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### Wire module and manufacturing method thereof

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#### Abstract

A wire module is disclosed, which includes a wire group and a wire-distributing device. The wire group has a plurality of wires. The wire-distributing device includes a first wire-distributing module and a second wire-distributing module. The first wire-distributing module has a first wire-distributing member and a first sectional surface. The first sectional surface is located on the surface of one end of the first wire-distributing member, and the first part of the plurality of wires is positioned side by side on the first wire-distributing member. The second wire-distributing module has similar structures and configurations to the first wire-distributing module, wherein the first wire-distributing module is stacked on the second wire-distributing module, and the first sectional surface and the second sectional surface are correspondingly located on the same side.

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## Background/Summary

### CROSS-REFERENCE TO RELATED APPLICATION

(1) This application claims the priority benefits of Taiwan patent application No. 111150957, filed on Dec. 30, 2022. The entirety of the abovementioned patent application is hereby incorporated by reference herein and made a part of this specification.

### BACKGROUND OF THE INVENTION

1. Field of the Invention

(2) The present invention relates to a wire module. Specifically, the present invention relates to a wire module having a wire-distributing device.

2. Description of the Prior Art

(3) When a wire module is processed and soldered, different types of wires require different pre-

treatments, such as using lasers with different wavelengths to remove the outer layer of a wire module. Furthermore, along with factors such as changes in connection interfaces, the increase in the number of wires, the decrease in wire pitch, and the limitation of circuit board size, the difficulty in processing is increased, resulting in longer processing time and poor quality of the wire assembly.

#### SUMMARY OF THE INVENTION

(4) To solve the technical problems, an embodiment of the present invention provides a wire module that includes a wire group and a wire-distributing device. The wire group includes a plurality of wires. The wire-distributing device includes a first wire-distributing module and a second wire-distributing module. The first wire-distributing module has a first wire-distributing member and at least one first aligning-coupling portion connected to one end of the first wire-distributing member. The first part of the plurality of wires is positioned side by side on the first wire-distributing member. The second wire-distributing module has a second wire-distributing member and at least one second aligning-coupling portion connected to one end of the second wire-distributing member. A second part of the plurality of wires is positioned side by side on the second wire-distributing member. The first wire-distributing module is stacked on the second wire-distributing module, and the first wire-distributing member and the second wire-distributing member are relatively positioned by combining the first aligning-coupling portion and the corresponding second aligning-coupling portion.

(5) Another embodiment of the present invention provides a wire module that includes a wire group and a wire-distributing device. The wire group has a plurality of wires. The wire-distributing device includes a first wire-distributing module and a second wire-distributing module. The first wire-distributing module has a first wire-distributing member and a first sectional surface located on the surface of one end of the first wire-distributing member. The first part of the plurality of wires is positioned side by side on the first wire-distributing member. The second wire-distributing module has a second wire-distributing member and a second sectional surface located on the surface of one end of the second wire-distributing member. A second part of the plurality of wires is positioned side by side on the second wire-distributing member. The first wire-distributing module is stacked on the second wire-distributing module, and the first sectional surface and the corresponding second sectional surface are located on the same side.

(6) An embodiment of the present invention also provides a manufacturing method for a wire module. The method may include sorting a plurality of wires into a first part and a second part. The method may include fixing the first part of the plurality of wires to a first wire-distributing module and fixing the second part of the plurality of wires to a second wire-distributing module. One end of the first wire-distributing module has at least one first aligning-coupling portion, and one end of the second wire-distributing module has at least one second aligning-coupling portion. The method may include forming a wire module with the first wire-distributing module and the second wire-distributing module. The first aligning-coupling portion is combined with the corresponding second aligning-coupling portion to fix the positions of the first wire-distributing module and the second wire-distributing module relative to each other.

(7) An embodiment of the present invention has the following technical effects for prior art. An embodiment of the present invention may sort a plurality of wires into different groups (for example, an upper layer and a lower layer), and then perform different pre-treatments (for example, using lasers with different wavelengths to remove the outer layer of the wires). Therefore, the technical problems of poor quality of the wire assembly caused by a large number of wires, wires with a smaller pitch, and the smaller size of a circuit board may be improved.

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## Description

## BRIEF DESCRIPTION OF THE DRAWINGS

- (1) In order to make the abovementioned and other purposes, features, advantages, and embodiments of the present invention more clearly understood, the accompanying drawings are described as follows:
- (2) FIG. 1 is an exploded diagram of a wire module according to an embodiment of the present invention.
- (3) FIG. 2 is a partially enlarged three-dimensional schematic diagram of the assembled wire module according to an embodiment of the present invention.
- (4) FIG. 3 is a three-dimensional schematic diagram of a first wire-distributing module at a first angle according to an embodiment of the present invention.
- (5) FIG. 4 is a three-dimensional schematic diagram of a first wire-distributing module at a second angle according to an embodiment of the present invention.
- (6) FIG. 5 is a three-dimensional schematic diagram of a second wire-distributing module at a first angle according to an embodiment of the present invention.
- (7) FIG. 6 is a three-dimensional schematic diagram of a second wire-distributing module at a second angle according to an embodiment of the present invention.
- (8) FIG. 7 is a three-dimensional schematic diagram of a first wire-distributing module and a second wire-distributing module before being assembled into a wire-distributing device according to an embodiment of the present invention.
- (9) FIG. 8 is a schematic front view of the first wire-distributing module and a second wire-distributing module after being assembled into a wire-distributing device according to an embodiment of the present invention.
- (10) FIG. 9 is a schematic front view of a first wire-distributing module and a second wire-distributing module after being assembled into a wire-distributing device with a first aligning-coupling portion and a second aligning-coupling portion removed according to an embodiment of the present invention.
- (11) FIG. 10 is a three-dimensional schematic diagram of a wire-distributing device and a wire group before being assembled according to an embodiment of the present invention.
- (12) FIG. 11 is a three-dimensional schematic diagram of a wire-distributing device and a wire group after being assembled according to an embodiment of the present invention.
- (13) FIG. 12 is a three-dimensional schematic diagram of a wire-distributing device, a wire group, and a circuit board before being assembled according to an embodiment of the present invention.
- (14) FIG. 13 is a three-dimensional schematic diagram of a wire-distributing device and a circuit board according to another embodiment of the present invention.
- (15) FIG. 14 is a schematic side view of a wire-distributing device, a wire group, and a circuit board after being assembled according to an embodiment of the present invention.
- (16) FIG. 15 is a schematic flowchart of a manufacturing method of a wire module according to an embodiment of the present invention.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

(17) Various embodiments will be described in the specification, and a person having ordinary skill in the art may easily understand the spirit and the principles of the present invention by referring to the specifications and the drawings. Here, each element, or part, shown in each drawing may be exaggerated or changed for clarity. Therefore, a person having ordinary skill in the art should understand that the size and the relative ratio of each element or part shown in the drawings are not the actual sizes and relative ratios of the actual element or part. Additionally, although some specific embodiments have been described in detail herein, these embodiments are intended to be illustrative only and are not to be considered in a limiting or exhaustive sense in all respects. Therefore, various changes and modifications to the present invention should be apparent to and may be easily accomplished by a person ordinarily skilled in the art without departing from the

spirit and principles of the present invention.

(18) It should be noted that although the terms “first”, “second”, “third” and the like may be used herein to describe various elements, components, regions, layers, and/or sections, these elements, components, regions, layers and/or sections shall not be limited by these terms. These terms are only used to distinguish one element, component, region, layer, and/or section from another element, component, region, layer, and/or section. Therefore, a “first element”, “component”, “region”, “layer” and/or “section” discussed below could be termed a second element, component, region, layer, and/or section without departing from the teachings herein.

(19) Referring to FIG. 1 and FIG. 2, FIG. 1 is an exploded diagram of a wire module according to an embodiment of the present invention, and FIG. 2 is a partially enlarged three-dimensional schematic diagram of the assembled wire module according to an embodiment of the present invention. As shown in FIG. 1, an embodiment of the present invention provides a wire module **10** which includes a wire group **100**, a wire-distributing device **200** having a first wire-distributing module **300**, and a second wire-distributing module **400**, a circuit board **500**, an upper housing **600**, a lower housing **700**, and a wire connector **800**. The plurality of wires of the wire group **100** are sorted into different groups and positioned by the first wire-distributing module **300** and the second wire-distributing module **400** of the wire-distributing device **200**. The plurality of wires may be soldered to the circuit board **500** after sorting and positioning, and the wire connector **800** may be soldered to the circuit board **500**, wherein the detailed structures of each element will be described in the following paragraphs of the specification with drawings.

(20) Referring to FIG. 3 and FIG. 4, FIG. 3 is a three-dimensional schematic diagram of a first wire-distributing module at a first angle according to an embodiment of the present invention, and FIG. 4 is a three-dimensional schematic diagram of a first wire-distributing module at a second angle according to an embodiment of the present invention. As shown in FIG. 3, the first wire-distributing module **300** in the wire-distributing device **200** has a first wire-distributing member **310**, and the first wire-distributing member **310** has two ends along the X-axis direction. The left end **311** connects to a first aligning-coupling portion **320**, and the right end **312** connects to a first aligning-coupling portion **330**. The detailed structures of the first wire-distributing member **310** may include a first wire-distributing grooves **340**, a first wire-distributing tube **349**, and a first wire-distributing tube **350**. The first wire-distributing tube **349** on the left is disposed between the first wire-distributing grooves **340** and the first aligning-coupling portion **320**, and the first wire-distributing tube **350** on the right is disposed between the first wire-distributing grooves **340** and the first aligning-coupling portion **330**.

(21) Part of the wires of the wire group **100** may be positioned in the aforementioned first wire-distributing grooves **340** side by side along the Y-axis direction as shown in FIG. 3. For example, the first wire-distributing grooves **340** may be unclosed grooves as shown in FIG. 3, and the shape of each the groove matches the shape of the corresponding wire. Some wires of the wire group **100** may be allowed to pass through the first wire-distributing tube **349** and the first wire-distributing tube **350**. For example, the first wire-distributing tube **349** and the first wire-distributing tube **350** may be ring-shaped tubes as shown in FIG. 3, and the diameter of the ring-shaped tubes may be larger than the diameter of the wires positioned side by side in the first wire-distributing grooves **340**. An adhesive injection hole is respectively disposed on the surface of the first wire-distributing tube **349** and the surface of the first wire-distributing tube **350** facing away from the second wire-distributing module **400**. For example, an adhesive injection hole **351** is disposed on the first wire-distributing tube **349** on the left, and an adhesive injection hole **352** is disposed on the first wire-distributing tube **350** on the right, to inject adhesive to fix the wires passing through the first wire-distributing tube **349** and the first wire-distributing tube **350**. Therefore, when wire module **10** is in the subsequent processing processes, the relative positions between the wires will not be changed and the processing quality will not be affected. The detailed configurations of the first wire-distributing module **300** and the wire group **100** will be described in the following paragraphs with

FIG. 10 and FIG. 11.

(22) Moreover, the detailed structures between the first wire-distributing member **310** and the first aligning-coupling portion may include a pre-cut groove. For example, a pre-cut groove is disposed between the first wire-distributing tube **349** on the left and the first aligning-coupling portion **320**. That is, the end **311** may include the pre-cut groove **313** for the remove of the first aligning-coupling portion **320** of the assembled wire module **10**. Similarly, a pre-cut groove is disposed between the first wire-distributing tube **350** on the right and the first aligning-coupling portion **330**. That is, the end **312** may include the pre-cut groove **314** for the remove of the first aligning-coupling portion **330** of the assembled wire module **10**.

(23) In addition, the first wire-distributing module **300** is provided with a positioning groove on the surface opposite to the adhesive injection hole. That is, one side of the first wire-distributing member **310** is provided with a positioning groove toward the second wire-distributing module **400**. For example, a region of the left end **311** of the bottom surface of the first wire-distributing module **300** is provided with a positioning groove **315**, and a region of the right end **312** of the bottom surface of the first wire-distributing module **300** is provided with a positioning groove **316**. The positioning groove **315** and the positioning groove **316** are used for fixing the position of the aforementioned circuit board **500**. When the aforementioned wire group **100** is soldered to the circuit board **500**, the relative position between each wire and the circuit board **500** will not be changed and the processing quality will not be affected. The detailed configurations of the wire group **100**, the first wire-distributing module **300**, and the circuit board **500** will be described in the following paragraphs in FIG. 12 and FIG. 13.

(24) Furthermore, the first aligning-coupling portion of the first wire-distributing module **300** can be provided with a coupling portion to couple the first wire-distributing module **300** and the second wire-distributing module **400** together to fix their positions relative to each other. For example, the coupling portion **370** can be disposed of on the bottom surface of the first aligning-coupling portion **320** toward the second wire-distributing module **400**, and the coupling portion **371** can be disposed of on the bottom surface of the first aligning-coupling portion **330** toward the second wire-distributing module **400**. The structures of the second wire-distributing module **400** corresponding to the coupling portion **370** and the coupling portion **371** will be described in FIG. 5 to FIG. 8.

(25) Referring to FIG. 5 and FIG. 6, FIG. 5 is a three-dimensional schematic diagram of a second wire-distributing module at a first angle according to an embodiment of the present invention, and FIG. 6 is a three-dimensional schematic diagram of a second wire-distributing module at a second angle according to an embodiment of the present invention. As shown in FIG. 5, the second wire-distributing module **400** in the wire-distributing device **200** has a second wire-distributing member **410**, and the second wire-distributing member **410** has two ends along the X-axis direction. The left end **411** connects to a second aligning-coupling portion **420**, and the right end **412** connects to a second aligning-coupling portion **430**. The detailed structures of the second wire-distributing member **410** may include a second wire-distributing groove **440**, a second wire-distributing tube **449**, and a second wire-distributing tube **450**. The second wire-distributing tube **449** on the left is disposed between the second wire-distributing grooves **440** and the second aligning-coupling portion **420**, and the second wire-distributing tube **450** on the right is disposed between the second wire-distributing grooves **440** and the second aligning-coupling portion **430**.

(26) Similarly, part of the wires of wire group **100** may be positioned in the second wire-distributing grooves **440** side by side along the Y-axis direction as shown in FIG. 5, and part of the wires of wire group **100** may pass through the second wire-distributing tube **449** and the second wire-distributing tube **450** along the Y-axis direction. It should be noted that the direction of the second wire-distributing groove **440** of the second wire-distributing member **410** is configured to be opposite to the direction of the first wire-distributing groove **340** of the first wire-distributing member **310**. In other words, the Z-axis direction of FIG. 3 is opposite to the Z-axis direction of FIG. 5.

(27) Next, an adhesive injection hole may also be provided on the surface of the second wire-distributing tube **449** and a surface of the second wire-distributing tube **450** facing away from the first wire-distributing module **300**. For example, an adhesive injection hole **451** is disposed on one side of the second wire-distributing tube **449** on the left toward the negative Z-axis, and an adhesive injection hole **452** is disposed on one side of the second wire-distributing tube **450** on the right toward the negative Z-axis, to inject the adhesive to fix the wires passing through the second wire-distributing tube **449** and the second wire-distributing tube **450**. Therefore, when wire module **10** is in the subsequent processing processes, the relative positions between the wires will not be changed and the processing quality will not be affected. The detailed configurations of the second wire-distributing module **400** and the wire group **100** will be described in the following paragraphs with FIG. **10** and FIG. **11**.

(28) Moreover, the detailed structures between the second wire-distributing member **410** and the second aligning-coupling portion are similar to the first wire-distributing module **300**. For example, a pre-cut groove is disposed between the second wire-distributing tube **449** on the left and the second aligning-coupling portion **420**. That is, the end **411** may include the pre-cut groove **413** for the remove of the second aligning-coupling portion **420** of the assembled wire module **10**.

Similarly, a pre-cut groove is disposed between the second wire-distributing tube **450** on the right and the second aligning-coupling portion **430**. That is, the end **412** may include the pre-cut groove **414** for the remove of the second aligning-coupling portion **430** of the assembled wire module **10**.

(29) In addition, the second wire-distributing module **400** is provided with a positioning groove on the surface opposite to the adhesive injection hole. That is, one side of the second wire-distributing member **410** is provided with a positioning groove toward the positive Z-axis. For example, a region of the left end **411** of the top surface of the second wire-distributing module **400** is provided with a positioning groove **415**, and a region of the right end **412** of the top surface of the second wire-distributing module **400** is provided with a positioning groove **416**. The positioning groove **415** and the positioning groove **416** are used to fix the position of the aforementioned circuit board **500**. When the aforementioned wire group **100** is soldered to the circuit board **500**, the relative position between each wire and the circuit board **500** will not be changed and the processing quality will not be affected. The detailed configurations of the wire group **100**, the second wire-distributing module **400**, and the circuit board **500** will be described in the following paragraphs with FIG. **12** to FIG. **14**.

(30) Corresponding to the first wire-distributing module **300**, the second aligning-coupling portion of the second wire-distributing module **400** is provided with an aligning hole to connect the first wire-distributing module **300** and the second wire-distributing module **400** to fix their positions relative to each other. For example, an aligning hole **470** is disposed on the surface of the second aligning-coupling portion **420** toward the first wire-distributing module **300**, and the aligning hole **471** is disposed on the surface of the aligning-coupling portion **430** toward the first wire-distributing module **300**. The assembly of the first wire-distributing module **300** and the second wire-distributing module **400** into the wire-distributing device **200** will be further described in FIG. **7** and FIG. **8**.

(31) Referring to FIG. **7** and FIG. **8**, FIG. **7** is a three-dimensional schematic diagram of the first wire-distributing module and a second wire-distributing before being assembled into a wire-distributing device according to an embodiment of the present invention, and FIG. **8** is a schematic front view of the first wire-distributing module and a second wire-distributing after being assembled into a wire-distributing device according to an embodiment of the present invention. It should be understood that FIG. **7** and FIG. **8** do not show all the elements that have been marked in FIG. **3** to FIG. **6** for the brevity of marking.

(32) Referring to FIG. **3** to FIG. **8**, an embodiment of the coupling portion **370** and the coupling portion **371** of the first wire-distributing module **300** can be implemented as a protruding structure, such as a cylinder as shown in FIG. **7**. In contrast, the implementation of the alignment holes **470**

and the alignment holes **471** of the second wire-distributing module **400** can be implemented as a structure having a shape corresponding to the coupling portion **370** and the coupling portion **371**, such as a circular hole as shown in FIG. 7. When the first wire-distributing module **300** and the second wire-distributing module **400** are stacked along the Z-axis direction as shown in FIG. 7, the coupling portion **370** of the first aligning-coupling portion **320** is assembled with the alignment hole **470** of the second aligning-coupling portion **420** to fix their positions relative to each other. Similarly, the coupling portion **371** of the first aligning-coupling portion **330** is assembled with the alignment hole **471** of the second aligning-coupling portion **430** to fix their positions relative to each other, as shown in FIG. 8. It should be understood that the method of assembling the first wire-distributing module **300** and the second wire-distributing module **400** into the wire-distributing device **200** is not limited to the way of using the coupling portions and the alignment holes. For example, the first aligning-coupling portion may be directly bonded to the corresponding second aligning-coupling portion by an adhesive (not shown in the figure).

(33) In FIG. 8, the first wire-distributing grooves **340** of the first wire-distributing member **310** and the second wire-distributing grooves **440** of the second wire-distributing member **410** are disposed on opposite surfaces, and the first wire-distributing grooves **340** and the second wire-distributing grooves **440** have different configurations. For example, the amounts of their wire-distributing grooves are different, the shapes of their wire-distributing grooves are not the same, or the positions of their wire-distributing grooves may not be aligned (for example, they may be staggered). The configurations of the wire-distributing grooves may be correspondingly adjusted according to the configurations of the wire group **100**. Similarly, the configurations of the first wire-distributing tube of the first wire-distributing member and the second wire-distributing tube of the second wire-distributing member may be correspondingly adjusted according to the wire group **100**.

(34) When the first wire-distributing module **300** and the second wire-distributing module **400** are stacked to form the wire-distributing device **200**, the left positioning groove **315** of the first wire-distributing module **300** as shown in FIG. 4 may be aligned with the left positioning groove **415** of the second wire-distributing module **400** as shown in FIG. 5 to form an opening **317** and an opening **417** that are communicating directly, as shown in FIG. 8. Similarly, the right positioning groove **316** of the first wire-distributing module **300** as shown in FIG. 4 may be aligned with the right positioning groove **416** of the second wire-distributing module **400** as shown in FIG. 5 to form an opening **318** and an opening **418** that are communicating directly. Therefore, opening **317**, opening **417**, opening **318**, and opening **418** will prevent the relative positions of the wires and the circuit board **500** from shifting and affect the processing quality when the wire group **100** is soldered to the circuit board **500**.

(35) In addition, after the wire group **100** is fixed to the wire-distributing device **200** and the wire group **100** is soldered to the circuit board **500**, depending on the size of the overall wire module **10**, the first aligning-coupling portion **320** and the second aligning-coupling portion **420** may be selectively peeled off, twisted off, cut or sheared to reduce the width of the wire module **10**. Similarly, the first aligning-coupling portion **330** and the second aligning-coupling portion **430** may be peeled off, twisted off, cut, or sheared to reduce the width of the wire module **10** as described in the following FIG. 9.

(36) Referring to FIG. 9, FIG. 9 is a schematic front view of a first wire-distributing module and a second wire-distributing module after being assembled into a wire-distributing device and a first aligning-coupling portion with a second aligning-coupling portion removed according to an embodiment of the present invention. The difference between FIG. 9 and FIG. 8 is that FIG. 9 is another variational embodiment of FIG. 8. In FIG. 9, the first sectional surface **360**, the first sectional surface **361**, the second sectional surface **460**, and the second sectional surface **461** represent the exposed sectional surfaces after the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420** and the second aligning-



coupling portion **430** are removed. The first sectional surface **360** and the corresponding second sectional surface **460** are located on the same side, and the two sectional surfaces may be arranged flush, side by side, front and back, or in other ways. There may be a gap between the two sectional surfaces or they may be connected. Similarly, the first sectional surface **361** and the corresponding second sectional surface **461** are located on the same side, and the two sectional surfaces may be arranged flush, side by side, front and back, or in other ways. There may be a gap between the two sectional surfaces or they may be connected.

(37) Furthermore, the remove of the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420** and the second aligning-coupling portion **430** are preferably performed at the pre-cut groove **313**, the pre-cut groove **314**, the pre-cut groove **413** and the pre-cut groove **414**. In other words, the positions of the first sectional surface **360**, the first sectional surface **361**, the second sectional surface **460** and the second sectional surface **461** are respectively corresponding to the positions of the pre-cut groove **313**, the pre-cut groove **314**, the pre-cut groove **413** and the pre-cut groove **414**.

(38) For example, the first sectional surface **360**, the first sectional surface **361**, the second sectional surface **460**, and the second sectional surface **461** are the relatively flat surfaces exposed at the two ends of the first wire-distributing module **300**, and the second wire-distributing module **400** after removing the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420** and the second aligning-coupling portion **430** by using laser, cutting, shearing, twisting or other methods. Alternatively, the first sectional surface **360**, the first sectional surface **361**, the second sectional surface **460**, and the second sectional surface **461** are the relatively uneven or irregular surfaces exposed at the two ends of the first wire-distributing module **300**, and the second wire-distributing module **400** after removing the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420** and the second aligning-coupling portion **430**.

(39) Referring to FIG. **10** and FIG. **11**, FIG. **10** is a three-dimensional schematic diagram of a wire-distributing device and a wire group before being assembled according to an embodiment of the present invention, and FIG. **11** is a three-dimensional schematic diagram of a wire-distributing device and a wire group after being assembled according to an embodiment of the present invention. It should be understood that FIG. **10** and FIG. **11** do not show all the elements that have been marked in FIG. **3** to FIG. **6** for the brevity of marking.

(40) In FIG. **10**, the plurality of wires of the wire group **100** may be sorted into an upper layer and a lower layer as the first part **110** of the wire group **100** and the second part **120** of the wire group **100**. The first part **110** of the wire group **100** may be further sorted into different wire types, and positioned side by side in the first wire-distributing module **300**. For example, the first part **110** of the wire group **100** is sorted into the data cables **111** on the left side, the data cables **112** on the right side, and the electronic cables **113** on the middle part. Similarly, in the second part, **120** of the wire group **100** is sorted into the data cables **121** on the left side, the data cables **122** on the right side and the electronic cables **123** on the middle part.

(41) In FIG. **10**, the data cable **111** and the data cable **121** of the wire group **100** may be respectively extended into the first wire-distributing tube **349** on the left and the second wire-distributing tube **449** on the left along the direction of the negative Y-axis, the electronic cables **113** and the electronic cables **123** may be respectively positioned side by side in the first wire-distributing grooves **340** and the second wire-distributing grooves **440**, and the data cable **112** and the data cables **122** of the wire group **100** may be respectively extended into the first wire-distributing tube **350** on the right and the second wire-distributing tube **450** on the right. For the brevity of marking, the schematic three-dimensional diagram of the wire group **100** positioned in the wire-distributing device **200** may be referred to FIG. **2**, and the schematic side view may be referred to FIG. **11**.

(42) It should be noted that the first part **110** and the second part **120** of the wire group **100** may be

respectively pretreated by laser to remove the outer layers first, and then the first wire-distributing module **300** and the second wire-distributing module **400** are assembled to form the wire-distributing device **200**. The technical problems of unstable processing quality caused by the smaller pitch of the adjacent wires may then be improved.

(43) Referring to FIG. **12** to FIG. **14**, FIG. **12** is a three-dimensional schematic diagram of a wire-distributing device, a wire group, and a circuit board before being assembled according to an embodiment of the present invention, FIG. **13** is a three-dimensional schematic diagram of a wire-distributing device and a circuit board according to another embodiment of the present invention, and FIG. **14** is a schematic side view of a wire-distributing device, a wire group, and a circuit board after being assembled according to an embodiment of the present invention. It should be understood that FIG. **12** to FIG. **14** do not show all the elements that have been marked in FIG. **3** to FIG. **6** for the brevity of marking.

(44) In FIG. **12**, The circuit board **500** includes a left connecting end **510** and a right connecting end **520**. The connecting end **510** has a protruding positioning portion **511** at the front end, and the connecting end **520** has a protruding positioning portion **512** at the front end. For example, an embodiment of the positioning portion **511** and the positioning portion **512** may be in the form of a plug shape as shown in FIG. **12**. In FIG. **12**, the right positioning portion **512** of the circuit board **500** may be inserted into the space formed by the positioning groove **316** and the positioning groove **416** from the right opening **318** and the right opening **418** of the wire-distributing device **200** along the positive Y-axis direction to fix the positions of the circuit board **500** and the wire-distributing device **200** relative to each other. Furthermore, the circuit board **500** is positioned between the first part **110** of wire group **100** and the second part **120** of wire group **100**. Similarly, the left positioning portion **511** of the circuit board **500** fixes the positions of the wire group **100** and the wire-distributing device **200** relative to each other in the same manner, and the details are not repeated here.

(45) Moreover, after positioning the circuit board **500** on the wire-distributing module, the connecting end **510** and the connecting end **520** of the circuit board **500** may be removed together with the positioning portion **511** and the positioning portion **512**, to reduce the width of the wire module **10**. In this embodiment, a row of holes **530** and a row of holes **540** are respectively disposed between the connecting end **510** and the connecting end **520** of the circuit board **500** and the main body of the circuit board **500** as pre-splitting paths. The rows of holes serving as the pre-splitting path are preferably aligned or collinear with the pre-cut groove **313** and the pre-cut groove **413**. When the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420**, and the second aligning-coupling portion **430** are respectively removed from the pre-cut groove **313** and the pre-cut groove **314**, the connecting end **510** and the connecting end **520** may be respectively peeled off, cut or sheared together with the positioning portion **511** and the positioning portion **512** along the row of holes. For the brevity of marking, the schematic diagram of the relative positions between the assembled circuit board **500**, wire group **100**, and wire-distributing device **200** may be referred to FIG. **2**, and their side view may be referred to FIG. **14**.

(46) In another embodiment, the configuration method of the positioning portions of the circuit board may be further implemented in different methods. As shown in FIG. **13**, the positioning portion **513** and the positioning portion **514** of the circuit board **500'** may be configured on locations other than the two ends of the circuit board **500'**, such as locations close to the middle region. Moreover, the corresponding positioning groove **315**, positioning groove **316**, positioning groove **415**, and positioning groove **416** are provided on the wire-distributing device **200** to fix the positions of the circuit board **500'** and the wire-distributing device **200** relative to each other. In this configuration, the circuit board **500'** may not be processed with the actions of peeling off, cutting, or shearing when the first aligning-coupling portion **320**, the first aligning-coupling portion **330**, the second aligning-coupling portion **420** and the second aligning-coupling portion **430** are

removed.

(47) An embodiment of the present invention also provides a manufacturing method for a wire module. Referring to FIG. 15, FIG. 15 is a schematic flowchart of a manufacturing method of a wire module according to an embodiment of the present invention. As shown in flowchart 900, at step S910, the wire group 100 may be first sorted into the first part 110, and the second part 120, as shown in FIG. 10.

(48) At step S920, the first part 110 of the wire group 100 is fixed to the first wire-distributing module 300. For example, data cable 111 and data cable 112 of the first part 110 of the wire group 100 are fixed to the first wire-distributing tube 349 and the first wire-distributing 350 of the first wire-distributing module 300 by adhesive. Furthermore, the electronic cables 113 of the first part 110 of the wire group 100 may be positioned side by side in the first wire-distributing grooves 340 of the first wire-distributing module 300, as shown in FIG. 8, FIG. 10, and FIG. 11. Similarly, the method of fixing the second part 120 of the wire group 100 to the second wire-distributing module 400 is similar to fixing the first part 110 of the wire group 100 to the first wire-distributing module 300, and the details are not repeated here.

(49) At step 930, the first wire-distributing module 300 and the second wire-distributing module 400 are assembled to form the wire-distributing device 200. The assembling method may combine the coupling portion 370 and the coupling 371 respectively disposed on the first aligning-coupling portion 320 and the first aligning-coupling portion 330 of the two ends of the first wire-distributing module 300 with the aligning hole 470 and the aligning hole 471 respectively disposed on the second aligning-coupling portion 420 and the second aligning-coupling portion 430 of the two ends of the second wire-distributing module 400. Then the first wire-distributing module 300 and the second wire-distributing module 400 are assembled to form the wire-distributing device 200, as shown in FIG. 3 to FIG. 8. Alternatively, the first aligning-coupling portion 320 and the first aligning-coupling portion 330 of the two ends of the first wire-distributing module 300 may be fixed to the second aligning-coupling portion 420 and the second aligning-coupling portion 430 of the two ends of the second wire-distributing module 400 by an adhesive.

(50) At step S940, the first part 110 of the wire group 100 may be soldered to one side of the circuit board 500, and the second part 120 of the wire group 100 may be soldered to the side of the circuit board 500 opposite to the side of the first part 110 of the wire group 100, as shown in FIG. 2, FIG. 12 to FIG. 14. Furthermore, the wire connector 800 is soldered to the circuit board 500. Finally, wire module 10 is formed after the upper housing 600 and the lower housing 700 are assembled.

(51) At step S950, after the first part 110 of the wire group 100 and the second part 120 of the wire group 100 are soldered to the circuit board 500, depending on the size of the wire module 10, it can be determined whether to remove (e.g., to peel off, cut or shear) the first aligning-coupling portion 320, first aligning-coupling portion 330, the second aligning-coupling portion 420 and the second aligning-coupling portion 430 of the two ends of the wire module 10 together with the positioning portion 511 and the positioning portion 512 of the circuit board 500 for fixing the relative positions of the wire group 100, the wire-distributing device 200 and the circuit board 500, to expose the corresponding sectional surfaces, such as the first sectional surface 360, the first sectional surface 361, the second sectional surface 460 and the second sectional surface 461 shown in FIG. 9.

(52) Although the preferred embodiments of the invention have been described herein, the above description is merely illustrative. The preferred embodiments disclosed will not limit the scope of the present invention. Further modification of the invention herein disclosed will occur to those skilled in the respective arts and all such modifications are deemed to be within the scope of the invention as defined by the appended claims.

## Claims

1. A wire module, comprising: a wire group having a plurality of wires; and a wire-distributing device, comprising: a first wire-distributing module having a first wire-distributing member and at least one first aligning-coupling portion connected to one end of the first wire-distributing member, wherein a first part of the plurality of wires is positioned side by side on the first wire-distributing member; and a second wire-distributing module having a second wire-distributing member and at least one second aligning-coupling portion connected to one end of the second wire-distributing member, wherein a second part of the plurality of wires is positioned side by side on the second wire-distributing member, wherein the first wire-distributing module is stacked on the second wire-distributing module, and the first wire distribution member and the second wire distribution member are relatively positioned by correspondingly combining the first aligning-coupling portion and the second aligning-coupling portion.
2. The wire module of claim 1, wherein a pre-cut groove is disposed between the first wire-distributing member and the connected first aligning-coupling member, and a pre-cut groove is disposed between the second wire-distributing member and the connected second aligning-coupling member.
3. The wire module of claim 1, wherein the first wire-distributing member comprises a plurality of first wire-distributing grooves, and the second wire-distributing member comprises a plurality of second wire-distributing grooves; wherein the plurality of first wire-distributing grooves and the plurality of second wire-distributing grooves are respectively disposed on opposite surfaces of the first wire-distributing member and the second wire-distributing member.
4. The wire module of claim 3, wherein when the first wire-distributing module and the second wire-distributing module form the wire-distributing device, the plurality of the first wire-distributing grooves and the plurality of second wire-distributing grooves comprise a configuration that is not aligned with each other.
5. The wire module of claim 1, wherein the first wire-distributing member comprises at least one first wire-distributing tube for at least one wire to pass therethrough, and the first wire-distributing tube has an adhesive injection hole and an adhesive connecting the wire via the adhesive injection hole.
6. The wire module of claim 5, wherein the first wire-distributing member comprises at least one first wire-distributing groove, and the first wire-distributing tube is located between at least one first wire-distributing groove and the first aligning-coupling portion.
7. The wire module of claim 6, wherein the plurality of wires comprises an electronic cable and a data cable, the electronic cable is positioned in the first wire-distributing groove, and the data cable is positioned in the first wire-distributing tube.
8. The wire module of claim 6, further comprising: a circuit board partially located between the first part and the second part of the plurality of wires, wherein the circuit board has a connecting end toward the wire-distributing device, and the connecting portion protrudes to form at least one positioning portion, wherein a surface of the first wire-distributing member has a positioning groove toward the second wire-distributing member, and the positioning groove has an opening toward the circuit board, and the positioning portion extends from the opening into the positioning groove.
9. A wire module, comprising: a wire group having a plurality of wires; and a wire-distributing device, comprising: a first wire-distributing module having a first wire-distributing member and a first sectional surface located on a surface of one end of the first wire-distributing member, wherein a first part of the plurality of wires is positioned side by side on the first wire-distributing member; and a second wire-distributing module having a second wire-distributing member and a second sectional surface located on a surface of one end of the second wire-distributing member, wherein a second part of the plurality of wires is positioned side by side on the second wire-distributing member; wherein the first wire-distributing module is stacked on the second wire-distributing

module, and the first sectional surface and the second sectional surface are correspondingly located on the same side.

10. The wire module of claim 9, wherein the first wire-distributing member comprises a plurality of first wire-distributing grooves, and the second wire-distributing member comprises a plurality of second wire-distributing grooves; wherein the plurality of first wire-distributing grooves and the plurality of second wire-distributing grooves are respectively disposed on opposite surfaces of the first wire-distributing member and the second wire-distributing member.

11. The wire module of claim 9, wherein the first wire-distributing member comprises at least one first wire-distributing tube for at least one wire to pass therethrough, and the first wire-distributing tube has an adhesive injection hole and an adhesive connecting the wire via the adhesive injection hole.

12. The wire module of claim 11, wherein the first wire-distributing member comprises at least one first wire-distributing groove, and the first wire-distributing tube is located between at least one first wire-distributing groove and the first sectional surface.

13. The wire module of claim 11, wherein the plurality of wires comprises an electronic cable and a data cable, the electronic cable is positioned in the first wire-distributing groove, and the data cable is positioned in the first wire-distributing tube.

14. A manufacturing method of a wire module, comprising: sorting a plurality of wires into a first part and a second part; fixing the first part of the plurality of wires to a first wire-distributing module, and fixing the second part of the plurality of wires to a second wire-distributing module, wherein one end of the first wire-distributing module has at least one first aligning-coupling portion, and one end of the second wire-distributing module has at least one second aligning-coupling portion; and forming the wire module with the first wire-distributing module and the second wire-distributing module, wherein the first aligning-coupling portion is correspondingly combined with the second aligning-coupling portion to position a relative location of the first wire-distributing module and the second wire-distributing module.

15. The manufacturing method of claim 14, wherein fixing the first part of the plurality of wires comprises: fixing at least one of the first part of the plurality of wires to a first wire-distributing tube of the first wire-distributing module by an adhesive.

16. The manufacturing method of claim 14, wherein fixing the first part of the plurality of wires comprises: fixing at least one of the first part of the plurality of wires to a first wire-distributing groove of the first wire-distributing module.

17. The manufacturing method of claim 14, wherein forming the wire module with the first wire-distributing module and the second wire-distributing module comprises: respectively fixing at least one first aligning-coupling portion of the first wire-distributing module with the at least one second aligning-coupling portion of the second wire-distributing module by an adhesive.

18. The manufacturing method of claim 14, wherein forming the wire module with the first wire-distributing module and the second wire-distributing module comprises: disposing of a coupling portion on the first aligning-coupling portion; and disposing of an aligning hole on the second aligning-coupling portion, and the coupling portion is correspondingly assembled with the aligning hole.

19. The manufacturing method of claim 14, further comprising: soldering the first part and the second part of the plurality of wires to a circuit board.

20. The manufacturing method of claim 19, wherein after soldering the first part and the second part of the plurality of wires to the circuit board, the first aligning-coupling portion and the second aligning-coupling portion are selectively removed to expose a corresponding sectional surface.

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