

METHOD FOR CUTTING LIQUID CRYSTAL PANEL WITH LIQUID CRYSTALS

FIELD OF THE INVENTION

[0001] The invention relates to a method for cutting a liquid crystal panel, in particular to a method for cutting a liquid crystal panel with liquid crystals.

BACKGROUND OF THE INVENTION

[0002] At present, there is no display design and production special for military tanks, deep-sea submarines, aerospace equipment and the like in the manufacturing field of display panels. Therefore, high-end display products for the special fields and the special equipment may be restrained in the aspects of the dimension and the display scale of the display panels, and thus only the current traditional LED display screens can be used as display interfaces. In the prior art, non-standard display screens are usually customized in liquid crystal panel manufacturing companies, but the cost is too high.

SUMMARY OF THE INVENTION

[0003] The objective of the invention is to provide a method for cutting a liquid crystal panel with liquid crystals and solve the technical problem of high cost in the prior art due to the customization of non-standard LCDs (Liquid Crystal Displays) in the application industry.

[0004] The technical proposal of the invention is to provide a method for cutting a liquid crystal panel with liquid crystals, which comprises the following steps of:

[0005] determining the cutting line of the first surface, in which the liquid crystal panel is

horizontally disposed on a cutting plane of a cutting table; a cutting line area of the first surface of the liquid crystal panel is enlarged for display and aligned along the cutting direction; the cutting line is determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut is fixed after the determination of the cutting line;

[0006] cutting the first surface, in which the first surface of the liquid crystal panel is cut along the determined cutting line, and the cutting depth cannot exceed a liquid crystal layer in the liquid crystal panel during the cutting;

[0007] determining the cutting line of the second surface, in which the liquid crystal panel is horizontally disposed on the cutting plane of the cutting table; a cutting line area of the second surface of the liquid crystal panel is enlarged for display and aligned along the cutting direction; the cutting line is determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut is fixed after the determination of the cutting line; and

[0008] cutting the second surface, in which the second surface of the liquid crystal panel is cut along the determined cutting line, and the cutting depth cannot exceed the liquid crystal layer in the liquid crystal panel during the cutting.

[0009] The further technical proposal of the invention is that: the method also comprises the step of: overturning and aligning the liquid crystal panel to be cut before the step of determining the cutting line of the second surface, namely overturning and disposing the liquid crystal panel on the cutting plane of the cutting table, and aligning the liquid crystal panel along the cutting direction; and fixing the liquid crystal panel to be cut after alignment.

[0010] The further technical proposal of the invention is that: in the step of cutting and aligning

the first surface or overturning and aligning the liquid crystal panel to be cut, the liquid crystal panel to be cut is fixed by vacsorb in the fixing process.

[0011] The further technical proposal of the invention is that: the method also comprises the step of determining the cutting depth which is the sum of the distance from a cutting head to the liquid crystal panel to be cut and the thickness of the section above the liquid crystal layer of the liquid crystal panel to be cut.

[0012] The further technical proposal of the invention is that: the cutting depth is between 0.04 and 0.08 mm.

[0013] The further technical proposal of the invention is that: in the steps of cutting the first surface and cutting the second surface, the cutting width of the cutting head is less than 0.005mm.

[0014] The further technical proposal of the invention is that: in the steps of determining the cutting depth for the first time and determining the cutting depth for the second time, the distance, between the cutting head and the liquid crystal panel to be cut, in a plurality of areas and the thickness of the liquid crystal panel to be cut are measured, and the cutting depth is determined by the mean value of multiple measured values.

[0015] The further technical proposal of the invention is that: in the steps of determining the cutting line of the first surface and determining the cutting line of the second surface, two separated areas in the cutting line area of the liquid crystal panel are enlarged for display.

[0016] The further technical proposal of the invention is that: the two separated areas are respectively disposed at two ends of the cutting line of the liquid crystal panel.

[0017] The invention has the advantages that: the invention provides a method for cutting a liquid crystal panel with liquid crystals, which adopts the means of determining the cutting line

and the cutting depth in view of different surfaces and cutting the liquid crystal panel with the liquid crystals twice. According to the method for cutting the liquid crystal panel with the liquid crystals, provided by the invention, a non-standard liquid crystal panel cut by the technical proposal can be used for cutting finished products of liquid crystal panels with liquid crystals and non-standard liquid crystal panels can be obtained with no damage to the liquid crystal panels, and thus the cost of the non-standard liquid crystal panels can be greatly reduced.

BRIEF DESCRIPTION OF THE DRIAWNGS

[0018] FIG. 1 is a flow diagram of the method for cutting the liquid crystal panel with the liquid crystals, provided by the invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0019] Further description is given to the technical proposals of the invention with the preferred embodiments.

[0020] As illustrated in FIG. 1, the technical proposal of the invention is to provide a method for cutting a liquid crystal panel with liquid crystals, which comprises the following steps of:

[0021] Step 100: determining the cutting line of the first surface, in which the liquid crystal panel is horizontally disposed on a cutting plane of a cutting table; a cutting line area of the first surface of the liquid crystal panel is enlarged for display and aligned along the cutting direction; the cutting line is determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut is fixed after the determination of the cutting line.

[0022] The specific implementation process is as follows: firstly, the liquid crystal panel to be cut is horizontally disposed on the cutting plane of the cutting table, and the sideline of the liquid crystal panel to be cut is usually a standard straight line and aligned along the cutting direction; secondly, the cutting line area of the first surface of the liquid crystal panel is enlarged for display by a magnifier; thirdly, for no damage to the liquid crystal panel and for the guarantee of the use of the cut liquid crystal panel, the cutting line is determined along the middle area of a line of the liquid crystal pixels in the liquid crystal panel to be cut, wherein during the determination of the cutting line, two separated areas of the cutting line of the liquid crystal panel are enlarged for display; a cutting head is aligned by enlarged display; and as centers of the enlarged areas are related to cutting points of the cutting head, the cutting line can be obtained after the enlarged display and the alignment of the two separated areas and the adjustment of the cutting line; and fourthly, in order to ensure the cutting effect, the liquid crystal panel to be cut must be always stable during the cutting, and thus the liquid crystal panel to be cut must be fixed after alignment. In the embodiment of the invention, the liquid crystal panel to be cut is fixed by vacsorb. As the cutting plane of the cutting table is leveled, the other surface of the surface to be cut of the liquid crystal panel to be cut is subjected to vacsorb and attached to the cutting plane of the cutting table, so as to guarantee that the liquid crystal panel to be cut be always stable during the cutting.

[0023] Step 200: cutting the first surface, in which the first surface of the liquid crystal panel is cut along the determined cutting line, and the cutting depth cannot exceed a liquid crystal layer in the liquid crystal panel during the cutting.

[0024] The specific implementation process is as follows: the first surface of the liquid crystal panel is cut along the determined cutting line. More specifically, the middle area of a line of the

liquid crystal pixels in the liquid crystal panel to be cut is cut along the determined cutting line. During the cutting, the cutting depth cannot exceed the liquid crystal layer in the liquid crystal panel; the cutting head must be subjected to rapid feed; and the cutting speed must be more than 800cm/s.

[0025] Step 300: determining the cutting line of the second surface, in which the liquid crystal panel is horizontally disposed on the cutting plane of the cutting table; a cutting line area of the second surface of the liquid crystal panel is enlarged for display and aligned along the cutting direction; the cutting line is determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut is fixed after the determination of the cutting line.

[0026] The specific implementation process is as follows: firstly, the cutting line area of the second surface of the liquid crystal panel is enlarged for display by the magnifier; secondly, for no damage to the liquid crystal panel and for the guarantee of the use of the cut liquid crystal panel, the cutting line is determined along the middle area of a line of the liquid crystal pixels in the liquid crystal panel to be cut, wherein during the determination of the cutting line, two separated areas of the cutting line of the liquid crystal panel are enlarged for display; the cutting head is aligned by enlarged display; and as centers of the enlarged areas are related to cutting points of the cutting head, the cutting line can be obtained after the enlarged display and the alignment of the two separated areas and the adjustment of the cutting line; and thirdly, in order to ensure the cutting effect, the liquid crystal panel to be cut must be always stable during the cutting, and thus the liquid crystal panel to be cut must be fixed after alignment. In the embodiment of the invention, the liquid crystal panel to be cut is fixed by vacsorb. As the cutting plane of the cutting table is

leveled, the other surface of the surface to be cut of the liquid crystal panel to be cut is subjected to vacuum and attached to the cutting plane of the cutting table, so as to guarantee that the liquid crystal panel to be cut be always stable during the cutting. Moreover, in the embodiment, the method also comprises the step of overturning and aligning the liquid crystal panel to be cut.

[0027] Step 400; cutting the second surface, namely cutting the second surface of the liquid crystal panel according to the determined cutting line and the determined cutting depth.

[0028] The specific implementation process is as follows: the second surface of the liquid crystal panel is cut along the determined cutting line. More specifically, the middle area of a line of the liquid crystal pixels in the liquid crystal panel to be cut is cut along the determined cutting line. During the cutting, the cutting depth cannot exceed the liquid crystal layer in the liquid crystal panel; the cutting head must be subjected to rapid feed; and the cutting speed must be more than 800cm/s.

[0029] In a preferred embodiment of the invention, the method also comprises the step of determining the cutting depth which is the sum of the distance from the cutting head to the liquid crystal panel to be cut and the thickness of the section above the liquid crystal layer of the liquid crystal panel to be cut. More specifically, the method also comprises the step 101 after the step of determining the cutting line of the first surface, namely determining the cutting depth of the first surface, in which the cutting depth is the sum of the distance from the cutting head to the liquid crystal panel to be cut and the thickness of the section above the liquid crystal layer of the liquid crystal panel to be cut. The method also comprises the step 301 after determining the cutting line of the second surface, namely determining the cutting depth of the second surface, in which the cutting depth is the sum of the distance from the cutting head to the liquid crystal panel to be cut

and the thickness of the section above the liquid crystal layer of the liquid crystal panel to be cut. Therefore, not only the cutting process can be realized but also the liquid crystals cannot flow out and the cutting effect can be guaranteed. In the embodiment, the distance, between the cutting head and the liquid crystal panel to be cut, in a plurality of areas and the thickness of the liquid crystal panel to be cut are measured, and the cutting depth is determined by the mean value of multiple measured values. In addition, in the embodiment, the cutting depth is between 0.04 and 0.08 mm. Moreover, in the steps of cutting the first surface and cutting the second surface, the cutting width of the cutting head is less than 0.005mm.

[0030] In a preferred embodiment of the invention, in the steps of determining the cutting line of the first surface and determining the cutting line of the second surface, two separated areas in the cutting line area of the liquid crystal panel are enlarged for display; and the two separated areas are respectively disposed at two ends of the cutting line of the liquid crystal panel, so that the whole cutting line can be more straight and more accurate.

[0031] The invention has the advantages that: the invention provides a method for cutting a liquid crystal panel with liquid crystals, which adopts the means of determining the cutting line and the cutting depth in view of different surfaces and cutting the liquid crystal panel with the liquid crystals twice. According to the method for cutting the liquid crystal panel with the liquid crystals, provided by the invention, a non-standard liquid crystal panel cut by the technical proposal can be used for cutting finished products of liquid crystal panels with liquid crystals and non-standard liquid crystal panels can be obtained with no damage to the liquid crystal panels, and thus the cost of the non-standard liquid crystal panels can be greatly reduced.

[0032] Although the invention has been described in detail with respect to specific preferred

embodiments, it shall not be deemed that the embodiments of the invention be only limited to the description. Various simple deductions or replacements can be made by those skilled in the art without departing from the concept of the invention and shall all fall within the scope of protection of the invention.

What is claimed is:

1. A method for cutting a liquid crystal panel with liquid crystals, comprising the following steps of:

determining the cutting line of the first surface, in which the liquid crystal panel horizontally disposed on a cutting plane of a cutting table; a cutting line area of the first surface of the liquid crystal panel enlarged for display and aligned along the cutting direction; the cutting line determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut fixed after the determination of the cutting line;

cutting the first surface, in which the first surface of the liquid crystal panel cut along the determined cutting line, and the cutting depth not exceeding a liquid crystal layer in the liquid crystal panel during the cutting;

determining the cutting line of the second surface, in which the liquid crystal panel horizontally disposed on the cutting plane of the cutting table; a cutting line area of the second surface of the liquid crystal panel enlarged for display and aligned along the cutting direction; the cutting line determined along a middle area of a line of liquid crystal pixels in the liquid crystal panel to be cut; and the liquid crystal panel to be cut fixed after the determination of the cutting line; and

cutting the second surface, in which the second surface of the liquid crystal panel cut along the determined cutting line, and the cutting depth not exceeding the liquid crystal layer in the liquid crystal panel during the cutting.

2. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1, wherein the method also comprises the step of overturning and aligning the liquid crystal panel to be cut before the step of determining the cutting line of the second surface, namely overturning

and disposing the liquid crystal panel on the cutting plane of the cutting table, and aligning the liquid crystal panel along the cutting direction.

3. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1 or 2, wherein in the step of cutting and aligning the first surface or overturning and aligning the liquid crystal panel to be cut, the liquid crystal panel to be cut is fixed by vacsorb in the fixing process.

4. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1, wherein the method also comprises the step of determining the cutting depth which is the sum of the distance from a cutting head to the liquid crystal panel to be cut and the thickness of the section above the liquid crystal layer of the liquid crystal panel to be cut.

5. The method for cutting the liquid crystal panel with the liquid crystals according to claim 4, wherein the cutting depth is between 0.04 and 0.08 mm.

6. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1, wherein in the steps of cutting the first surface and cutting the second surface, the cutting width of the cutting head is less than 0.005mm.

7. The method for cutting the liquid crystal panel with the liquid crystals according to claim 4, wherein in the steps of determining the cutting depth for the first time and determining the cutting depth for the second time, the distance, between the cutting head and the liquid crystal panel to be cut, in a plurality of areas and the thickness of the liquid crystal panel to be cut are measured, and the cutting depth is determined by the mean value of multiple measured values.

8. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1, wherein in the steps of determining the cutting line of the first surface and determining the cutting line of the second surface, two separated areas in the cutting line area of the liquid crystal panel are

enlarged for display.

9. The method for cutting the liquid crystal panel with the liquid crystals according to claim 8, wherein the two separated areas are respectively disposed at two ends of the cutting line of the liquid crystal panel.

10. The method for cutting the liquid crystal panel with the liquid crystals according to claim 1, wherein the cutting speed is more than 800cm/s.