Patent Specification

CURVING STONE

Description

The invention is about the methodology of producing curved stone.

The process is as follow:

Stone is cut into a thin slice of slabs, mostly in the range of one to three millimeters, depending on the intended objects.

The thin slabs then is heated to approximately fifty degree centigrade, using industrial oven or blow torch (for smaller objects). This is to open the pores of the thin slab, to absorb the epoxy.

The heated thin slab then coated both sides with the right type of epoxy resin, to cover the pores and create flexibility during bending, then let it be 'surface dry' for a few minutes, depending on the resin type, but not to let it completely dry. This is the 'Coating Process'.

At the right timing, the 'coated thin slab' will be placed in between the curving mould. And steadily, but step by step, pressurized to conform to the shape of the mould. During this process, epoxy resin will be reapplied as necessary to cover the micro-cracks resulted from this 'bending process'.

The 'Bending Process' is done when the desired shape is achieved, and the thin slab will be left in the mould to allow it to maintain the shape until the epoxy

resin dry, usually about twelve to twenty four hours, depending on resin type, weather, humidity, etc.

The ‘curved stone slab’ is carefully removed from the mould, recoated again to cover the remaining micro-cracks and then needs to be let completely cured, generally about forty eight hours to smooth out the surfaces, before final finishing process such as sanding, honing, or polishing can be done.

Figure 1, the ‘heating process’ in which a cross-section of a thin stone slab (1) is heated using a blow torch (2).

Figure 2, the ‘heated thin stone slab’ (1) undergoes the ‘coating process’ where the slab is coated thoroughly with epoxy resin (3) on both sides.

Figure 3 (3A and 3B), the ‘coated thin stone slab’ (4) undergoes the ‘bending process’ to form the simplest curve, ‘bend’ by one axis(x-axis) . The slab is placed in the curving mould (5A and 5B) with the direction of mould movement (7) being indicated by arrows, to conform the shape of the mould with direction of curve (6) indicated by arrow. The ‘single axis curved stone slab’ (8) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (9) of the stone generated from ‘bending process’.

Figure 4, the ‘single axis curved stone slab’ (8) is removed from the mould and recoated again to cover the remaining micro-cracks.

Figure 5, the result of the curvy shape stone slab in single axis (x-axis) (10) after finishing.

Figure 6 (6A and 6B), is a section similar to the one shown in figure 3, in which the ‘coated thin stone slab’ (4) undergoes the ‘two axis (x and y-axis) bending process’. The slab is placed in the two axis curve mould (11A and 11B) with the direction of mould movement (12) being indicated by arrow, The ‘two axis curved stone slab’ (13) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (14) of the stone generated from ‘bending process’.

Figure 7, the ‘two axis curved stone slab’ (13) is removed from the mould and recoated again to cover the remaining micro-cracks.

Figure 8, the result of the curvy shape stone slab in two axis (x and y-axis)(15) after finishing.

Figure 9 (9A and 9B), is a section similar to the one shown in figure 3, in which ‘the coated thin stone slab’ (4) undergoes the ‘three axis (x,y and z-axis) bending process’. The slab is placed in the three axis curve mould (16A and 16B) with the direction of mould movement (17) being indicated by arrow. The ‘three axis curved stone slab’ (18) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (19) of the stone generated from ‘bending process’.

Figure 10, the ‘three axis curved stone slab’ (18) is removed from the mould and recoated again to cover the remaining micro-cracks.

Figure 11, the result of the curvy shape stone slab in three axis (x, y and z-axis)(20) after finishing.

Claims

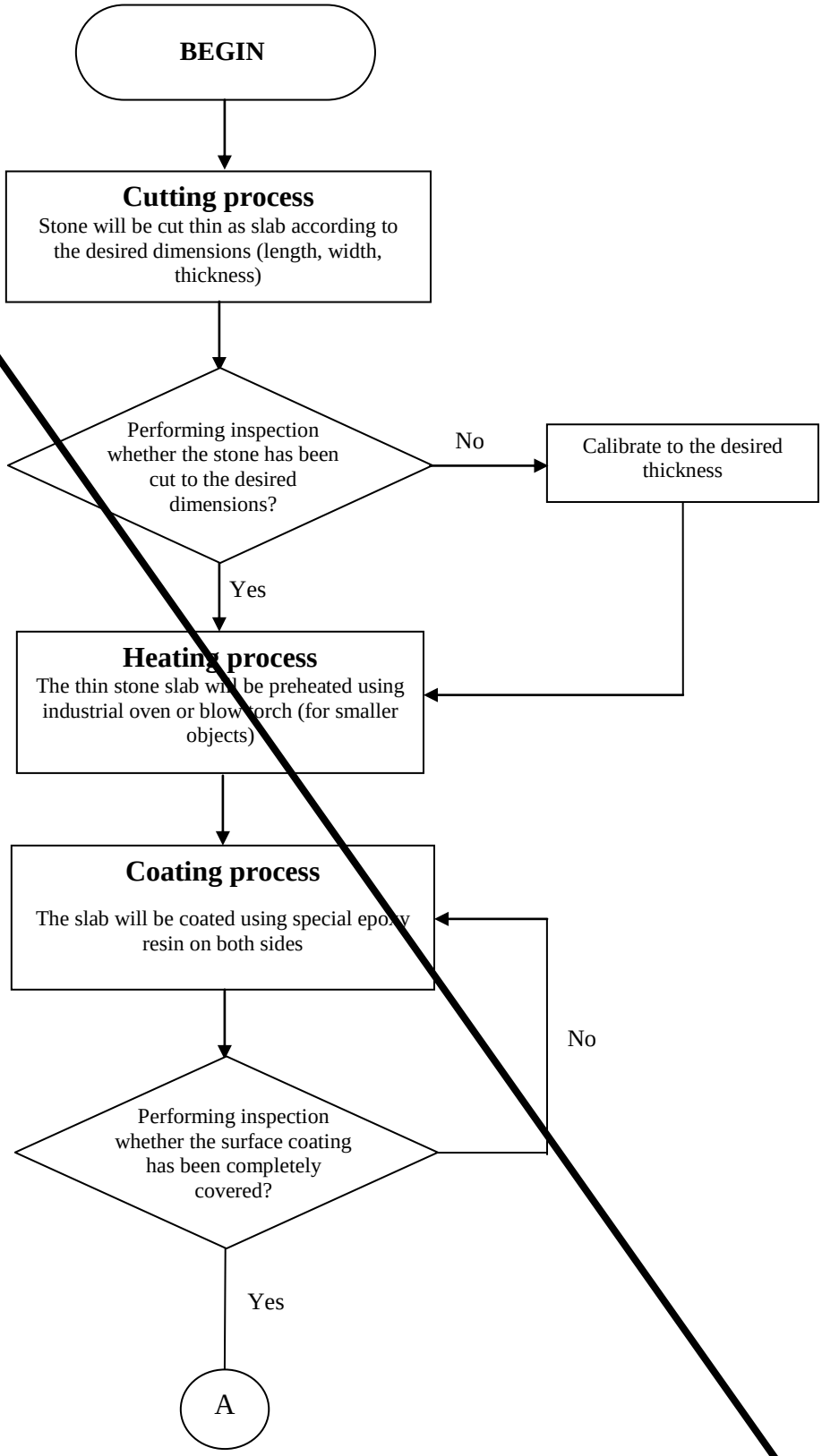
1. A method of producing curved stone slab, comprising of heating the thin stone slab (1) called the ‘heating process’.

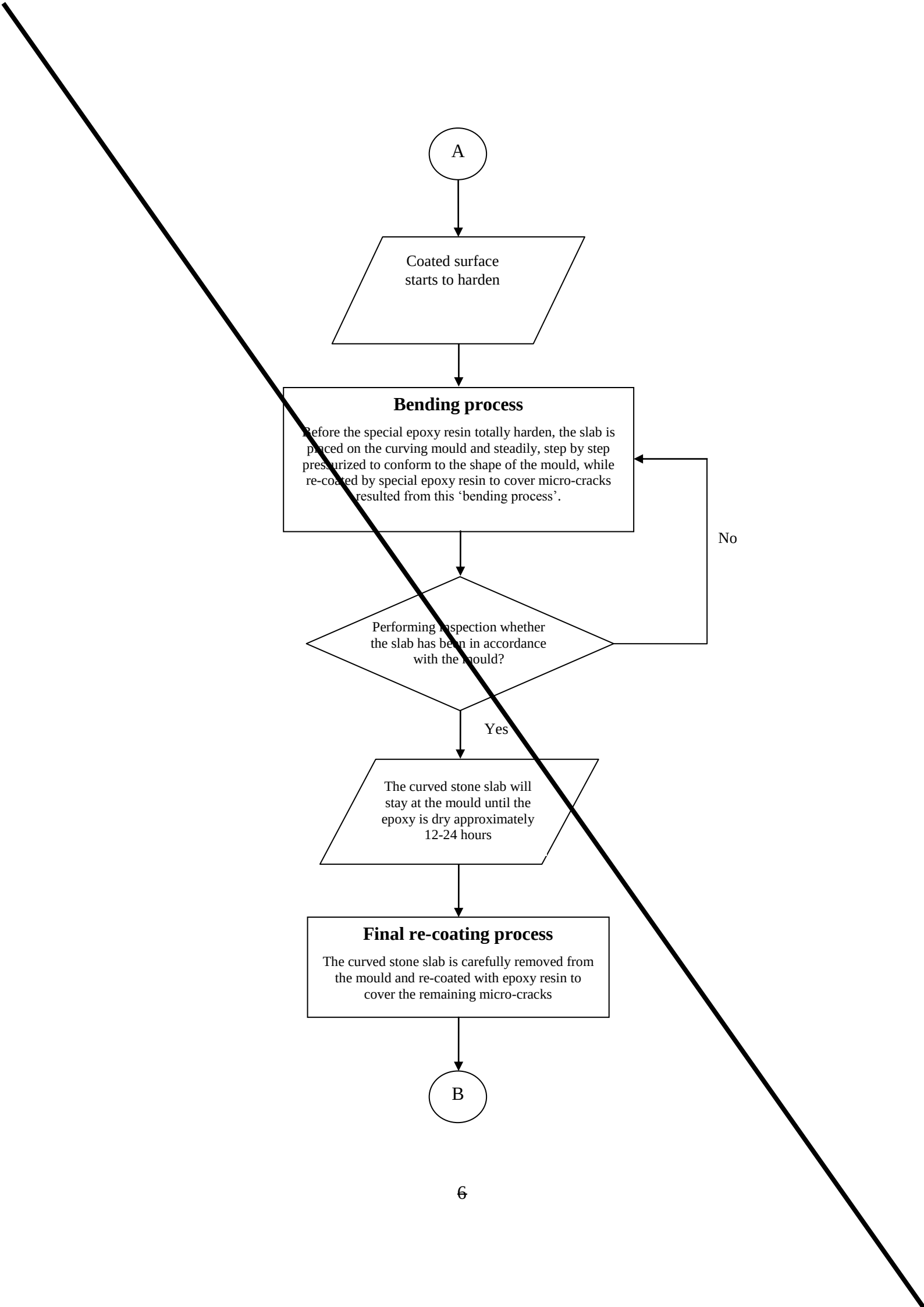
2. A continuation of the method as claimed in Claim 1, comprising of thoroughly coating the ‘heated thin stone slab’ (1) with epoxy resin (3) and then left to semi-dry, called the ‘coating process’.

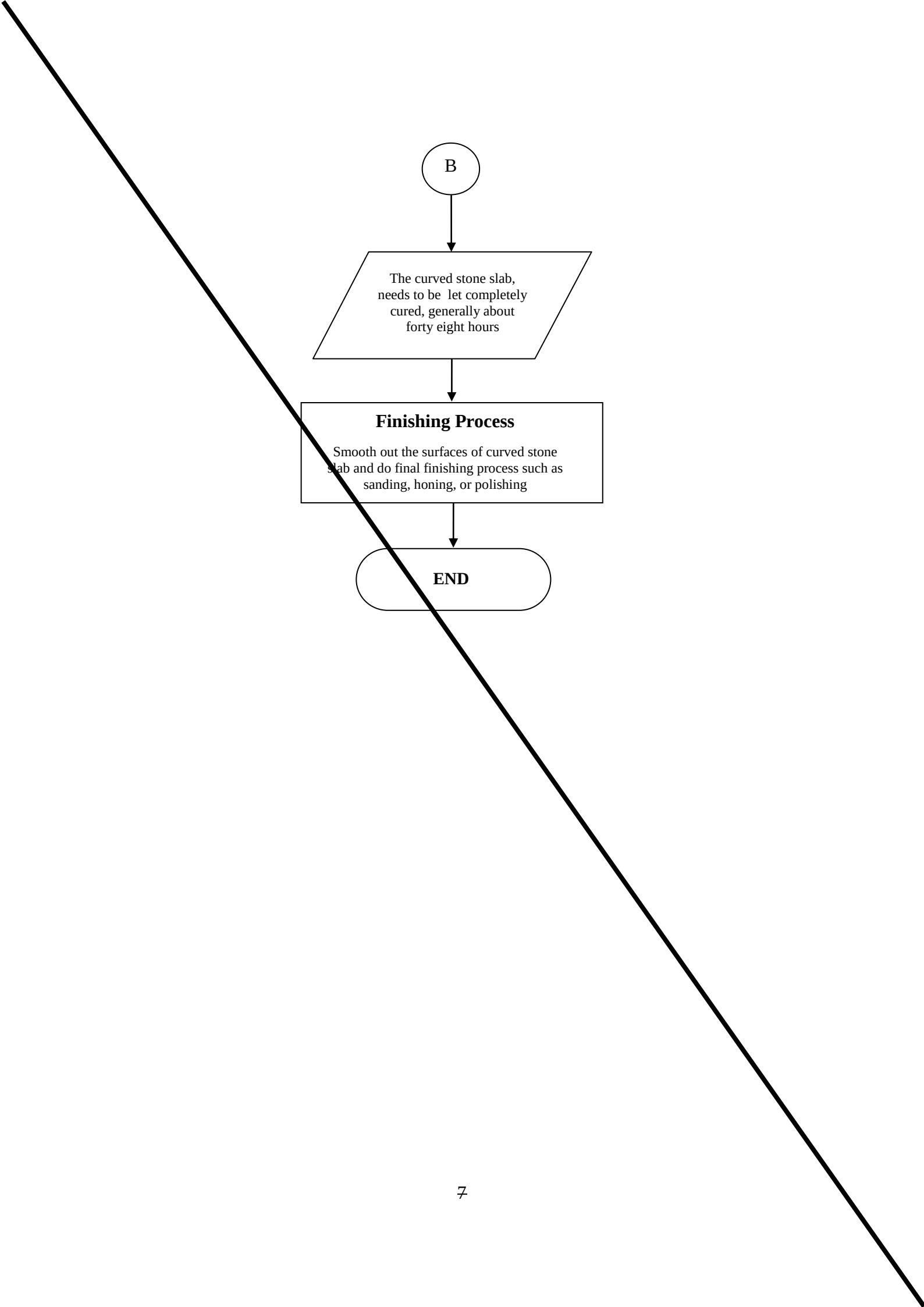
3. A continuation of the method as claimed in Claim 1 and 2, comprising of steadily, step by step, pressurizing the coated thin stone slab (4) to conform to the shape of the mould, until it reaches the desired curved shape, while being constantly recoating with epoxy resin (3) to fill the micro-cracks generated during the process, called the ‘bending process’.

4. A continuation of the method as claimed in Claim 1 to 3, comprising of carefully removing the curved stone slab from the mould then recoating it with epoxy resin (3) to cover the remaining micro-cracks and to smoothen its surface when the epoxy is completely dry.

Production Flow Chart




A
Coated surface starts to harden
Bending process
Before the special epoxy resin totally harden, the slab is placed on the curving mould and steadily, step by step pressurized to conform to the shape of the mould, while re-coated by special epoxy resin to cover micro-cracks resulted from this 'bending process'.
No
Performing inspection whether the slab has been in accordance with the mould?
Yes
The curved stone slab will stay at the mould until the epoxy is dry approximately 12-24 hours
Final re-coating process
The curved stone slab is carefully removed from the mould and re-coated with epoxy resin to cover the remaining micro-cracks
B


B
The curved stone slab, needs to be let completely cured, generally about forty eight hours
Finishing Process
Smooth out the surfaces of curved stone slab and do final finishing process such as sanding, honing, or polishing
END

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CURVING STONE

Definition

Stone : As defined in usage as Building Material, Furnishing Element, Daily Ware, Ornaments, etc, includes Marble, Granite, Onyx, Limestone, Dolomite, Slate, Travertine, Basalt, Quarzite, Jasper, Lapis Lazuli, Fossil, etc.

Curving : A process of changing the shape of material from a plane, flat shape, into bended, curvy shape, be it in single axis, two axis or in all three axis.

Description

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The thin slabs then is heated to approximately fifty degree centigrade, using industrial oven or blow torch (for smaller objects). This is to open the pores of the thin slab, to absorb the epoxy.

The heated thin slab then coated both sides with the right type of epoxy resin, to cover the pores and create flexibility during bending, then let it be 'surface dry' for a few minutes, depending on the resin type, but not to let it completely dry. This is the 'Coating Process'.

At the right timing, the 'coated thin slab' will be placed in between the curving mould. And steadily, but step by step, pressurized to conform to the shape of the mould. During this process, epoxy resin will be reapplied as necessary to cover the micro-cracks resulted from this 'bending process'.

The 'Bending Process' is done when the desired shape is achieved, and the thin slab will be left in the mould to allow it to maintain the shape until the epoxy resin dry, usually about twelve to twenty four hours, depending on resin type, weather, humidity, etc.

The ‘curved stone slab’ is carefully removed from the mould, recoated again to cover the remaining micro-cracks and then needs to be let completely cured, generally about forty eight hours to smooth out the surfaces, before final finishing process such as sanding, honing, or polishing can be done.

Figure 1, the ‘heating process’ in which a cross-section of a thin stone slab (1) is heated using a blow torch (2).

Figure 2, the ‘heated thin stone slab’ (1) undergoes the ‘coating process’ where the slab is coated thoroughly with epoxy resin (3) on both sides.

Figure 3 (3A and 3B), the ‘coated thin stone slab’ (4) undergoes the ‘bending process’ to form the simplest curve, ‘bend’ by one axis(x-axis) . The slab is placed in the curving mould (5A and 5B) with the direction of mould movement (7) being indicated by arrows, to conform the shape of the mould with direction of curve (6) indicated by arrow. The ‘single axis curved stone slab’ (8) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (9) of the stone generated from ‘bending process’.

Figure 4, the ‘single axis curved stone slab’ (8) is removed from the mould and recoated again to cover the remaining micro-cracks.

Figure 5, the result of the curvy shape stone slab in single axis (x-axis) (10) after finishing.

Figure 6 (6A and 6B), is a section similar to the one shown in figure 3, in which the ‘coated thin stone slab’ (4) undergoes the ‘two axis (x and y-axis) bending process’. The slab is placed in the two axis curve mould (11A and 11B)

with the direction of mould movement (12) being indicated by arrow, The ‘two axis curved stone slab’ (13) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (14) of the stone generated from ‘bending process’.

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Figure 9 (9A and 9B), is a section similar to the one shown in figure 3, in which ‘the coated thin stone slab’ (4) undergoes the ‘three axis (x,y and z-axis) bending process’. The slab is placed in the three axis curve mould (16A and 16B) with the direction of mould movement (17) being indicated by arrow. The ‘three axis curved stone slab’ (18) is constantly recoated with epoxy resin (3) on both sides during the process to fill the micro-cracks (19) of the stone generated from ‘bending process’.

Figure 10, the ‘three axis curved stone slab’ (18) is removed from the mould and recoated again to cover the remaining micro-cracks.

Figure 11, the result of the curvy shape stone slab in three axis (x, y and z-axis)(20) after finishing.

Figure 12, the basic production process for all three different groups (one axis, two axis, and three axis)

Claims

1. A method of producing curved stone slab, comprising of heating the thin stone slab (1) called the ‘heating process’.

2. A continuation of the method as claimed in Claim 1, comprising of thoroughly coating the ‘heated thin stone slab’ (1) with epoxy resin (3) and then left to semi-dry, called the ‘coating process’.

3. A continuation of the method as claimed in Claim 1 and 2, comprising of steadily, step by step, pressurizing the coated thin stone slab (4) to conform to the shape of the mould, until it reaches the desired curved shape, while being constantly recoating with epoxy resin (3) to fill the micro-cracks generated during the process, called the ‘bending process’.

4. A continuation of the method as claimed in Claim 1 to 3, comprising of carefully removing the curved stone slab from the mould then recoating it with epoxy resin (3) to cover the remaining micro-cracks and to smoothen its surface when the epoxy is completely dry.