

FORM 2

THE PATENTS ACT, 1970

(39 of 1970)

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The Patent Rules, 2003

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COMPLETE SPECIFICATION

(See section 10 and rule 13)

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TITLE OF THE INVENTION

“6-AXIS ROBOTIC WORKSTATION FOR LASER ENGRAVING”

We, applicant(s)

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The following specification particularly describes the nature of the invention and the manner in which it is performed:

FIELD OF THE INVENTION

The present invention concerns a robot arm that can be used for an industry robot and which can articulate to produce a movement pattern with high movement ability, excellent accessibility, and great precision because of a small amount of rotation, comparatively high translation movement, and especially a robot arm that can be used for an industrial robot.

DISCUSSION OF THE PRIOR ART:

The use of robots in manufacturing is not just an issue today but also the industry's future. From one-task manipulators to today's sophisticated and collaborative industrial robots, robotics has undergone a lengthy evolution. The best way to ensure that injury decreases and job productivity are achieved seems to be via the employment of a collaborative robot for collaboration with the operator. Without a robot, the operator must do monotone procedures frequently, which severely affects his physical condition and exposes him to laser hazards since the operator must put the blank into the laser plant directly.

Laser engraving is now the most used technique for marking materials and advertising or ornamental article manufacturing. Half-finished goods in the industry are tagged with traceability laser, which creates a particular kind of unique code on the material. This code enables the operator to track in the database the semi-finished or completed product. The laser marking technique has no competition on the market, thanks to its speed, precision, and excellent quality of marking and graving.

However, like with the mechanical engraving technique, the laser engraving process takes the essential precautions to prevent harm to operators' health. If the safety guidelines and components are not followed, laser engraving may be extremely hazardous for the operator.

Burns occur in the effect of a high-intensity laser on the skin. The lasting harm to the eyesight
5 of the operator may occur if the laser strikes your eye.

The robot conducts handling tasks on the workstation, which may be hazardous for the operator's health. The operator stays at his job since he only touches the material lightly and uses the robot safely. Designing an appropriate solution for robotic workplaces, material handling, and safety components provides time savings, investment rates, higher productivity,
10 and improved safety for workers who move close to the laser.

LASER ENGRAVING DEVICE

Patent number: 8912465

Abstract: A laser engraving device that can adjust its machining position is disclosed. The device includes a laser machine for supplying laser beam, a guide rod adjacent to and parallels to the laser machine, a galvanometric scanner coupled to the guide rod and being movable with the guide rod, and a driver disposed at the end of the guide rod for driving the guide rod.

Type: Grant

Filed: September 6, 2012

Date of Patent: December 16, 2014

Assignee: Legend Laser Inc.

Inventor: Shyr-Cherng Kuo

**RESIN COMPOSITION FOR LASER ENGRAVING, FLEXOGRAPHIC PRINTING
ORIGINAL PLATE FOR LASER ENGRAVING, METHOD FOR PRODUCING
FLEXOGRAPHIC PRINTING ORIGINAL PLATE FOR LASER ENGRAVING,
FLEXOGRAPHIC PRINTING PLATE, AND METHOD FOR MAKING FLEXOGRAPHIC
PRINTING PLATE**

Publication number: 20160183659

Abstract: Provided are a resin composition for laser engraving, from which a flexographic printing plate having excellent instability of the engraving residue generated by laser engraving, as well as excellent

engraving sensitivity, printing durability, and printing durability over time can be obtained; a flexographic printing plate precursor for laser engraving produced using the resin composition for laser engraving; a method for making a flexographic printing plate using the flexographic printing plate precursor; and a flexographic printing plate obtained by the plate-making method. Disclosed is a resin composition for laser engraving of the present invention, including (Component A) a resin that is a plastomer, (Component B) a vulcanizing agent, and (Component C) a compound having a hydrolyzable silyl group and/or a silanol group in an amount of 0 parts by mass or more and less than 0.1 parts by mass relative to 100 parts by mass of Component A.

Type: Application

Filed: March 9, 2016

Publication date: June 30, 2016

Applicant: FUJIFILM Corporation

Inventor: Hiroshi TASHIRO

LASER ENGRAVING DEVICE

Publication number: 20190176269

Abstract: A laser engraving device includes a carrier substrate, a position detecting module, and a laser engraving module. The carrier substrate is used to carry at least one wafer, and at least one wafer has a

first engraving area formed thereon. The position detecting module includes a first transmitting component and a first receiving component. The laser engraving module includes a first laser generator to provide a first laser light source. The position detecting module can provide a first position signal of the first engraving area by matching the first transmitting component and the first receiving component. Therefore, the light from the first laser source generated by the first laser generator can be precisely projected onto the first engraving area of at least one wafer according to the first position signal to form a first predetermined pattern on the first engraving area.

Type: Application

Filed: December 10, 2018

Publication date: June 13, 2019

Inventor: CHIEN-SHOU LIAO

ID CARDS WITH BLOCKED LASER ENGRAVING WRITABILITY

Patent number: 9079443

Abstract: The invention relates to layer structures for ID cards on which information can be written by laser engraving and which have an additional layer that is applied to the card body after the laser engraving and restricts or completely prevents subsequent writing on the card using laser engraving, and consequently prevents falsification of the identifying information contained and relates to a method for

blocking the laser engraving writability of layer structures on which information can be written by laser engraving.

Type: Grant

Filed: October 10, 2009

Date of Patent: July 14, 2015

Assignee: Bayer MaterialScience AG

Inventors: Heinz Pudleiner, Mehmet-Cengiz Yesildag, Georgios Tziovaras, Dirk Pophusen

ROBOTIC WASH CELL USING RECYCLED PURE WATER

Publication number: 20070150101

Abstract: The present invention pertains to a robotic wash cell including a six-axis robotic arm and end effector equipped with nozzles that spray unheated, solvent-free, pure water at high pressure to clean or debit objects by maintaining the nozzles nearby and substantially normal to each surface being cleaned or edge being deburred. The robotic cell wash is particularly useful for cleaning contaminants such as oil and grease from items having more complex shapes. The six-axis robotic arm positions the nozzles and their sprays substantially normal to each surface being cleaned or deburred. The nozzles produce a multi-zone spray pattern with a continuous effective cleaning zone. A water recycling and the pressurizing system collects the used water, separates the oil and grease contaminants to a level of about

five ppm, and pressurizes the pure water to about 3,000 psi for washing operations or about 6,000 psi for deburring operations.

Type: Application

Filed: November 22, 2006

Publication date: June 28, 2007

Inventor: Stephen Laski

METHOD OF WASHING A CONTAMINANT FROM A SURFACE VIA A ROBOTIC ARM

Publication number: 20060184281

Abstract: The present invention pertains to a robotic wash cell including a six-axis robotic arm and end effector equipped with nozzles that spray unheated, solvent-free, pure water at high pressure to clean or deburr objects by maintaining the nozzles nearby and substantially normal to each surface being cleaned or edge being deburred. The robotic cell wash is particularly useful for cleaning contaminants such as oil and grease from items having more complex shapes. The six-axis robotic arm positions the nozzles and their sprays substantially normal to each surface being cleaned or deburred. The nozzles produce a multi-zone spray pattern with a continuous effective cleaning zone. A water recycling and the pressurizing system collects the used water, separates the oil and grease contaminants to a level of about

five ppm, and pressurizes the pure water to about 3,000 psi for washing operations or about 6,000 psi for deburring operations.

Type: Application

Filed: April 17, 2006

Publication date: August 17, 2006

Inventor: Stephen Laski

While the present invention is described herein by example using embodiments and illustrative drawings, those skilled in the art will recognize that the invention is not limited to the images of drawing or drawings described and are not intended to represent the scale of the various components. Further, some features that may form a part of the invention may not be illustrated in specific figures for ease of illustration. Such omissions do not limit the embodiments outlined in any way. It should be understood that the drawings and detailed descriptions are not intended to limit the invention to the particular form disclosed. Still, on the contrary, the story is to cover all modifications, equivalents, and alternatives falling within the scope of the present invention as defined by the appended claims. As used throughout

In this description, the word "may" is used in a permissive sense (i.e., meaning having the potential to) rather than the mandatory sense (i.e., meaning must).

Further, the words "a" or "an" mean "at least one," and the word "plurality" means "one or more" unless otherwise mentioned. Furthermore, the terminology and phraseology used herein are solely for descriptive purposes and should not be construed as limiting in scope. Language such as "including," "comprising," "having," "containing," or "involving," and variations thereof, is intended to be broad and encompass the subject matter listed after that, equivalents, and additional subject matter not recited, and is not intended to exclude other additives, components, integers or steps. Likewise, the term "comprising" is considered synonymous with the words "including" or "containing" for applicable legal purposes. Any discussion of document acts, materials, devices, articles, and the like is solely included in the specification to provide a context for the present invention. It is not suggested or represented that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention.

In this disclosure, whenever a composition or an element or a group of elements is preceded with the transitional phrase "comprising," it is understood that we also contemplate the same design, component or group of elements with transitional words "consisting of," "consisting," "selected from the group of consisting of," "including," or "is" preceding the recitation of the composition, element or group of elements and vice versa.

The present invention is described from various embodiments concerning the accompanying drawings, wherein reference numerals used in the accompanying drawing correspond to the like elements throughout the description. However, this invention may be embodied in many

different forms and should not be construed as limited to the embodiment set forth herein. Instead, the image is provided so that this disclosure will be thorough and complete and fully convey the invention's scope to those skilled in the art. The following detailed description provides numeric values and ranges for various aspects of the implementations described.

5 These values and ranges are treated as examples only and are not intended to limit the claims' scope. Also, several materials are identified as suitable for various facets of the implementations. These materials are to be treated as exemplary and are not intended to limit the invention's scope.

SUMMARY OF THE PRESENT INVENTION:

10 The concept of the innovation is the creation of a laser graving robotic workplace. The introduction of the innovation explains why robots and engraving are introduced into manufacturing. The next section of the proposal is the robotic workplace design, which specifies the arrangement of individual machines at work.

A universal jig was developed for the precision placing and reproducing of the semi-finished
15 object in a graving box. The next stage was the choice of appropriate parameters for the engraving process itself. The settings chosen impacted the texture of the etched product color. At the end of the essay comes the global assessment about the savings in time and overall savings in engraving for a single piece of goods. The time saved for producing one piece of

goods was 42 seconds using a robotic laser engraving workstation. An extra 35 items will be manufactured from workstations for robotic laser engraving.

BRIEF DESCRIPTION OF THE DRAWING:

To clarify various aspects of some example embodiments of the present invention, a more particular description will be rendered by referencing specific embodiments illustrated in the appended drawings.

It is appreciated that these drawings depict only illustrated embodiments of the story and are therefore not considered limiting its scope. The invention will be described and explained with additional specificity and detail through the accompanying drawings so that the advantages of the present invention will be readily understood. A detailed description of the story is discussed below in conjunction with the 10 appended drawings, which should not be considered to limit the scope of the invention to the accompanying drawing.

Further, another user interface can also be used with the relevant modification to provide the aforementioned results with the same modules, its principal, and protocols for the present invention.

It is to be understood that the above description is intended to be illustrative and not restrictive. For example, the 15 above-discussed embodiments may be used in combination with each other. Many other embodiments will be apparent to those of skill in the art upon reviewing the above description.

The benefits and advantages which the present invention may provide have been described above about specific embodiments. These benefits and advantages and any elements or limitations that may cause them to occur or

become more pronounced are not construed as critical, required, or essential features of any or all of the embodiments.

While the present invention has been described concerning particular embodiments, it should be understood that the images are illustrative and that the invention's scope is not limited to these embodiments. Many variations, modifications, additions, and improvements to the embodiments described above are possible. It is contemplated that these variations, changes, additions, and improvements fall within the invention's scope.

A stationary hybrid engraver with a laser marking on three axes. The machine comes packed with the benefits of YVO4 and fiber lasers integrating oscillating technology. YVO4 lasers (yttrium vanadate active medium - yttrium vanadium grills) are extremely excellent marking quality with high-marking speed lasers in turn. YVO4 lasers are highly marked. In the program Marking Builder 3, the graphic design was produced for graving.

Jig Design concept:

The laser beam impinges on the material and graves it from the laser head marking at a distance of 179 mm. A height of ± 21 mm from the height of the semi-product for engraving is permitted automated adjustment of the focal length with the laser head. The jig was developed so that the semi-finished object was placed accurately in a gravure box and that engravings could be repeated in small series manufacturing. The several components of the jig prototype were produced in additive technology and

then mounted in one unit. To accurately specify the location of the material for graving in the x-axis and y-axis, sliding dovetails are developed during the jig fabrication.

Six-axis robotic arm UR1

Robot arm UR10 with six axes The quality of its labor, unlike people, is never exhausted physically or psychologically. The robot needs the appropriate maintenance to function properly when it is worn out and outdated. In the dirty, rainy, and loud surroundings, the robot can also operate. Most robots in the automobile sector are utilized, with robots sold, cut, assembled, coated, etc. The robot is also utilized for product packing and palletization. This includes unloading and loading in the machining centers of semi-finished or completed items. It is also employed in the field where the camera scans the precise position of the component, the robot takes them and transfers them to a certain location, the so-called "pick and place" jobs. In figure 1 shows a basic six-axis robotics workstation.

We Claim:

1. A robot arm, which can be used as an industrial robot and consists of several hollow arm members, each with joints in opposite ends and a center axis, is used to rotate the arm members in such joint areas with each other; it is said to consist of a top arm member, a bottom arm member and at least
5 one intermediate arm member in between.
2. The robot arm adapted as an industrial robot as described in claim 1 includes one piece, in which one arm member overlaps another arm member, and a seal is attached to the above-coated piece.
3. 3. The robot arm, as described in claim 1, is suited to use as an industrial robot, characterized by the fact that those joints situated on the opposing ends of the middle arm member are created at the same
10 view of that middle arm member's central axis.
4. The robot arm suited to be used as an industrial robot, as described in claim three, was characterized by the fact that such joint faces are created in twisted relationships on the opposite ends of the said intermediate arm.

Dated this 09th day of August, 2021

15

Signature: 


Applicant(s)

Dr. Asheesh Kumar et. al.

ABSTRACT

The invention relates to the creation of a laser graving robotic workstation. The innovation explains how important robots are to industry 4.0. The installation of the 6-axis robotic arm is the main focus of customized solutions. This six-axis robotic arm places the specified jig into the engraving machine with the semi-finished product. The semi-finished product is graved on the completed product in the graving machine. This saves the operator time to identify the location in the engraving machine for the semi-finished product. The design of the suggested jig is universal to provide a precise definition of the location in the x-axis and the y-axis. After the jig, the semi-finished product is put in a bed and may be changed by another product in case of other semi-finished product dimensions. The conclusion is that time savings are compared in separate stages, and time savings are generated for the whole graving portion.

Dated this 09th day of August, 2021

Signature: 

Applicant(s)

Dr. Asheesh Kumar et. al.