrometeorite can be used to make the flap before the chimer laser reshapes the cornea. This procedure is known as laser-assisted in situ seriousness's (ALASKA). Dentistry Laser dentistry can be a precise and effective way to perform many dental procedures. The potential for laser dentistry to improve dental procedures rests in he dentist's ability to control power output and the duration of exposure on the tissue (whether gum or tooth structure), allowing for treatment of a highly specific area of focus without damaging surrounding tissues.

If you consider yourself somewhat of an anxious dental patient and are seeking extreme safety and comfort, you might consider looking for dentists who have incorporated laser dentistry techniques into their practices and treatments. It is estimated that 6 percent of general dentists own a laser for soft-tissue applications, with that number expected to increase over time. As the applications for dental lasers expand, greater numbers may minimize pain and recovery time. The application of lasers in dentistry opens the door for dentists to perform a wide variety of dental procedures they otherwise may not be capable of performing.

Dentists using lasers in dentistry have become adept at incorporating the state-of-the-art precision technology into a number of common and not-so-common procedures. INDUSTRY Cutting Laser cutting is a technology that uses a laser to cut materials, and is typically used for industrial manufacturing applications, but is also starting to be used by schools, mall businesses, and hobbyists. Laser cutting works by directing the output of a high-power laser, by computer, at the material to be cut. The material then

either melts, burns, vaporizes away, or is blown away by a Jet of gas,[l] leaving an edge with a high-quality surface finish.

Industrial laser cutters are used to cut flat-sheet material as well as structural and piping materials. There are three main types of lasers used in laser cutting. The CO laser is suited for cutting, boring, and engraving. The neodymium (Nd) and neodymium yttrium- aluminum-garnet (Nd-HAG) lasers are identical in style and differ only in application. Nd is used for boring and where high energy but low repetition are required. The Nd-HAG laser is used where very high power is needed and for boring and engraving. Both CO and Nd/ Nd-HAG lasers can be used for welding.

Welding Welding results when materials are heated to a molten state and fused together. Lasers generate light energy that can be absorbed into materials and converted to heat energy. By employing a light beam in the visible or infrared portion of the electromagnetic spectrum, we can transmit this energy from its source to the material using delivery optics which can focus and direct the energy to a very small, recipes point. Since the laser emits coherent radiation, the beam of energy has minimal divergence and can travel large distances without significant loss of beam quality or energy.

What does all this mean to the manufacturing engineer? To appreciate the potential of employing lasers in welding operations, you must redefine some of the traditional approaches to viewing “ efficiency” as it relates to energy conversion. The laser is a relatively inefficient converter of electrical energy into output light, with the best lasers achieving only 2 to 15 percent energy conversion, depending upon the type of laser being used. However, virtually

all of this output light energy is delivered to a small spot, as small as a few thousandths of an inch or less.

Consequently, for applying thermal energy to small areas, there are no other methods as efficient as lasers. This ability to selectively apply energy offers some distinctive metallurgical advantages in some welding applications, but also creates some unique problems. Since the surface heating generated by the laser light relies upon the material’s heat conductivity to produce the weld, penetration is usually limited to less than 2 millimeters. 2 By using a technique known as “ keyhole’s,” higher ewer lasers (> 106 W/cam) can make deeper penetrations. By heating the spot of filled with unionized metallic gas and becomes an effective absorber, trapping about 95 percent of the laser energy into a cylindrical volume, known as a keyhole. Temperatures within this keyhole can reach as high as 25, 000 co, making the keyhole’s technique very efficient. 4 Instead of heat being conducted mainly downward from the surface, it is conducted radically outward from the keyhole, forming a molten region surrounding the vapor. As the laser beam moves along the work-piece, the molten metal fills in behind the keyhole and solidifies to form the led.

This technique permits welding speeds of hundreds of centimeters per minute or greater, depending on laser size. Marking Parts Laser engraving, and laser marking, is the practice of using lasers to engrave or mark an object. The technique does not involve the use of inks, nor does it involve tool bits which contact the engraving surface and wear out. These properties distinguish laser engraving from alternative engraving or marking technologies where inks or bit heads have to be replaced regularly. The

impact of laser engraving has been more pronounced for specially-designed “ lasers” materials.

These include laser- sensitive polymers and novel metal alloys. The term laser marking is also used as a generic term covering a broad spectrum of surfacing techniques including printing, hot-branding and laser bonding. The machines for laser engraving and laser marking are the same, so that the two terms are usually interchangeable. MILITARY Guided Munitions Laser-guided munitions use a laser designator to mark (illuminate) a target. The reflected laser light from the target is then detected by the seeker head of the weapon, which sends signals to the weapon’s control surfaces to guide it toward the designated point.

Laser-guided bombs are generally unopposed, using small fins to glide towards their targets. Powered laser-guided missiles, such as some variants of the US GM-65 Maverick and the French AS. ALL, use the same guidance system, but have greater range and invulnerability because they are not limited to unopposed flight. Some Lag’s have been fitted with strap-on rocket motors to increase their range; one such weapon is the SINS GM-123 Skipper. The earliest laser guidance seekers measured the intensity of the reflected laser light at four corners of the seeker window.

The seeker then actuated the control fins to steer the weapon in the erection of the strongest signal return, thereby keeping the weapon centered on the pulse. Later weapons have more sensitive seekers and more sophisticated control systems that waste less energy with course corrections, improving accuracy and range, but the principle remains essentially the same. The first

such weapon to be developed was the Texas Instruments BOLT-117. Most laser-guided bombs are produced in the form of strap-on kits: seeker heads, and steering fins that can be attached to a standard general-purpose bomb or penetration bomb.

Such kits are modular, allowing relatively easy upgrades, and are considerably cheaper than repose-built weapons. Alternative to Radar Iliad (Light Detection and Ranging, also LADDER, sometimes Laser Imaging Detection and Ranging) is an optical remote sensing technology that can measure the distance to, or other properties of, targets by illuminating the target with laser light and analyzing the backscattered light. ILIAD technology has applications in geometric, sensing, atmospheric physics,[l] airborne laser swath mapping (ALLS), laser altimeter, and contour mapping.

The acronym LADDER (Laser Detection and Ranging) is often used in military contexts. The term “ laser radar” is sometimes used, even Hough ILIAD does not employ microwaves or radio waves and therefore is not radar in the strict sense of the word. ILIAD metrics are statistical measurements created from the AD point cloud achieved from ILIAD and normally used when predicting forest variables from ILIAD data. [2] Other than those applications listed above, there are a wide variety of applications of ILIAD, as often mentioned in National ILIAD Dataset programs.

RESEARCH Laser Ablation Laser ablation is the process of removing material from a solid (or occasionally liquid) surface by irradiating it with a laser beam. At low laser flux, the material is heated by the absorbed laser energy and evaporates or sublimates. At high laser flux, the material is typically

converted to a plasma. Usually, laser ablation refers to removing material with a pulsed laser, but it is possible to ablate material with a continuous wave laser beam if the laser intensity is high enough.

The simplest application of laser ablation is to remove material from a solid surface in a controlled fashion. Laser machining and particularly laser drilling are examples; pulsed lasers can drill extremely small, deep holes through very hard materials. Very short laser pulses remove material so quickly that the surrounding material absorbs very little heat, so laser drilling can be done on delicate or heat-sensitive materials, including tooth enamel (laser dentistry). Several workers have employed laser ablation and gas condensation to produce Anna particles of metal, metal oxides and metal carbides.

Laser ablation has biological applications and can be used to destroy nerves and other tissues. For example, a species of pond snails, Hellions travois, can have their sensory neurons laser ablated off when the snail is still an embryo to prevent use of those nerves. Laser ablation can be used on benign and malignant lesions in various organs, which is called Laser-induced interstitial thermometer’s. The main applications currently involve the reduction of benign thyroid nodules [5] and destruction of primary and secondary malignant liver lesions.

Laser Capture Misdirection Laser capture misdirection (LLC), also called Misdirection, Laser Misdirection (ELM), or Laser-assisted misdirection (ELM or LAM) is a method for isolating specific cells of interest from microscopic regions of tissue/cells/ organisms. [1][2] A laser is coupled into a microscope

and focuses onto the tissue on he slide. By movement of the laser by optics or the stage the focus follows a trajectory which is predefined by the user. This trajectory, also called Element, is then cut out and separated from the adjacent tissue.

After the cutting process, an extraction process has to follow if an extraction process is desired. More recent technologies utilize non-contact misdirection. The laser capture misdirection process does not alter or damage the morphology and chemistry of the sample collected, nor the surrounding cells. For this reason, LLC is a useful method of collecting selected cells for DNA, RNA and/or protein analyses. LLC can be performed on a variety of tissue samples including blood smears, cytological embedded archival tissue may also be used. 11] On formalin or alcohol fixed paraffin embedded tissues, DNA and RNA retrieval has been successful, but protein analysis is not possible (requires frozen section). [citation needed] Product Development/ Commercial Laser Printing Laser printing is a digital printing process that rapidly produces high quality text and graphics on plain paper. As with digital photocopiers and multifunction printers (Maps), laser printers employ a xerographic printing process, but differ from analog hoteliers in that the image is produced by the direct scanning of a laser beam across the printer’s photoreceptor.

Barded Scanners A barded reader (or barded scanner) is an electronic device for reading printed Barbados. Like a flatbed scanner, it consists of a light source, a lens and a light sensor translating optical impulses into electrical ones. Additionally, nearly all barded readers contain decoder circuitry

analyzing the brocade’s image data provided by the sensor and sending the brocade’s content to the scanner’s output port.

Laser Pointers A laser pointer or laser pen is a small handheld device with a power source (usually a eatery) and a laser diode emitting a very narrow coherent low-powered laser beam of visible light, intended to be used to highlight something of interest by illuminating it with a small bright spot of colored light. Power is restricted in most Jurisdictions not to exceed 5 mm. The small width of the beam and low power of typical laser pointers make the beam itself invisible in a reasonably clean atmosphere, only showing a point of light when striking an opaque surface.

Some higher-powered laser pointers project a visible beam via scattering from dust particles or water droplets along the beam path. Higher-power and higher-frequency green or blue lasers may produce a beam visible even in clean air because of Raleigh scattering from air molecules, especially when viewed in moderately-to-dimly lit conditions. The intensity of such scattering increases when these beams are viewed from angles near the beam axis. Such pointers, particularly in the green-light output range, are used as astronomical-object pointers for teaching purposes.

The recent low-cost availability of infrared (R) diode laser modules of up to 1000 mm (1 watt) output has created a generation of IR-pumped frequency-doubled (DIPS) laser pointers in green, lee, and violet, of higher visible power, typically up to 300 mm. Because the IR-laser component in the beams of these visible lasers is difficult to filter out, and also because filtering it contributes extra heat which is difficult to dissipate in a small

pocket “ laser pointer” package, it is often left as a beam component in cheaper high- power pointers.

This invisible laser light component causes a degree of extra potential hazard in these devices when pointed at nearby objects and people. Laser pointers make a potent signaling tool, even in daylight, and are able to produce a right signal for potential search and rescue vehicles using an inexpensive, small and lightweight device of the type that could be routinely carried in an emergency kit. Laser pointers if aimed at a person’s eyes can cause temporary disturbances to vision.

A laser light show may consist only of projected laser beams set to music, or may accompany another form of entertainment, typically musical performances. Laser light is useful in entertainment because the coherent nature of laser light allows a narrow beam to be produced, which allows the use of optical scanning to draw patterns or images on walls, ceilings or other surfaces including whitetail smoke and fog without refocusing for the differences in distance, as is common with video projection.

This inherently more focused beam is also extremely visible, and is often used as an effect. Sometimes the beams are “ bounced” to different positions with mirrors to create laser sculptures. Laser scanners consist of small mirrors which are mounted on galvanometers to which a control voltage is applied. The beam is deflected a certain amount which correlates to the amount of voltage applied to the galvanometer scanner. Two galvanometer scanners can enable X-Y control voltages to aim the beam to any point on a square or rectangular raster.

This enables the laser lighting designer to create patterns such as Luxurious figures (such as are often displayed on oscilloscopes); other methods of creating images through the use of galvanometer scanners and X-Y control voltages can generate letters, shapes, and even complicated and intricate images. (The use of X-Y raster scanning to create images is also used in television picture tubes.) A planar or conical moving beam aimed through atmospheric smoke or fog can display a plane or cone of light known as a “ laser tunnel” effect.