

SORTING DISPOSABLE GLOVES ACCORDING TO SIZE

5 The present invention generally relates to the sorting and identification
of gloves made of natural materials (latex) or of plastic materials
(polyethylene, polypropylene, etc.) or polymers (nitrile), which are usually
disposable after use and are employed more specifically in controlled
10 atmosphere environments. More precisely, the invention relates to a process
for automatically sorting these gloves, according to size, from a number of
gloves of varying sizes, as well as to a machine for implementing the
process.

 The invention thus permits automatic identification of these products,
which makes it possible to contemplate their reprocessing, whereas they are
15 usually thrown away. Reprocessing or recycling takes place after a batch of
products of varying sizes have been grouped together according to size.

 The gloves presently used are, at best, marked using an alphanumeric
code and, at worst, have no marking at all. Present alphanumeric codes are
either a code giving different indications, such as the batch number or the
20 works in which the gloves have been manufactured, or solely a code
indicating the size of the glove.

 The markings provided on this type of type of glove are kept to a
minimum to prevent its being contaminated by the ink. These gloves are, in
fact, used in specific processes necessitating control over all contamination.

25 The codes currently used on this type of product, when they exist, do
not permit automatic sorting owing to the low efficiency of the readers on a
material that is liable to crease and that is elastic.

 Furthermore, no automatic process permits efficient sorting of this
type of product according to size.

30 There are known sorting operations that are carried out on textiles on
which a bar code label can be apposed, but this cannot be transposed to
gloves as no label can be apposed on them and the use of a bar code or a

direct alphanumeric marking on these products is not industrially satisfactory as reading efficiency is then too poor owing to the elasticity and the deformation of these products.

The invention provides a solution to this problem by proposing a process of semi-automatic sorting according to size which is efficient and industrially cost-effective, which permits complete unit-based identification of each glove, and which makes it possible to collect far more information in a minimum amount of time.

The main object of the invention is thus a process for the semi-automatic sorting of disposable gloves according to size from a number of gloves that are pre-marked and of varying sizes, a process which consists in taking a glove from said number and placing it on a holder capable of removing its creases and restoring its shape, in placing the glove before a two-dimensional matrix code reader and in orientating the glove in the direction of an individual band conveyor that corresponds to a given size of glove, with a view to routing it towards a storage container, with a programmed automaton providing the interface between the reader and the glove orientating system.

According to one particular feature of the invention, the new gloves that are to undergo the sorting process are pre-marked using a specific ink that is resistant to decontamination treatments, and non-allergenic. The marking makes it possible to see whether the glove is the right side out or inside out, the code apposed being unique and different for each glove.

The invention also relates to a machine for semi-automatically sorting disposable gloves according to size from a number of gloves of varying sizes, to implement the process, a machine which comprises a plurality of workstations each provided with a receptacle containing the gloves to be sorted, a programmed automaton, a holder, a matrix code reading and decoding system, a conveyor belt, and a compartment for distributing the gloves to individual band conveyors.

According to one preferred feature of the invention, the glove holder is an inflatable holder associated with an ejection device and a blown air

injection device.

Further particular features and advantages of the invention will emerge from a study of the following description of exemplary embodiments taken non-limitatively, and wherein reference is made to the annexed drawings, which show:

Fig. 1, a general perspective view of a sorting machine;

Fig. 2, a larger scale view, in perspective, of a workstation;

Figs. 3 et 4, larger scale views, in perspective, of parts of a workstation, showing, respectively, the glove holder and the distribution compartments;

Fig. 5, a diagrammatic elevation view of a variant of the glove holder;

Fig. 6, a cross-sectional view along line VI-VI of Fig. 5.

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Fig. 1 is an illustration of a complete processing line of a machine for sorting gloves according to size in which a series of identical workstations A, B, C, D, E are represented. Each workstation, shown in greater detail in Fig. 2, is provided with a receptacle 1 of gloves to be sorted, located in the upper portion next to a programmed automaton 8. Below it, on a cross-member 12, is fixed a device 5 for ejecting a glove, having an orifice 13 that communicates with an inflatable holder 2 designed to receive the glove, said holder being mounted beneath the cross-member, as more clearly shown in Fig. 3. A matrix code reader 3 is disposed laterally to holder 2 opposite a luminous and/or reflecting background 4, placed on the other side of the holder. Thus, this luminous background 4 (Fig. 2) is advantageously constituted by a transparent plate behind which is installed a white light, thus permitting a better contrast with the black code on the glove, thus better reading. Beneath inflatable holder 2 is mounted a plate 14 forming a working plane with an opening 15 located vertically above one end of a conveyor belt 7 which extends transversely to the processing line, under receptacle 1.

It can be seen from Fig. 4 that, along belt 7, are located a number of distribution compartments 6, the lower portion of each of which is open above an individual band conveyor 10. Each band routes the gloves sorted at the end of the line to a storage container 16 (see Fig. 1).

To make the sorting operations described hereinafter possible, the new gloves have been pre-marked with a specific ink resistant to the decontaminating operation that will be subsequently undergone by the glove. The ink chosen further produces little contamination and is non-allergenic for users. This specific marking is designed to make it possible to see if the glove is the right side out or inside out.

As to the code apposed on the glove, it is unique and different for each item. It is thus possible to check subsequently the number of times the glove has been through the sorting device, and to ensure computerised follow-up and complete traceability of the glove throughout its useful life.

The products to be sorted are thus stored in the receptacles 1 of each workstation. Receptacle 1 is sufficiently large to contain one day's production. Through it pass transverse metal bars, not shown, the function of which is to screen the products in order to break up any accumulations. At its base, it has a chute for gravity feeding the products to plate 14.

The first manipulation consists in the operator fitting the glove over inflatable holder 2. The latter is designed as a blowing nozzle contained in a cylinder of suitable dimensions and are connected to orifice 13, into which is injected a stream of blown air at a rate of at least 720 litres per hour. Each glove is thus held on the holder and subjected to an air flow thanks to which its creases are removed or its shape is restored so that the matrix code that it bears is as clear as possible. If necessary, the glove is firstly turned right side out.

Following this operation, holder 2 effects a 360° rotation and the two dimensional matrix code marked on the glove travels past the reading window of reader 3. This reader is a camera which automatically identifies the presence of a code in its visual field. It is to be noted that reading can be carried out directly on holder 2, or off it by placing the glove manually in the reading window. In all cases, the deformation of the glove, by virtue of its elasticity, must not exceed 10% if a reading efficiency of over 95% is to be maintained.

A decoder 19 is used to decrypt the code, which includes the size of

the glove as well as an identification number specific to the glove itself. The information thus collected is processed by automat 8 which, via a program, is able to determine at least the size of the glove and act on a corresponding compartment 6. The glove, which is moved on conveyor belt 7, will be
 5 pushed by a mechanism associated with the compartment in question and will drop onto individual band 10 that will route it to storage container 16. The set of bands 10 serve all the workstations on the processing line. There are thus as many individual band conveyors and containers as there are sorting classes, each glove having thus been orientated towards the
 10 individual band corresponding to its size. An individual band conveyor may possibly be provided for gloves rejected by the operator.

The number of identical workstations on the processing line can, of course, and without departing from the scope of the invention, be increased to enhance sorting capacity. There will then be as many holders, readers,
 15 luminous backgrounds and selection devices as there are workstations.

Thanks to this process and to this machine according to the invention, a qualitative and quantitative solution is provided for identifying and sorting gloves of varying sizes and which have to be grouped together according to size, which makes it possible to carry out reprocessing processes and
 20 subsequent packaging operations.

An alternative embodiment of holder 2 is illustrated in Figs. 5 and 6. In this particular case, it is not inflatable, but its periphery is provided with two half crowns 17 pivoting about pins 18 extending along a generating line of the cylinder. One of the two crowns is connected to a dynamometer 9.

25 The cylindrical holder communicates with a source of compressed air (arrow) as in the preceding case, orifices 11 being provided in the holder and the crowns.

The operator fits the glove to be tested on holder 2 above crowns 17. The opening of one or of both crowns, as seen in Fig. 6, will stretch the glove
 30 with a resistance proportional to its size, which will be measured by the dynamometer, thus enabling the size of the glove to be determined. Compressed air is then blown into the glove in order to restore its shape. The

holder then performs its 360° rotation and the reader reads the code, which is processed by the decoder as with the preceding version. The combined information of the dynamometer and of the decoder is transmitted to the automaton. The crowns then draw together and the glove is ejected onto the
5 conveyor. The process then continues as above.



CLAIMS

1. Process for the semi-automatic sorting of disposable gloves according to size from a number of gloves that are pre-marked and of varying sizes, characterised in that it consists in taking a glove from said
5 number (1) and placing it on a holder (2) which removes its creases and restores its shape, in placing the glove before a two-dimensional matrix code reader (3) and in orientating the glove in the direction of an individual band conveyor that corresponds to a given size of glove, with a view to routing it towards a storage container (16), and in that a programmed automaton (8)
10 provides the interface between the reader and the glove orientating system.

2. Semi-automatic sorting process according to claim 1, characterised in that the new gloves that are to undergo the sorting process are pre-marked using a specific ink that is resistant to decontamination treatments, and non-allergenic, in that the marking makes it possible to see whether the
15 glove is the right side out or inside out, and in that the code apposed is unique and different for each glove.

3. Machine for semi-automatically sorting disposable gloves according to size from a number of gloves of varying sizes, to implement the process according to claim 1, characterised in that it comprises a plurality of
20 workstations (A, ... E) each provided with a receptacle (1) for the gloves to be sorted, a programmed automaton (8), a glove holder (2) capable of removing the creases of this glove and restoring its shape, a matrix code reading and decoding system (3, 19), a conveyor belt (7), and a compartment (6) for distributing the gloves to individual band conveyors (10).

25 4. Semi-automatic sorting machine according to claim 3, characterised in that the glove holder (2) is an inflatable holder associated with an ejection system (5) and a blown air injection orifice (13).

5. Semi-automatic sorting machine according to claim 3, characterised in that the periphery of the glove holder (2) is provided with two pivoting half
30 crowns (17), at least one of which is connected to a dynamometer (9).

6. Semi-automatic sorting machine according to claim 3, characterised in that a matrix code reader (3) is disposed laterally to the holder (2) opposite



a luminous and/or reflecting background (4) placed on the other side of the holder.

7. Semi-automatic sorting machine according to claim 3, characterised in that a plate (14) forming a working plane beneath holder (2) is pierced by
5 an opening (15) located vertically above one end of a conveyor belt (7) which extends transversely to the line of workstations, under the receptacle (1).

8. Semi-automatic sorting machine according to claims 3 and 7, characterised in that the receptacle (1) comprises transverse bars and a chute down to the plate (14).

10 9. Semi-automatic sorting machine according to claims 3 and 7, characterised in that distribution compartments (6) are disposed along the conveyor belt (7), each one being placed above an individual band conveyor (10).

10. Semi-automatic sorting machine according to claim 3,
15 characterised in that the set of individual band conveyors (10) serves all the workstations on the line.